This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

UNIVERSITY OF WISCONSIN
LIBRARY

+

THE

PENNY CYCLOPÆDIA

OF

THE SOCIETY

FOR THE

DIFFUSION OF USEFUL KNOWLEDGE.

VOLUME XXI.

SCANDEROON——SIGNET.

TRANSFERRED TO
U OF W LIBRARY

LONDON:
CHARLES KNIGHT AND Co., 22, LUDGATE STREET.

MDCCCXLI.

Price Seven Shillings and Sixpence, bound in cloth.

COMMITTEE.

Chairman—The Right Hon. LORD BROUGHAM, F.R.S., Member of the National Institute of France.

Vice-Chairman—JOHN WOOD, Esq.

Treasurer—WILLIAM TOOKE, Esq., F.R.S.

W. Allen, Esq., F.R. and R.A.S.
Captain Beaufort, R.N., F.R. and R.A.S., Hydrographer to the Admiralty.
G. Burrows, M.D.
Peter Stafford Carey, Esq., A.M.
William Coulson, Esq.
R. D. Craig, Esq.
J. F. Davis, Esq., F.R.S.
H. T. Dela Beche, Esq., F.R.S.
The Right Hon. Lord Denman.
Samuel Duckworth, Esq., M.P.
R. F. Duppa, Esq.
The Right Rev. the Bishop of Durham, D.D.
Sir Henry Ellis, Prin. Lib. Brit. Mus.
T. F. Ellis, Esq., A.M., F.R.A.S.
John Elliotson, M.D., F.R.S.
George Evans, Esq., M.P.
Thomas Falconer, Esq.
I. L. Goldsmid, Esq., F.R. and R.A.S.
Francis Henry Goldsmid, Esq.
B. Gompertz, Esq., F.R. and R.A.S.
G. B. Greenough, Esq., F.R. and L.S.
M. D. Hill, Esq.
Rowland Hill, Esq., F.R.A.S.
Right Hon. Sir J. C. Hobhouse, Bart., M.P.
David Jardine, Esq., A.M.
Henry B. Ker, Esq.
Thomas Hewitt Key, Esq., A.M.
George C. Lewis, Esq., A.M.
Thomas Henry Lister, Esq.
James Loch, Esq., M.P., F.G.S.
George Long, Esq., A.M.
H. Malden, Esq. A.M.
A. T. Malkin, Esq., A.M.
James Manning, Esq.
R. I. Murchison, Esq., F.R.S., F.G.S.
The Right Hon. Lord Nugent.
The Right Hon. Sir Henry Parnell, Bt., M.P.
Richard Quain, Esq.
Dr. Roget, Sec. R.S., F.R.A.S.
Edward Romilly, Esq., A.M.
The Right Hon. Lord John Russell, M.P.
Sir M. A. Shee, P.R.A., F.R.S.
The Right Hon. Earl Spencer.
John Taylor, Esq. F.R.S.
Dr. A. T. Thomson, F.L.S.
Thomas Vardon, Esq.
H. Waymouth, Esq.
J. Whishaw, Esq., A.M., F.R.S.
The Hon. John Wrottesley, A.M., F.R.A.S.
Yates, Esq., M.P.

LOCAL COMMITTEES.

Alton, Staffordshire—Rev. J. P. Jones.
Anglesea—Rev. E. Williams.
Rev. W. Johnson.
Mr. Miller.
Ashburton—J. F. Kingston, Esq.
Barnstaple.— — Bancraft, Esq.
William Gribble, Esq.
Belfast—Dr. Drummond.
Birmingham—J. Corrie, Esq. F.R.S. *Chairman.*
Paul Moon James, Esq., *Treasurer.*
Dr. Conolly.
Bridport—James Williams, Esq.
Bristol—J. N. Sanders, Esq., F.G.S. *Chairman.*
J. Reynolds, Esq., *Treasurer.*
J. B. Estlin, Esq., F.L.S., *Secretary.*
Calcutta—James Young, Esq.
C. H. Cameron, Esq.
Cambridge—Rev. James Bowstead, M.A.
Rev. Prof. Henslow, M.A., F.L.S. & G.S.
Rev. Leonard Jenyns, M.A., F.L.S.
Rev. John Lodge, M.A.
Rev. Geo. Peacock, M.A., F.R.S. & G.S.
Rev. Prof. Sedgwick, M.A., F.R.S. & G.S.
Rev. C. Thirlwall, M.A.
Canterbury—John Brent, Esq., Alderman.
William Masters, Esq.
Canton—Wm. Jardine, Esq., *President.*
Robert Inglis, Esq., *Treasurer.*
Rev. C. Bridgman,
Rev. C. Gutzlaff, } *Secretaries.*
J. R. Morrison, Esq.
Cardigan—Rev. J. Blackwell, M.A.
Carlisle—Thomas Barnes, M.D., F.R.S.E.
Carnarvon—R. A. Poole, Esq.
William Roberts, Esq.
Chester—Hayes Lyon, Esq.
Henry Potts, Esq.
Chichester—John Forbes, M.D., F.R.S.
C. C. Dendy, Esq.
Cockermouth—Rev. J. Whitridge.
Corfu—John Crawford, Esq.
Mr. Plato Petrides
Coventry—Arthur Gregory, Esq.
Denbigh—John Madocks, Esq.
Thomas Evans, Esq.
Derby—Joseph Strutt, Esq.
Edward Strutt, Esq., M.P.
Devonport and Stonehouse—John Cole, Esq.
— Norman, Esq.
Lt. Col. C. Hamilton Smith, F.R.S.
Dublin—T. Drummond, Esq. R.E., F.R.A.S.
Edinburgh—Sir C. Bell, F.R.S.L. and E.
Etruria—Jos. Wedgwood, Esq.
Exeter—J. Tyrrell, Esq.
John Milford, Esq. (*Coaver.*)
Glamorganshire—Dr. Malkin, Cowbridge.
W. Williams, Esq., Aberpergwm.
Glasgow—K. Finlay, Esq.
Professor Mylne.
Alexander McGrigor, Esq.
James Cowper, Esq.
Guernsey—F. C. Lukis, Esq.
Hull—J. C. Parker, Esq.
Leamington Spa—Dr. Loudon, M.D.
Leeds—J. Marshall, Esq.
Lewes—J. W. Woollgar, Esq.
Liverpool Loc. As.—W. W. Currie, Esq. *Ch.*
J. Mulleneux, Esq., *Treasurer.*
Rev. Dr. Shepherd.
Maidenhead—R. Goolden, Esq., F.L.S.
Maidstone—Clement T. Smyth, Esq.
Jos. Case, Esq.
Malmesbury—B. C. Thomas, Esq.
Manchester Loc. As.—G. W. Wood, Esq., *Ch.*
Benjamin Heywood, Esq., *Treasurer.*
T. W. Winstanley, Esq., *Hon. Sec.*
Sir G. Philips, Bart., M.P.
Benj. Gott, Esq.
Masham—Rev. George Waddington, M.A.
Merthyr Tydvil—J. J. Guest, Esq., M.P.
Minchinhampton—John G. Ball, Esq.
Monmouth—J. H. Moggridge, Esq.
Neath—John Rowland, Esq.
Newcastle—Rev. W. Turner.
T. Sopwith, Esq., F.G.S.
Newport, Isle of Wight—Ab. Clarke, Esq.
T. Cooke, Jun., Esq.
R. G. Kirkpatrick, Esq.
Newport Pagnell—J. Millar, Esq.
Newtown, Montgomeryshire—W. Pugh, Esq.
Norwich—Richard Bacon, Esq.
Wm. Forster, Esq.
Orsett, Essex—Dr. Corbett, M.D.
Oxford—Dr. Daubeny, F.R.S. Prof. of Chem.
Rev. Prof. Powell.
Rev. John Jordan, B.A.
E. W. Head, Esq., M.A.
Pesth, Hungary—Count Szechenyi.
Plymouth—H. Woollcombe, Esq., F.A.S., *Ch.*
Snow Harris, Esq., F.R.S.
E. Moore, M.D., F.L.S., *Secretary.*
G. Wightwick, Esq.
Presteign—Dr. A. W. Davis, M.D.
Ripon—Rev. H. P. Hamilton, M.A., F.R.S. and G.S.
Rev. P. Ewart, M.A.
Ruthin—Rev. the Warden of
Humphreys Jones, Esq.
Ryde, I. of Wight—Sir Rd. Simeon, Bt.
Salisbury—Rev. J. Barfitt.
Sheffield—J. H. Abrahams, Esq.
Shepton Mallet—G. F. Burroughs, Esq.
Shrewsbury—R. A. Slaney, Esq., M.P.
South Petherton—John Nicholetts, Esq.
St. Asaph—Rev. George Strong.
Stockport—H. Marsland, Esq., *Treasurer.*
Henry Coppock, Esq., *Secretary.*
Sydney, New South Wales—
William M. Manning, Esq.
Tavistock—Rev. W. Evans.
John Rundle, Esq.
Truro—Henry Sewell Stokes, Esq.
Tunbridge Wells—Dr. Yeats, M.D.
Uttoxeter—Robert Blurton, Esq.
Waterford—Sir John Newport, Bt.
Worcester—Dr. Hastings, M.D.
C. H. Hebb, Esq.
Wrexham—Thomas Edgworth, Esq.
J. E. Bowman, Esq., F.L.S., *Treasurer*
Major William Lloyd.
Yarmouth—C. E. Rumbold, Esq.
Dawson Turner, Esq.
York—Rev. J. Kenrick, M.A.
J. Phillips, Esq., F.R.S., F.G.S.

THOMAS COATES, Esq., *Secretary*, No. 59, Lincoln's Inn Fields.

AUG 10 1921
Mrs. A. E. Proudfit
21-22

THE PENNY CYCLOPÆDIA

OF

THE SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE.

SCANDEROON, or **ISKENDEROON**, or **ALEXANDRETTA**, formerly called Alexandria, a seaport town in the north of Syria, at the head of the Gulf of Scanderoon, which was founded by Alexander the Great. It is a very unhealthy place, whence it is called in one of the antient Itineraries *Alexandria scabiosa*, and only owes its importance to its being the seaport to Haleb or Aleppo. Its unhealthiness is in a great measure owing to the waters which flow down from the mountains, and collect in great marshes around the town. Moryson, who visited it in 1596, represents it as 'a poor village, built all of straw and dirt, excepting some houses built of timber and clay in some convenient sort, and it lies all along the sea-shore. For the famous city of Aleppo having no other haven, the merchants do here unload their goods, but themselves make haste to Aleppo, staying as little here as possibly they can, and committing the care of carrying their goods upon camels to the factors of their nations continually abiding there. The pestilent air is the cause that they dare not make any stay there, for this village is compassed on three sides with a fenny plain, and the fourth side lies open upon the sea' (quoted by Russell, *Natural History of Aleppo*, vol. i., p. 358, Lond., 1794). Niebuhr (*Beschreibung*, &c., vol. iii., pp. 18, 19, Hamburg, 1837), who visited Scanderoon in 1766, describes its situation and state in much the same terms, and says, that with the exception of the houses of the vice-consuls and merchants, it contains only sixty or seventy poor dwellings, inhabited for the most part by Greeks. He adds, that there are the remains of some building in the morass surrounding the town, which proves that the place was formerly much larger than it is at present. A similar account of the state of Scanderoon is also given by a still more recent traveller (Damoiseau, *Voyage en Syrie et dans le Désert*, p. 4, Paris, 1833).

SCANDINAVIA is a term adopted in geography and history, and is of great antiquity. The name Scandinavia occurs in Pliny (*Hist. Nat.* iv. 13), who states that Scandinavia is the best known island in the Sinus Codanus (the Baltic), and is of unascertained dimensions. The part which was known was inhabited by the Hilleviones, who had five hundred pagi or districts. This description seems to refer to the large peninsula which forms the north-western portion of the continent of Europe, and comprehends the countries which at present are known under the names of Norway and Sweden. The area of this peninsula is somewhat more than 300,000 square miles, and it is consequently one-third greater than France, but as the largest portion of it is covered with sterile mountains, it is in general thinly inhabited, and the whole population does not much exceed four millions.

The small sovereignties which existed in this peninsula when it first began to be noticed in history, became united into the two great monarchies of Sweden and Norway in the twelfth and thirteenth centuries. But the internal governments of these states were so ill arranged, that the countries were continually a prey to internal wars, and they were the scenes of never-ceasing bloodshed. In the mean time Denmark had acquired a more regular government, and the famous Margaret, queen of Denmark, succeeded in uniting the crowns of Denmark, Sweden, and Norway in her own person. Norway was acquired by inheritance, and Sweden by conquest.

By the union of Calmar (1397) these countries were never to be disjoined. Norway indeed remained united with Denmark up to 1814, but Sweden was separated from it in the middle of the fifteenth century. From that time the two countries of Scandinavia constituted separate states, until the year 1814, when Denmark was obliged to cede Norway to Sweden, and Norway submitted to the new order of things. Since that time the whole peninsula has been under the same king, but the two countries of Norway and Sweden have preserved their constitutions, which differ in every respect. [NORWAY; SWEDEN.]

SCANDINAVIAN LITERATURE. The antient Scandinavian language, once common to the whole north-western portion of Europe beyond the Baltic, is now confined to Iceland, where it has undergone little change since the ninth century. [ICELAND.] This dialect of the Gothic is the parent stock of both Swedish and Danish, the former of which tongues has retained more of the original character than the other, which is also the language of Norway; and if not for the literature they contain, in a philological point of view they deserve far more attention than they have hitherto obtained from Englishmen, since they throw considerable light on the history of our own language. There is also a striking similarity of construction between them and English, which renders them of comparatively easy acquisition to ourselves. Nearly the same grammatical simplicity prevails, nor are their verbs and nouns subject to those numerous changes of terminations which render such languages as the German and the Russian so perplexing to a foreigner. Into the subject of Scandinavian literature, properly so called, we do not propose to enter, it being one of such magnitude that of itself alone it would require as much space as can be afforded for a literary-historical sketch of the two nations whom we here place together under the same common title.

Literature, in the usual meaning of the term, was of exceedingly tardy development in both Denmark and Sweden; for what learning there was, continued for a long time to be confined to the Latin of the schools. The people however possessed an abundant stock of those traditional poetical records which scarcely lay any claim to individual authorship, being rather the embodying of the sentiments and feelings of an entire race than those of individuals. Of these national songs there are many distinguished by the title of Kiæmpe Viser, or Heroic Ballads, which strains of romantic minstrelsy serve to give an idea of the compositions of the antient bards or skalds. Deeds of arms and bravery constitute their main subjects; for in the infancy of states personal courage and physical strength are regarded as the chief titles to pre-eminence, more especially in such a region as Scandinavia, where the sword was the only patrimony of the younger branches of a family, and was a possession quite as honourable and frequently more lucrative than that of the soil. Possessing a very great extent of sea-coast, the inhabitants regarded that element also as their natural territory. Their piratical expeditions, undertaken partly through necessity and partly from the love of adventure, obtained for them a fearful fame; and the leaders of these hardy pirates assumed the imposing title of Sea-kings. These 'Viser' contain moreover no small quantity of legendary fable and supernatural lore, derived from the antient Sagas and the mythology of the Edda [EDDA], whose wild traditions, half oriental and half northern, were so congenial to the spirit of the people that they continued to cherish the remembrance of them long after the establishment of Christianity (which was not earlier than the commencement of the eleventh century); and in modern times they have been largely made use of by Oehlenschläger and other living or recent poets, who have found in them a source of powerful interest for their countrymen. For a while indeed it was very doubtful whether the Gospel would prevail against the popular belief in the Valhalla. The labours of the early missionaries in the ninth and tenth centuries produced very little effect; the people continued to be almost entirely pagan, and Svend Tvæskiæg, the successor of Harald, renounced Christianity, and did all he could to re-establish the worship of the antient idols; nor was it until after the accession of Canute the Great (1014) that Christianity became the national religion, and churches and convents began to be built. For several years afterwards however little improvement took place in the intellectual condition of the people. Literature can hardly be said to have been cultivated at all. Its sole monument is the history (written in Latin) by Saxo Grammaticus, who died in 1208. In the same century, the first public library was formed at Lund, in Sweden, which was then under the dominion of Denmark; but during the following century literary studies rather declined, being superseded on the one hand by the system of dialectic then in vogue; and on the other, by extravagant monkish legends. In the fifteenth century the university of Copenhagen was established by Christian I., and opened in 1479; yet it was long before either that event or the adoption of the principles of the Reformation effected any improvement in education or in the intellectual condition of the people.

In the mean time the language itself, now one of the softest in sound and most simple in construction of all the Gothic dialects, which had begun to change from that of Iceland in the eleventh and twelve centuries, gradually borrowed more and more from the Low-German, but did not acquire any fixity until the fifteenth. Its progress was greatly retarded by Latin being employed as the language of the clergy and students, and German as that of the court and the higher classes. Although it possesses scarcely any literary value in itself, otherwise than as a specimen of the language at that period, the most remarkable production of the fifteenth century is 'Den Danske Riimkronike' (or chronicle in rhyme) of Niel, a monk of Soröe, who being desirous of giving his countrymen their annals in a more popular form, made use of the work of Saxo Grammaticus, continuing it from the substance of other Latin records, but moulding the whole differently, and making each monarch relate his own exploits and the events of his reign. The first edition of this work is that of 1495, and one was published by Molbech in 1825, illustrated by an introduction and a glossary. Not long after Niel, a priest at Odensee, named Mikkel, obtained some celebrity by his religious poems, the longest of which is in honour of the rosary, and breathes the spirit of Roman Catholic devotion. As a model of style, of language, and versification, this production places its author at the head of the Danish poets of the fifteenth century. About twenty years later, the same place (Odensee) gave Denmark another writer of some note in its literary annals, namely, Christian Hansen, a schoolmaster, who first attempted dramatic poetry, and whose compositions, though barbarous in taste, and both grotesque and coarse in their dialogue, are not wholly destitute of merit as regards style, nor of interest as throwing some light on the manners and opinions of the age. The real poetry however of the whole of this period is to be sought for in the national ballads and other compositions of popular minstrelsy, which, though despised by those who affected any sort of learning, were ardently cherished by the rest of the people. The first printed collection of such pieces was that published by Sorenson Wedel, the translator of Saxo Grammaticus, in 1591, at the instance of the queen Sophia. Its success was so great that it quickly passed through several editions, and in 1695 Peter Syv added a second hundred pieces to the first, which it originally contained. Since that time similar collections have been published at various times; and one of the best and most complete is that by Abrahamson, Nyerup, and Rahbek, in 5 vols. 8vo., Copenhagen, 1812-14.

Together with the Reformation came a change in literary taste—an impulse towards literature, from Germany. Romances of chivalry, legends, tales of magic, moralities, and similar works, were translated from that language, as were also some pieces of Hans Sachs, of the Dutch poet Cats, and even of the Scots Lindsay. Still notwithstanding that the classics, both Greek and Latin, were now generally studied, no one thought of taking them as models of composition, instead of servilely copying contemporaries who were themselves little advanced before them. Consequently, scarcely a name of the slightest importance has been preserved, until we arrive at that of Anders Arrebo, in the seventeenth century, whose fame is now limited to his being considered the morning star, or rather the harbinger of the modern literature of Denmark. This writer, who was born in the island of Aeröe, in 1587, studied at the university of Copenhagen, and became bishop of Drontheim at the age of thirty, but was afterwards deprived of his dignity, and retired to Malmöe in Sweden, where he died in 1637. His chief production is his 'Hexaemeron,' a poem in heroic rhyme, on the creation, in imitation of that by Du Bartas, and it displays considerable refinement of language and versification. To him succeeded Anders Bording and Thomas Kingo, the first of whom was a more industrious than gifted writer. He published a great number of poetical pieces in a work edited by himself, under the title of 'The Danish Mercury,' which were little more than a rhyming chronicle of the events of the day. Kingo, who has been termed the Dr. Watts of Denmark, on account of the religious cast of his poetry, and who was the son of a weaver, entered the church, and became bishop of Fynen. His celebrity among his contemporaries was very great, and he certainly possessed much genuine talent; but his private character was by no means the most amiable. He was even sordidly avaricious, and the man who expressed so many noble and generous sentiments displayed in his own conduct much that was despicable and mean. Still he is exempt from the reproach of countenancing vice in others by the laxity and immoral tendency of his own productions. His writings still continue to be read, nor is it many years since his 'Psalms' were reprinted with a very numerous list of subscribers. Jörgen Jörgenson Sorterup is almost the only other name of any importance belonging to this period. Inferior to Kingo in poetical feeling, he had the merit of breaking through the literary mannerism of the time, and striking into a different route. His 'Heltesange,' or heroic songs, wherein he celebrates the naval achievements of his countrymen and the victories of Frederic IV., revive, though in an inferior degree, the animated strains of the older Kæmpe Viser. After all, Sorterup and his immediate predecessors constitute only the first faint dawnings of Danish literature, which in Holberg suddenly attained to a noon-day brightness. [HOLBERG.]

In a sketch like the present we cannot recapitulate Holberg's chief productions, while to examine them as they deserve, and so as to give a satisfactory idea of them and of their author's varied talents, would be matter for a volume of some bulk. In speaking of such a man, it is difficult to award him his just praise without seeming to fall into exaggeration; for what he is fairly entitled to is known only to those who are actually acquainted with his writings. As the author of 'Peder Paars,' he has been compared not only to Butler, but to Hogarth, and although no imitator of either, he rivals both the poet and the painter in satiric humour. That production alone would have immortalised him among his countrymen. The same may be said of his comedies: with defects and sins against good taste which no one would now fall into, they are marked by great dramatic power and genuine humour.* There is scarcely any branch of literature which he left unattempted.

---

* The English reader will find a well executed specimen of Holberg as a dramatist in an entire scene from his comedy of 'Don Ranudo Colibrados,' in the Appendix to Feldborg's 'Denmark Delineated,' which work also contains much interesting information relative both to the artists and the literary men of that country.

but he was not equally successful in all. In some of them he has since been greatly surpassed by other Danish writers, but there is no one who has yet equalled him in his own peculiar line. He was to Danish literature what Peter the Great was to Russia. He gave it a sudden and powerful impulse, and produced a no less beneficial than extraordinary change in the intellectual tastes of his countrymen, whom he taught to read and to think. In short, if 'Don Quixote' alone will repay a student for the task of acquiring the Spanish language, so will the works of Holberg indemnify an Englishman for the labour, or rather the recreation, of making himself acquainted with a language so nearly allied to his native tongue.

Contemporary with Holberg were Gram, Falster, Sneedorff, and Tullin. The first of these, who was Archivarius of Denmark, was an acute and industrious antiquary and historian. His inquiries threw much light upon the more obscure portions of Northern annals; and some of their results were given to the world in the notes to the Florentine edition of Meursius's 'History of Denmark.' Though his productions were inconsiderable in number, Christian Falster acquired no small repute as a satirist, in which character he wrote in a still bolder and bitterer tone than Holberg himself, while as a poet he was certainly superior to him. His satires went through several editions between 1730 and 1750.

Sneedorff is not a name of great eminence, yet he was a most serviceable labourer in the field of literature—one to whom the language itself is greatly indebted for the example which he set of a pure, elegant, and graceful style, such as no previous writer had attained to. These qualities rendered his periodical, entitled 'The Patriotic Spectator,' exceedingly popular, and contributed to improve the taste both of readers and of writers. As a poet he has far less merit, though his poems were much admired in their day. We may in this place mention Tyge Rothe, professor of philosophy at the university of Copenhagen, for, like Sneedorff, he greatly contributed to refine the language, and his work on the 'Love of One's Country' is a finished model of style. When he attempted verse however his eloquence forsook him; his philosophical poem on the 'Destiny of Man' shows him to have been more favoured by the goddess of wisdom than by the muses.

What Sneedorff and Rothe did for prose, Tullin performed for poetry; he gave it the charm of melody, ease, and richness; on which account, although not a poet of the first order, he may fairly be considered a master in the mechanical part of the art. In that respect he may be classed with Pope, and he also occasionally resembles the English poet in his moral strains. He was acquainted with the English poets, and seems to have imbibed no small portion of the spirit of Young, whom he closely approaches in his 'Skabningens Ypperlighed,' or poem on the creation, which displays a similar loftiness in the conceptions and deep religious sentiment. This production had many admirers in Germany, and Jenisch pronounces it to be a work displaying a fiery imagination, unrivalled by anything of the kind in his own language. Tullin was certainly not devoid of poetical power: indeed his thoughts are often sublime and most happily expressed. His lyrical pieces possess much elegance and tenderness, and they encouraged a number of imitators, some of them mere versifiers, while none of them produced more than agreeable trifles.

We now arrive at a period of the literature—of its poetry especially, which may be designated as that of Ewald [Ewald], for he impressed upon it a character till then unknown, vivifying it by his own fervid genius. If Holberg was the founder of Danish comedy, Ewald was the creator of the national tragedy. His 'Rolf Krage' (1770) forms an epoch in the drama, being the first model of that species of it which has since been so successfully cultivated by Oehlenschläger and others. As a lyric poet he stands still higher, and some writers have pronounced him the most perfect and powerful master in that branch of the art that the world has ever yet seen. Distinguished by genius, he was scarcely less so by misfortune, which may in some degree be attributed to his imprudence, as well as to disappointment, and to the cold indifference of those who should have patronised him as an ornament to their country. A tithe of the posthumous honour and applause bestowed upon him would have cheered, perhaps prolonged his bitter and brief existence. Contemporary with Ewald, his coheritor in indigence, his counterpart in many respects, his opposite in others, was Johan Herman Wessel, who, like Holberg, was a native of Norway, and like him possessed much comic talent and turn for humorous satire. Of these qualities he gave proof in his dramatic epigram or parody entitled 'Kierlighed uden Strömper (Love without stockings) (1772), which experienced a very different reception from Ewald's 'Rolf Krage, for its success on the stage was almost unprecedented, and it became such a favourite, that it was not uncommon for persons to know the whole of it by heart. Nevertheless he is said not to have intended it for representation, and to have been so doubtful of its success on the stage, that it was with the greatest difficulty his friends could prevail upon him to offer it. After this production, his tales in verse are those which exhibit him to most advantage, since they earned for him the title of the Danish Lafontaine. They partake however more of the manner of Prior.

For convenience sake we may here put together the names of the brothers Trojel, Bull, Weyer, Fasting, Samsöe, Storm, and Suhm, as those of the principal writers of the time who closed their career before the end of the century. Peter Magnus and Peter Cofod Trojel claim notice chiefly for their songs and bacchanalian lyrics, a species of poetry in which the Danes have greatly distinguished themselves. Magnus is also known by his satires and poetical epistles some of which possess considerable merit. Bull was the author of some ethic and didactic poems, but as a writer he has no great merit. Niels Weyer was a poet of more than ordinary promise, but as he died at the age of twenty-one, his works do not show the refined fruits of talent. Claus Fasting obtained more celebrity by his epigrams, some of the best in the language, than by his tragedy of 'Hermione.' The other three are far more important names in our catalogue; yet that of Samsöe we may dismiss at once, referring to what has already been said of him [Samsöe], and pass on to Edward Storm. If Storm were known only by his comic epic 'Bragur,' in hexameter verse, his reputation would not be high, since, if not absolutely a failure, it is a very moderate performance, and by no means to be compared with his tales and fables, which display much genuine comic humour, and some of which are particularly felicitous, exhibiting that keen relish for the ludicrous which appears to be a trait in the national character. Nor are his ballads less admirable: they breathe the genuine spirit of the antient minstrelsy, and, but for their modern diction, might be taken for compositions of the antient Skalds. Suhm's claims to celebrity are of a different kind, for though not without pretensions as a poet, it is by his historical works that he adorned the literature of his country. His 'History of Denmark' (in 11 vols.) displays extraordinary diligence and research, and is a work of no ordinary merit, though its value is now in some degree lessened by recent productions of the kind, such as G. L. Baden's (in 5 vols., 1829-32) and L. C. Müller's (2 vols., 1835-6). He also wrote many historical tales and narratives (occupying three volumes in the collection of his works), founded upon antient traditions, and giving lively pictures of the manners and habits of the former population of Scandinavia, and of the national character.

Before the close of the century a new school, at least a new generation, had begun to spring up. Both Rahbek and Baggesen had already made themselves favourably known to the public, and the first had already done much towards popularising a taste for literature by his two periodical publications, the 'Minerva' (commenced in 1785) and the 'Danish Spectator,' both of which obtained merited success. About the same time Baggesen had made himself a favourite with the public by his 'Comic Tales,' decidedly the best of their kind in the language; while, in his 'Labyrinthen,' or Tour through Germany, Switzerland, &c., he had produced the most admirable specimen of a prose style that the literature possesses. Yet considering how much more both of them afterwards performed, these writers can be said to have been at this period only in the early part of their career. That of Oehlenschläger, a name now of European celebrity, may be dated from the first years of the nineteenth century, the poetical pieces by him, which appeared in 1803, being almost the first of his published productions, and in the following year the first book of his rifacciamento, or modernised version of the Edda, printed in Rahbek's 'Charis.' With the 'Edda' he proceeded no further than that specimen, but in his dramas and some other works he has re-opened the stores of antient Scandinavian fable and mythology, and revived the olden spirit of his fatherland.

As a better opportunity does not offer itself, we will here make mention of two writers, who ought not to be passed over, although we do not know whether they may not be still living. At the end of the eighteenth century the Danish drama was signalised by one of the best productions of its kind which had then appeared, 'Niels Ebbesen,' a tragedy, by Christian Levin Sander. The celebrity which it obtained was such that it was translated into several languages. Nor is it the less remarkable as being the only successful effort of the author, whose other dramatic attempts, especially in comedy, hardly attain mediocrity. Shortly afterwards (1804) appeared 'Det Befriede Israel' ('Israel Delivered'), an epic poem in hexameters, by Jens Michael Hertz, which was certainly a failure upon the whole, notwithstanding it contains detached parts of considerable merit. In fact Danish literature cannot yet boast of a single epic; yet if it has nothing which strictly answers to that title, it possesses some narrative poems of the kind, such as Ingemann's 'Valdemar' (not his romance of that name), and his 'Black Knights,' which are meritorious performances.

Other names which may here be introduced as those of writers belonging to the last decennium of the century, but whose biographical dates we are unable to specify more clearly, are Otto Horrebow, Edward Colbiornsen (who died about 1791), and W. H. F. Abrahamson, all of whom possessed considerable poetical talent in compositions of a descriptive or didactic class. To these may be added Magd. Sophia Buchholm, who in 1793 published some poems which were highly creditable both to her talent and her feeling. About the same time appeared three volumes of comedies and other dramatic pieces by the elder Heiberg, some of the best original productions that had then been given to the stage since the days of Holberg. Olufsen too distinguished himself (1793) by a solitary masterpiece, his 'Gulddaasen,' which as a specimen of comedy made no less sensation than Samsöe's 'Dyvecke' did in tragedy.

Jacob Baden, the earliest on our list of those who, although they belong as writers to the eighteenth, lived also in the nineteenth century, did very much for the language by his 'Grammar Raisonné,' by his 'Critical Journal,' and by various philological treatises which have become established authorities for idiom and style. He is also known by his able translation of Tacitus. His wife, who was born in 1740, and who survived him, also possessed literary talent, and published 'Den Fortsatte Grandison,' a continuation of Richardson's romance.

J. C. Tode, though a German by birth and a physician by profession, nevertheless distinguished himself in literature as a humorous writer, as which his 'Moralske og Satiriske Afhandlinger' (1793) exhibit him to great advantage, and show him to have possessed a fund of pleasantry. His Fables are also among the best in the language. He was chiefly ambitious of shining in comedy, but though he produced several very clever pieces, which were at the time an acquisition to the stage, they are not marked by any superior merits. From those who have spoken of the writers of Denmark, Foersom has been so far from obtaining the notice he deserves, that his name has scarcely been mentioned by any of them; all the more valuable therefore is the biographical account given of him by Feldborg. It is true he was not an original writer, but he performed for his countrymen the essential service of enabling them to enjoy Shakspere in a worthy form. 'His translation of Shakspere,' says Feldborg, 'is as much a work of genius as a statue of Thorvaldsen's or a tragedy of Oehlenschläger's.' This is a high encomium, and, we are willing to believe, well merited also, though we cannot positively vouch for its being quite free from exaggeration. However, it is certain that as far as he proceeded in it (for he translated only some of the plays) he executed his arduous task with true devotion.

The year 1821 deprived Denmark of four of its poets—Rein, Thaarup, Zetlitz, and Pram. Rein holds a subordinate rank, although his narrative pieces possess much merit. Thaarup, on the contrary, was a literary veteran, who, besides having produced two of the best and most popular operas in the language, had distinguished himself in the higher species of lyric poetry, especially in his Hymns and Cantatas. Zetlitz occupies a respectable station, by his satires and poetical epistles, and also by his heroic odes. Relative to Pram we need add nothing here to the account already given of him. [PRAM.] Baggesen's is a name which stands out prominently from those of almost all the rest of his countrymen, he being in that respect nearly upon a level with Oehlenschläger; and the extended celebrity which they both enjoy is due to another cause besides the intrinsic merit of their works, namely, to their having written many of them in German, or afterwards reproduced them in that language. That Baggesen should ever have employed a foreign tongue is greatly to be regretted, because he was capable of using his own in the most attractive manner. His translation of Holberg's 'Niels Klimm,' for instance (which was originally written in Latin), is a happy specimen of style. He seems to have aimed at temporary celebrity rather than permanent fame, when he joined the thronged ranks of German literature, in which he could hope to attain only a second-rate or third-rate reputation, whereas in his own he might have occupied a foremost place. He was a writer of varied talents, and in his lyric pieces he touched every mood, from the sublime to the burlesque, from the gay to the pensive. In his other writings he frequently showed much of Voltaire, of Wieland, and of Sterne. Unfortunately he did not direct his powers either so advantageously to himself or so usefully to others as he might have done. His life was an unsettled one, during the greater part of which he lived self-banished from his country; and he also suffered himself to be too much engaged by literary party quarrels, repeatedly attacking Oehlenschläger, Rahbek, and others with violent bitterness.

Less gifted than Baggesen, with more of industry and of tact than of superior talent, Rahbek raised himself to an honourable place in Danish literature. It was as a journalist, critic, and literary historian, rather than as an original writer, that he commanded attention, for in the last character he was merely pleasing and agreeable, without displaying much peculiar power of any kind. His 'Erindringer mit Liv,' or Reminiscences, is however an interesting autobiography, far more detailed than Oehlenschläger's.

After Rahbek, we come to Oehlenschläger himself, Ingemann, and other writers who are yet living, and at whom we can take no more than a hasty glance. The writings of the first-mentioned alone would form the subject of a long analysis, and have in fact been frequently so examined both in German and in English periodicals. That he looked for subjects, if not exactly for models, in the legends of the older Scandinavian history and mythology, has already been mentioned; but he has also occasionally gone to the east and to the south for them. His 'Fiskeren' and 'Aladdin' are two charming dramatised poems in Oriental costume, while his 'Correggio,' a piece more adapted in its form to the stage, presents us with the idea of a true artist. Yet although the dramatic is his favourite form of composition, he has attempted many others; among these is his 'Nordens Guder,' styled by himself an epic, but rather a cyclus of ballads or narrative poems in different metres, recording the fabled adventures of the Scandinavian deities. He has also written a romance in 4 volumes, entitled 'Oen i Sydhavet,' or 'The Island in the South Sea,' which is a sort of 'Robinson Crusoe,' prolix, it is true, but not more so than Defoe's. Ingemann has obtained celebrity not only as a poet, but also in the field of historical romance, and is generally complimented with the title of the Walter Scott of Denmark. His chief production of that kind, 'Valdemar Seir,' has recently been translated into English. Several other writers have since cultivated the same species of composition; and foremost among them stand Carsten Hauch (who has displayed great dramatic power in tragedy) and Petersen. Thus it is not improbable that Danish literature will soon be able to show some original productions of that kind, whereas it has hitherto possessed scarcely any but translations, those by its own writers being rarely more than mere tales, and Kruse being almost the only one who can be regarded as a novelist; yet as far as his own country is concerned, many of his later productions cannot be taken into account, since they are written in German. He has however written several dramatic pieces in Danish, a collection of which was published in four volumes, 1818-20. Stein Blicher's novels are not only more recent but more truly Danish than Kruse's, inasmuch as they depict the national character with graphic fidelity. Another writer, who conceals himself under the assumed name of Karl Bernard, has also produced some spirited manners-painting novels.

If no second Holberg has arisen, Denmark now possesses among its living writers several able dramatists; one of the most recent of whom, Hertz, has revived the true tone and spirit of comedy; while the younger Heiberg has cultivated the romantic and poetical drama with great success, and likewise rendered himself a favourite with the public by his vaudevilles. Chr. Bredahl's 'Dramatiske Scener,' 5 vols., 1819-32, display marks of real genius. Of C. J. Boye we know little; nevertheless his 'William Shakspere' (1826) entitles him to mention from us, not only on account of the interest which the subject itself possesses for our countrymen, but also for the ability with which it is treated. Tieck, König, and others have taken Shakspere as the hero of their fictions, but scarcely one has exhibited him so naturally.

In other branches of literature Denmark possesses several eminent scholars and men of science. Rask's name is known as one of the most eminent philologists of the present century; and to his may be added those of Grundtvig, Petersen, and Rafn, all of whom have laboured diligently and successfully in northern archæology and history. The study of northern antiquities has been greatly promoted by the establishment of the Royal Society of Northern Antiquaries at Copenhagen. Besides his other historical works, the 'Bibliotheca Anglo-Saxonica' of Grundtvig recommends him to literary antiquaries in this country; which remark applies also to L. C. Müller's 'Collectanea Anglo-Saxonica,' 1834. In classical archæology the Chevalier Bröndsted has acquired European celebrity by his 'Travels and Researches in Greece,' and other works. The name of Professor Oerstedt is generally known by his labours in electricity and magnetism. His younger brother, Anders Sandöe Oerstedt, has distinguished himself by his writings on jurisprudence, polity, and moral philosophy. In art, Thorvaldsen's fame is such that the bare mention of his name is sufficient. With that of the great Danish sculptor, Thiele's name is in some measure associated, as that of his biographer and literary interpreter, by his two splendid folio volumes on the artist's life and works. In architecture, both Hansen (brother-in-law to Rahbek) and Malling have done much, and have introduced a better taste than formerly prevailed. The former has published his chief designs in a large folio work highly creditable to the Danish press.

The annexed tables of the deceased and of some of the living writers of Denmark, including also the names of one or two artists, will serve to complete this portion of our subject, as a useful accompaniment to it:—

Died.
1637. **Arreboe, Anders** (born 1587), 'Hexaemeron,' or 'Creation.'
1677. **Bording, Andreas** (born 1619).
1678. **Broby, Erik Erikensen** (Pontoppidan), (born 1616), natural history, &c.
1702. **Syv, Peter** (born 1631), 'Danish Grammar.'
1722. **Sorterup, Jörgen, J.**, satirical poetry, &c.
1742. **Reenberg, Töger** (born 1656), fables, satires, &c.
1748. **Gram, Hans**, history and antiquities.
1750. **Eilschov, Fred. Chr.** (born 1725), philosophical pieces, &c.
1752. **Falster, Christian** (born 1690), satires.
1754. **Holberg, Ludvig** (born 1684), general literature, biography, history, comedy, satire, &c.
1764. **Sneedorf, Jens S.** (born 1732), periodical literature, &c.
1765. **Tullin, Christ. B.** (born 1728), ethic and descriptive poetry, lyrical do.
1765. **Kraft, Jens** (born 1720), logic and metaphysics, &c.
1770. **Langebek, Jacob** (born 1710), the 'Danish Library,' 'Danish Magazine,' &c.
1778. **Möllmann, Bernh.** (born 1702), history.
1781. **Ewald, Johann** (born 1743), lyric poetry, poetical drama, &c.
1783. **Wessel, J. H.** (born 1742), comedy and parody, tales, &c.
1783. **Wibe, Joh.**, comedy.
1783. **Bull, Johann** (born 1739), didactic poetry, &c.
1784. **Trojel, P. C.** (born 1754), poetry.
1788. **Weyer, Niels** (born 1767), poetry.
1788. **Biehl, Charl. Dorothea** (born 1731), dramatic pieces.
1789. **Luxdorf, B. Will.** (born 1716).
1790. **Wivet** (born 1728), comedy.
1791. **Fasting, Christian**, poetry, epigrams, &c.
1793. **Trojel, P. Magnus** (born 1743), satires, &c.
1794. **Storm, Edward** (born 1749), ballad poetry, &c.
1794. **Smith, Laurits** (born 1753), divinity and moral philosophy.
1795. **Rothe, Tyge** (born 1731), didactic poetry, &c.
1796. **Samsöe, Ole Joh.** (born 1759), tragedy.
1798. **Suhm, Peter Fred.** (born 1728), history, &c.
1798. **Birkner, Mich. Gottlob.** (born 1756), distinguished as a classical prose writer.

Nineteenth Century.

1801 **Juel, Professor Jens** (born 1745), a celebrated portrait painter.
1802. **Wiedeveld, Joh.** (born 1731), eminent sculptor, and Thorvaldsen's master.
1803. **Bast, Povel Dankel**, poetry, epigrams, &c.
1804. **Baden, Jacob** (born 1735), philology, &c.
1807. **Tode, J. Clemens** (born 1736), comedies, fables, humorous pieces, &c.
1808. **Guldberg, Ove** (born 1731), comedy.
1809. **Zoega, Jörgen** (born 1756), Egyptian antiquities, &c.
1815. **Bugge, Thos.** (born 1740), astronomy and mathematics.
1815. **Thorlacius, S. Thorsden** (born 1741), northern antiquities and literature.
1817. **Foersom, Peter** (born 1778), translator of Shakspere.
1819. **Bastholm, Christ.** (born 1740), philosophy and morals, sermons, &c.
1821. **Rein, Jonas**, poetical tales, &c.
1821. **Thaarup, Thos.** (born 1749), lyric poetry, hymns, &c.
1821. **Zetlitz, Jens** (born 1761), satires, epistles, &c.
1821. **Hasse, Laurits** (born 1737), novelist.
1821. **Pram, Christian** (born 1756), 'Staerkodder,' poetry, drama, &c.
1823. **Malling, Ove**, history and biography.
1825. **Bruun, Thos. Christ.** (born 1750), satires, tales, &c.
1826. **Baggesen, Jens** (born 1764), poetry and miscellaneous works.
1828. **Lorentzen, Chr. Aug.** (born 1753), artist, painted the 'Holberg Gallery.'
1832. **Heiberg, Pet. Andreas** (born 1758), comedy, political essays, &c.
1832. **Rask, Rasmus Christ.** (born 1784), philology, grammar, Northern and Oriental languages.
1833. **Treschov, Niels** (born 1751), theology and moral philosophy.
1834. **Moller, Jens** (born 1779), history and theology.
1836. **Rahbek, Knud Lyne** (born 1760), general literature and criticism, biography, poetry, drama.

Living Writers, &c.

Born.
1759. **Nyerup, Rasmus**, literary history and biography, criticism, &c.
1770. **Hornemann, Jens Wilken**, botany.
1770. **Thorvaldsen, Bertel** (Albert), sculptor.
1775. **Mynster, Jac. Pet.**, bishop of Zealand, pulpit eloquence and theology.
1777. **Gebauer, Chr. Dav.**, celebrated animal painter.
1778. **Kruse, Laurits**, novelist.
1779. **Möller, Jens, Dr.**, theology and literature.
1779. **Oehlenschläger, Adam**, poetry, drama, romance, &c.
1781. **Bröndsted, P. O.**, classical archæology and geography.
1783. **Molbech, Chr.**, literary history, criticism, &c.
1783. **Grundtvig, Nic. F. S.**, history, poetry, northern mythology, and antiquities.
1783. **Eckersberg, Chr. Will.**, eminent historical painter.
1784. **Lindberg, J. Chr.**, controversial theology.
1789. **Ingemann, Bern. Severin**, epic poetry, historical romance, &c.
1789. **Dahl, Joh. Chr.**, landscape-painter.
1791. **Heiberg, Joh. Ludvig**, son of P. A. H., distinguished dramatic writer.
1791. **Hauch, Joh. Carsten**, tragedies and romances.
1791. **Petersen, M. N.**, Danish language and philology, history and antiquities.
1794. **Hansen, Morits Chr.**, tragedy, novels, tales, and educational works.
1795. **Rafn, Karl Chr.**, northern literature and antiquities.

1798. Hertz, Henrich, comedy, poetry, &c.
1805. Anderson, H. C., poetry, romance, &c.
Paludan-Müller, 'Dandserinden,' a comic poem, &c.
Wergeland, Hen. Arnold, poetry, drama.

Sweden.—Though the modern literature of Sweden developed itself more tardily than that of Denmark, its course was nearly the same; for, springing from one common stock, both nations were similar in genius and intellectual disposition. More remote from intercourse with other European nations than its neighbour and rival, Sweden retained not only more of the parent language, but for a considerable time more of the Scandinavian character in its oral poetry. The Scalds continued to recite their compositions at the court of the Swedish princes till about the middle of the thirteenth century, when the last Skald upon record was Sturle Thordson, in the reign of Berger Jarl. Notwithstanding almost the whole of the following period to the time of Gustavus Vasa was one of turbulence or oppression, a taste for poetry continued to manifest itself in the popular songs and traditions in rhyme, some of which have been collected by Geijer and Afzelius.* Compared with these authorless compositions, the productions of those who professed to cultivate literature, such as it then was, were feeble and tasteless. Books of monkish devotion, rude treatises on medicine, astronomy, and a few other sciences, as then understood, but overlaid with superstition and mysticism, together with chronicles in barbarous Latin, present only a picture of intellectual barrenness. No such luminaries as a Dante or a Chaucer arose, and the few names which history has handed down to us are little better than mere sounds and shadows.

One of the most celebrated, or rather, the least obscure, is Nicholas Hermanni, bishop of Linköping, who died in 1391, and was canonized in 1416. Besides some theological works, he wrote legends, and translated the Life of St. Ansgarius, the first Christian missionary who visited Sweden (829). Eric Olai, professor of theology at Upsala (died 1486), composed some psalms and canticles. Nearly two centuries before, or about 1308, Eufemia of Norway, grandmother of Magnus Smek, had caused the history of Alexander the Great, the romance of 'Flores and Blanzeflor,' and some other productions of a similar kind to be translated into Swedish verse. Yet for a long time Swedish literature is little more than a dreary blank. Even learning was scarcely cultivated, for though the university of Upsala was founded by Sten Sture in 1478, it languished through neglect and for want of teachers, and can hardly be said to have been effectively established till the time of Gustavus Adolphus (1621-24). Nevertheless, though Sweden continued to be greatly behind Denmark in this respect, printing was introduced into the former country some years earlier than into Denmark. A press was first set up at Upsala in 1476, another at Stockholm in 1482, and a third at Wadstena in 1490. Wadstena is noted for the convent of St. Brigitta, where her daughter St. Catherine died abbess of it in 1391, and where, a century later (1498), a nun named Ingrida wrote an epistle to her lover, which is considered to be the most elegant and correct specimen of the Swedish language of that period, and indeed superior to any which appeared for a long time after. This composition, so full of eloquence and genuine passion, and in which the sentiments of love and mystical devotion are intermingled, places Ingrida by the side of the more celebrated Heloisa.

With her patriot Vasa (1523-60), a new æra dawned upon Sweden. [GUSTAVUS ERICKSON.] That prince, who more truly deserves the epithet of 'great' than most on whom it has been bestowed, possessed much literary talent, and very superior powers of eloquence, although he had to contend with a language which was still rude and unpolished. He founded the royal library at Stockholm, established schools throughout the country, and favoured the doctrines of the Reformation, in which he was seconded by the chief scholars in the kingdom. Among those who more especially distinguished themselves by their zeal were the brothers Olaus and Lars or Laurentius Petri. The former, who had studied at Wittenberg, was made secretary of council by Gustavus, but afterwards fell into disgrace, and was even sentenced to death upon a charge of high treason, though he was eventually pardoned. Laurentius also studied at Wittenberg, and on his return was made professor of theology at Upsala, where he preached the principles of Luther to crowded congregations, notwithstanding he had been excommunicated by the council of Catholic clergy. This loyal and intrepid 'Apostle of the North,' as he was subsequently called, was made archbishop of the kingdom in 1531. As a writer his labours were very considerable; besides a number of theological treatises, he made almost an entire translation of the Bible, in which he was assisted by his brother Olaus, and upon which he was engaged at the time of his death in 1573.

The unfortunate Eric XIV. possessed a taste not only for literature, but for music and painting, which last he is said to have practised, and to have executed the whole-length portrait of himself, in the gallery at the castle of Gripsholm. In the succeeding reign (John III.) literature and the sciences were neglected for political and theological disputes; but in that of Charles IX. they began to revive. Charles himself may be placed among royal authors, for he wrote his own history in verse, and also many songs and other poetical pieces. We have here to consider Gustavus Adolphus not in his character of a warrior and a statesman, but in that of an encourager of the peaceful arts. He was himself gifted with more than ordinary powers of eloquence, and his address to the states (1620) may be considered a model of that oratory which at once appeals to the heart and the understanding. This prince also began to compose his own memoirs, which are scarcely less admirable for their style than interesting for their matter. Inseparably connected with the name of Gustavus Adolphus is that of Axel Oxenstierna (1583-1654), one of the most eminent statesmen of his own day or any other, and also a patron of letters.

The family of the Messenii is one of some note in the literary annals of Sweden at this period. Johannes Messenius the elder (1584-1637) conceived the plan of dramatising the history of Sweden in a series of fifty plays, six of which he completed. They have gone through several editions, but they show that he was not the rival though the contemporary of Shakspere. His own history is rather remarkable. Being accused of holding a secret and treasonable correspondence with Sigismund of Poland and the Jesuits, he and his family were sentenced to imprisonment for life, but were released after twenty years' confinement. His son Arnold and his grandson Johannes (who was born in prison, 1629), both possessed talents; and the former, who was appointed historiographer by Christina, wrote the history of Charles IX., and also of Sigismund, neither of which however was printed. If the younger Johannes had so far followed his father's example as to abstain from publishing, the fatal end of both might have been averted; but he produced a satire, when he was only eighteen, in which he reflected very severely not only upon the nobles, but the queen herself. The consequence was that he was brought to trial, and his father being also implicated in the charge, both perished on the scaffold.

Of Eric Tegel and Carl Carlson Gyllenhjelm it will be sufficient to say that the former was secretary to Charles IX., and wrote the history of Gustavus I. and Eric XIV.; of the other, that he was the natural son of Charles IX., and high admiral of Sweden, and published in 1632 a work against the doctrines of the Roman Catholics ('Katholicismens Villomeningar'). Jöran or George Stjernhjelm, ennobled by Gustavus Adolphus, and patronised by Christina, enjoyed considerable reputation as a poet, in which capacity he furnished the ballets or masques which were then in vogue at court. The production by which he is now chiefly known is his 'Hercules,' a sort of didactic poem in hexameter verse, which though not without merit in regard to style and versification, displays more of ingenious argumentative talent than of poetical power. Nevertheless it was well entitled to the admiration which it received from his contemporaries. Stjernhjelm was well read both in antient and modern literature, had visited different countries, and acquired several languages. Nor did he confine his studies to poetry, for he published the 'Codex Argenteus,' with a translation. His contemporaries Rosenhane and Spegel distinguished themselves—the one by his sonnets, in which he showed himself a disciple of Ronsard; while the other was, like Arreboe, the Danish poet, an imitator of Du Bartas. Spegel also compiled a dictionary of the Swedish language, which was afterwards greatly extended by Ihre.

---

* 'Svenska Folkvisor,' 3 vols. 8vo., 1814. The two first volumes of a similar collection, by Arwidson, have since appeared under the title of 'Svenska Fornsanger.' J. E. Rydquist has also made an interesting contribution to literary archæology in his 'Nordens aldsta Skadespel,' on the dramatic songs and compositions of the Swedes, similar to those of Iceland and Finnland.

Among the literary men of the seventeenth century, Olof Rudbeck, both the father and son of that name, deservedly rank high. The elder Rudbeck has left a monument of extraordinary erudition, but also of wild and extravagant hypotheses, in his ‘Atlantis’ (4 fols. fol.). With them may be mentioned the two Perinskiolds, who revived the study of Icelandic literature. John, the father, translated from that language Snorre Sturleson's ‘History,’ and many beautiful Northern traditions, in a simple and elegant style; and Frederic was likewise an able antiquary and diligent labourer in the same field. Another remarkable contemporary instance of family talent on the part of father and son occurs in the elder and younger Nicodemus Tessin, both of whom ranked among the first-rate architects of their time. Nor was the grandson, Count Carl Gustavus Tessin, with whom the title expired in 1770, less esteemed for his taste and ability as an architect, beside his merit as a writer.

The commencement of the eighteenth century was by no means propitious to literature in Sweden. The age of laborious erudition had passed away, that of the belles-lettres can scarcely be said to have begun before the reign of Gustavus III. Still one or two names of note occur during the first half of the century. Even were there no other than that of Olof von Dalin, it would suffice to vindicate the national taste at this period, he being not undeservedly regarded as the Swedish Addison. Like his prototype, he not only set the example of a more graceful and polished prose style, but sought to entertain while he instructed, to improve while he amused his readers. The ‘Svenska Argus’ (begun in 1733, when the writer was only twenty-four) obtained as marked success as the English ‘Spectator.’ Nor was the interest on the part of the public diminished by the name of the writer remaining unknown for three years. There is another point of resemblance between the Swedish and the English essayist,—neither of them shone in conversation, or displayed in it any of those graces which adorn their writings; both, again, tried their ability in the drama, although neither the ‘Cato’ of the one nor the ‘Brynilda’ of the other manifests any tragic power. Dalin succeeded better in comedy. His ‘Svenska Friheten’ was greatly admired in its day, but that and his other poems have now fallen very much in estimation, which is also the case with his ‘History of Sweden,’ a work that added much to the author's reputation, as being popular and captivating in its style, but its real value is now almost destroyed by the more recent histories of Geijer, Fryxell, and Strinnholm.

To the same epoch with Dalin belongs Madame Nordenflycht, who was regarded almost as a prodigy of learning in her sex, and whose elegies and other poems occasionally display real feeling and talent, though they are for the most part in a false taste, and disfigured by affectation. The fame of this lady was not confined to Sweden, for her literary acquaintance was cultivated by correspondents in other countries, and among the rest by Haller, Fontenelle, and Holberg. It was she who instituted, in 1753, the Society which assumed the title of ‘Utile Dulci,’ and which enrolled Counts Creutz and Gyllenborg, and other followers or patrons of literature among its members. To another female, Louisa Ulrica, the queen of Adolphus-Frederick, who not only patronised, but also cultivated scientific and literary pursuits, Sweden is indebted for the establishment of the Academy of Stockholm (1757). About the same time other literary societies began to spring up, such as the ‘Apollini Sacra’ at Upsala, and the ‘Aurora’ at Abo. These institutions undoubtedly served to encourage literature; but it is very questionable whether they were not also injurious to it, by dictating formal rules, and a submission to pedantic theories of criticism. Considered in this latter point of view, even the otherwise splendid period of Gustavus III. (1772-92) is not altogether exempt from reproach. That illustrious patron of literature and art, who, unlike Louis XIV., distinguished himself not only by encouraging talent in others, but by the display of it in himself—who, while he munificently patronised the muses as a sovereign, enrolled himself among their votaries, was unfortunately prepossessed in favour of French models. Hence the literature of his time bears more of a French than a national physiognomy. Nevertheless much good was effected, by an impulse being then given, which afterwards took a better direction. Besides reorganising the Swedish Academy of Stockholm (1786), Gustavus established several other institutions, and liberally supported the two universities of Upsala and Lund; and although his literary taste was French, he exerted himself very much in behalf of the Swedish language.

From the commencement of his reign the names of literary persons begin to be so numerous, that it is difficult to include all of them within the compass of a mere sketch. There is no occasion for our speaking at all of Linnæus, both because his fame does not exactly belong to literature so called, and because his life and writings have been treated of in another place. [LINNÆUS.] We turn to the more obscure name of Olof Rudbeck, which would perhaps have been less so than it now is, had he not died prematurely. He displayed considerable originality and talent for the comic epic in his ‘Boräsiade,’ a poem in four cantos, describing the heroic contest between the citizens of the town of Boräs, under their burgomaster, and the desperate rebel Hofmann. The two noble writers Counts Creutz and Gyllenborg may be placed together, notwithstanding the latter survived the other upwards of twenty years, as being not only attached friends, but literary associates. Creutz's ‘Atis och Camilla,’ a descriptive poem in five cantos, is considered the best work of its kind in the language; while, if not entitled to rank as an epic, Gyllenborg's ‘Täget ofver Belt’ displays much vigour of imagination and happy execution. The last-mentioned writer produced also some dramatic pieces; and as a fabulist he stands decidedly at the head of his countrymen. Celsius, bishop of Lund, was the biographer, or rather, the historian of Gustavus Vasa and Eric XIV., in two different works; and he also took the first prince as the subject of an heroic poem in seven books; but in this department he showed himself greatly inferior to Gyllenborg. He also wrote a tragedy called ‘Ingeborg.’

We now come to one who though he cultivated only a minor department of poetry, manifested in it a power and originality that place him far above those who are chiefly skilful imitators of standard models—to Bellman, who is generally styled the Swedish Anacreon, a title that detracts almost as much as it compliments, for he has borrowed nothing from the antient bard. A strong vein of nationality and racy humour pervades all his principal productions—his ‘Fredman's Epistles,’ his songs, &c., which rendered him at once the favourite of all classes. As he wrote so he lived, as he lived so he died—a staunch devotee to Bacchus; for it is related of him, that finding his end approaching, he invited some of his companions to partake a farewell revel, at the close of which he bade adieu for ever to song and wine.

In some respects Lidner was quite opposite to Bellman, and in others greatly resembled him. Nothing can be more unlike the gay and joyous effusions of the one than the sombre, plaintive, and touching strains of the other; but the love of wine was the same in both, or rather Lidner carried it to a degree of coarse intemperance not palliated by any joviality of temperament. He was indeed one of those who seem voluntarily to doom themselves to misery and degradation; for his conduct was so thoroughly reckless, so devoid of all ordinary prudence, as to frustrate the benevolent intentions of Gustavus, his royal patron, and to render every attempt of his friends to serve him utterly unavailing. Nevertheless, with all his follies and vices as a man, with all his imperfections as a writer, Lidner possessed that spark of genius which still recommends his poetry, while so many contemporary productions, applauded and extolled in their day, are now forgotten.

Among those literary men who enjoyed in a particular degree the personal favour of Gustavus, was Kellgren, who if not a great was a pleasing poet, full of ingenious and happily expressed ideas, set off to advantage by the elegance and harmoniousness of his versification. Both by his lyrical pieces and his satires he rendered himself deservedly a favourite with the nation; and he is still read with satisfaction, notwithstanding he has too much of the affected polish and refinement of the school then in vogue, and too little of that freshness and vigour which mark some of the writers of a later period. His successor at the Swedish Academy, Stenhammer, distinguished his brief career by his ode on the battle of Svensksand, and a poem on the importance of religion to states, both which are master pieces of their kind. He also commenced a parody of the ‘Æneid.’ Magnus Lehnberg advanced pulpit eloquence very far beyond any of his predecessors in Sweden; the sermons of Bäld, Tolesson, and others, which had previously been regarded as first-rate compositions of that class, rendered the superiority of Lemberg's the more evident. Thorild, the literary antagonist of Kellgren, distinguished himself scarcely less as the zealous but unsuccessful champion of the liberty of the press than as a writer: he rendered himself so obnoxious to the government in the former character, that he was obliged to seek an asylum in Denmark. Among his poems that on the Passions is esteemed the best, but his more important productions are in prose, and show him to have been a profound thinker and a dealer in ingenious paradoxes. Professor Hoijer was also an able writer on subjects of philosophy, æsthetics, and criticism, which he treated in a masterly and eloquent style, and with great clearness.

Axel Silfverstolpe, chamberlain to Queen Sophia Magdalena, and Count Oxenstierna, who emulated the example of his uncle Count Gyllenborg, both possessed literary talent; and if the former did not shine as a poet of the first class, he produced several agreeable and elegant pieces. More ambitious, Oxenstierna showed himself to be also more favoured by the muses: his descriptive poem, in nine books, entitled 'Skördarne,' or Harvest, and his 'Dagens-Stunder,' rank among the best productions of their kind in the language, as well on account of the imagination which they display, as for the beauty of the expression.

Madame Lenngren (daughter of Professor Malmstedt of Upsala) manifested a peculiar vein of poetry, adorning familiar subjects with the simple graces of nature and truth, and observing a happy medium between affected refinement and vulgar literal reality. Her 'Grefvinnans Besök' (Visit to the Parsonage), 'Den Glada Festen,' and 'Porträtterne,' are so many charming pictures of domestic life, delightful from their freshness and their truth, and also for a certain tone of ingenuous and delicate satire. The Swedish Academy honoured her memory by a medal, on the obverse of which is her bust, and on the reverse a muse holding a lyre, with this inscription: 'Quo minus gloriam petebat eo magis assecuta.' With this amiable woman we may here be allowed to make brief mention of two other literary females, not having been able to ascertain when they died or whether they be yet living, namely, the Baroness d'Albedyhl and Madame Berger (born Countess of Cronhjelm), the former of whom published 'Gefion' (Upsala, 1814), a little epic poem in four cantos, and has been styled the Swedish Sevigné for the elegance of her epistolary style; the other has acquired some reputation both as a novelist and a poetess, especially by her 'Capriciosa,' a charming tale in verse. To these may further be added Madame Nyberg, known to the public under the name of Euphrosyne, whose poems display both fancy and feeling with much beauty of language. She is a disciple of the new romantic or Phosphorist school, and her manner bears some resemblance to Atterbom's, in whose 'Almanack of the Muses,' for 1822, there is a dramatic poem by her, founded on the legend of St. Christopher. Deviating somewhat from the order in which their names occur in the table at the end of this article, we will here, for convenience sake, group together Adlerbeth, Leopold, and some other writers, before we mention Stagnelius, Vitalis, and Nicander, who may be considered as more particularly belonging to the *Phosphorists*, or new romantic school, as opposed to the *Classicalists*. In his original poems, particularly in his Epistles, Baron d'Adlerbeth shows himself an amiable moralist and philosopher, but his tragedies are merely correct lifeless productions carefully modelled according to French dramatic rules. He also translated Virgil, Horace, and the 'Metamorphoses' of Ovid. Edelcrantz, who, previously to his being ennobled by the title of baron in 1789, was called Clewberg, first attracted notice by his *Eloge* on Louisa Ulrica, which eloquent composition obtained for him the place of librarian at the university of Abo. Another much superior production of his is the 'Ode till Svenska Folket;' his merit however lay not so much in what he himself did as a writer, as in the services which he rendered to art and science, manufactures, commerce, and agriculture. He first introduced the telegraph and the steam-engine into Sweden, and he kept up a correspondence with the most distinguished scientific persons in different parts of Europe, including our own countrymen Sir John Sinclair and Sir Humphry Davy. He was also perpetual president of the Academy of Painting and Sculpture.

The veteran Leopold, whose career extended through so long a period, was looked up to as the leader of the classical or French school of literature, which was in fashion under Gustavus III. at the beginning of the present century. He has sometimes been called the Voltaire of Sweden—not that he resembled Voltaire in character—and his tragedies have been greatly extolled; but, like his models, they are cold and declamatory, with little of real passion or poetry, though abounding with splendid rhetoric. The same may be said of his Odes, one of which, 'Begäret till ett udödligt Namn,' has been translated in the sixth volume of the 'Foreign Quarterly Review.' He succeeded better in his tales and satires, to which latter kind of composition his talent was well enough suited, and there his polished elegance and sententiousness are in their place. As a prose writer he is deservedly considered a model of style.

Hammarskjold produced several interesting works on subjects of literary criticism, and among others one on the character of Schiller as a poet, historian, and philosopher (1807); also a series of lectures on the history of literature and the fine arts in Sweden (1818-19). Stjernstolpe is mentioned elsewhere. [STJERNSTOLPE.] Stagnelius, Vitalis, and Nicander all belonged to the new school; all possessed strong poetical power, and all died in the prime of life. Stagnelius, the most highly gifted of the three, whose literary career commenced in 1812 and was closed in less than twelve years, has been described as possessing a truly poetic nature, and as resembling the mystic German Novalis. His works, comprised in three volumes, consist of 'Vladimir,' 'Blenda,' 'Gunlög,' and fragments of two other epic poems, tragedies and other dramatic pieces, and his lyrical and miscellaneous compositions. Finely touched as his productions of that class are, the peculiar turn of his genius in a great measure disqualified him for succeeding in the epic and the drama. He had too much of what the Germans call *subjectivity*, and he accordingly was always displaying his own feelings and sentiments, instead of identifying himself with his characters. He therefore pleases better—we might say, completely satisfies in such a dramatised poem as that of the 'Martyrs,' in which religious enthusiasm and Christian fortitude are depicted in the most sublime strain of poetry. After all it is as a lyric poet that he excels; the finest passages in his tragedies and his epics are all of a lyrical cast; and among his lyrics the series of religious pieces entitled 'The Lilies of Sharon' are preeminent, and would of themselves have secured for him a place among the highest order of poets. Eric Sjöberg, better known under the assumed name of Vitalis, was one of those who, highly favoured with natural gifts, have been the outcasts of fortune. His whole life was one of struggle, privation, and hardships; and he closed it within the walls of a public hospital. As a writer he has sometimes been classed among those whose power lay in comic humour; yet although flashes of mirth and satiric pleasantry occasionally occur in his poems, the pervading character of most of them is melancholy and tenderness, and a weariness of spirit longing to be at rest. He was indeed very unequal, often pathetic and sublime, sometimes even below mediocrity. As to Nicander, we may refer to a previous article [NICANDER], merely remarking that while his poetry manifests strong fancy and deep enthusiasm, it is not free from occasional extravagance or from marks of negligence. Wallin, archbishop of Upsala, who died lately, acquired well merited popularity both as a preacher and a poet. His sermons and discourses are noble specimens of pulpit eloquence, nor was his delivery less impressive. Nearly all his poetical productions are of a devotional cast, and his psalms have been generally adopted throughout Sweden.

Among the living poets and literary men of Sweden, Franzen may be allowed to take precedence according to seniority, if not altogether according to reputation; for in the latter respect the first place incontestibly belongs to Tegner, bishop of Wexiö. The reputation of the bishop of Hörnesand (Franzen) however is not very much inferior to that of the bishop of Wexiö; he was one of the first who broke away from the factitious style in which mechanical excellence was chiefly regarded, and who strove to render poetry the interpreter of the mind. His lyrical and elegiac compositions are very numerous, and are decidedly his best: they seem spontaneous effusions replete with the eloquence of the heart. In his longer poems he was far less happy; that in twenty cantos for instance, on the marriage of Gustavus Vasa, is both monotonous and deficient in the interest requisite for so long a narrative. 'Columbus,' another historical poem, published in 1831, but not yet finished, has not added much to his fame; neither has he succeeded much better in tragedy. Notwithstanding these deductions, he is certainly a master within his own peculiar sphere, and is also an admirable prose writer. His popularity is beyond all question; and if it be true, as has been stated, that of one edition of his poems 3000 copies were sold within a single week, it is a circumstance almost unparalleled, not numerically, but in proportion to the population of the country, to which alone the demand for books in the language may be said to be confined.

Ling may be considered in some respects as the Swedish Oehlenschäger, for, like the Dane, he has *Scandinavianised* the drama of his country, taking the subjects of his tragedies, or rather dramatic poems, from the antient northern mythology and legends. One of his principal productions, 'Gylfe,' is a sort of modern history of Sweden disguised under a mythological mask, but, as it has been observed, an allegory extended to fifteen cantos and as many thousand lines must not expect to meet with many readers—certainly with none among strangers.

Esaias Tegner is universally recognised as the poet of Sweden; the one who stands pre-eminent in the affections of the nation and in the esteem of foreigners. His reputation has extended itself where even the existence of Swedish literature was scarcely known before; his 'Frithiöf's Saga' has found more than one translator both in Germany and in England; and anecdotes are told of persons learning the language merely in order to be able to read it in the original. Added to all which, he is one of those upon whom, like Göthe and Schiller, volumes of criticism have been written. To sum up his literary character as briefly as possible, it may be observed that Tegner has not displayed poetic invention: his 'Frithiöf' is no more than a reproduction of the antient Icelandic 'Saga;' still he possesses the art of bestowing an inexpressible charm on whatever he touches. His language is most harmonious, his colouring most pleasing, and he always shows himself a genuine son of the North. Hence his great popularity is accounted for; since popularity does not fall to the share of the greatest poet or artist, but rather to him who can interest the greatest number. We pass over 'Axel,' and Tegner's other productions, which have been frequently mentioned in various journals both English and foreign.

Professor E. G. Geijer has done very much for the study of northern history, literature, poetry, and mythology. His 'Svea Rikes Häfder,' or 'Records of Sweden,' is an excellent work, whose intrinsic merits are set off by a felicitous style. The same writer has also produced a 'History of the Swedish Nation,' and a history of Sweden from 1719 to 1772. Afzelius, a relation of Adam Afzelius the botanist, and John Afzelius the chemist, who joined with Geijer in editing a collection of 'Folkvisor,' or antient national ballads, is also known as an historian and literary antiquary. His translation of the 'Elder' or 'Sämand's Edda,' is greatly esteemed; nor is he without reputation as a poet. After Tegner, Atterbom's name is the one more generally known beyond Sweden as that of one who has distinguished himself in poetry. A warm partizan, indeed one of the founders of the modern or romantic school, he took an active share in the warfare between that and the classical one, as editor of the journal 'Phosphorus' (1810-13), from which the title of Phosphorists has been given to that literary party. He has likewise rendered great service to Swedish literature by his 'Poetical Almanac' (commenced in 1812), which has from time to time been the means of introducing to the public many able writers. In 1817-18 he visited Germany and Italy, and on his return was appointed tutor to the crown-prince Oscar in German poetry and literature. A few years later (1824-27) he confirmed his previous fame and popularity by his 'Lycksalighetens ö' (the Island of the Blest), a 'sagospel,' or romantic poem, in 'five adventures;' for the story of which fanciful fairy allegory we refer to the account given of it in the second volume of the 'Foreign Review.' Notwithstanding this production—whose colouring is in many parts of southern luxuriance—increased the number of Atterbom's admirers, it has not escaped critical censure on the score of insipid and exaggerated sentimentality, while on the other hand it has been characterised by Nicander as a splendid lyrical panorama. Among his other poems the romantic tale of the 'Blue Bird' is one of the most popular. He is also esteemed as a prose writer, and his discourse on the death of Kernell (1824), a young man of great talent, is considered a highly affecting piece of eloquence. His 'Letters from Rome,' addressed to Geijer, and published in the journal 'Svea,' are highly interesting, both on account of the criticism which they display and the information which they give relative to many living artists of the German school. A German translation of all his poems, by Gottlieb Mohnicke, appeared in 1840.

On those who yet remain to be spoken of we can bestow scarcely any further notice than what is supplied by the annexed table; nor do the names there given as those of living writers by any means include all who are entitled to honourable mention, but it is as yet difficult to collect any particulars respecting them, some of them having only recently become known as writers.

There is one department of literature, we may observe, in which Sweden now possesses some original productions of ability and merit, although it was scarcely cultivated at all till within the last twenty years—namely, that of prose fiction and the novel. Nearly all Scott's historical romances have been translated, and they have had a considerable influence in creating a taste for this species of reading. Frederick Cederborg, who began his career somewhat earlier, has distinguished himself by several productions of the kind, fraught with humour and abounding with comic scenes. Livijn's 'Spader Dame' and other novels display an originality and power, a strength both in their humorous and their pathetic parts, which have seldom been equalled. The modern novel has been treated with great success by Frederica Bremer; and Baroness Knorring has been happy in her delineations of the gay and fashionable world; while Engström has produced some interesting pictures of country life and manners. In the fine arts Sweden can boast of some distinguished names: those of Bystrom and Göthe in sculpture would do honour to any nation.

Died.
1636. Tegel, Eric, history.
1637. Messenius, Joh. (born 1584), drama.
1650. Gyllenhjelm, Carl (born 1574), poetry.
1672. Stjernhjelm, Jöran (born 1598), poetry, antiquities.
1698. Ehrenstrahl, David, K. (born 1629), painter.
1702. Rudbeck, Olof, Elder (born 1630).
1714. Spegel, Haquin, Archbishop (born 1645), poem on the creation, 'Paradiset,' psalms, &c.
1728. Tessin, Count N., Younger (born 1654), architect
1743. Triewald, Sam. (born 1688), satires, &c.
1744. Celsius, Anders (born 1700), astronomy, &c.
1763. Dalin, Olof (born 1708), history, poetry, &c.
1763. Mörk, Jac. Hen. (born 1714), novels, &c.
1763. Nordenflycht, Hedwig Charlotte (born 1718), poetry.
1770. Tessin, C. Carl Gustaf (born 1697), architecture, literature, &c.
1777. Rudbeck, Olof (born 1756), heroic-comic poetry.
1778. Linnæus, Carl (born 1707), botany, &c.
1780. Ihre, Joh. (born 1707), philology and antiquities.
1785. Creutz, Count Gust., poetry.
1790. Botin, A. V. (born 1724), history, &c.
1793. Lidner, Bened. (born 1769), poetry.
1794. Celsius, Olof, bishop of Lund (born 1716), 'Gustavus Vasa,' an heroic poem; tragedies.
1795. Bellman, Carl M. (born 1745), poetry, songs, &c.
1795. Kellgren, Joh. Hen. (born 1751), satires.
1799. Stenhammar, Joh. (born 1769), poetical tales, &c.
1800. Boethius, Dan., moral philosophy, &c.
1801. Hiernöe, Joh. (born 1748), sculptor and architect.
1807. Lehnberg, Magnus, Bishop, sermons.
1808. Gyllenborg, Count Gust. (born 1731), poetry.
1808. Thorild, Thos. (born 1759), poetry, philosophy, politics.
1810. Elqstrom, Pehr, poetry.
1812. Hoijer, Prof. Benj. C. H. (born 1757), philosophy, æsthetics, &c.
1814. Sergell, Tobias (born 1740), eminent sculptor.
1815. Lindegren, Carl, comedy, elegiac poetry, &c.
1816. Silferstolpe, Axel Gabr., poetry, translations, &c.
1816. Hörberg, Pehr (born 1746), historical painter.
1817. Lenngren, Anna Maria (born 1754), poetry.
1818. Adlerbeth, Baron d', Gudmund, tragedies, &c.
1818. Oxenstjerna, Count (born 1750), poetry and oratory.
1820. Torneblad, Bengt. Jon., political pieces, &c.
1821. Edelkrantz, Baron, poetry, fine arts, science.
1821. Wahlberg, Carl Gust., novelist.
1823. Stagnelius, Eric Joh. (born 1793), epic poetry, &c.
1824. Silferstolpe, G. A. (born 1772), history and geog.
1824 (about). Rosenstein, Nils (born 1752), poetry, &c.
1827. Biberg, philosophy.

1827. Thunberg, C. P. (born 1742), natural history, &c.
1827. Hammarskiold, Lorens (born 1785), criticism, &c.
1828. Sjöberg, Eric (Vitalis), (born 1794), poetry.
1829. Leopold, Carl Gust. (born 1756), tragedies, lyric poetry, &c.
1829. Ödmann, Samuel (born 1750), theology, &c.
1831. Stjernstolpe, Joh. Magnus (born 1777), poetry.
1837. Afzelius, Adam (born 1750), natural history.
1837. Afzelius, Joh. (born 1753), chemistry.
1839. Rudberg, Prof. Fred. (born 1800), physical sciences.
1839. Nicander, Carl A. (born 1799), poetry.
1839. Wallin, Olof, Archbishop (born 1779), religious poetry, &c.
1839. Fries, Elias (born 1794), botany, philosophy, &c.

Living Writers, &c.

Born.
1760. Adlersparre, Georg., history, statistics, military science, general literature.
1772. Franzen, Frans Mich., Bishop, poetry.
1774. Fahlcrantz, Carl Joh., landscape painter.
1776. Ling, Pehr, epic poetry, history.
1779. Goethe, Gust., sculptor.
1779. Berzelius, Jacob, chemistry and physical sciences.
1781. Wingard, Carl Fred., Archbishop, theology, &c.
1782. Tegner, Esaias, bishop of Wexiö, poetry, &c.
1783. Bystrom, Joh. Nich., sculptor.
1783. Geijer, Eric Gust., history, lyric poetry, &c.
1785. Afzelius, Arvid Aug., poetry.
1788. Palmblad, Wilh. Fred., biography, geography, poetry, tales, &c.
1790. Atterbom, Dan. Amadeus, distinguished poet.
1790. Fahlcrantz, Chr. Eric, humorous poetry.
1791. Lundblad, Joh. Fred., 'Svensk Plutark.'
1791. Dahlgren, Carl J., humorous poetry, tales, &c.
1794. Ahlquist, Abr., archæology, history, botany.
1795. Fryxell, Anders, history, poetry.
1796. Beskow, Bernh., drama and poetry.
1800. Wahlberg, Pehr Fred., botany, medicine, &c.
1802. Bremer, Frederika, novelist.
1807. Böttiger, Carl Wilh., poetry.
* Fogelberg, Bengt Erland, sculptor.
* Runeberg, Joh. Ludvig, epic poetry, idylls, &c.

SCANDIX (from σκάνδιξ), the name of a genus of plants belonging to the natural order Umbelliferæ. It is known by the margin of its calyx being obsolete or obscurely 5-toothed; petals obovate, emarginate, and mostly furnished with an inflexed point; fruit with a very long beak, separable into two parts, each with 5 blunt equal ribs, the furrows without vittæ; seed squarely convex, with a deep furrow in front. This genus is composed of annual herbs, with square rather striated stems, bi-pinnate leaves, the leaflets divided into linear lobes. The umbels have few rays. The involucra are wanting or composed of one leaf. One of the species, *S. pecten veneris*, the common Shepherd's Needle, or Needle Chervil, is a native of Europe and the North of Africa, and is very plentiful in the cultivated fields of Britain. It is known by its involucels possessing jagged leaves, and its nearly smooth fruit with a bristly-edged beak. It possesses slightly acrid and aromatic qualities, and is supposed to be the Scandix of Dioscorides, which was used as a potherb by the Greeks. One of the species of this genus, *S. cerefolium*, the garden chervil, which is now referred to the genus Anthriscus, was formerly much cultivated in gardens, and was recommended by Geoffroi and Haller as a medicine in dropsy, hæmorrhoids, and other diseases. It is used in France as a salad, and in Holland as a potherb, but is not in much repute in this country. It is known by its twice-pinnate leaves, with channelled footstalks, stem slightly hairy at the joints, umbels sessile, either axillary or opposite the leaves; fruit somewhat furrowed, not ribbed, smooth. It is a native of the South of Europe, and though common in some parts of Great Britain, is probably an outcast from gardens.

SCANIA. [SWEDEN.]

SCANSO'RES, Mr. Vigors's name for an order of birds comprising the families RAMPHASTIDÆ, PSITTACIDÆ, Picidæ [WOODPECKERS], Certhiadæ [CREEPER], and CUCULIDÆ. (*Linn. Trans.*, vol. xiv.)

Mr. Swainson also makes the *Tribe Scansores* consist of the families *Ramphastidæ*, *Psittacidæ*, *Picidæ*, *Certhiadæ*, and *Cuculidæ*. (*Classification of Birds*, vol. ii.)

The Prince of Canino arranges under the tribe Scansores the families *Psittacidæ*, *Picidæ*, and *Cuculidæ*. (*Birds of Europe and North America.*)

Mr. G. R. Gray makes the order *Scansores* consist of the *Ramphastidæ*, the *Psittacidæ*, the *Picidæ*, and the *Cuculidæ*.

SCANTLING, a term used by carpenters to express the transverse dimensions of a piece of timber; and also, in some cases, as a general name for small timbers, such as the quartering for a partition, rafters, purlins, or pole-plates in a roof, &c. All quartering or squared timber under five inches square is designated scantling.

In masonry the same word is used to express the size of stones in length, breadth, and thickness.

SCAPEGOAT, or AZAZEL (עֲזָאזֵל). On the great day of atonement among the Jews, the high-priest was to choose two goats, and after presenting them before the Lord at the door of the tabernacle, he was to cast lots upon them, one lot being for the Lord, and the other 'for Azazel.' The one upon which the Lord's lot fell was to be sacrificed as a sin offering, and the other was to be presented alive before the Lord to make an atonement with him, which was done by the high-priest laying both his hands on the head of the goat, and confessing over him the sins of all the people, which were thus said to be 'put upon the head of the goat.' The goat was then to be sent away into the wilderness by the hand of a fit man, who was to let him go in the wilderness. (*Levit.*, xvi. 8-28.) According to the Rabbins, the goats were placed before the high-priest, one on his right hand and the other on his left, who then drew out of an urn with his two hands two lots, the one inscribed 'for the Lord,' and the other 'for Azazel,' and the fate of each goat was determined by the lot that appeared in the hand before which he stood. It was considered a favourable omen when the lot 'for the Lord' appeared in the high-priest's right hand. The high-priest then fastened a long narrow fillet of scarlet to the head of the scapegoat, and after confessing his own sins and those of the people over him, he sent him away. If the atonement was accepted, the fillet on the goat's head, as the Rabbins say, turned white; and to this circumstance they understand Isaiah to allude in those words, 'Though your sins be as scarlet, they shall be white as snow' (i. 18). The goat was then carried to a desert place (in the time of the Temple), about twelve miles from Jerusalem, where, instead of being set at liberty (*Levit.*, xvi. 22), it was thrown down a precipice, and thus dashed to pieces. This consummation of the sacrifice was communicated by signals to the people assembled at the Temple, when another token of the divine acceptance was given by a crimson fillet which was tied on the Temple door turning white. It is added that the usual tokens of the divine approbation ceased about the time of the death of Christ. (Lightfoot's *Works*, vol. ix., p. 173-180; x. 75, 104-5, ed. Pitman.) The typical import of this ceremony, namely, that Christ *bears away* the sins of men, seems to be referred to by Isaiah (liii. 11, 12), and in the following passages of the New Testament (*John*, i. 29; *Heb.*, ix. 28; 1 *Pet.*, ii. 24).

The meaning of the word *Azazel* is very doubtful. It seems to be derived from a root (which still exists in Arabic) meaning *to separate*. 1. The common interpretation refers it to the goat itself as being *sent away*. 2. Some take it to be the place to which the goat was sent, as being either a proper name, or merely a general term for a *separate place* or wilderness. 3. Spencer and most of the German critics consider it to be the name of an evil spirit, who was supposed to inhabit desert places; and they would translate *Levit.* xvi. 10, 'to let him go *to Azazel* (instead of, *for a scapegoat*) into the wilderness.' These three explanations are discussed in Jennings's 'Jewish Antiquities' (b. iii., c. 8), who has pointed out formidable objections to the last view, and especially the close resemblance which the ceremony so explained bears to that worship of devils which was expressly forbidden by the Mosaic law (*Levit.*, xvii. 7). The best explanation appears to be that of Winer (*Biblisches Realwörterbuch*, art. 'Versöhnungstag'), who understands the word, with the prefix which is attached to it each time that it is used, to mean *for a separation* or *putting away*, namely, of the sins of the people.

(Calmet, arts. 'Azazel' and 'Expiation;' Spencer, *De Leg. Hebraeor.*; Bochart, *Hierozoicon*; Jahn, *Archäol. Bibl.*; Rosenmüller, *Scholia*, *Levit.* xvi.)

SCAPHIDURI'NÆ. [STURNIDÆ.]

SCAPOLITE, *Chelmsfordite*, *Paranthine*, *Wernerite*. occurs crystallized and massive. Primary form a square prism. Cleavage parallel to the lateral faces and the dia gonal planes of the primary form. Fracture uneven, conchoidal. Hardness, easily scratches fluor spar and sometimes apatet. Colour white, grey, green, reddish, violet. Lustre vitreous; translucent, opaque. Specific gravity from 2·612 to 2·724. When strongly heated by the blowpipe it swells up and fuses into a brilliant white enamel. Scapolite occurs in Sweden, Norway, Finnland, and North America.

Analysis of the mineral from Pargas by Nordenskiold:—

Silica . .	43·83
Alumina . .	35·43
Lime . .	18·96
Water . .	1·03
	99·25

SCAPTEIRA, Fitzinger's name for a genus of *Pristidactyle Cœlodont Saurians* (*Lacertian* or *Autosaur Lizards*) of Duméril and Bibron.

Generic Character.—Tongue of an arrow-head shape, with no sheath at the base, moderately long, notched at the anterior extremity, covered with imbricated squamiform papillæ. Intermaxillary teeth conical, simple. Maxillary teeth slightly compressed; the first simple, the succeeding teeth tricuspidate. Nostrils lateral, circumscribed by three convex plates—one naso-rostral, two nasofrenal. Eyelids. Tympanic membrane stretched within the auricular border. A fold of the skin in front of the breast. Lamellæ on the belly. Femoral pores. Feet terminated each by five flattened toes, which are smooth below, but dentilated laterally. Tail cyclo-tetragonal at its root, rounded throughout the rest of its extent.

Example, *Scapteira grammica.*

Description.—Greyish white, washed with greenish on the upper parts. The cranium and the temples sprinkled with black specks. Other black specks, but finer and more numerous, are spread upon the neck, the back, and the sides, and united to each other by delicate lines still more fine. Some small black dashes are scattered on the base of the tail. The upper part of the limbs dotted (piqueté) with black: all the lower parts white.

Locality.—Africa (Nubia). (Dum. and Bibr.)

SCA'PULA. [SKELETON.]

SCA'PULA, JOHN, was probably a native of Lausanne. He lived during the latter half of the sixteenth and the commencement of the seventeenth century, and at one period of his life he was employed at Paris in the printing establishment of Henry Stephens. The time of his death is unknown, but it is probable that in the year 1612 he was still alive. Scapula is only known as the editor of a Greek dictionary, which, instead of gaining him credit, has drawn upon him the just and severe censure of all honest men. He was employed by Stephens at the time when that great scholar was printing his 'Thesaurus Linguæ Græcæ,' which was published in 1572. After the publication of that work, Scapula appears to have left his employer, for in 1579 he published at Basel a 'Lexicon Græco-Latinum,' fol. This dictionary is in fact only an extract from or abridgement of the great work of Stephens. The sale of the 'Thesaurus' was of course greatly diminished by the publication of an abridgement, and Stephens, who had spent almost all that he possessed upon his work, became involved in considerable difficulties. Scapula did not even acknowledge what he had done; on the contrary, he constantly endeavoured to conceal the source from which he had drawn. Some of his biographers have asserted that Scapula published his dictionary while the 'Thesaurus' was printing, an assertion which is wholly unfounded, for there is no edition earlier than that of 1579. Though Scapula injured Stephens, he did a great service to those students who could not afford to buy the expensive work of Stephens.

The dictionary of Scapula has frequently been reprinted. He himself published a second edition at Basel in 1589. Other reprints appeared in 1594, 1598, 1605, 1611, 1627, 1637. The Elzevirs of Amsterdam published, in 1652, a fine edition in folio, which was reprinted, in 1665, at Basel. The last editions are those of Glasgow, 1816, 2 vols. 4to., and of London, 1820, 4to., edited by Major. Another work of Scapula, 'Primogeniæ Voces, seu Radices Linguæ Latinæ,' was published at Paris, in 1612, 8vo.

SCARABÆIDES, a very extensive group of beetles forming the chief part of the section Lamellicornes. The Scarabæides of Latreille were regarded by Linnæus as a genus, but this great naturalist being acquainted with 87 species only, whilst the various collections at the present time contain together about 3000, it is natural that entomologists should have sought for characters among the species of this immense group, by which they might be divided into sections; hence we find in the works of Fabricius (Linnæus's pupil) the present group raised to the rank of a family, and subdivided into several genera. These genera are however but few in number compared with those instituted by modern entomologists, which amount to nearly 200.

The Scarabæides (or Scarabæidæ) are distinguished from the other section of Lamellicorn bettles (the *Lucanidæ*) chiefly by the structure of their antennæ, which are proportionately shorter; the basal joint being of moderate size, that is, but little longer than those which follow it;[*] whereas, in the *Lucanidæ*, the basal joint is usually very long, and often nearly as long as all the other joints taken together,[†] the latter forming, in their natural position, an angle with the first joint. The club with which the attennæ terminates also generally differs considerably in form. In the *Scarabæidæ* it is most usually composed of three leaf-like joints but sometimes the number is increased to seven, as in the common cockchafer (Melolontha vulgaris), and these joints, when the insect is at rest, are closely applied together, and form either an elongated or rounded nob, which is bent at an angle with the basal joints. In those species which have the club rounded, the two outer joints are stouter than the others, and have the external surface convex, and the internal convave. In the *Lucanidæ* the terminal joints are produced in front at an angle with the axis, but are less expanded, and generally more distinctly separated and shorter than in the *Scarabæidæ*. The more typical species of the *Lucanidæ* moreover are remarkable for the great development of the mandibles in the male sex.[‡]

Latreille divides the *Scarabæidæ* into six sections, to which he applies the following names:—*Coprophagi*, *Arenicoli*, *Xilophili*, *Phyllophagi*, *Anthobii*, and *Melitophili*.

The *Coprophagi* have the antennæ generally composed of eight or nine joints, the three last of which form the club; the labrum and the mandibles are membranous and hidden, and the lobe with which the maxillæ are terminated is also of the same texture; it is broad and curved inwards. The terminal joint of the maxillary palpi is always the largest, and either approaches to an oval form, or is nearly cylindrical: but the terminal joint of the labial palpi is almost always more slender than the preceding joints, and often very small. Behind the last-mentioned palpi is a small membranous protuberance. The mentum is emarginated, and the claws of the tarsi are always simple.

To this group belong the dung-feeding Scarabæi, and these are for the most part of a black colour, or black and brown. Some few species however are adorned with brilliant metallic colours. They are usually of a short and broad form; in some the body is somewhat depressed, and approaches to a square form; the head is large, broad, and flattish, and has numerous notches in front; the fore legs are very broad and deeply notched on the outer side, and are moreover remarkable for the want of tarsi to the anterior pair of legs, and the absence of a scutellum. To this section belongs the Sacred Beetle of the Egyptians. The *Scarabæus Sacer* of Linnæus is about one inch long, or rather more, and of a black colour. This species is not only found in Egypt, but is met with in the South of France, Spain, and Italy, and, as well as other species of the group to which it belongs, encloses its eggs in a ball of excrement, which it forms by rolling the substance by means of its hind legs. The size of the ball, when completed, is much larger than that of the insect, being sometimes as much as one inch and a half in diameter.

In other species of the *Coprophagi* the body is convex, and although short, slightly inclining to a cylindrical form. A great portion of these have the head armed with an erect horn in the male sex, and the fore part of the thorax truncated or slightly concave, elevated in the middle, and not unfrequently produced at the sides into short stout pointed horns, as in the genus *Copris*. In a closely allied genus (*Phanæus*) the species are usually adorned with brilliant colours. These insects have often a very long horn on the head, or this is sometimes replaced by two short horns; the thorax has a concavity in front, and usually has an angular protuberance on each side of the disk. These insects are usually of moderate size, and sometimes large, but there are two extensive groups of *Coprophagi* the species of which are small; they constitute the genera *Onthophagus* and *Aphodius*. In the former the body is short and subdepressed; the thorax is nearly as large as the elytra, and has a concavity in front, and a protuberance in the middle of the posterior boundary of this concavity; the head is usually armed with a small horn, which is directed backwards and upwards. In the *Aphodii* the body approaches to a cylindrical form, and the head and thorax are destitute of horns.

---

[*] See Fig 9 in Article COLEOPTERA, vol. vii., p. 341.

[†] See Fig. 13.—*Ib*

[‡] The common Stag-beetle (*Lucanus Cervus*) affords a familiar example of this family.

Of the genera mentioned, we possess no British examples of the first, or *Scarabæus* proper (or *Ateuchus*, according to some authors). The species of this group are confined to the warmer parts of the Old World. The species of the genus *Copris*, *Onthophagus* and *Amphodius*, are of universal distribution, if we except Australia, where we are not aware that the first of these genera occurs. The species of *Phanæus* are almost entirely confined to the warm parts of South America, the only exceptions occurring in North America.

The species of the second great section of the Scarabæidæ (the *Arenicoli*) are distinguished by their having the mandibles horny and usually projecting; the lobe of the maxillæ is straight; the terminal joint of the labial palpi is always distinct, and nearly as long as the preceding; the antennæ have ten or eleven joints; they are moreover distinguishable from other Scarabæi (the species of *Aphodius* excepted) by their elytra being extended over the apex of the abdomen. The three principal genera in this section are *Geotrupes*, *Bolboceras*, and *Trox*. The species of *Geotrupes* are usually of moderate size, of a black colour, often tinted with blue or green, and usually brilliant beneath. The body is convex, and the head and thorax are rarely furnished with protuberances; they are almost entirely confined to Europe, North Asia, and North America; feed upon the excrement of cattle, under which they construct their burrows. Several species are found in England, and some are seen in great abundance flying about the roads towards the evening.

In *Bolboceras* the body is nearly hemispherical; the males are often provided with an erect horn on the head, and protuberances on the fore part of the thorax. The species are usually of moderate size, and appear to be found in all the temperate and warm parts of the globe. Only one species is found in this country.

The species of the genus *Trox* are also usually of moderate size, and are found in all parts of the globe. In these insects the body is convex, and remarkable for the roughness of the upper parts: they are always of a dull brown or greyish colour, and appear as if covered with a coating of dried earth. Their food (according to Latreille) consists of the roots of vegetables, but they will also eat decayed animal substances, and in this respect differ from other *Scarabæi* the habits of which we are acquainted with.

Latreille's third and two following sections we cannot regard as very natural. [XILOPHILI.]

SCARBOROUGH is a borough and market town situate in the wapentake of Pickering Lythe, in the North Riding of the county of York, in 54° 18′ N. lat. and 11″ W. long., 40 miles north-east of York, and 217 north of London. It returns two members to parliament.

The peculiarities of the locality attracted to it inhabitants at a very early period: its name, implying a fortified rock, is of Saxon derivation, and there is reason to suppose that it was also a Roman settlement.

It is situated in the recess of a semicircular sweep of the coast, forming a bay open towards the south and south-west, and protected towards the north and north-east by the high and steep promontory with the old castle on its summit. It has, step by step and street by street, crept up the acclivity, the oldest streets having been formerly a part of the sands, and the modern streets and terraces being the most elevated, and commanding an extensive seaward prospect.

The first authentic record of its municipal character occurs in the reign of Henry II., who conferred a charter of incorporation upon the town, and granted to the bailiffs, burgesses, and inhabitants certain dues on merchant ships and fishing-vessels, to enable them 'to make a new port with timber and stone.' It ranks amongst the most antient boroughs that send members to parliament; and in the parliament held in 1282, the 11th of Edward I., Scarborough was the only town in Yorkshire, besides the city of York, that was summoned to send representatives. The town itself was in antient times defended by strong walls, a moat, and earthen mounds; and the castle must, before the application of artillery, have been absolutely impregnable to all attacks of open violence. The ruins of this antient castle are on a promontory elevated more than 300 feet above the level of the sea, having at the summit an area of nineteen good green acres, terminating on three sides in a perpendicular rock, and the fourth side, towards the town and bay, being a steep rocky slope. The castle was built in the reign of King Stephen, by William le Gros, earl of Albermarle and Holderness, and has been the scene of many events remarkable in history. Here Piers de Gaveston, the favourite of Edward II., sought refuge from the exasperated barons, but was obliged to surrender for want of supplies, and was beheaded. Robert Aske, the leader of the Pilgrims of Grace, made an unsuccessful attempt upon the castle in 1536. In the time of Wyatt's rebellion, in 1553, it was surprised and taken by Thomas, second son of Lord Stafford, by the stratagem of introducing a number of soldiers disguised as peasants; but three days afterwards it was retaken by the earl of Westmoreland, and Stafford and three other of the leaders were executed for treason. During the civil wars the castle underwent two sieges by the parliamentary forces, the first of which lasted twelve months. It was then, like many others, dismantled by order of the parliament. On the breaking out of the rebellion in 1745, it underwent a temporary repair; and when the danger was over, the present barracks, to accommodate 120 soldiers, were built and three batteries, for the protection of the town and harbour, have since been erected.

The style of the corporate body is, 'the bailiffs and burgesses of the town of Scarborough.' The borough is comprehended in the Act for the regulation of Municipal Corporations in England and Wales. Scarborough combines the advantages of sea-bathing and of mineral baths, and owes to these natural advantages its past celebrity and present prosperous condition. Its neighbourhood presents a course of the finest sands in England, undulating into a variety of beautiful bays, and sheltered by lofty cliffs and bold projecting headlands. Its own bay is spacious and open to the sea, and the water pure and transparent. The sand is clear, smooth, and level, and the inclination of the beach towards the sea scarcely perceptible. No considerable river enters this part of the sea, nor is the beach so extensive as to be very hot even under a summer's sun. The sea in the month of August is some degrees cooler than at Brighton or any place south of the Thames, and bathing may be enjoyed at all times of the tide, and in almost all sorts of weather, with security and ease. There are also various excellent baths, and the most complete accommodation for the enjoyment of marine bathing.

The two mineral springs on the very edge of the sea-water are protected from its encroachment by a handsome turreted structure called the New Spa, erected beneath the cliff, on an artificial foundation or sea-wall. This handsome building comprises a large saloon to assemble and walk in, and other smaller rooms and contrivances. Both the springs have been recently (in 1840) very minutely analysed by Professor Philipps of York, and are found to comprise carbonate and sulphate of lime, magnesia, and oxide of iron, in proportions which may be found accurately stated in Dr. Granville's 'Spas of England:' their effects are of a cooling and tranquillising character, and are of appropriate efficacy for patients labouring under acidity and pain in the stomach.

The scenery surrounding Scarborough is of a beautiful and indeed romantic character, and numerous objects of historic or architectural attraction are to be found within a moderate distance. Towards the north, elevated moors of great extent raise their bleak and barren summits, forming a bold and striking contrast in the landscape to the highly cultivated country that lies to the westward; and to the south and south-west the Wold Hills in the East Riding present another grand and extensive line of boundary to the prospect. Weaponness, or Oliver's Mount, little more than a mile from the town, possesses every requisite that can render a walk to its summit delightful. Within four miles is the picturesque village and parish of Harkness, where also is the elegant mansion of Sir R. V. B. Jonstone. The admirer of modern architecture may visit Castle Howard, the far-famed and splendid seat of the earl of Carlisle, while the lover of antient remains may contemplate the ruins of Rivaulx Abbey, supposed to have been the first Cistercian monastery founded in Yorkshire, which are of considerable extent and unusually perfect.

One of the most remarkable objects at Scarborough is the Cliff Bridge, erected upon piers seventy-five feet high, over a chasm 400 feet wide, which separates the town from the Spa, between which places the bridge now forms a delightful promenade. On the northern side of the bridge is an elegant circular edifice with a dome, for the museum of the Philosophical Society, which comprises a most complete and valuable series of geological specimens: part of the same building is also used as a news-room. There are two churches, the parish church of St. Mary's, and one more recently erected, called Christ Church; and also chapels in connection with various religious denominations—Independents, 'Baptists, Friends, Roman Catholics, Wesleyan and Primitive Methodists, and possibly some others.

Among the charities of the place may be mentioned the Amicable Society, for clothing and educating the children of poor persons in this town; the Seamen's Hospital, and a Sea-Bathing Infirmary. There are also several charities.

The population was 6409 in 1801, 6710 in 1811, 8188 in 1821, and 8369 in 1831.

SCARBROITE, *Hydrated Silicate of Alumina*, occurs massive. Fracture conchoidal. Hardness about 2·0. Easily scratched by the knife, and polished by the nail. Adheres to the tongue, and has a strong earthy smell when breathed upon. Colour white. Opaque. Dull. Streak shining. When put into water, does not become transparent, nor fall to pieces, but increases in weight. Specific gravity 1·48. Occurs as veins in the beds of sandstone covering the calcareous rock near Scarborough, between septæ of oxide of iron.

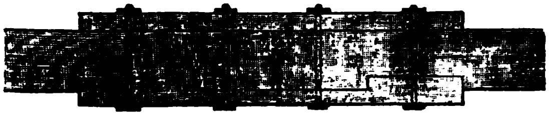
Analysis by Vernon:—

Silica	7·90
Alumina	42·75
Water	48·55
Oxide of Iron	0·80
	100·

SCARFING, the mode of joining two pieces of timber end to end, in such a manner that they may appear but one, and cannot be pulled asunder by a force applied in the direction of their length, without breaking off part of the wood at the joint.

Other modes of uniting two timbers into one continuous length are sometimes practised; as, for instance, the simple plan called *fishing* a beam, in which the ends abut against each other, and pieces of wood are added on each side, as shown in *Fig.* 1; the whole being held together by iron bolts. The strain on the bolts may be reduced by indenting the pieces added at the joint into the beam, as represented in the lower part of the figure; or by transverse keys of hard wood driven into grooves, of which one-half is cut in the beam, and the other in the supplementary pieces, in a similar manner to those shown in *Fig.* 6.

Fig. 1.



Where neatness is more essential than strength, scarfed joints are preferred to any arrangement of this kind, because a beam united by them is of the same breadth and depth at the joints as at other parts. *Figs.* 2 and 3 represent two of the simplest forms of scarfing, in both of which the strain is borne wholly by the bolts. It is advisable to add a plate of iron on the faces of the beam where the heads and nuts of the bolts pass through, and the ends of these plates may be turned into the wood, as shown in the cuts. Of these two plans the first appears rather preferable, because the screwing up of the bolts has no tendency to alter the position of the parts; while in the second it has a tendency to make the inclined faces slide upon each other, and thereby to open the joint.

Fig. 2.

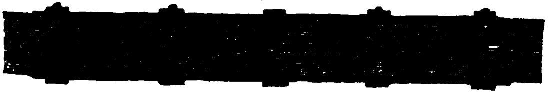
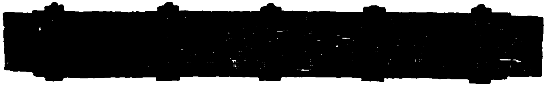


Fig. 3.



It is desirable to avoid depending solely upon bolts for the strength of a scarf, owing to the effect of the shrinking of the timber, and the liability of the bolts to be, in consequence of their small dimensions, pressed into the wood. *Fig.* 4 is a scarf that may be used without bolts, although the addition of them adds much to the security of the joint.

Fig. 4.

In this plan a key or wedge is driven gently into the square space at *a*, to bring the parts into their places. Two other illustrations will suffice to explain other varieties of scarfing. *Fig.* 5 is a diagonal scarf, in which the parts are said to be *tabled* together; they being so cut and fitted to each other that no force can separate them longitudinally, without breaking, so long as the bolts hold them together sideways.

Fig. 5.

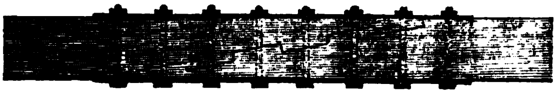
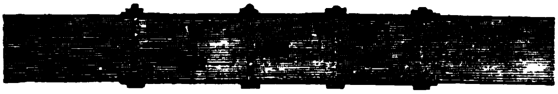


Fig. 6 shows a very simple and good plan of scarfing, which is easily executed with accuracy, owing to the absence of oblique faces. In this arrangement keys are used to resist any force tending to separate the beam in the direction of its fibres, instead of the parts being tabled together. The ends of the keys, which should be of hard wood, and let into both pieces of the beam to an equal depth, are shown by the dark tint in the cut.

Fig. 6.



Varieties may be almost infinitely multiplied by increasing the number of the faces, whether oblique or square, and uniting the parts either by tabling, keying, or a combination of the two; but in most cases the greatest simplicity should be aimed at, in order that the parts may the more readily be made to fit each other with accuracy. Very complicated scarfs have been used by some old carpenters, respecting which Robison observes that 'many seem to aim at making the beam stronger than if it were of one piece;' an absurdity too manifest to need refutation. Where a scarfed beam is exposed to transverse strains, the joint should be varied from the ordinary form; but for these and some other contrivances to meet peculiar circumstances the reader is referred to the practical works of Tredgold, Nicholson, &c. When a piece of timber subject to compression in the direction of its length has to be scarfed, oblique faces should be avoided, because of their tendency to slide upon each other. Though bolts are commonly used to secure scarfed joints, iron hoops or straps, driven on tightly, have been recommended in their stead, and possess the advantage of not weakening the timber. In joints that depend wholly on bolts, Tredgold recommends that the sum of their areas should never be less than two-tenths of the area of the section of the beam. From the same authority we give the following rules for the length of scarfs:—

In oak, ash, or elm, the whole length of the scarf should be six times the depth or thickness of the beam, where there are no bolts.

In fir, without bolts, twelve times the depth.

The whole length of a scarf dependent wholly upon bolts should be in oak, ash, or elm, about three, and in fir, six times the depth of the beam.

When bolts and indents are used together, the length of the scarf may be, in hard woods twice, and in soft woods four times the depth.

SCARIFIER. [Arable Land.]

SCARI'TIDÆ, a family of Coleopterous insects belonging to the section Geodephaga, which section corresponds to the genera *Carabus* and *Cicindela* of Linnæus. The *Scaritidæ* have the prothorax separated from the elytra by a narrow cylindrical neck; the mandibles are usually large and armed with strong teeth on the inner side; the labrum is small; the mentum is furnished with a tooth; the antennæ are usually short, and have the basal joint long; the legs are short; the anterior tibiæ are broad, and strongly notched on the outer side, and fitted for burrowing; and the anterior tarsi in the males are not dilated. The body is usually elongated, and straight at the sides; the head, thorax, and elytra are nearly equal in width. The principal genera contained in this family are *Scarites, Pasimachus, Camptodontus, Acanthoceles, Clivina,* and *Dischirius.*

In *Scarites* (Fabricius) the mandibles are strongly toothed on the inner side, the second and third joints of the antennæ are obconic, and the following joints are shorter, compressed, and subquadrate. The species of this genus are very numerous, and are found in nearly all the temperate and warmer portions of the globe.

The species of the genus *Pasimachus* differ chiefly from *Scarites* in being proportionately broader, and of a somewhat depressed form; in having the thorax produced on each side behind, and forming distinct angles; the mandibles are shorter and more arched, and the maxillæ have no terminal acute hook. The species of this genus are peculiar to North America, and are of a tolerably large size, averaging about one inch in length.

Dejean separates from *Scarites*, under the generic name *Oxygnathus*, the *S. elongatus* of Wiedemann, which differs in having the mandibles more slender and elongated, and destitute of teeth on the inner side. The only known species is found in the East Indies; it is of a very narrow form.

Camptodontus is another genus founded by Dejean upon a single species. In this insect the labial palpi are decidedly shorter than the external maxillary palpi; and, like them, are terminated by a spindle-formed joint: the basal joint of the antennæ is scarcely longer than either of the following joints. It inhabits Cayenne.

The genus *Acanthoceles* is established by Latreille upon a singular insect found at the Cape of Good Hope; it is of a short and broad form, and has the anterior tibiæ still more strongly notched than in the species of *Scarites;* the tibiæ of the middle and hinder pair of legs are stout, curved, and concave on the inner side, and very rough and covered with short spines on the outer side. The thorax is broader than long, and the elytra are almost equal in length and width, distinctly striated, and rounded at the apex. This insect is of a black colour (as are almost all the *Scaritidæ*), and about three-quarters of an inch in length.

The species of *Clivina* are of small size, averaging about a quarter of an inch in length, and nearly cylindrical form. The basal joint of the antennæ in these insects is scarcely longer than the others, the mandibles are comparatively short, and the terminal joint of the palpi is pointed. They are found nearly all over the world; they live under stones, and frequent damp situations.

In the genus *Dischirius* the species also have a wide geographical range, and are of small size; indeed the smallest of the present family: they are very nearly allied to *Clivina*, but are almost invariably adorned with metallic colours, usually brassy-green. The terminal joint of the labial palpi is proportionately stouter than in *Clivina;* the thorax usually approaches to a spherical form, and the tibiæ are less strongly notched. Numerous species of this genus are found in England, the largest of which is less than a quarter of an inch in length. They are always found on the wet mud on the margins of ponds and such places.

SCARLATI'NA (originally written Scarlattina, from *scarlatta*, a red-coloured cloth), scarlet fever. This disease was not distinguished by the antients from any of the other eruptive fevers; they contented themselves with classing together all these fevers as pestilential, and they attributed the variety of eruptions that accompanied them to different combinations of the humours. Small-pox, measles, and scarlatina were described by the Arabians, but they looked upon them merely as varieties of the same disease, and even to the close of the eighteenth century the two last-named maladies were confounded. Dr. Withering, in a second edition of an essay which he published on scarlet fever in the year 1793, first pointed out its distinctive characters.

Scarlatina, like small-pox and measles, may appear as an epidemic, or it may be propagated by a specific contagion; as an epidemic, it most usually appears at the latter end of the summer and the beginning of autumn; sporadically, it is met with at all seasons. It further resembles the diseases we have just named in rarely attacking twice the same individual. Scarlatina varies much in severity, from the mild febrile disturbance which has been pronounced by Sydenham to be fatal only through the officiousness of the doctor, to that grave form of the disease which has received the appellation of malignant. This difference has given rise to its division into three species, the Scarlatina simplex, S. anginosa, and S. maligna. Scarlatina is ushered in by rigors, followed by increased heat of the body, thirst, loss of appetite, and all the symptoms of inflammatory fever. On the second day of this fever, or somewhat later in the severer forms of the disease, patches of a scarlet-coloured efflorescence begin to appear on the face and neck, which extend downwards, and, coalescing, soon spread over the whole body. On the trunk however the rash is seldom uniform, but is distributed in diffuse irregular patches, the scarlet hue being most vivid about the flexures of the joints and on the loins; occasionally minute vesicles are visible, and Sauvages has considered this circumstance sufficient to constitute a distinct species, which he calls S. variolodes. On the third and fourth days the eruption is at its height; even the mouth and fauces are not free from it, the papillæ of the tongue are unusually red and elongated, and the face is generally more or less swollen. On the fifth day it begins to decline, disappearing by interstices, so that the patches reappear as at the commencement, and it is generally gone before the end of the seventh. Between the eighth and twelfth days the cuticle comes off in the form of a scurfy desquamation, and the fever has subsided. At those periods of the disease when the eruption is in patches, scarlatina is apt to be mistaken for measles, but it may readily be distinguished from the last-named disease by the following signs:—In measles the patches are of a rosy hue, of a crescentic form, and elevated above the surrounding skin; in scarlatina they resemble more the colour of boiled lobster, want the crescentic shape, and the hand passed over them detects minute asperities, but no elevated patches. It is further distinguished from measles by the greater heat of skin, the temperature being sometimes as high as 108° or 112° of Fahr., by the absence of catarrhal symptoms, and by the state of the papillæ of the tongue.

Roseola is the name of an affection which is characterised by an eruption bearing some resemblance to scarlatina; but it is of a more crimson colour, pursues its course in a direction contrary to that of scarlatina, viz. from the extremities and trunk to the neck and face, and is attended with less constitutional disturbance.

Scarlatina accompanied with sore throat, anginosa, or cynanchica, as it is termed, is a much more frequent and severe form of the disease than that which we have just described. Not only are the precursory febrile symptoms more violent, but the whole course of the malady is protracted; the eruption is seldom so universal as in the simple variety, but is in scattered patches which frequently vanish and reappear, the interior of the mouth and fauces is of a high red colour, tumefied and painful, superficial ulcerations not unfrequently form on the tonsils, uvula, and soft palate, and the throat is much clogged up with a tough viscid phlegm. In S. maligna the fever is of a typhoid character, the pulse is small and feeble, the tongue and lips dry, and encrusted with a brown fur; there is delirium alternating with coma, and the rash is faint and continually coming and going; the ulcers in the throat are covered with dark coloured sloughs, and a large quantity of viscid mucus clogs up the fauces and impedes respiration and deglutition. These symptoms are often accompanied by diarrhœa, and by petechiæ on the skin, with hæmorrhage from the nose, throat, bowels, or other parts, which generally lead to a fatal termination this may occur on the third or fourth day of the disease, or the patient may linger to the second or third week: if recovery take place, it is exceedingly tedious. It has been observed that during the prevalence of scarlatina adults are not unfrequently affected with the efflorescence in the mouth and throat, without the skin participating in the affection. For this class of cases Dr. Tweedy has proposed the name of S. faucium. All the varieties of scarlatina that we have mentioned may be observed during the prevalence of the same epidemic, and even among members of the same family; but it is no less true that each epidemic has generally a certain character or type, which it is important to ascertain in order to regulate the treatment. This circumstance renders it difficult to come to any just conclusion as to the mortality from this disease.

From the register of cases kept at the London Fever Hospital, it appears that in the years 1822 and 1823 the disease was extremely mild, as none of the patients died during these years. In 1824 the mortality was 1 in 21; in 1825, 1 in 13; in 1826, 1 in 29; in 1827, 1 in 41; in 1828, 1 in 10; in 1829, 1 in 6; in 1830, 1 in 6; in 1831 the disease was not prevalent, and none of the cases proved fatal; in 1832 the mortality was 1 in 40. Of 644 cases treated at this hospital, the gross mortality was 38, of which 13 were males and 25 females. Tables kept at the same institution show that females are more subject to its attacks than males, and children than adults; but it is not a disease which prevails so generally as measles or small-pox. If not equally prevalent however, the secondary diseases induced by it are perhaps more troublesome and numerous, and among the principal of these may be enumerated anasarca, ophthalmia, inflammation of and discharge from the internal ear, with destruction of its drum, and consequent deafness, enlargement and suppuration of the cervical glands, laryngitis, and chronic bronchitis. The first-named of these diseases, Anasarca, is of such frequent occurrence, that a few remarks on it are necessary to render complete our history of Scarlatina. It comes on as frequently after the mild as after the severe forms, but is never observed as a sequence of S. maligna, and rarely occurs after puberty. Two or three weeks after desquamation of the cuticle has taken place, and while the patient is convalescing, he begins to complain of languor and loss of strength and appetite; his sleep is disturbed, his pulse quick, his bowels costive, and his urine scanty. Or the attack may begin with sickness and purging, the face and upper parts then begin to swell, and the swelling shortly extends over the whole body. In some rare instances, after the anasarca has become general, effusion has taken place into the brain, chest, and abdomen, occasioning death in a few hours. The morbid appearances which are met with in the bodies of those who die of Scarlatina, depend upon the stage of the disease at which dissolution took place. At an early period, it may be said that we are unacquainted with any changes in the solid or fluid constituents of our frame that are characteristic of the disease we are treating of, whilst those that are met with when death has taken place at a more advanced period can hardly be said to be proper to the disease, but are owing to certain morbid actions supervening upon it and excited by it. With respect to the treatment of Scarlatina, it must have reference to the constitution of the individual attacked, to the type of the prevailing fever, and to the particular form of it by which he may be effected. In the simple variety, little is required beyond keeping the patient quiet and cool, and restricting him to the use of a mild unstimulating diet. In the S. anginosa, the treatment as a general rule should be antiphlogistic, general bleeding is not requisite, and is apt to retard recovery by reducing the patient's strength; but cupping on the back of the neck, or the application of leeches behind the ears or under the jaw, is considered by Dr. Tweedy to be 'the most effectual mode of relieving the inflammation of the throat.' Emetics are likewise recommended at the commencement of the disorder, and the bowels are to be kept open by means of gentle aperients. Many practitioners advise the employment of antimonials and other diaphoretics, in order to excite perspiration, but these remedies fail in producing what their advocates so much desire, and consequently no useful purpose can be served by their exhibition. The practice which seems on the whole to be most beneficial, and certainly is most agreeable to the patient's feelings, consists in reducing the unnatural heat of the skin by the application of external cold. Dr. Currie of Liverpool, who first called the attention of the profession to this point, directs that the patient be taken out of bed, 'stripped naked, and placed in an empty tub; a bucket or two of cold water is then to be suddenly emptied over the head, and the body being quickly dried, he is to be again placed in bed. If the sensation of chilliness remain, a little warm wine and water is to be administered.' The more usual mode is to wash or spunge the surface of the body with cold water, or vinegar and water, as often as the temperature is above the natural standard. It is of course necessary that the apartment be kept cool and well ventilated, and the thirst may be allayed by acidulated drinks. When the throat is much affected, a small blister may be applied externally, and warm-water gargles made use of; or the steam arising from warm water may be inhaled with advantage. After the fever and rash have abated, bark and the mineral acids, with a more generous diet, should be prescribed.

S. maligna, if seen at its commencement, is generally benefited by an emetic; but in a more advanced stage it requires the same mode of treatment which is adopted in all malignant fevers. While the excretions are promoted by some mild mercurial preparation, as the Hydrargyrum cum cretâ, in doses of three to five grains once or twice a day, local inflammation must be guarded against and combated by means of leeches and blisters, and at the same time the strength must be supported by a suitable diet. Cases in which the vital powers are extremely low require the free administration of wine and the occasional use of opium. The sesqui-carbonate of ammonia has been much recommended by Dr. Peart, who directs that two drams of it be dissolved in five ounces of water, and that two tea-spoonfuls of this mixture be given every two, three, or four hours, according to the urgency of the symptoms. When the cutaneous heat is great and the surface dry, tepid washings afford great relief; and where the patient is unable to gargle his throat, the sloughs and mucus should be removed by means of the syringe. Similar treatment, both local and general, will be required in that variety of the disease in which the throat is affected without any efflorescence on the skin, regard of course being had to the degree of its virulence. In the treatment of all these varieties of Scarlatina practitioners may differ in opinion respecting the efficacy of particular remedies, but they are all agreed upon the general principles to be adopted, and of these none is more important than the ventilation of the sick chamber and the free admission of fresh air around the patient.

SCARLATTI, ALESSANDRO and DOMENICO, father and son, are persons of great celebrity in musical history, who flourished from the latter part of the seventeenth century till the middle of the eighteenth.

ALESSANDRO, founder of the Neapolitan school of music, was born at Naples in 1650, and though it is not known from whom he derived his early instruction, it is certain that he completed his studies under Carissimi, to whose notice he introduced himself, and whose favor he obtained by his performance on the harp, which was of the most finished kind. This acquaintance was formed at Rome, in which city, and also at Venice, Alessandro produced many compositions, both for the church and theatre, with uniform success. After passing some years in various parts of Italy, he finally settled in his native city, and devoted himself to his art, the improvement of which was his most anxious wish, and engaged a large share of his time. He at first turned his attention to the operatic overture, and soon gave a dramatic character to what till then had been without design and wretchedly meagre. He also is supposed to have originated violin accompaniments to airs, and likewise those symphonies, or ritornels, which afford variety and relieve the singer. The recitative *obbligato* is also indebted to him for vast improvement; and the *da capo*, or repetition of the first portion of an air, is ascribed to him, and continued long in use; though modern taste has abolished what, very frequently in vocal music, led to a gross violation of common sense.

The elder Scarlatti, we are told, produced two hundred masses, a hundred operas, and three thousand cantatas. He was, Dr. Burney says, author of the words of many of the last. The same writer adds, that he 'found part of his (Scarlatti's) property among the stolen goods of all the best compositions of the first forty or fifty years of the last century.' Very little of this amazing quantity was ever printed, and a still smaller portion is known, even to musical antiquaries, at the present day. Some of the cantatas were arranged as duets by Durante, his pupil. [DURANTE.] A clever madrigal for four sopranos and an alto is published in the second part of Martini's *Saggio di Contrappunto;* and a fugue of his composition, in F minor, which, for scientific contrivance and beauty of effect, has few rivals, appears among the Harpsichord Lessons of his son. He was knighted at Rome by Christina, queen of Sweden, and there died in 1725.

DOMENICO SCARLATTI was born in 1683. He inherited the prudence as well as the talent of his father; and as the parent had profited much by his connection with so great a master as Carissimi, so the son derived at least equal advantages from his acquaintance with the first of musicians, Handel, whose friendship he acquired while both were residing at Venice. So much attached was the young Italian to the celebrated Saxon, that he followed him to Rome, and only quitted his friend on receiving an appointment in the service of the king of Portugal. He afterwards returned to the papal city; but on the death of his father, proceeded to Naples, where he formed an intimacy, beneficial to both, with Hasse, an opera composer of the first rank. [HASSE.] He finally, in 1735, accepted an invitation to Madrid, as master of the royal chapel and teacher to the queen, who had been his pupil at Lisbon. He died in that city in 1751.

Domenico left many operas and other compositions; but his 42 *Suites de Pièces pour le Clavecin* is the work by which he is now known, and on which his reputation solely rests. To execute these was, during nearly half a century, the object at which all ambitious harpsichord players aimed: to perform them well was considered a decisive proof of practical excellence; and even now it requires a nimble and brilliant finger to do them justice, though in point of style they are thoroughly obsolete, are quite unsuited to the nature of the piano-forte, and, indeed, are considered rather as musical curiosities than as fit subjects for study, even for the professional musician. We must however except the two fugues forming part of the work, which, for every good quality that distinguishes the kind of composition, have never yet been surpassed, and must always be admired by those who have acquired a taste for this elaborate species of harmony. Domenico Scarlatti left a son, GIUSEPPE, born at Naples in 1718, who composed some harpsichord music, and many Italian operas, all of which were popular in their day; and some of the latter were produced at the King's Theatre in London; but not a single piece of his music ever came under our view. Dr. Burney (in Rees's *Cyclop.*) says, —'his works are distinguished by a light pleasing style peculiar to the Scarlatti family.' He died at Vienna in 1776.

SCARLET DYE. The finest scarlet dye is obtained from cochineal. [COCHINEAL.] According to Berthollet the dyeing of scarlet is performed at two operations; the first is called the boiling (*bouillon*), and the second the *reddening*.

For a boiling intended to dye about 100 pounds of cloth, six pounds of bitartrate of potash (cream of tartar) are first thrown into water a little more than lukewarm; after the bath has been well stirred, and become a little hotter, half a pound of powdered cochineal is thrown in and well mixed. Immediately afterwards five pounds of clear solution of chloride (muriate) of tin are poured in and carefully mixed. As soon as the bath begins to boil, the cloth is introduced, and made to circulate rapidly two or three times; when it has been subjected to a boiling heat for two hours, it is removed and well washed.

For preparing the second bath, which is the *reddening*, five pounds and a half of powdered cochineal are put into a boiler, as soon as the water which it contains is about to boil, and after being properly mixed, fourteen pounds of solution of chloride of tin are added, and the cloth is thrown in, rapidly whirled for a short time, then boiled for an hour, taken out, cooled, and washed and dried.

Some variations in the proportions of the different ingredients are occasionally adopted, for an account of which we may refer to Berthollet's 'Treatise on Dyeing.'

SCARPA, ANTONIO, was born at La Motta, a small village of Friuli, in the year 1748. His parents were persons in humble life, and he was indebted to a distant relation for the means of commencing his studies, while yet very young, at the university of Padua. The death of his early benefactor soon left him dependent on his own resources; but he continued to pursue his studies with such diligence that he became distinguished above his fellows, and was honoured with the esteem and friendship of the illustrious Morgagni.

In the year 1772 Scarpa's acquirements had become so well known, that he was selected as the most fit person to fill the chair of anatomy in the university of Modena, which was then re-established. Here he published his first work, a treatise on the structure of the internal ear. The grand-duke of Modena, Francis III., to whom this book had been dedicated, nominated Scarpa in the same year to the post of surgeon-in-chief to the military hospital in his capital. Success abated nothing of Scarpa's habits of diligence. Having published another work, on the structure of the nerves, he set out on a journey to France, Holland, and England, during which he made the acquaintance of many eminent men. During his stay in Paris, the offer of the anatomical chair in the university of Pavia was made to him by the emperor Joseph II. A feeling of gratitude to his early patron induced Scarpa to decline this flattering offer until he was urged to accept it by the duke of Modena himself. He was eventually installed in his chair at Pavia in the year 1783. His researches into the anatomy of the organs of smell and hearing, and his treatises on the nerves of the heart, and on the minute anatomy of bone, followed each other in rapid succession, and showed his unwearied assiduity. These works, and especial that on the nerves of the heart, which decided in the affirmative the long disputed question whether the heart is supplied with nerves, had procured for Scarpa before the end of the eighteenth century a European reputation. But he still continued those labours to which he was so much devoted. In the year 1801 he published a valuable treatise on the diseases of the eye; and in 1804 his observations on the cure of aneurism appeared, to which a question proposed some years previously by the Parisian Academy of Medicine had given occasion. In 1809 he published a splendid work on hernia, which raised his reputation to the highest point. Three years afterwards he gave up the labour of public teaching, but received in the year 1814 the honourable appointment of Director of the Medical Faculty of Pavia. His suggestions for an improved system of medical education were not attended to, and disgust led him to resign this post, and about the same time he retired from practice. He followed his old pursuits however with undiminished energy in retirement, and it is to this period of his life that we owe some most valuable remarks on the operation for stone, as well as many other surgical tracts. The collection of these minor treatises was one of the last labours of his life. He pursued it, though suffering for some years under almost total blindness, and the publication of the third and concluding volume, in 1832, preceded his death by only a few months.

In addition to his profound knowledge as an anatomist, Scarpa possessed unrivalled skill as a draughtsman, a talent that contributed greatly to the success of his works. His industry was indefatigable, and a bare enumeration of the titles of his works would occupy nearly a column of this Cyclopædia. All that he wrote had a definite practical aim, and hence no lapse of time will render his labours useless or cause his name to be forgotten. In point of industry he has been compared to Cuvier, and, like him, he did not confine his investigations to one department of science. Even medicine and the kindred sciences did not engross all of Scarpa's time. He was an elegant scholar, a man of great taste in the fine arts, as well as thoroughly skilled in agriculture, and a passionate lover of the chase. He was a member of the Institute of France, and of most of the learned societies of Europe; and he was honoured even by Napoleon, who seems to have respected his devoted loyalty to the Austrian family, as well as by the house of Austria itself.

In person Scarpa was about the middle size, of very gentlemanly deportment, though not without a degree of reserve and austerity towards strangers, but of a disposition so amiable that he made friends of all who knew him. After several years of severe suffering from a calculous disorder, which terminated fatally, by inducing inflammation of the bladder, Scarpa died at Pavia, on the 30th of October, 1832.

A list of Scarpa's works, many of which have been translated into English, is appended to a sketch of his life in the 'Archives Générales de Médecine' for March, 1833. Another biographical notice is contained in the 'Medical Gazette' for December 8, 1832, where the date of his birth is erroneously stated to have been 1745; and a third, more full than either, in the 'Annali Universali di Medicina' for November, 1832.

SCARPE. [SCHELDE.]

SCARPANTO, the modern name of the island Carpathus (Κάρπαθος), which lies between Rhodes and Crete, from the latter of which it is distant 60 Roman miles, according to Pliny (iv. 20). We know scarcely anything of its history. It is mentioned by Homer (*Il.*, ii. 676), under the name of Crapathus (Κράπαθος), and is spoken of by Pliny (v. 36) as one of the Rhodian islands. Strabo (x. 489, Casaub.) describes it as lofty and 200 stadia in circumference, and says that it contained four towns, one of which was called Nisyrus. The sea between Rhodes and Crete was called the Carpathian Sea, from the name of the island.

SCARRON, PAUL, a celebrated French burlesque writer, was born at Paris in or about 1610, of an antient family, and to the inheritance of wealth, until an artful stepmother supplanted him in his father's affections, and finally deprived him of his inheritance and reduced him to poverty. Exiled from home, young Scarron purchased his restoration to favour by entering upon an ecclesiastical life, for which his character and habits were ill suited, and in which he never proceeded beyond the introductory degrees. For some years he indulged in gross and scandalous debauchery, in which, at the age of 27, he was stopped by the results of a singular extravagance. Being at Mans, where he held a canonry, during the Carnival, and desirous of sharing the gaieties of the season, which he could not do consistently with his character as a churchman, he and three friends hit on the device of covering themselves with honey, and rolling in feathers. Thus plumed they entered the town; but the joke was thought too strong even for Carnival licence, and being assaulted and plucked, the unfeathered bipeds were fain to escape by jumping into the Sarthe, and hiding in the rushes. The other three died in consequence of this adventure; and Scarron himself contracted maladies from cold and exposure, which rendered him for the rest of his life, to use his own phrase, an abridgment (*raccourci*) of human suffering. Disease and pain could not however subdue his lively spirit, and the rest of his life was spent in ministering by his writings and conversation to the amusement of the courtly and the gay, to whom his house became a rendezvous; and not being troubled with an over-scrupulous delicacy, he obtained both from private liberality and court favour the means of leading an easy and expensive life. In 1652 he became acquainted with Madlle. d'Aubigné (afterwards Madame de Maintenon), then in a state of poverty and dependence. His heart, capable, notwithstanding its levity, of noble emotions, was touched by her merit and her distress; and with a delicate and disinterested generosity, he offered to her the choice either of entering a convent at his expense, or of sharing his precarious fortunes as his wife. She chose the latter; and chastened by her influence, the society of his house, always a favourite resort of the wits, became still more select and brilliant. Meanwhile his fortune became smaller and smaller; for on his marriage he had lost his canonry, and his other chief dependence, the profit arising from the sale of his works, diminished greatly towards the end of his life. This however, like all other evils, he bore with unflinching gaiety; and his last days were only troubled by anxiety for the prospects of his wife, whose conduct in a trying situation had been irreproachable, and for whom he had conceived a high affection and esteem. [MAINTENON.] He died October 14th, 1660; and his last words were, 'I could not have supposed it so easy to make a joke of death.'

One cannot but sympathise with a man who bore great sufferings with such unconquerable cheerfulness; and that there was much to love in Scarron's libertine and thoughtless character is proved by the affection of a large circle of friends, including many of the most distinguished characters of the time. His works bear the impress of his mind: witty, lively, unlaboured, and unrefined, they were despised by the critic Boileau, but favourites on the stage and with the people. The plots of his comedies were mostly borrowed from the Spanish: they are slight, irregular, and farcical; but they made people laugh. His collected works have been published in various editions. The chief of them are, 'L'Eneide Travestie,' 8 books, continued by Moreau de Brazey; Comedies; 'Le Roman Comique,' the most lasting of his works; 'Nouvelles Espagnoles,' translated from the Spanish; and his Letters. Most of Scarron's works have been translated into English; some by the facetious (to give him the usual epithet) Tom Brown, and the 'Roman Comique' by Oliver Goldsmith.

SCARUS, a genus of fishes of the family Labridæ. The species of this genus are remarkable for the structure of their jaws, which project, are convex in front and concave within, and present a sharp cutting edge. The teeth cover these jaws, being arranged upon their outer surface like scales, and are blended together in such a manner that their outlines are scarcely discernible. Besides these teeth on the jaws, there are others on the pharyngeal plates, which are of a depressed transverse form. The body is of the same oblong oval form as in the Wrasses, to which fishes the species of the present group are closely allied. The scales are very large.

The Scari are inhabitants of the tropical seas, and from the brilliancy of their colouring, combined with the peculiar form of their jaws, have received the name of parrot-fishes.

SCAURUS is the cognomen of a branch of the Patrician gens of the Aemilii, but it was also borne by other families, such as the Aurelii. The house of the Aemilii Scauri did not attain high honours until the latter period of the republic, and there are only two members of it who have acquired reputation in the history of Rome, M. Aemilius Scaurus, the princeps senatus, who was consul in 115 B.C., and his son, who bore the same name. The first of the family mentioned in history is L. Aemilius Scaurus, who had the command of a part of the fleet in the war against Antiochus, 190 B.C. (Liv., xxxvii. 31.)

M. AEMILIUS SCAURUS, the princeps senatus, was born in 163 B.C. His father, though a patrician, was poor, and carried on the business of a charcoal merchant (*carbonarium negotium*), (Aurel. Vict., *De Vir. Ill.*, c. 72), and when he died, the son, for want of means, hesitated whether he should devote himself to public affairs or engage in some lucrative business. He decided upon the former. He first distinguished himself as a soldier in Spain, and afterwards (126 B.C.) he served under L. Aurelius Orestes in Sardinia. A few years afterwards (123 B.C.), when he obtained the office of curule ædile, he was not able to exhibit to the people the games customary on that occasion, but he made up this deficiency by a just and punctual fulfilment of the duties of his office. In the year 120 B.C. he was prætor urbanus, and his coins, on which the head of Apollo is represented, probably belong to this year, and refer to the *Ludi Apollinares*, the celebration of which was always conducted by the prætor urbanus. At the time when Hiempsal sought help at Rome against Jugurtha, Scaurus was among the first who urged the necessity of punishing the usurper, and did not, like many others, accept the bribes that were offered to him. This conduct however is attributed by Sallust (*Jug.*, 15) not to his love of justice, but to his fear of detection; and this opinion is sufficiently confirmed by his subsequent conduct in Africa (Sallust, *Jug.*, 29) and on other occasions. In the year 116 B.C. he offered himself as a candidate for the consulship, but without success. (Cic., *Pro Muren.*, 17.) In the following year however he not only obtained the consulship, but in the course of the same year he was made princeps senatus. During his consulship he carried two laws, one a Lex Sumtuaria, and another respecting the suffrage of freedmen; and he also triumphed over the Ligurians and several Alpine tribes.

In 109 B.C. Scaurus was censor with Livius Drusus, and in this capacity he restored the Mulvian bridge, and formed the Via Aemilia, which ran past Pisa and Luna to Dertona. When his colleague died, Scaurus, according to custom, should have laid down his office, but he refused until the tribunes threatened him with imprisonment. In 107 B.C. Scaurus was made consul a second time. His unsuccessful competitor, P. Rutilius, brought a charge of bribery and corruption (*ambitus*) against him; but he was acquitted, and then brought the same charge against his adversary. (Cic., *Brut.*, 30; *De Orat.*, ii. 69.) Some years afterwards one of his sons took part in the unfortunate campaign against the Cimbri on the Athesis (Adige), under Quintus Catulus, and when he, with several others, escaped to Rome, his father so severely reproached him for his cowardice, that the young man put an end to his life. (Valer. Max., v. 8, 4.) In 100 B.C. Scaurus received the office of præfectus annonæ, of which the senate had deprived L. Saturninus, and in the ensuing mutiny Scaurus defended the senatorial party. (Cic., *Pro Rabir.*, 7.) During the latter years of his life he was much harassed by his personal enemies, though their charges, especially those which referred to his avarice, may not have been unfounded. At the time when he was a member of the college of augurs, he refused to admit Cn. Domitius Aenobarbus into the college, and was therefore accused by him of having caused the neglect of the sacra of the Roman people at Lanuvium. Scaurus escaped punishment, though with great difficulty. (Ascon. *in Scaurian.*, p. 21, Orelli.) A short time afterwards, Q. Servilius Cæpio brought against him the charge of having enriched himself in an unlawful manner during an embassy in Asia, but Scaurus again escaped by bringing another accusation against Cæpio. The latter however, to avenge himself, in the year 90 B.C., induced the tribune Q. Varius to accuse Scaurus of having instigated the Italian allies to take up arms; but the bold manner in which Scaurus denied the charge, induced Varius to withdraw his accusation. (Aurel. Vict., c.; Ascon., c., p. 22.) It must have been soon after this event that Scaurus died, for we know that in the year 88 B.C. his widow became the wife of Sulla.

If we were to judge of Scaurus according to the opinion expressed by Cicero in several of his works, we must consider him one of the first of the Romans: Cicero at least considered him as the greatest man of his age. This partiality of Cicero for Scaurus arose partly from both of them belonging to the aristocratical party, and partly from the circumstance that Cicero, when a youth, had been introduced into his house, and the impression which the grave and proud aristocrat then made upon the young man was never effaced. Scaurus possessed some of the stern virtues of an antient Roman, and though he was an inflexible aristocrat, he enjoyed the highest esteem of the people as well as of the senate, which is shown from the fact that all the charges brought against him fell to the ground. Although originally poor, he had in the latter years of his life amassed immense wealth. The character which Sallust gives of him is that of a 'homo nobilis, impiger, factiosus, avidus potentiæ, honoris, divitiarum, ceterum vitia sua callide occultans;' and it was undoubtedly by the appearance of sincerity and integrity which he kept up throughout his life in such a masterly manner, that he gained the admiration of so many of his contemporaries. Scaurus also distinguished himself as an orator (Cic., *Brut.*, 29, 30), and wrote a work, in three books, containing the history of his own life, which however is now lost.

M. **Aemilius Scaurus**, son of the former, and afterwards son-in-law of Sulla, inherited only the bad qualities of his father. He increased his wealth during the proscriptions of Sulla; and during the war against Mithridates, when he served as quæstor in the camp of Pompey, he disgraced his name by accepting bribes for declaring himself in favour of Aristobulus against Hyrcanus in Jerusalem. Pompey however gave him the province of Syria with three legions, and here he remained until 59 B.C. During this time he made a plundering inroad into the peaceful country of Aretas, who could only prevent Scaurus from committing further robberies by the enormous bribe of 300 talents. (Joseph., *Ant. Jud.*, xiv. 5.) After his return to Rome he obtained the curule ædileship, in the year in which P. Clodius was tribune, that is, 58 B.C. (Cic., *Pro Sext.*, 54.) The games which he exhibited on this occasion far surpassed everything which the Romans had seen (Plin., *Hist. Nat.*, xxxvi. 15), and involved him greatly in debt. (Ascon., *Argum. ad Scaurian.*) Soon after this he obtained the office of prætor, and in 35 B.C., during his administration of Sardinia, he extorted exorbitant sums from the inhabitants, in order to enable him to purchase the votes in the approaching election for the consulship. But when he came forward as a candidate, the Sardinians, through the person of the tribune P. Valerius Triarius, brought against him the charge of repetundæ, and other crimes were at the same time laid to his charge (34 B.C.). His position was dangerous in the highest degree. He was defended by six advocates, and among them Hortensius and Cicero. A great part of the speech which the latter made for him is still extant. But the exertions of his friends, his own tears and lamentations, and the remembrance of his father, induced the judices to acquit him. A few days afterwards he was accused of ambitus, and although Cicero defended him again, he was condemned, and went into exile.

M. Aemilius Scaurus the Younger is one of the worst specimens of Roman nobles towards the end of the republic, and his whole life is one uninterrupted series of crimes. He was despised by all good men, and gained the admiration of the populace only by his unbounded extravagance, for which he indemnified himself by plundering foreign countries. Notwithstanding all this, Cicero twice undertook the defence of this unprincipled man. It may be that Cicero's admiration for Scaurus the father induced him to attempt to save the name of Scaurus from disgrace. What Horace (*Carm.*, i. 12, 37) means in reckoning the Scauri among the greatest men of the republic, is wholly inconceivable.

M. **Aemilius Scaurus**, a son of the former, betrayed Sext. Pompeius, his own brother-in-law, in Asia, to the generals of Antony. After the battle of Actium he was taken prisoner, but pardoned for the sake of his mother Mucia. (Ascon., c.; Dion. Cass., li. 2.)

Mamercus Scaurus, a son of the former, and grandson of M. Aemilius Scaurus the Younger, was a good orator and poet, but a man of the most dissolute conduct. (Tacit., *Annal.*, vi. 29; Dion Cass., lviii. 24; Senec., *De Benef.*, iv. 31.) In the reign of Tiberius he was accused of high-treason, and, in the same reign (A.D. 34), of adultery with Livia. These charges may have been unfounded, but the real cause of his persecutions was some verses against the emperor, which his enemy Macro had inserted in one of the tragedies of Scaurus. To escape further persecution, he put an end to his life. Seneca (*Suasor.*, 2) calls him the last of the Scauri.

SCELIDOTHE'RIUM. [Megatheriidæ.]

SCELO'TES, Fitzinger's name for a genus of *Reptiles* placed by MM. Duméril and Bibron among the *Scincoidian Lizards*, with the following

Generic Character.—Nostrils lateral, each opening in two plates (the nasal and the rostral); a single supero-nasal plate situated across the muzzle, behind the rostral plate; teeth conical, simple; tongue flat, of an arrow-head shape, squamous, and notched at its point; palate not furnished with teeth, but with a longitudinal groove; auricular apertures very small; no anterior limbs; posterior feet divided into two unequal, unguiculated, subcylindrical toes, without dentilations; muzzle subcuneiform; sides rounded; tail conical, pointed; scales smooth.

In this genus the form, taking the first step towards the ophidian type, is entirely without the anterior extremities; but the posterior extremities still exist, and are each divided into two toes, the internal much shorter than the external; whereas in *Pygopus* [Bipes] all external appearance of toes is lost, although the posterior extremities are still retained.

Example, *Scelotes anguineus*, Fitz.; *Scelotes Linnæi*, Dum. et Bibr.; *Anguis Bipes*, Linn.

Description.—Coppery or bronzed yellow on the back and upper part of the tail; lateral parts of the body greyish; as many rows of small black points marked with a whitish dash in the middle as there are longitudinal bands of scales on the upper part and sides; all the lower parts greyish.

Locality.—Cape of Good Hope.

SCENE-PAINTING. With respect to the stage of the antient theatres very little is known, and even that is exceedingly indistinct, being founded not upon description, but merely on incidental allusions. Granting therefore that the antients employed some kind of temporary stage decoration suited to the subject of the piece, it is very questionable if it at all resembled our modern scenery. Indeed the stronger presumption is that it did not: while the width of their stages renders it difficult to understand how any scene painted upon a single piece of canvass of sufficient size could have been let down, or rather drawn up, as it is supposed the *aulæa* were, or otherwise changed during the performance; it is quite certain that, however contrived or executed, any kind of scenery like that of our modern theatres could not have produced the same degree of illusion. The very circumstance of the performance taking place in the open air, and in daylight, removes all doubt as to the great inferiority of scenic effect, especially when it is recollected that besides daylight there was sunshine also, consequently accidental shadows thrown from one side upon the stage and scene itself. In fact, without very strong positive proof, we may very well be excused for questioning if there was anything approaching to scenic illusion and stage effect in the dramatic exhibitions of the antients. Such doubt is further greatly strengthened by our knowing that so far from showing any proficiency in linear and aërial perspective, in powerful chiaroscuro, and in landscape composition, nearly all the remains and specimens of antient painting betray great ignorance of or disregard to them, yet they are precisely those branches of his art in which it is requisite that the scene-painter should be thoroughly skilled, and those which are most essential to his subjects. Without a thorough knowledge of these branches it is impossible to produce any tolerable imitation of buildings or landscape views, which in fact comprise nearly the whole of the scene-painter's province. Besides all this, it is evident that so far from exacting truth-like imitation, the antients overlooked many gross inconsistencies upon their stage; their tragic and comic masks were grotesquely unnatural, while, by enlarging the actors' heads and faces, they must have had the effect of diminishing rather than at all increasing their apparent stature, giving them the proportions of dwarfs with stunted bodies. Consequently, though we are very imperfectly acquainted with the stage performances and apparatus of the Greek and Roman theatres, the little that we do know is, as far as it goes, quite conclusive against any degree of scenic illusion having been reached.

With the rise and progress of scene-painting and stage-effect in modern times we are not much better acquainted, since no specimens of early scenery have been preserved, and only scanty, casual, and fragmentary notices relative to it have come down to us. From what is recorded of Baldassari Peruzzi's [Peruzzi] works of this class, and those of some other artists, it would seem that scene-painting was brought all at once to perfection about the time of Leo X. We suspect however that there is some exaggeration in such accounts, for all excellence is comparative, and the same degree of illusion which would now be thought not at all extraordinary would have seemed quite magical to those accustomed to very inferior attempts. Owing to want of historical record and accurate description, it is also very doubtful whether any considerable improvement took place in the general economy of the stage and everything connected with scenic apparatus, as well as in scene-painting. Some of Peruzzi's own designs for scenes are said to be still in existence, and were there engraved copies of them, or had other chefs-d'œuvre of the kind been so perpetuated and spread abroad, we should be able to decide where now we can only doubt. For much of his reputation with his contemporaries Inigo Jones was indebted to the fancy and talent he displayed not merely as a scene-painter, but in getting up pageants and masques, and planning the decorations and machinery for them. The descriptions however given of them are so quaint and bombastic, that they rather show how liberal others were of their admiration towards him, than convince us that Jones himself approached those scenic contrivances and effects which have since been produced. In fact we have little more than traditional report to depend upon, for there exists no history of theatrical painting and of the various improvements which have from time to time taken place in the decorations and apparatus of the stage.

Of this last, and of the quantity of hidden machinery requisite for expeditiously changing the scenes, as well as for effecting more complex displays in pieces of *spectacle*, we shall not here speak, but confine our remarks to the painted scenery alone. Beginning with what is technically the *drop-scene*, as being the simplest of all, we have merely to remark that it is no more than a picture or single painted surface let down by way of blind or curtain between the acts, so as to close up the opening of the proscenium. As it generally continues to be used for an indefinite time—the one at Covent Garden has been there ever since the theatre was rebuilt (1809)—the drop is more carefully executed than back scenes, which, showy as they may be in effect, are required only for a season, and are at a much greater distance from the spectators. As far too as pictorial effect and truth of perspective are concerned, a drop shows itself to far greater advantage than other scenery, which is composed of different pieces constituting what is called a set of scenes. These consist of the narrow upright pieces called *side-scenes* or *wings*, of the narrow horizontal ones (*hanging-scenes* or *soffits*, painted to imitate a sky or ceiling, but chiefly intended to screen the space over the stage), and of the *back scene*. Backs again are of two kinds, viz. *rolling* scenes, which are let down from above, and *flats*, which are formed of two sliding scenes strained upon framing, like the wings, and meeting each other and uniting in the centre. These are employed when what are termed *practicable* scenes are required, that is, with doors, windows, &c., which admit of being used as real doors, &c.; or else when there is occasion that the 'flat' should suddenly open and discover another scene behind it. In addition to these, there are what are termed *open* flats, which are scenes cut out in places so that both the background is seen and the actors can pass through them. They are commonly used for the representation of groves or forests, but sometimes for interiors with open arches. There are besides what are technically known as *pieces*, narrow scenes placed obliquely on one side of the stage when it is wanted to show a cottage or corner of a house, with a *practicable* door in it. Lastly, there is *set scenery*, as it is termed, a species of stage decoration very recently introduced, where, instead of the usual wings ranged one behind the other, there is a single scene on each side extending from front to back, so that the stage is completely enclosed. By this means a more perfect representation of a room can be obtained than where wings are employed.

In fact side-scenes or wings can be regarded as little better than so many detached screens absolutely necessary to shut out from view the space on each side of the stage, since in themselves they rather detract from than at all aid illusion and effect; more especially in interiors, where what should represent a continuous wall or surface on either side is broken into several pieces, which are besides placed parallel to the back scene or flat, instead of being at right angles to it. If the scenery be viewed exactly from the centre and from the true perspective distance, the defect thus occasioned is not very striking or offensive; but if the spectator be near to the stage, or placed on one side of the house, the whole becomes more or less distorted, and the wings only so many disjointed fragments, so that all scenic illusion is destroyed, and should the back scene be at a considerable distance, no part of it will be visible to those in the boxes next the proscenium, but merely the range of wings on one side and the gaps between them.

Scene-painting is executed in *distemper*, that is, with colours mixed up with size, the design being first made in a sketch, which is accurately laid down to scale, and from which the perspective outlines are transferred to the larger surface. Instead of beginning with dead colouring and then gradually working up his picture, the artist puts in all his effects at once (as in fresco painting)—the full tone of the lights and shadows, finishing as he proceeds, and merely retouching those parts afterwards which require additional depth or brilliancy. In this kind of painting, *bravura* of execution and strikingness of effect are indispensable, and nature must be rather exaggerated than the contrary; at the same time care must be taken lest mere gaudiness be substituted for brilliancy and richness. Further, as much of the costume of the piece depends upon him, it is important that the scene painter should not only be well skilled in architectural delineation, but also well informed as to the styles of different countries and periods, so as to avoid those errors and anachronisms which are frequently committed, and which are sometimes so glaring that no beauty of execution can atone for them.

Much of the effect of scenery depends upon a skilful mode of lighting it; in which respect considerable improvements have taken place of late years, and the light is now occasionally thrown from above, as well as from the sides and the foot-lights. A variety of mechanical contrivances have also been brought to great perfection so as to imitate particular effects in the most deceptive manner, such as those of moonlight, where the moon breaks through the clouds and gleams upon water, &c., changes of the sky from clear to stormy, or the contrary, the sudden glare of fire, &c.

Though looked upon as a very subordinate branch of the pictorial art, many artists of superior ability have applied themselves to scene-painting. To the name of Peruzzi we may add those of Bibiena, Servandoni, Loutherbourg, Lambert, Rooker, Gonzago, Quaglio [Quaglio], Sanquirico, Gropius, Stanfield, and Roberts. The fate of the scene-painter however resembles that of the actor: splendid as his triumphs are, they are of short duration; after a time his works are suffered to disappear completely; nay, even while they are before the public, and excite admiration, it is not always that the artist himself is thought of, or comes in for much share of praise. Yet, though the performances of a Garrick or a Siddons cannot be perpetuated and handed down to posterity, those of the scene-painter may to a certain extent be preserved by engraving; and if not many, there are at least some productions of the class that will merit to be so rescued from oblivion. This has indeed occasionally been done in other countries; for instance, a series of scenes painted by Sanquirico for the La Scala theatre at Milan have been engraved and published, but we are not aware that anything of the kind by English artists has been given to the world in that shape.

SCEPA'CEÆ, a small natural order of plants belonging to the rectembryose group of incomplete Exogens. The plants of this order are trees having alternate coriaceous leaves, with membranous stipules, which form the scales of the bud. The flowers are diœcious; the males are arranged in catkins, the females in short axillary racemes. The calyx is inferior, 4-5-6 leaved, in one or two whorls; stamens 2-5, with 2-celled anthers; ovary with 2 cells, in each of which there are 2 ovules; no style; stigma, with 2 short emarginate lobes or 4-ringed ones; seeds single or 2, enveloped in a succulent aril; embryo green, in the axis of albumen. These plants are allied to Cupuliferæ and Betulaceæ in their amentaceous flowers, but their arillate albuminous seeds and dehiscent 2-celled pericarp distinguish them from these as well as any other orders to which they may seem to have relation. They are natives of the tropical parts of India. The wood of one of the species, *Lepidostachys Roxburghi*, or Kokra, is used in India for various economical purposes on account of its hardness.

SCEPTIC (Σκεπτικός), one who doubts, who deliberates, who circumspects. Such is the primary meaning of the word, but like most words it has been wrested from its primary signification by ignorance or prejudice, and is now, beyond its philosophical meaning, used to express a dissenter from an established religion. In one sense it denotes a philosopher; for doubt is the first step in science; it is the refusal to take for granted any explanation of phenomena that may be offered, and the *circumspection* of the grounds and truth of this explanation. In common usage, Sceptic denotes, loosely enough, an atheist, deist, pantheist, &c., or, more precisely, the holder of any heterodox opinions. Common usage is here, as is usually the case, wrong. To set the matter in its true light, we must remark that scepticism is simply doubt, while heterodoxy is disbelief; something manifestly distinct from doubt, which is a mere oscillation of the mind between opinions; the belief of this moment passing into the contrary belief of the next; whereas disbelief is the belief in something contradictory. This latter definition of disbelief being new, we will briefly endeavour to substantiate it. Reid, and others of the Scotch school, class disbelief as an independent power of the mind, equally with belief. We hold that the two are one and the same power exercised on contrary opinions. Let us take a simple illustration: A believes that Mr. Jones is in the next room; B disbelieves it. Assent and dissent must here, as everywhere, be rigidly demarcated from belief and disbelief. A *believes*, that is, from certain indications (having heard him speak, or seen him enter) it is his firm conviction that Mr. Jones is in the next room. B *disbelieves*, that is, from certain indications (having seen him go out, or fancying he saw him in the street, or knowing that he must be elsewhere) it is his firm conviction that Mr. Jones is not in the next room. Now it is evident that this denial is identical with the belief that Mr. Jones is *elsewhere*, and *not* in the room. If he had no *belief* in his being *elsewhere*, how could he disbelieve his being in the room? Impossible. He might *dissent* from it from passion, for argument, or for the sake of deceiving others, but in his own mind he could not disbelieve; for belief is not voluntary; it is the irresistible result and conclusion of certain evidences or thoughts. But he might doubt his being in the room. And what would be passing in his mind then? Why, a constant oscillation between evidence and evidence. He might have heard Mr. Jones's voice, or a voice he thought like it; and he might have seen, or fancied he saw, Mr. Jones in the street; here the conflicting evidence being pretty equal, his mind must oscillate, *i.e.* he *doubts*. In this case he must either relinquish the subject altogether, or go into the next room to satisfy himself; for the mind cannot remain *passive;* its essence and condition is activity, and if it once be placed in contact with a subject, it must lean to one side or the other. It must believe a thing or disbelieve it (*i.e.* believe something else which is contradictory), or must oscillate—one moment believing this thing, and the next believing another thing. If then this distinction be borne in mind—if we have rightly demarcated doubt from disbelief—the erroneous application of sceptic in common usage will be obvious. An unbeliever and an infidel are convertible terms in ordinary language; but nothing can be more erroneous. An unbeliever, in a positive sense, is the believer in some *other* religion, and as dogmatic in his belief as the most orthodox (and hence the early Christians were called atheists by the Greeks, because they disbelieved in *their* gods), and might turn round upon the orthodox believer with the charge of unbelief in *his* religion. Thus a Mohammedan is an unbeliever to the Christians, and *vice versâ*. An *Infidel*, on the other hand, as the word implies, is one with no belief, a doubter, a sceptic. The Infidel, when truly such, does not dissent because he believes something else—not because he has a contrary faith—but because he cannot believe for any length of time either the one or the other; he oscillates between them. This last is the true sceptic; this he always remains; he doubts, he deliberates, he circumspects to the last day of his existence: as soon as he ceases to doubt, deliberate, and circumspect, and takes up a distinct faith, his character as a sceptic vanishes; he becomes a believer. When considering the great and awful subjects of religion or philosophy, the weakness of the human mind must ever keep it in this state of scepticism, when once it has renounced its faith in things higher than its own logic:—when once reason is set up as the standard, measure, and exponent of all things, the human being is lost in the shoreless sea of scepticism. Hence mathematicians and logicians have so often been sceptics when they have acknowledged no higher source of knowledge than their small 'discourse of reason, looking before and after.' History affords many a saddening spectacle

> 'Of poor humanity's afflicted logic,
> Struggling in vain with ruthless destiny.'

In one sense, there are few who are not sceptics on certain points; and on the other hand, few who can properly be designated as sceptics; for to deserve this they must *continue* in the state of doubt which admits of no affirmation. Most men begin, as was said of Descartes, in doubting everything, and end in believing everything. The few who have consistently preserved the character of sceptic have been among the most celebrated in the history of philosophy. [SCEPTICISM.]

SCEPTICISM (Σκέψις), doubt, deliberation, circumspection. There are two significations to this word: the one denoting doubt of *an* explanation of phenomena; the other the more precise indication of a certain class of philosophers who have *continued* sceptics, whose system of thought in its fundamental points ever remained sceptical. To this latter we alone direct ourselves.

Socrates has been commonly called the founder of this sect by the enunciation of his famous tenet,—all he knew was that he knew nothing. But this was more a limitation of the confidence of the Dogmatists and Sophists, and a confession of the weakness of the human understanding, than any fundamental scepticism, such as was subsequently embraced by Pyrrho and others; for though Socrates, more occupied with pulling down than building up, advanced few speculative opinions of his own, yet we agree with Schleiermacher in awarding to him the merit of having first posited the true idea of science (as the intercommunion of dialectics, physics, and ethics); and this one positive principle in his philosophy is sufficient alone to demarcate him from the sceptics. As well might Bacon be accused of scepticism, his position in the 'History of Philosophy' being very similar to that of Socrates. How different this is from the scepticism of Pyrrho,

> 'Who would not with a peremptory tone
> Assert the nose upon his face his own,'

and whose whole philosophy consisted in a suspension of judgment, or perpetual negation [PYRRHO], may be seen by a comparison with some definitions of scepticism by the philosophers themselves. Sextus Empiricus, the historian of the sect, defines it as 'the power (δύναμις) of opposing in all their contradiction the *sensuous representations* and the *conceptions of the mind* (φαινόμενα τε καὶ νοούμενα), and thus to induce perfect suspension of judgment' (*Sextus Emp. Pyrrho. Hypot.*, i. 1, 4); and Carneades denied the possibility of real knowledge of anything from the twofold relation of the representation (image-idea, φαντασία) to the object (τὸ φανταστόν), and to the mind (ὁ φαντασιούμενος), as the mind had no criterion of the truth: all that could be affirmed was mere probability (τὸ πιθανόν). Ænesidemus defines it as the recollection of opinions from the testimony of the senses or other evidence, by which means one dogma was opposed to another, and upon comparison all found useless and confused. (Brucker, *Instit. Philos.*, ii., c. 14, § 7.) From the fallaciousness of sense, the differences of sensuous perceptions in different organizations, the weakness of understanding, and the impossibility of diving beneath the appearances to the real causes of things, the sceptics deduced a system of indifference which became equally difficult to accept or refute. They maintained that every proposition requires a prior proposition to support it, and so on *ad infinitum;* or else it assumes some axiom which cannot be proved, and is to be taken for granted without demonstration, and consequently may be denied with the same force with which it is assumed. Further, that nothing can be known by means of itself, nor by means of something else, whilst that other remains unknown, and that other mu either be unknown or known by means of something else, and so on *ad infinitum*. (Sextus Emp., i. 15.) This last is extremely subtle, and in itself is irresistible; but as Kant profoundly remarked, there is this fundamental flaw in absolute scepticism, 'that it gives out everything for appearance. It therefore distinguishes appearance from truth, and of course must have a mark of distinction; consequently presupposes a knowledge of the truth, thus contradicting itself.' The careful avoidance of any expression savouring of certainty—the using of the term *seems* for *is*—which was adopted by this sect, has been inimitably ridiculed with all his wit and vivacity by Molière (*Mariage Forcé*, act i., sc. 8); and indeed a system so unsatisfactory never could and never has taken much root except in minds of a very peculiar and indolent nature. The abnegation of man's proudest faculty, reason, the perpetual indecision on every point, so little accords with the fertile and prodigious activity and creative power of the mind, that the real professors of scepticism have been universally indolent, easy-natured, sensual men, with whom the speculative doubting was stimulus enough. Morhoff (*Polyhistor*, ii., lib. i., c. 6, and l. ii., c. ix.) gives an account of all the sceptical writers in his dull laborious way; Brucker and Enfield (*Hist. of Philos.*, i., b. ii.. c. 16) give a more detailed account of their tenets. [PYRRHO.]

Of modern scepticism it is remarkable that it differs little from the antient, and that whatever strides philosophy may have taken in other departments, it has made little or none in that of doubt. The same clenching subtle arguments occurred to a Theætetus as to a Hume. However we will proceed to give a brief historical account of the attempts made to revive it.

Sanchez, a Portuguese physician, published in 1581 a treatise entitled 'De multum nobili et primâ universali Scientiâ quod nihil scitur' (on the excellent and first universal science that nothing is known), a rare and extraordinary work, containing the leading arguments of the sceptics propounded in an extravagant manner; but after many sweeping assertions on the impossibility of all science, he at last admits the possibility of truth, and hints very plainly that he himself has attained it. It is an evidence of the restless spirit of the times and the growing servility to the authority of Aristotle and his followers. But notwithstanding his natural confidence in his own exclusive perception of truth, Sanchez was a real sceptic. Jerom Hernhaym, an abbot of Prague, on the other hand, who wrote a work 'De Typho Generis Humani' (on the vain glory of human nature), in which he endeavours to expose the falsehood, presumption, and uncertainty of human science, is to be distinguished from Sanchez and the Pyrrhonists; he was a pseudo-sceptic, and his evident design was to depreciate human learning as inimical to divine wisdom, and to lead men wholly to rely upon religious faith.

Of a similar tendency is the celebrated work of Bishop Huet ('Essai sur la Faiblesse de l'Esprit humain'), in which, after exhibiting the principal points of the sceptic philosophy as given in Sextus Empiricus to prove the insufficiency of human knowledge, he falls back upon the consequent necessity of retiring within faith and being content with it. So palpable is the pretence of his scepticism, that besides being a devout and learned bishop, he was the author of 'Demonstratio Evangelica.' Yet with singular inconsistency he addressed this demonstration to the very understanding which he had so triumphantly asserted could *not* attain truth.

Bayle is, as Cousin remarks, the ideal of sceptics. [BAYLE.]

Glanvill, whose 'Scepsis Scientifica, or Confest Ignorance the way to Science,' 'has hardly,' says Hallam, 'been seen by six living persons' (Hallam, *Lit. of Europe*, iv.), is the systematic sceptic of the seventeenth century, and as his work is altogether a curiosity from the rarity of its notice, the extraordinary nature of its contents, and from its author having been a clergyman and member of the Royal Society, and from his having one year afterwards published a book in favour of witchcraft, we shall take a rapid view of its contents. After surveying our ignorance in general and in particular, he begins chap. ix. with these remarkable passages —'The disease of our intellectuals is too great not to be its own evidence; and they that feel it not, are not less *sick*, but stupidly so. The weakness of human understanding all will confess, yet the confidence of most in their own reasonings practically disowns it; and it is easier to persuade them from other lapses than their own; so that while all complain of our ignorance and error, every one exempts himself.' . . 'All opinions have their truth, and all have what is not so; and to say all are true and none, is no absurdity.' . . . 'Truth is never *single;* to know one will require the knowledge of many.' . . . 'Thus is truth *relative*, and little considerable can be obtained by catches. The painter cannot transcribe a face upon a transient view; it requires the information of a fixed and observant eye; and before we can reach an exact sight of truth's uniform perfections, this *fleeting transitory*, our life, is gone. So that we see the face of truth but as we do one another's when we walk the streets, in a careless *pass-by;* and the most diligent observers view but the back side of the hangings, the right one is on the other side of the grave.' These passages give a much better idea of Glanvill's style, illustration, and thought, than the random passages quoted by Hallam. He continues to examine the causes of our ignorance, which he places in 'the impostures and deceits of our senses,' chap. x., and well observes, 'Thus our reasons being innoculated on the sense, will retain a relish of the stock they grew on; and if we would endeavour after an unmixed knowledge, we must unlive our former lives, and undo in the *day* of our more advanced understandings what we had spun in the *nightmare* of our ignorance.' Chap. xi. contains illustrations of these deceptions. Chap. xii. another illustration, 'which is the translating the idea of our passions to things without us.' Chap. xiii. to xvi. on the fallacies of the understanding, how produced. Chap. xvii. to xxii. directed against Aristotelians. In chap. xxiii. we have a forethought of Hume's doctrine of causation. 'All knowledge of *causes* is *deductive*, for we know none by simple intuition, but through the mediation of their effects. So that we cannot conclude anything to be the cause of another but from its continual accompanying it; for the *causality* itself is *insensible*.' He further maintains that there is no demonstration but where the contrary is impossible, and that we can scarce conclude so of anything; and observes, in the spirit of Kant, 'Our demonstrations are levied upon principles of our *own*, not universal *nature*.' Causes he declares, in chap. xxi., are 'the alphabet of nature and science, and we cannot read without them;' and yet these causes we *cannot* know, 'as we know nothing but effects, and those by our senses.' 'Causes are so connected that we cannot know any without knowing all, and this is omniscience. From the above brief account of a work little known, it will be seen that its neglect has been undeserved, and that it is one the most striking which belongs to the school. Brucker does not mention it, nor does Enfield.

Bishop Berkeley, so commonly classed with the philosophical sceptics upon that misconception of the term we have before adverted to, is to be regarded simply as a believer in another system of philosophy from that usually accepted. He denied the existence of an external world. [BERKELEY.] His belief was in idealism. But although he in his own person was not a sceptic, yet the irresistible consequence of his system was an absolute scepticism, which Hume failed not to perceive. The question of an external world is in itself a matter of indifference. We are so constituted as to be affected in the same way as if it had this external reality; it is the *mendacity of consciousness*, the unconditional scepticism which must result from seeing the very foundation-stone of our intellect (consciousness) thus built upon sand, that fixes the importance of the question.

Hume was the greatest and the legitimate sceptic of the eighteenth century. His was genuine Pyrrhonism. He attacked the very foundations of our knowledge by contrasting with them their self-contradictions. 'The truth is,' observes Dugald Stewart, 'that whereas Berkeley was sincerely and *bonâ fide* an idealist, Hume's leading object was plainly to inculcate *universal scepticism*. In this respect the real scope of his arguments has, I think, been misunderstood by most if not by all his opponents. It evidently was *not*, as they seem to have supposed, to exalt reasoning in preference to our instinctive principles of belief, but by illustrating the contradictory conclusions to which our different faculties lead, to involve the whole subject in the same suspicious darkness, and to set their evidence aside as good for nothing.' (*Essays*, ii., c. 1.) Hume accepted Berkeley's arguments in disproof of external reality, but he went still farther; after denying a *substantive world* (consciousness being concerned only with ideas or representations), he denied on the same ground a *substantive mind*. For, he asks, as we know but impressions and ideas, how can we know that there is anything *more* than these? These are the substance and limit of our knowledge. The mind itself has no distinct, energetic, *substantive* existence —it is but a *succession of ideas.* This is the doctrine expounded by Theætetus the Sophist, in Plato: 'There can be nothing true, nothing existent, distinct from the mind's own perceptions' (*τὰ φαινόμενα ἑκάστῳ ταῦτα καὶ εἶναι*). In truth the assumption of an external reality upon any grounds hitherto proposed is gratuitous and questionable. In the fact of perception it is assumed that there is—1, the consciousness; and, 2, the exciting external cause. But upon a patient and rigid interrogation of consciousness, all we find in it, as a fact, is a change in our state of being; beyond this no other element is *given*, but *assumed*. Now the question can never be—whether we *are* conscious of a change of being (since change is the condition of consciousness, and the individual consciousness is proof of itself), but whether, as the sceptic requires to know, we have or can have any *knowledge* or *consciousness* of this external exciting cause in itself. This we must give up. It being admitted that we are influenced by externals mediately (*i.e.* in *representation*), therefore our consciousness is of the *ideas*, not of the *objects themselves*. All that we really know is our own consciousness—our change of being—but we remain ignorant whether that change proceed from an *evolution of being itself*, or from the correlation of being and an external object. The reasonings of Reid, Stewart, Brown, &c. against this doctrine are most puerile. Stewart alone seems to have comprehended it in some of its aspects, but he nowhere fairly exposes and refutes it. If Hume is to be refuted, it must be, as Kant plainly saw, by a reconsideration of the very elements of perception, and an investigation of the received doctrines which Hume, assuming as established, employed as first principles. This was the work of Kant. Since the time of Hume there has been no legitimate sceptic.

SCEPTRE, from the Greek *skeptron* (*σκῆπτρον*), a staff, or rod, carried by princes as the ensign of judicial and sovereign power: whence in Homer it is accounted sacred, and the most solemn oaths sworn by it. The reader who desires to know the different forms in which the sceptre is represented upon antient coins, may consult Rasche's 'Lexicon Rei Nummariæ,' v. *Sceptrum*. Le Gendre tells us ('Nouvelle Histoire de France,' 8vo., Paris, 1719, tom. ii., p. 116) that with the kings of France of the first race the sceptre was a golden rod as tall as the king himself. The sceptre, as an ensign of royalty, is of greater antiquity than the crown.

SCHAFFHAUSEN (*Schaffhouse*, in French), one of the cantons of the Swiss confederation, is situated north of the Rhine, and is bounded on the north, east, and west by the grand-duchy of Baden, and on the south by the cantons of Thurgau and Zürich, from which it is separated by the Rhine. It is one of the smaller cantons of Switzerland; the area is computed at 153 English square miles, and the population, by the census of 1834, was 32,268. The people profess the Reformed religion. The language of the country is a dialect of the German, resembling that of Suabia. The surface of the canton is hilly, and the soil is mostly calcareous. The general slope of the valleys is southwards towards the Rhine, which drains the whole country. Agriculture constitutes the chief occupation of the people; the country produces corn, wine, flax, hemp, and fruits, especially cherries. The climate is mild, compared with other parts of Switzerland. The manufactures consist of leather, steel, cotton-spinning, and distilling of kirschwasser. The canton has iron-mines, from which about 30,000 hundredweight of iron is yearly extracted. Most of the ore is smelted in the furnaces of Laufen near the fall of the Rhine.

The canton is divided into six districts: Schaffhausen, Stein, Thayngen, Neunkirch, Unterhallau, and Schleitheim. The only towns of the canton are Schaffhausen, Stein, and Neunkirch, but there are many villages and hamlets. The government was formerly like that of most Swiss cantons, that is to say, the citizens of the head town were the legislators, and the country population was subject to them; but by the new constitution of 1831 the democratic principle has become established.

All citizens of the canton who are twenty years of age are electors. Paupers, bankrupts, and criminals are deprived of the franchise. Foreigners who purchase the bourgeoisie, or freedom of one of the communes of the canton, become entitled to the elective franchise after five years. The legislative body, called the great council, consists of seventy-eight members. The town of Schaffhausen returns eighteen deputies, one for every 381 souls, and the rest of the canton returns sixty, at the rate of one for every 423 souls. This is the only privilege which the town still retains. Candidates for seats in the great council must be electors, and twenty-five years of age. Father and son, or two brothers, cannot sit together in the council. The little council, or executive, consists of nine members chosen by the great council; the members must be at least thirty years of age. The president of the little council is styled burgomaster Both the great and little council are renewed every four years.

The revenues of the canton amount to 150,000 florins, derived from an income tax, a house tax, patents, the monopoly of salt, which belongs to government, as well as the cantonal forests.

The town of Schaffhausen is built on the side of a hill sloping to the bank of the Rhine, and is about 1200 feet above the sea. It is surrounded by walls flanked with towers, and has a fort, the vaults of which are bomb-proof. The streets are irregular, and most of the houses are old looking, but many are modern and handsome. The most remarkable buildings are the cathedral, the church of St. John, the town-house, and the arsenal. Schaffhausen has a college with ten professors, a gymnasium, several elementary schools, and an orphan asylum. The town library has become possessed of the library of John Müller, the historian of Switzerland. There is a society for the encouragement of agriculture, a Bible Society, and a Society of Beneficence, which has founded a savings'-bank. There are at Schaffhausen several mercantile firms who do considerable business, especially in colonial articles, which are introduced from Germany. The population is about 6800. The curious bridge of one arch, of 360 feet span, was destroyed by the French in 1799, and has been replaced by a common wooden bridge.

Schaffhausen was originally a hamlet of boatmen, and a place for unloading the goods which came down from the lake of Constance by the Rhine, the boats being obliged to stop here on account of the falls in the river below the town: and hence its name 'Scapha.' In the eleventh century a large monastery being built in the neighbourhood, a town afterwards grew around it, and in the thirteenth century it was walled, and obtained the rank of an imperial town. In 1330 it came into the possession of the House of Austria, but in the fifteenth century it recovered its independence, and allied itself to the Swiss cantons; and in 1501 it was received as a member of the Confederation.

The small town of Stein, which is situated at the outlet of the Rhine from the Untersee, or lower lake of Constance, has a handsome bridge over the Rhine, and some remarkable old buildings. It carries on a considerable trade in wine. Neunkirch is a small walled town, with 1200 inhabitants.

SCHALCKEN, GODFREY, was born at Dort, in 1643. His father, who was rector of the college in that town, intended him for one of the learned professions; but finding that he had a decided inclination to painting, he placed him under Solomon van Hoogstraten. He was afterwards for several years a pupil of Gerard Douw, whose style and manner of handling he very successfully imitated in small pictures of domestic scenes, chiefly represented by candlelight. After leaving Douw, he attempted to elevate his style by studying the works of Rembrandt, but finding himself unequal to the task, he returned to his original manner, and his pictures were eagerly bought. He painted in a variety of manners, but he was most eminently successful in candlelight pieces.

Some English gentlemen encouraged him to visit England, where he met with great success, till he attempted portraits on a large scale, in which he proved so inferior to Kneller, that he injured his reputation; but happily he soon became sensible of his error, and again painted on a small scale. It is to be regretted that though in his pencilling he is almost equal to Mieris or Vanderwerf, he is often incorrect in his drawing of the figure, and he also appears to have copied nature precisely as he saw it, without attempting even to give a graceful air to his subjects; hence in his portraits of women he was not so successful as in those of men. The subjects of his male pictures are well composed. On leaving England, he retired to the Hague, where he practised with great success till his death in 1706. There are three capital pictures by this artist in the collection of his late majesty George IV.

SCHATZ, GEORGE, born at Gotha, November 1, 1763, was a German writer deservedly esteemed in his day both as an original writer and a critic. Being of a delicate constitution, he preferred books to the society and amusements of other boys of his age; but although devoted to reading, and to a species of it seldom taken up by the young, he could not submit to formal study. He therefore gained little by his residence at the university of Jena, where it was intended he should apply himself to jurisprudence, but he occupied himself with Italian literature and poetry; and planned a translation of Tasso, and another of Macchiavelli's 'History of Florence,' which last he afterwards nearly completed. The death of his father left him at liberty to return to Gotha, where he thenceforth almost continually resided. He now set about diligently studying almost every European language and literature, in order to become acquainted with their character and with the best writers and the chief productions in them. By this means he acquired no less valuable than extensive stores of reading, which enabled him to supply a number of excellent essays and papers to different literary journals, including those on Ercilla and Camoens, in the supplement to Sulzer's 'Theorie der Schönen Künste.' While his more finished pieces of criticism of that kind possess a permanent interest, his 'reviews' on the productions of the day were calculated to serve the cause of good taste, and generally displayed talent, shrewdness, and humour, that, if employed on less fugitive subjects, would have earned a very high reputation for the writer.

His original productions are not many, neither do they belong to the highest species of poetry. Nevertheless in his prose fables he is second only to Lessing, while in his sonnets and madrigals he shows himself rather the rival than the imitator of Petrarch. Many of his minor pieces are indeed mere trifles, but are distinguished by that captivating charm of manner which frequently constitutes almost the sole difference between prosy rhyming and highly wrought poetry. That he should have executed comparatively so little, while gifted with powers to excel, ceases to be matter of astonishment or reproach, when it is considered that he died in his thirty-second year, March 3, 1795.

SCHAUENBURG is a province of the electorate of Hesse-Cassel, which is entirely detached from the rest of the territory, and is situated between 51° 56′ and 52° 35′ N. lat., and between 9° 15′ and 9° 33′ E. long. It is bounded on the north-east and south by Hanover, on the south-west by Lippe-Detmold and Westphalia, and on the west by Schauenburg-Lippe: the area is 192 square miles. The surface is undulating, but there are some extensive plains. The soil is light, and on the banks of the Weser very fertile. The Süntel mountain in the east, the Deister on the north-east, and the Bückeberg on the west, are calcareous mountains of no great elevation, all clothed with fine forests. The Weser flows through a considerable part of the province, and all the smaller streams are its tributaries, either directly or indirectly, by means of the Leina. The climate is temperate, rather dry than damp, resembling that of Westphalia. The parts adjacent to the Weser produce corn, especially rye, barley, and oats, in abundance, and a considerable quantity is exported. The inhabitants raise potatoes, and all kinds of culinary vegetables, flax, and rapeseed. The forests are 75,000 acres in extent, and furnish timber for home consumption and for exportation. There is excellent pasturage and a fine breed of cattle. Domestic animals, game, and fish are not abundant. The minerals are salt, freestone, and coals, which are the best in all this part of Germany. Properly speaking, there are no manufactures. The province has its own separate government. The population is about 26,000 Lutherans and 2000 Calvinists, between 200 and 300 Jews, and a few Roman Catholics. The chief place is Rinteln, a tolerably well-built town upon the Weser, over which there is a bridge of boats, and which is here joined by the Exter. It lies in a pleasant country, has one gymnasium, one Lutheran and one Calvinist church, an old castle, and 3200 inhabitants.

SCHAUENBURG-LIPPE. This principality is sometimes called Schaumburg-Lippe, which, though used occasionally in official documents, is stated by Hassel to be incorrect. It consists, 1, of a portion of the county of Schauenburg, between 52° 11′ and 52° 30′ N. lat., and between 9° and 9° 25′ E. long.; it is bounded on the north and north-east by the Hanoverian province of Calenburg, on the east and south-east by the Hessian province of Schauenburg, and on the south-west and west by the Prussian province of Westphalia; and 2, of a part of the county of Lippe, namely, the bailiwicks of Blomberg and Alverdissen. The area is 210 square miles. The principality contains a few small streams. The face of the country is partly level, and partly mountainous, especially on the south-east, where the Bückeberg, a wooded mountain-chain, enters it. The country produces abundance of corn, pulse, flax, hemp, rapeseed, potatoes, and fruit. The minerals are coals, salt, gypsum, limestone and good building-stone. There is a good breed of cattle. There are no manufactures, but the country-people spin some yarn, and weave linen for their own use. The population of the principality is 24,000 Lutherans, 3600 Calvinists, and about 100 Roman Catholics. The revenues are about 21,000*l.* sterling, chiefly arising from the domains, the taxes being moderate. There are no debts, for on the close of the Assembly of the Estates, in 1818, the prince undertook to pay from his private property the debts, which amounted to above 20,000*l.* sterling. He also contributes one-tenth to all extraordinary contributions, both in money and kind, in peace and war. His highness, as a member of the German confederation, has one vote in conjunction with Hohenzollern and some other princes in the select council, and one vote of his own in the full council. The contingent to the army of the Confederation is 2040 men.

Bückeburg, the capital, is a well built town, situated at the foot of the Harz mountains, on the banks of a small stream called the Aue. It contains a palace, the residence of the prince, formerly surrounded with ramparts, which are now converted into public promenades and gardens. There are in the town one Lutheran and one Calvinist church, a gymnasium, 400 well built houses, and 2000 inhabitants.

SCHAUMBURG, SCHAUMBURG-LIPPE. [Schauenburg, Schauenburg-Lippe.]

SCHEELE, CHARLES WILLIAM, an illustrious chemist, who was born at Stralsund in Pomerania, in December, 1742, where his father was a tradesman. He was educated first in a private academy in his native town, and afterwards in a public school. Having a desire to study pharmacy, he was apprenticed to an apothecary at Göttenburg, with whom he remained eight years, during which period he acquired much valuable chemical information. In 1773 he removed to Upsal, where he became acquainted with Bergman, who became his friend and patron, and Scheele's publication entitled 'Chemical Observations and Experiments on Air and Fire' is prefaced by an introduction from the pen of Bergman. Observing that fire could not be maintained without the presence of air, Scheele turned his attention to its analysis; and he found that what was then called liver of sulphur and some other substances occasioned a diminution of the atmospheric air to which they were exposed, to about four-fifths of its original volume. He afterwards obtained oxygen gas, or, as he called it, *empyreal air*, by decomposing nitric acid, and by other processes; and he showed that this air was totally absorbable by liver of sulphur, and that upon adding as much of this gas to the residuum of the air which had been acted upon by liver of sulphur as had been absorbed by it, atmospheric air was reproduced. He found that the flame of burning hydrogen gas produced a similar diminution in the bulk of the air to that occasioned by the action of liver of sulphur.

It will be observed that, like Priestley, he discovered oxygen gas; and though not so early, yet, as Priestley himself admits, without any knowledge of what he had previously achieved.

Another and most important discovery which we owe to the labours of Scheele, is the elementary gaseous body now called chlorine, but by him named dephlogisticated marine acid. If we substitute, as has been very commonly done, hydrogen for phlogiston, the views of the discoverer will be perfectly intelligible and quite correct; for it is now well known that when hydrogen is abstracted from marine (now called hydrochloric) acid, chlorine is obtained; and on the contrary, when hydrogen is combined with chlorine, marine acid is produced.

One of Scheele's first discoveries was that of tartaric acid, and he pointed out the mode of preparation, and this, with slight alterations, is still adopted: this was in 1770, and in the following year his paper on fluoric acid appeared in the Memoirs of the Stockholm Academy. He at first erroneously supposed that the silica which he obtained in the operation of preparing this acid was a compound of fluoric acid and water; but when the inaccuracy of this opinion was proved by other experiments, he gave it up.

In 1774 his experiments in manganese appeared in the Memoirs above mentioned, and it was during his researches on this metal that he discovered two bodies not previously known, namely, chlorine, already mentioned, and the earthy substance barytes.

In the following year he proposed a new method of preparing benzoic acid, and also published an essay on arsenic and its acid; and a few years afterwards he made known the preparation of arsenite of copper, since largely employed as a pigment under the name of Scheele's or mineral green. In subsequent years he published important papers on molybdena and plumbago; on milk, and the lactic acid which it contains when sour; and also on the metal tungsten.

In 1782 his experiments on Prussian blue appeared: these were instituted for the purpose of discovering the nature of the colouring-matter, and they display great ingenuity, and sagacity in an uncommon degree. It resulted from these researches that the Prussic acid, or the colouring principle, was a compound of azote and carbon.

He pointed out, in 1784, a process for preparing citric acid in a pure crystalline form; and not long afterwards he described processes by which malic and gallic acids might be obtained in a state of purity.

These are the most important of Scheele's discoveries; and, with scarcely any other exception than perhaps Priestley, no person has pointed out so many new substances. It is to be observed that his labours were conducted under very disadvantageous circumstances, and during a life of short continuance, for he died at the early age of forty-four years, at Köping near Stockholm, in 1786.

SCHEFFER, JOHN, was born in 1621 at Strassburg, and is said to have been a descendant of Peter Schöffer, one of the inventors of the art of printing. The principal objects of his study were the antient languages and history, in both of which he made such extraordinary progress, that in the year 1643 he published a very learned work, 'De Varietate Navium apud Veteres,' in 4to. The frequent disturbances in Alsace induced him to seek a more quiet home in a foreign country, and he went to Sweden, where, in 1648, he obtained a professorship in the university of Upsala. He died in 1679.

The life of Scheffer must have been one of incessant labour; for besides a great number of antient authors which he edited with notes and emendations, such as Aelian's 'Variae Historiae,' Phædrus, Arrian's 'Tactica,' a newly discovered fragment of Petronius, Aphthonius, Hyginus, Justin, Jul. Obsequens, and others, he wrote a great number of original works on various subjects, some of which have not yet been superseded by other works. The following list contains the most important among them:—'Agrippa Liberator, sive Diatriba de Novis Tabulis,' Strassb., 1645, 8vo., a curious work on the supposed custom of cancelling debts at Rome, in order to prevent insurrections of the poor; 'De Stylo ad Consuetudinem Veterum Liber Singularis,' Upsala, 1653, 8vo.; 'De Militia Navali Veterum Libri Quatuor,' 1654, 4to. This book also contains his earliest dissertation, 'Of the Ships of the Antients,' in a somewhat altered form. 'De Antiquorum Torquibus Syntagma,' Stockholm, 1659, 8vo.; a new edition with notes was published at Hamburg in 1707, 8vo.; 'De Natura et Constitutione Philosophiae Italicae seu Pythagoriae Liber Singularis,' Upsala, 1664 (reprinted at Wittemberg in 1701); 'Regnum Romanum, sive Dissertationes Politicae Septem in librum primum T. Livii, qui est de Regibus Romanorum,' Upsala, 1665, 4to.; 'Upsalia Antiqua, cuius occasione plurima in antiquitatibus borealibus et gentium vicinarum explicantur,' Upsala, 1666, 8vo.; 'Graphice, seu de Arte Pingendi Liber Singularis,' Nürnberg, 1669, 8vo.; 'De Re Vehiculari Veterum Libri Duo, accedit Pyrrhi Ligorii Fragmentum ex ejus libro de familiis Romanis, nunc primum editum Italice cum Lat. versione et notis,' Frankf., 1671, 4to.; this is still the best work on the subject. 'Memorabilia Sueticae Gentis,' Hamb., 1670; 'De Fabrica Triremium Epistola;' this little work was published at Eleutheropolis (Amsterdam), under the name of Constant Opelius, and is a criticism on a work of Meibom on the same subject. 'Lapponia, seu Gentis Regionisque Lapponicae Descriptio accurata,' Frankf., 1673, 4to.; 'Lectiones Academicae, seu Notae in Scriptores aliquot Latinos et Graecos,' Hamb. 1675 (it was reprinted in 1698 at Amsterdam, under the title 'Schefferi Miscellanea'); 'De Situ et Vocabulo Upsaliae, Epistola defensoria adversus Olaum Verelium,' Stockholm, 1677, 8vo.; 'De antiquis verisque Regni Sueciae Insignibus,' Stockholm, 1678, 4to.; 'Suecia Literata, seu de Scriptis et Scriptoribus Gentis Sueciae,' Stockholm, 1680. A new edition of this work with important additions by J. Moller, was published in 1698 at Hamburg. In 1781 the Society for Education at Upsala proposed a prize for the best eulogium on John Scheffer, and the prize was awarded to that of Eric Michel Fant, which was published at Stockholm in 1783, 8vo. Several of the works of Scheffer are incorporated in the 'Thesauri of Roman Antiquities.'

SCHEFFER, HENRY THEOPHILUS, the grandson of the former, was born at Stockholm in 1710. He studied mathematics, natural history, and chemistry at Upsala, under very eminent professors of this university. He afterwards established, at his own expense, a laboratory in Upsala, and made a number of very useful experiments. It was chiefly the analysis of such metals and plants as are used for dyeing, on which he bestowed his particular attention. He was a member of the Academy of Sciences at Stockholm, and furnished many valuable papers which are printed in the Transactions of the Academy. He also delivered a course of lectures on chemistry at Stockholm, which were published in 1776, by Bergman. Scheffer died in 1759.

SCHEID, EVERARD, more generally known under his Latin name *Scheidius*, a philologist who distinguished himself by his deep acquaintance with the Oriental languages, was born at Arnheim in Holland, in 1742. From his early youth he devoted all his time to the acquisition of the Eastern languages, principally the Hebrew and Arabic, of which he soon became a consummate master. In 1768 he was appointed professor at the university of Harderwyck. On his removal to Leyden he succeeded J. Albert Schultens in the chair of Oriental languages; though he did not long enjoy this post, for he died in 1795, soon after his appointment. Besides his edition of the 'Minerva de Causis Linguæ Latinæ,' by Sanchez [SANCHEZ], Scheid left several works on Eastern literature which are highly valued by scholars. The following are the titles of some: 'Primæ Lineæ Institutionum, sive Specimen Grammaticæ Arabicæ,' Leyden, 1779, 4to.; 'Ebn Doreydi Kassida, sive Idyllium Arabicum, cum Scholiis,' ibid., 1786, 4to.; 'Oratio de Fontibus Literaturæ Arabicæ,' ibid., 1767, 4to. He published also 'Glossarium Arabico-Latinum Manuale,' Leyden, 1769, 4to.; being an abridgment of the large Arabic and Latin lexicon by the celebrated James Golius. Scheid had projected a new Dutch translation of the Bible and other works, which death prevented him from executing.

SCHEINER, CHRISTOPHER, a learned German astronomer, was born at Wald near Mundelheim in Suabia, in 1575, and became a member of the order of Jesuits in 1595. Having early made proficiency in mathematics and astronomy, he was appointed professor of those sciences at Ingolstadt, and he afterwards gave instruction in them at Fribourg and Rome. The principal circumstance by which the life of this philosopher is distinguished is a discovery, in 1611, of the spots on the sun, independent of that which had been made by Galileo a few months previously. This discovery is announced in three letters addressed by Scheiner to Velser, the senator of Augsburg, in which the writer states that, in the beginning of the year, while looking at the sun through a telescope, he perceived on its disk some dark spots; and that in the following month of October, on repeating the observations, he ascertained that the spots had a movement across the disk. It appears from the same letters that P. Scheiner at first thought the spots to be small planets revolving about the sun; an idea which was afterwards maintained by P. Malapertius in a work published in 1627.

An expression in a letter from Velser to Galileo puts it out of doubt that the discovery made by the Italian philosopher was known in Germany when the letters of Scheiner were published (1612); and it must be further admitted that to Galileo belongs the merit of having, from the first, considered the spots of the sun as adhering to the disk of the luminary, and of having drawn from the regularity of their motions an argument for the rotation of the sun about its axis. It is but just however to Scheiner to state that he almost immediately abandoned his first hypothesis, and that we are indebted to him for numerous observations on the spots, as well as of Jupiter's satellites. The observations were published at Rome in 1630, in a work which, from being dedicated to Prince Orsini, was entitled 'Rosa Ursina.'

Scheiner, unfortunately for his fame as a philosopher, united himself with those persons who, at that time, opposed the hypothesis of Copernicus, and he published in 1614, at Ingolstadt, a volume entitled 'Disquisitiones Mathematicæ,' in which he argues in favour of the opinion that the earth is at rest in the centre of the universe. Besides these works Scheiner published, in 1616, a treatise on gnomonics; and, in 1617, a tract on celestial refraction, in which he assigns the true cause of the elliptical form assumed by the disk of the sun when near the horizon. He also published a treatise on optics in 1619. Scheiner was the inventor of the pantograph, and he has given a description of the instrument in a tract entitled *Pantographice*, &c., Rome, 1631.

This distinguished Jesuit, after quitting Rome, became rector of Neiss in Silesia: he gave lessons in mathematics to the archduke Maximilian, and at length he became confessor to the archduke Charles. He died of apoplexy in July, 1650, leaving the character of having been a man of agreeable manners as well as a laborious student.

SCHELDE (in Dutch and German), **ESCAUT** (in French), the *Scaldis* of the Romans, rises in France, in the department of Aisne, and flows northward to Cambray and Bouchain, in the department of Nord, receiving the Sensee on the left bank. From Bouchain it flows north-east by Valenciennes to Condé, and then north-west to Tournay in Belgium, receiving the Scarpe on the left bank between these two towns. From Tournay the Schelde flows north-north-west for a short distance, and then north-north-east by Oudenarde (Oudenaarden or Audenarde) to Ghent, where it receives the Lys on the left bank. From Ghent its course is eastward to Dendermonde, where it receives the Dender on the right bank; and then winding to the north-east, reaches Antwerp, receiving the Rupel on the right bank some miles above that city. From Antwerp its course is north-west, until, just on the border of Belgium and Holland, it separates into two principal arms, the Hond or West Schelde, and the East Schelde, by which it flows into the North Sea. The direction of these two arms is westward (the East Schelde being the more northerly), and they enclose between them a group of low islands, consisting of South Beveland, North Beveland, Wolfersdyk, and Walcheren, separated from each other by narrow channels. The fortress of Vlissingen, better known in England as Flushing, in the island of Walcheren, guards the entrance of the West Schelde. Branches from the West Schelde enclose the islands of Hulst, Axel, Oostburg, and Cadsand or Cassandria, which line the southern bank of that arm; while branches from the East Schelde, uniting with the Maas or Meuse, enclose the islands of Tholen, Duiveland, and Schouen or Schouwen, which line the northern bank of this arm. The passage of the East Schelde is guarded by the fortress of Bergen-op-Zoom. The little island of Saeftingen is just at the separation of the two arms.

The total length of the Schelde is estimated at about 210 miles, of which about 60 belong to France, 110 to Belgium, and 40 to Holland. The navigation of the river commences at Cambray, only about 20 miles from its source. Boats of various sizes are employed in the upper part, and small merchantmen ascend to Ghent by the canal of Sasvan-Ghent, which is cut northward from Ghent into the West Schelde, and then by the Schelde as far as Oudenarde, and some of the smallest go even higher than that. The width of the river at Dendermonde is 600 feet, at Antwerp 1200 feet, at the mouth of the East Schelde 7 miles, and of the West Schelde nearly 10 miles. Ships of war can get up to Antwerp, where the tide rises 12 feet.

Of its affluents the Scarpe is navigable to Arras, 44 miles; the Lys to Aire, 106 miles; and the Durme (which joins it between Dendermonde and Antwerp, and is made navigable by the tide for nearly its whole length) to Lokeren, 12 or 15 miles; these are all on the left bank. The Dender is navigable to Ath, 44 miles; and the Rupel (formed by the junction of the Dyle, the Senne, and the Nethe) is navigable to the junction of the Demer with the Dyle, 24 miles, or about 30 miles to Herenthals on the Little Nethe, or Westerloo on the Great Nethe. These join the Schelde on the right bank. There are several canals connected with the Schelde and its affluents.

The navigation of the mouth of the Schelde is seriously impeded by large sand-banks; but the traffic on all parts of the river is very great. The basin is not very large, and is bounded by low hills, which are ramifications of the heights of Ardennes.

SCHE'LESTADT, SE'LESTAT, or SCHLETTSTADT, a town in France in the department of Bas Rhin, 25 miles south-south-west of Strasburg. It was a place of importance, known to the Romans by a name variously written Ἔλκηβος (Elcebus) by Ptolemy, who gives it as one of the towns of the Τρίβοκκοι (Tribocci), a German nation settled on the left bank of the Rhine; Elcebus or Elcebum, in the Antonine Itinerary, and Hellellum in the Peutinger Table. It was destroyed by Attila in his invasion of Gaul; and for a long time remained in a low condition, though Charlemagne and his successors had a palace here. In the thirteenth century it was walled and repeopled, and became one of the most important of the free and imperial cities of Alsace. In the Thirty Years' War it again suffered much; but since the reunion of Alsace with France it has gradually revived. In the course of the present century its population has doubled.

The town is pleasantly situated amidst the meadows watered by the Ill, and commands a prospect of the Vosges on the west; their slopes covered with vineyards, and their summits crowned with ruined castles. The town is fortified: it has three gates, three churches, two ranges of barracks, an hospital, a prison, a college, and a theatre. The houses are crowded together and generally ill built. The population in 1831 was 9384 for the town, or 9646 for the whole commune; in 1836 it was 9700 for the commune. The townsmen manufacture calicos and other cotton goods; 'metallic cloth,' a peculiar and valuable fabric; hosiery, soap, pottery, twine, potash, arms, &c. There are tan-yards and breweries; and four fairs are held in the year. Coal and potters'-clay are found in the neighbourhood.

Schelestadt is the capital of an arrondissement containing an area of 444 square miles, with a population, in 1831, of 131,295; in 1836, of 134,887. It comprehends 114 communes, and is divided into eight cantons or districts, each under the jurisdiction of a justice of the peace.

SCHE'LLER, J. J. G., was born in 1735 at Jhlow, a village in the electorate of Saxony. He was educated at the Thomas schule of Leipzig, and afterwards in the university of the same place. He studied under Ernesti, and devoted himself to theology and philology. In 1761 he was appointed head master of the public school at Lübber, and in 1772 to the rectorship of the gymnasium of Brieg, in which office he continued until his death in 1803.

Scheller is principally known as the author of a Latin dictionary (Latin and German, and German and Latin), the first edition of which was published at Leipzig, in 1783, and the second in 1788, 3 vols. 8vo. The third edition, which was very much improved and enlarged, appeared in 1804-5, in 7 vols. 8vo. This book was very much used at the time, as it was almost the only dictionary of practical utility that had been published in the German language. It has been translated into Dutch (Leyden, 1799, 2 vols. 4to., with a preface by Ruhnken), and, some years ago, into English also. Scheller also wrote a smaller Latin dictionary for the use of schools; the second (1812) and subsequent editions were revised and improved by Lünemann. Scheller's other works are, 'Præcepta Styli bene Latini' (a third edition of which appeared at Leipzig, 1797, in 2 vols. 8vo.), and a Latin Grammar ('Ausführliche Lateinische Sprachlehre') which went through three editions, Leipzig, 1779, 1790, and 1803. This grammar is a work of little value; it has been translated into English.

SCHE'LTOPUSIK or **SHELTOPUSIK,** the ordinary name for a genus of *Reptiles*, *Pseudopus* of Merrem.

Cuvier considered that the *Scheltopusik* was a serpent; and, in his last edition of the *Règne Animal*, he arranged it at the head of the *Orvets*, *Anguis* [BLIND-WORM]; but most other herpetologists, indeed an exception does not occur to us, place it among the SAURIANS.

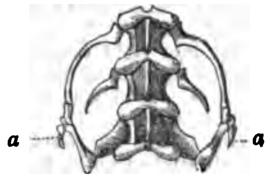
MM. Duméril and Bibron arrange the form under their *Chalcidian Lizards*, or *Cyclosaur Saurians*, with the following

Generic Character.—Tongue of an arrow-head shape, free and delicate for its anterior third only, notched triangularly in front, with granulous papillæ on the first third of its surface, and with filiform papillæ on the two last; teeth on the palate; intermaxillary teeth conical, simple; maxillary teeth subcylindrical or subtubercular; nostrils lateral, each opening in a single plate; a very small external auricular opening; eyelids; cephalic plates numerous; posterior limbs represented by two small scaly appendages, which are simple or slightly bifid, not pierced with pores, and situated one on the right and the other on the left of the vent; two rather deep lateral furrows; not the smallest fold under the neck.

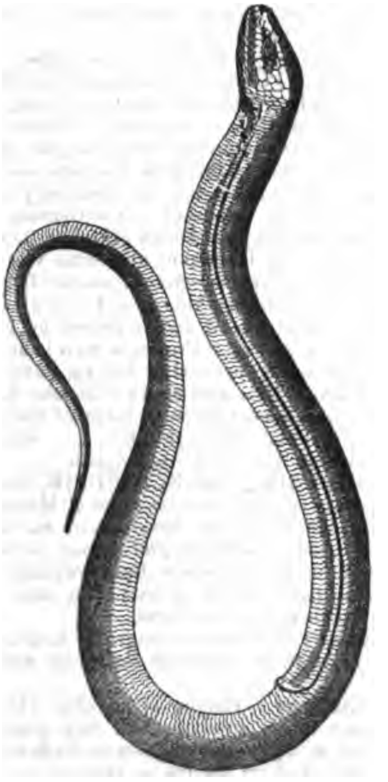
MM. Duméril and Bibron well observe, that if we were only to consider the form of their body, extremely elongated and deprived of feet as it is, like that of the Serpents, the Scheltopusiks would seem to have no right to occupy in a natural method the place which those zoologists assign to it, namely, among the *Ptychopleures*, between *Gerrhonotus* and OPHISAURUS, and consequently next to species which have limbs of as good conformation as the generality of Saurians. But, they remark, if *Ophisaurus* is not to come immediately next to *Gerrhonotus*, there is no other form which so nearly approaches the *Gerrhosaurs*, and particularly *Gerrhonotus*, in its internal and external organization, so closely indeed does it approach, that it might in some sort be said of the Scheltopusiks that they are apod *Gerrhonoti*. In both are found palatal teeth, a tongue covered with two sorts of papillæ, an external auricular orifice, cephalic plates in greater number than in the other Chalcidians, a well-defined longitudinal furrow on each side of the trunk, and finally, a regular system of scales which are homogeneous on the lower part of the body from the throat to the orifice of the cloaca. MM. Duméril and Bibron then point out some slight differences between the two genera, which, in their opinion, do not affect their general approximation.

The *Scheltopusik* has two lungs, but one is three or four times larger than the other.

The only species known is the *Pseudopus Pallasii*, Cuv.; *Le Bipède Sheltopusik* of Lacépède and others; *Lacerta Apus* of Gmelin; *Pseudopus serpentinus*, Bonap.



Pelvis of Scheltopusik, showing at *a*, *a* the rudiments of the posterior extremities.



The Scheltopusik.

Description.—The scales become osseous with age; on the neck, the back, and the sides they are subrhomboïdal; below, that is, on the throat, the breast, and the belly, they are hexagonal, wider than they are long, and slightly notched on their posterior border. In young subjects all the scales, with the exception of the gular, are surmounted with a strong carination; but by degrees, as the animal is developed, the carinæ are attenuated to such a degree that the scales of the dorsal region, and still more those of the abdominal region, preserve but a slight vestige of it; the caudal scales however remain constantly carinated. When the dorsal scales lose their carination, they become marked with longitudinal striæ, which are more or less strong in different individuals.

The Prince of Canino[*] describes the head and anterior part of the neck as being of a greyish-ash colour, whilst its posterior region is of the same tint as the trunk. The ground-colour of the upper part of the body is rusty chesnut verging on reddish. Each scale is dotted with a very great number of small blackish points. The colour of the back, in descending towards the sides, passes gradually into an ashy hue. The iris is golden green and the pupil black.

The colouring of the young is entirely different from that of the adults. They are greyish-brown above, and whitish-grey below. Above, their back is marked across with stripes, or rather with spots or chevrons of brown. There are brown stripes also from below upwards on the sides of their head and neck. There is one behind the nostril, a second under the eye, a third on the edge of the commissure of the lips, a fourth across the ear, and many others behind the last. The greater part of these stripes descend under the throat, where they join each other more or less regularly.

Geographical Distribution.—Wide. The Crimea, South of Siberia, Istria, the Morea, the whole of the Continent of Europe to the south, and the Mediterranean coasts of Africa, haunting thick herbage and grassy places.

The *Pseudopus D'Urvillii* of Cuvier and the *Pseudopus Fischeri* of Ménestriés are merely young individuals of the species above described.

The Prince of Canino[†] places the form in his family *Ophiosauridæ* and subfamily *Ophiosaurina*.

SCHEMNITZ (called in Hungarian *Selmecz-Banya*), a royal free town in the county of Honth, is the largest and most important of the Hungarian mining-towns. It is situated 2172 feet above the level of the sea, in a deep and narrow valley thickly wooded. The town is not large, but it has four extensive suburbs, part of which are two leagues distant. The population is about 8000 in the town, and between 9000 and 10,000 in the suburbs, most of whom are employed in the mines. Schemnitz was founded in the twelfth century, and, with the whole mining district of Northern Hungary, was entirely peopled with colonists from Flanders and Lower Saxony. This town is the centre of the mining district of Lower Hungary, which comprises fifteen towns. The mines formerly yielded annually 100,000 marks of silver, which is more than all Hungary now produces; and above 1800 marks of gold, which is equal to 132,000 ducats. From 1740 to 1773 the value of the precious metals was estimated at 70,000,000 of florins: at present the whole district does not produce annually above 400 marks of gold and from 60,000 to 80,000 marks of silver. The principal buildings are the town-hall, the two parish churches, the new Protestant church, which is a remarkably elegant edifice; the new palace, the residence of the civil governor; and the mining court-house. Of the public institutions, the most worthy of notice are, a Roman Catholic and a Protestant gymnasium; two high schools, and the mining academy, founded in 1760, which is frequented by pupils from all parts of Europe; with the chemical laboratory, and a splendid mineralogical and geological collection. The elevated situation of the mines has made it necessary to construct reservoirs, at a very great expense, to receive the snow and rain water necessary to work the machinery. The works most worthy of notice are in the village of Windschacht, where there is an hydraulic machine which raises 97,545 cubic feet of pit water from the depth of 180 fathoms in four and twenty hours. Schemnitz is situated in 48° 50′ N. lat. and in 18° 50′ E. long.

SCHEPLER, LOUISA. [OBERLIN, J. F.]

---

[*] 'Fauna Italica.'

[†] 'Amphibia Europæa,' in 'Memorie della Reale Academia delle Scienze di Torino,' Serie II., tom. ii., p. 385

SCHERERITE occurs in acicular crystals and small translucent layers. Colour white or yellowish-white. Lustre pearly. Devoid of taste or smell; is very friable. It melts at 112° Fahrenheit, and distils at 194°. It is insoluble in water and alkaline solutions, and in alcohol unless it be heated, but it dissolves in æther and oil of turpentine. When exposed to fire it inflames, and is entirely dissipated, with a somewhat aromatic smell.

It occurs in beds of lignite at Uznach, near St. Gall in Switzerland, and also at Bagh in the same country.

Analysis by Macaire Prinsep:—Hydrogen, 24; Carbon, 73.

SCHEUCHZER. [SALAMANDRIDÆ—*Fossil.*]

SCHEVELING, or **SCHEVENINGEN,** is a beautiful village in the province of South Holland, on the German Ocean, north-west of the Hague, with which it communicates by a broad avenue of oaks and limes, perfectly straight and above two miles in length: there is likewise a canal from the Hague to Scheveningen. The town is protected from the sea by the downs; but in 1574 upwards of one hundred houses were swept away by a high flood. The place has been greatly improved of late years, and is now much frequented for sea-bathing. There is a small pavilion belonging to the queen; a fine orangery and water-works. The inhabitants, about 3000 in number, subsist chiefly by fishing, and have in a great measure retained their antient manners and costume.

SCHIAVONETTI, LUIGI, or **LOUIS,** was born at Bassano, in the Venetian states, April 1, 1765. He was the eldest son of a stationer, with a large family and limited means. Luigi very early displayed a talent for drawing, and at the age of thirteen was placed under Giulio Golini, or Goldini,* a painter of some eminence, who became much attached to his pupil. Golini died about three years after, and young Schiavonetti turned his attention to engraving, and received some instruction in the mechanical part of the art from a very indifferent engraver named Lorio. He was employed for a time in engraving for Count Remaudini, and appears to have aimed at the style of Bartolozzi, whose engravings in the chalk manner were then attracting much attention. His skill in imitating this great master led to a connection with an engraver named Testolini, who eventually induced him to remove from Bassano to London, where he resided for some time with Bartolozzi, and afterwards established himself. He profited much by his connection with Bartolozzi, and continued the exercise of his talents with increasing reputation until his death, on the 7th of June, 1810. Most of the works of Schiavonetti were small, though he executed some important plates, and was engaged, at the time of his death, on the large engraving of Stothard's 'Canterbury Pilgrimage,' which was finished by James Heath. Besides his more elaborate works, the free etchings of Blake's illustrations to Blair's 'Grave,' and the beautiful head of Blake prefixed to that work, are deservedly much admired. Like the eminent man whose manner he adopted, he was distinguished for the freedom and accuracy of his drawing. The private character of Schiavonetti was such as to ensure general respect, and his funeral was attended by the president and several members of the Royal Academy. His brother Niccolo engraved in conjunction with him, and did not long survive him. (*Life* by Cromek, in 'Gent. Mag.,' vol. lxxx., part 1, &c.)

SCHIAVO'NE, ANDREA, called *Medula,* was born at Sebenico in Dalmatia, in 1522. He was of obscure parentage, and was placed with a house-painter at Venice, where he employed his leisure time in studying from prints after Parmigiano, and in contemplating the works of Giorgione and Titian. The latter artist, having become acquainted with the poverty of Schiavone, and approving of his ability, employed him with Tintoretto and others in the grand works for the library of S. Marco, where three entire ceilings are said to be by his hand. He soon became the rival of Tintoretto, but although he was excellent as a colourist, his defective knowledge of drawing rendered him unable to compete successfully with that master; the work however which he painted for the church of Santa Croce, representing the Visitation of the Virgin to Elizabeth, gained him considerable reputation. Two of his most admired works are in the church of the Padri Teatini at Rimini, one of them the Nativity of our Lord, the other the Assumption of the Virgin. Schiavone died at Venice in 1582. The chief merit of this artist consists in his colouring, to which he seems to have sacrificed other requisites of his art. Still his attitudes and draperies are graceful, and his countenances, more especially of women, expressive; nor are his compositions deficient in variety and skill. There are several etchings by him, some from his own designs, and others after Raffaelle, Parmigiano, and other artists. (Lanzi, *Stor. Pitt.*; Bryan's *Dictionary.*)

SCHIDO'NI, or **SCHEDONE, BARTOLOMEO,** was born at Modena, in 1560. Malvasia reckons him among the disciples of the Caracci, but Fuseli seems to doubt the correctness of this assertion, observing that either his earliest performances must be unknown, or that he must have been a very short time with the Caracci, since it is difficult to find any trace of their style even in his largest works. However this may be, it is evident that he formed his style by a most attentive study of the works of Correggio, whose grace and delicacy he more nearly approached than any other of the numerous imitators of that great artist; and in the cathedral of Modena there is a picture of S. Geminiano resuscitating a dead child, which has often been mistaken for a work of Correggio. Schidoni's juvenile performances in the public edifices of Modena had gained him considerable reputation, when Runuccio, duke of Parma, appointed him his principal painter. He executed for the duke several historical subjects, much in the manner of Correggio, but was chiefly employed in painting the portraits of his patron and his family; he painted also the portraits of all the princes of the house of Modena, which were distinguished by so much taste and variety of attitude, and such delicacy of colouring, as caused him to be reckoned among the best masters in Italy. Schidoni had an elevated genius; his style is extremely elegant; his touch light and delicate; the airs of his heads graceful; his skill in the treatment of the chiaroscuro and his colouring are admirable, and all his works are exquisitely finished, but he is often incorrect in his drawing. The extraordinary beauty of his works would always cause them to be eagerly sought after, and they are accordingly held in the highest estimation, and their value is greatly enhanced by their extreme rarity. He died in 1616, at the age of fifty-six.

SCHIEDAM is a considerable town in the province of South Holland, in the kingdom of the Netherlands, situated in 51° 55′ N. lat. and 4° 24′ E. long., on the Schie, a small river or canal which runs from Delft, and falls into the Maas at Schiedam. The population consisted, in 1841, of 5072 males and 6349 females, in all 12,051; of whom 7090 were Protestants, 4939 Roman Catholics, and 32 Jews. The inhabitants are much engaged in the herring fishery, but the town is chiefly celebrated for its numerous distilleries of gin (Hollands), of which there are above 200, which consume 30,000 lasts of corn annually. It should seem that the manufacture of gin has declined within these few years, for the distillers presented a petition, about two years ago, to the States-General, in which they stated that there was a great decrease in the quantity exported to the United States of North America, in consequence of the establishment of temperance societies in that country. Schiedam has a small harbour, and 352 ships (amounting to 53,547 tons) arrived in 1840, chiefly with cargoes of corn from the Baltic.

SCHIEFER SPAR, *Slate Spar, Foliated Carbonate of Lime,* occurs massive. Structure laminar, the laminæ being thin and generally curved, wavy or undulating. Yields easily to the knife. Colour white, reddish, yellowish, or greenish. Streak white. Lustre pearly on the surface of the laminæ, and vitreous on the edges. Translucent. Specific gravity 2·740. It is almost entirely soluble in acids with effervescence. It occurs in Cornwall, Scotland, and Ireland.

Analysis by—

	Suersee.		R. Phillips.
Carbonate of Lime . .	95·33		98·118
Silica	1·66		00·050
Oxide of Iron . . .	1·00		00·800
Water	2·	Water and loss . .	1·032
	99·99		100·

SCHILLER, FREDERICK, the greatest dramatist and most popular poet of Germany, was born on the 10th of November, 1759, in the town of Marbach, on the banks of the Neckar. He was first sent to school at Ludwigsburg, where, under the celebrated Jahn, he read Ovid, Virgil, and Horace, and also commenced Greek. But he had to follow the changes of residence and life of his parents, which interrupted his studies. This irregularity Carlyle thinks not the most propitious for educating such a boy, but we conceive that its variety was most propitious to the poet, who requires more knowledge of life under its manifold phases, than of books. Schiller had to gather the elements of learning from various masters. 'Perhaps,' says Carlyle, 'it was owing in part to this circumstance that his progress, though respectable, or more, was so little commensurate with what he afterwards became.' But, like most men of genius, we suspect he found the current of life too strong within him,—his heart throbbing with too many active impulses, to attend much to his drier studies, and that 'the stolen charms of ball and leap-frog were frequently bought by reproaches.' There is a poetic anecdote of his being found, while quite a child, during a thunder-storm, 'perched on the branch of a tree, gazing at the tempestuous face of the sky and watching the flashes as in succession they spread their lurid gleam over it; and when reprimanded by his parent, he replied, that the lightning was so very beautiful, he wished to see where it was coming from.' This does not seem like one whose organization fitted him to become the brodgelehrte (mere scholar) whom he afterwards so humorously described. (See his *Essay on Universal History.*) In 1772 he had to prepare for confirmation, and his mother 'having called him out of the street' (where he was playing), to seriously collect his thoughts, he wrote a hymn, which was his first composition, and which led to the opinion of his being adapted for the ecclesiastical order. He welcomed the prospect, and underwent the four annual examinations before the Stuttgard Commission, to which young men designed for the church are subject. But fate decided otherwise. The duke of Würtemburg, having founded a college, gave the sons of his officers a preferable claim to its benefits; he offered them to Schiller's father, who was an army surgeon, and, afraid to refuse the offer, young Schiller accepted it, but with great reluctance, and was, in 1773, enrolled as a student of law. It is indeed worthy of remark, considering how adverse the study of law is to poetry, that so many men of letters should have served a toilsome apprenticeship to it. Schiller, unable to endure its thraldom, exchanged it, in 1775, for the study of medicine, which however he only accepted as less tedious. Apart from his profession he stole cherished hours, which were devoted to Plutarch, Shakspere, Klopstock, Lessing, Göthe, Garve, Herder, Gerstenberg, and others. The 'Messias' of Klopstock and the 'Ugolino' of Gerstenberg were among his earliest and deepest studies, and, combined with his own religious tendencies, had early turned him to sacred poetry. At the age of fourteen he had finished the plan of an epic on Moses, which he subsequently worked up into a dissertation on the 'Legation of Moses.' (See his *Sendung Moses.*) But the popularity of 'Ugolino' and Göthe's 'Göz von Berlichingen,' and the impression which they made on him, inspired him with a dramatic impulse, and he wrote the 'Student of Nassau' and 'Cosmo dei Medici;' some fragments of the latter he preserved and incorporated with the 'Robbers.' Schiller brooded gloomily over his situation. He would often escape in secret to catch a glimpse of the busy world which to him was forbidden; but this only rendered him more averse to school-formalities and class-books, so that he would frequently feign sickness, that he might be left in his own chamber to write poetry. In addition to magazine contributions of little value, Schiller worked at his 'Robbers,' and when, in 1780, he graduated, he quoted from it in his thesis (*Ueber den Zuzammenhang der Thierischen Natur des Menschen mit seiner Geistigen*) as from an English work, 'The Life of Moor, Tragedy by Krake, act v., s. 1.' After taking his degree, he was attached as physician to the grenadier battalion, with a small salary. In 1781 he published the 'Robbers,' and in 1782 it was produced, with several entertainments, at Mannheim. The sensation which it excited all over Germany, more than its peculiar merits, calls for a slight notice of it. The outline of the plot is this: The Count von Moor has two sons, Karl and Franz. The younger, jealous of the love which Amalia and the Count bear to Karl, prejudices his father against him by false insinuations, and causes a letter of disinheritance to be written to Karl, who is at Leipzig. Driven to desperation, this young man flies into the forest of Bohemia, and becomes captain of a band of robbers. He afterwards returns in disguise to his father's house,—hears that his betrothed Amalia has become inconstant, and that Franz has not only intercepted all letters of contrition, but has imprisoned their aged father in a tower, with a view to starving him to death. Karl releases the old man, stabs Amalia, and delivers himself up to a poor man with eleven children, that the reward for his apprehension may do good. Franz strangles himself.

---

* The name is given differently by different writers.

The situations, the language, the characters, all partake of bombast, occasionally rising to the grand, but seldom escaping from melodrame. A comparison of the first scene with that in 'Lear,' of which it is a direct imitation, will illustrate the crudeness of the whole piece. Whirlwinds, hell, death, and despair are scattered about with exuberant hand. The pistol is to send him, 'alone and companionless, to some burnt and blasted circle of the universe,' where he would have 'eternity for leisure to examine the perplexed image of universal woe.' These two passages from the same soliloquy illustrate the work, which is a mixture of vehement swagger and real grandeur. As acted, it is a ranting, firing melodrame, which could only have had its effect from its vehement contradiction to the cold proprieties of the German-French school, or the more humble melodrame of Lessing. It is said to be 'the most *stimulant* tragedy extant in German literature.' Indeed it pours forth a thunder of rant; it brings impossible characters into violent situations; it is full of exaggerated gigantic metaphors. It has only the excuse of boyhood and boyish enthusiasm uncorrected by experience or knowledge. Schiller himself felt all this in his after-life, and in one of his letters he says, 'To escape from trammels which were a torment to me, my heart fled to an ideal world; but, unacquainted with the real one, from which I was separated by iron bars, ignorant of mankind, and unintroduced to the softer sex, my pencil necessarily missed the middle line between angel and devil, and could produce but moral monsters. . . . Its fault is in presuming to delineate men before I had met one.' The 'Robbers' is only interesting in connection with Schiller and with the history of German literature. The causes of its immense success were various. Respecting the revolution which it created in Germany and (according to public report in France and England) the number of 'young noblemen' which it seduced to brigandage, we may remark that the whole is an exaggeration worthy of the play itself. The intense purpose and passion of the piece produced a wide-spread sensation and many paltry imitations, but no lasting work, no lasting effect. As to the German youth, who all took the road, and the 'German noblemen,' they were about as numerous as the converts to 'Jack Sheppard,' of which so many silly reports have been industriously circulated. On inquiry it turns out that there was only one German nobleman, 'of fairest prospects,' and stricter scrutiny discovers him to have been a German blackguard, 'who took to the highway when he could take to nothing else; not allured by any ebullient enthusiasm, or any misdirected appetite for sublime actions, but driven by the more palpable stimulus of an empty purse.' With the natural feeling of an author, Schiller had ventured 'to go in secret and witness the first representation of the "Robbers" at Mannheim. His incognito did not conceal him, and he was put under arrest during a week for this offence.' Enraged at this and other offences to his dignity as a man, worn out with the prospect of frittering away his energies in his present 'cabbin'd, cribbed, confined' sphere, he resolved to escape, and, taking advantage of the arrival of some foreign duke at Stuttgard, fled from the city, in the month of October, 1782. Dalberg, the director of the Mannheim theatre, received him with open arms, and supplied him with money for his immediate wants. Here he began to look more calmly at his prospects, and, applying himself zealously to work, in the course of a twelvemonth produced his two tragedies 'Fiesco' and 'Kabale und Liebe.'

'Fiesco' still has many admirers. It is melodrame, not tragedy. Yet there is fine dramatic power visible in it. The fierceness and bombast of the 'Robbers' are subdued, though still apparent, and the delineation of characters, though faulty, yet much clearer and truer than in the latter piece. Hassan the Moor is a mere exaggeration, and Fiesco's conduct and language to him equally offensive. But there are still heavier faults. 'The Romance of Julia,' as Fiesco styles his intrigue, develops his subtle character, and affords a stage situation, but during its progress he will not spare his beloved wife the pangs (unnecessary as they are to his purpose) of jealousy. Why does he not hint to her that he but played with Julia? Then again his killing his wife by mistake at the last, is a most clumsy and inartificial contrivance; but it is another death however, the stage has another corpse strewed on it, and this with some is the perfection of tragedy. It is worthy of note that Schiller alters the historical catastrophe, and makes Fiesco fall by the hand of Varrina, the republican, because, as he very truly but rather pompously observes in the preface, the nature of the drama does not admit of the operation of chance or accident; and yet, in spite of this, he makes Fiesco kill his wife by accident. But there are many very justly admired beauties. The couleur locale, as the French call it, that is, that painting of the historic spirit and manner which lies deeper than costume, is well produced. The catastrophe has a most solemn effect. 'The midnight silence of the sleeping city,' says Carlyle, 'interrupted only by the distant sounds of watchmen, by the low hoarse murmur of the sea, or the stealthy footsteps and disguised voice of Fiesco, is conveyed to our imagination by a few brief touches. At length the gun is fired, and the wild uproar which ensues is no less strikingly exhibited.'

'Kabale und Liebe,' with some effective points and 'situations,' is still indifferent, if not bad, and far inferior to 'Fiesco' or the 'Robbers.' It is a household tragedy of the Kotzebue school, extravagantly written, puling with sentimentality, unreal, unpoetic, and unsatisfactory. The question of cabal and love is entirely forced from its import by a want of truth in the delineation. Considered as a drama, its construction is very faulty. What can be more revolting than the situation and feelings between the father and son here? Such pivots should never be admitted but for greater ends and more enlarged interests. What can be more superfluous than the introduction of Lady Milford? What more awkwardly undramatic than the contrivance for giving Wurm's letter an air of truth by making Ferdinand, who up to this period never suspected Louisa, now exclaim, 'You have a lover!' because she refuses to follow him? How much truer and more dramatic to have made him believe there was *some* mysterious bond which restrained her, instead of jumping at once to the foregone conclusion. Finally, the denouement is in the worst possible taste; a reckless attempt to excite our sensibilities; the making Ferdinand kill Louisa and himself out of pure wilfulness, when the whole matter could have been cleared up with a word. Her oath, forced as it was, certainly could not weigh in the scale with the crime of suicide. These three plays all manifestly belong to the same period, and are curious as evidences of the wild enthusiasm of a young poetic spirit.

In 1783 Schiller was appointed theatre-poet, a post of respectability and reasonable profit. He translated Shakspere's 'Macbeth' and some French plays for the theatre, besides his other duties. In 1785 appeared the first number of the 'Thalia,' a miscellany containing essays, criticisms, &c. on the drama, edited by him, which was continued till 1794. In the first number the first three acts of 'Don Carlos' were inserted, which were highly admired. In the 'Thalia' also were published his 'Philosophical Letters.' Having rejected on the one side the arguments of the supernaturalists, and on the other those of the Spinozists, the two parties then at war, he settled into a creed in which faith and reason embrace. His creed is a sort of mystical deism, which is expressed in this one phrase, 'The universe is a thought of God's.' These Letters remain a fragment. They are written with great power, but have little originality.

During the spring of 1785 Schiller migrated into Saxony, and settled near Leipzig. Here he wrote the 'Ode to Joy,' one of his most beautiful creations, and the novel of the 'Ghostseer,' which was never completed. He then went to Dresden, where he finished 'Don Carlos,' 'the first of his plays which bears the stamp of full maturity.' It is indeed a fine work, though deficient in unity of subject and treatment, which, as he himself remarks, results from his having delayed so long between the first part and the completion of the second. It is the most dramatic of all his plays, and the scenes between Posa and Philip, and between Philip and the Inquisitor, are among the finest specimens of dramatic writing. There is real passion beating through every vein of the work; and its situations are as effective as complex. But Schiller has himself criticised it in his 'Briefe über Don Carlos,' after which little is to be said.

In 1789 Eichhorn retired from the chair of history at Jena, and Göthe recommended Schiller to the place. Here he married Fräulein Lengefeld, and seemed at last comfortably settled. It was here, in addition to his lectures, that he worked at and published his excellent 'History of the Thirty Years' War.' The philosophy of Kant was now producing its revolution in the world of thought, and Schiller embraced it with ardour. His æsthetic essays upon Kantian principles are some of the profoundest and most important speculations on art that we have met with, particularly those on 'Grace and Dignity,' on 'the Pathetic,' on 'the Naïve and Sentimental,' on 'the limits of the Beautiful,' and 'the Letters on Æsthetic culture.'

In 1799 appeared 'Wallenstein.' This vast trilogy, which is his greatest work, and which in truth exhibits greater knowledge, poetic power, and mastery over materials, than his other plays, still appears to be written on a false principle. The drama is not the sphere for pure history. The local colouring is of course necessary in any historical subject, but to make this the dominant element is falsifying the first principle of the drama; yet this is what Göthe and Schiller have done, the former in 'Göz von Berlichingen' and 'Egmont;' the latter in 'Wallenstein' and 'Tell.' The historic truth of the scenes of 'Wallenstein' may be admitted, but their dramatic purpose and power are comparatively small. In 'Carlos' the historic truth was preserved, but not at the expense of the dramatic purpose, and for this reason we have called it the best of his dramas. 'Wallenstein' is so well known through the beautiful translation of Coleridge, that we need make no further comment.

Soon after the publication of 'Wallenstein,' Schiller once more changed his abode. The mountain air of Jena was prejudicial to his lungs, and he determined to go to Weimar, where his acquaintance with Göthe ripened into friendship, and he shared with him the superintendence of the theatre. (See what Göthe says on the valuable exertions of Schiller in the remodelling of plays, in his 'Werke,' b. xxxv.)

In 1800 appeared 'Maria Stuart,' not the most successful effort of his pen, but it contains powerful writing, and is an evidence of increased knowledge of the stage. The vehement and undignified squabble between the two queens is unworthy of the play. The catastrophe is admirable and truly worthy of a queen.

In 1801 was published 'Die Jungfrau von Orleans,' as direct a contrast to 'La Pucelle' as the earnestness and impassioned enthusiasm of Schiller were to the scepticism of Voltaire. As a drama its construction is not so careful. Montgomery is episodical, and the black knight ambiguous. But a great spirit is at work; divine poetry irradiates the scene, and we rise from the perusal under the enchanter's spell. Carlyle has described the Jungfrau as possessing a keen and fervent heart of fire, which the loneliness of her life and her deep religious feelings fanned into a flame. She sits in solitude with her flocks beside the chapel under the antient Druid oak, and visions are revealed to her such as no human eyes beheld. It seems the force of her own spirit expressing its feelings in forms which react upon itself. All this Schiller has delineated in a masterly manner. The piece had unbounded success, and on the night of its representation at Leipzig, when the curtain dropped at the end of the first act, there arose a deafening shout of 'Es lebe Friederich Schiller!' ('Long live Frederick Schiller!'), accompanied by trumpets.

In 1803 he published the 'Braut von Messina,' which was an experiment to see how far a play constructed on antique principles could move a modern audience. It was a failure, although in the preface he argued the point with ability. The plot is simple. A chorus is introduced, which gives occasion to magnificent poetry; but the whole fails to move or interest. It contains parts of as fine writing as any in his works, but the whole experiment was a mistake, which a critic like himself should never have made. The form which poetry seeks for itself in any country or period is suited to that period, but not to another. He thought that if he made the sentiments and subject modern, he could with impunity, or rather with success, clothe them in antient forms.

In 1801, a year after, 'the slight degree of failure or miscalculation,' says Carlyle, 'which occurred in the instance of the 'Bride of Messina,' was abundantly redeemed. 'William Tell' is one of Schiller's very finest dramas; it exhibits some of the highest triumphs which his genius combined with his art ever realized.' (*Life of Schiller*, p. 263.) A. W. Schlegel has also said, 'The last and best of Schiller's works is "Tell." Here he has wholly returned to the poetry of history.' (*Dram. Lect.*, ii. 392.) But the office of the drama is not and cannot be the 'poetry of history;' it is the poetry of passion in action. A drama means an action now doing, not a poetical painting of history. It is on this ground that while revelling in the delicious poetry, the exquisite painting, the truth of character and history exhibited in 'Tell,' we must unreservedly condemn it as a drama. Its merits, such as they are, deserve all admiration, but as a drama it falsifies and abnegates its vital principle, and as a model it is worthless. The vital error is making the historical element, instead of the passionate, the dominant one. But there are still other serious faults of conception and construction. Not to dwell upon the superfluous episodes of Bertha and Rudeny, and of Attinghausen, we have to remark on the error of the conception of Tell himself, the idea of which was furnished by Göthe. Tell is not a patriot, but a simple, sturdy, brave, open, resolute peasant. As a portraiture it is exquisite, but then these two serious consequences result from the conception: first, Tell has nothing intrinsically to do with the revolution of Switzerland; he is not mixed up with its hopes and interests beyond that of any other peasant, and has no more visible share in it than the killing of Gessler; secondly, Tell, not being a patriot, is no more than a murderer. This most serious æsthetic fault is inseparable from the conception. He is wronged by Gessler, and lies in wait for him in a rocky pass, and there shoots him. This is simply murder. In his soliloquy previous to the shot he nowhere indicates an intention of sacrificing the tyrant who oppresses his country and him, but simply his revenge at the man who has subjected him to shoot the apple from his son's head, and whose further hatred he dreads. Had he shot Gessler immediately after having shot at his son, we could have forgiven the excited passion of a father; but he broods over it, and lies in wait for his revenge. Gessler is a mere stage-tyrant, a devil without motive, without glimpse of character. We must observe that in the midst of all this erroneous conception there is some of his finest writing and execution, and that certain points are eminently dramatic: the scene, for instance, where Tell sits in the defile among the rocks of Küssnacht, waiting the approach of his victim, and the unconcern of the every-day travellers with their petty interests, as they pass along, contrasted with the fierce and gloomy purposes of Tell. This was Schiller's last play.

On the 9th May, 1805, after a lingering illness, he felt his end approaching. Of his friends he took a touching but tranquil farewell. Some one inquiring how he felt, he said, 'Calmer and calmer;' simple words expressive of the mild heroism of the man. About six, he sank into a deep sleep; once for a moment he looked up with a lively air, and said, 'Many things were growing clear and plain to him.' And so he died. The great and noble spirit which animated his heart now remains to us in his works, a heirloom to posterity, familiar to every lover of poetry, and worshipped by the whole nation.

In considering his separate works, it will perhaps be thought that we have leaned too much to objection; but we have tried them by the high standard which they demanded; and as for eulogy, they have had more than enough of that. We have endeavoured conscientiously to direct the judgment of the student. A few words in general on his poetical character may not be unimportant.

What distinguished Schiller, and made him the idol of all his nation, was a fine rushing enthusiasm, an exalted love of mankind, and an earnest faith in ideal excellence. Schiller could paint little except himself; but this personality, as in the case of Rousseau and Byron, is one of the causes of his success. All his women are formed from one type. Amalia, Leonora, Louisa, Thekla, Isabella, &c., gentle, loving, affectionate beings, with little individuality, but always surrounded by the halo of a poet's ideal love. The exceptions to this are his meretricious women (Julia, Lady Milford, Princess von Eboli, and Agnes Sorrel are all of one type), and Joanna d'Arc, who is Inspiration personified. His men are either villains, lay figures, or himself. This want of pliancy of imagination is a consequence of his exclusively *subjective* tendency, and he has no comedy for the same reason. On this head we may contrast him with Göthe, whose *objective* tendency enabled him to look out upon nature, and reflect as a mirror the whole universe of things. Schiller was consequently deficient in two essential qualities of a great dramatist, that intellectual faculty which enables the poet to go out of himself, and speak through his characters as they would speak and feel; and the power of selecting a few hints to typify a character, and of avoiding all extraneous matters. Shakspere and Göthe are the two models of dramatic writing in reference to the faculty of lightly touching on every subject without exhausting it. Schiller always exhausts, and hence the length and occasional tediousness of his dialogue; he leaves nothing to the imagination. So with his pathos; he is not pathetic, because he dwells on the minutest points of suffering till our sensibility, unrelieved by the imagination, remains deadened and drowsy. Schiller says of himself that he had not Göthe's manifold richness of ideas, but that his great endeavour was to make as much as possible out of a few. This is in other words admitting his subjective and personal constitution. As a consequence, he is obliged to work out his problems by means of violent contrasts, instead of evolving them from their own bases; thus Posa must be contrasted with Philip; Wurm and the President with Ferdinand; Karl von Moor with Franz; Wallenstein with Octavio; Protestantism with Catholicism in 'Mary Stuart;' Republicans with the Doge in 'Fiesco.' This is the strong use of light and shade by a Rembrandt, rather than the dramatic composition of a Raphael. Schiller's lyrics are the most perfect of his poems, because in them his own feelings only came into play. He has been called the Æschylus of Germany, with that blind designation which, seeing two points of resemblance (both being dramatists, and the most admired of their time), instantly concludes the resemblance of the whole. If compared to any one, it should be to Euripides, whom he resembles in his exhaustive, aphoristic, and rhetorical modes of writing; but he has an intensity and an earnestness which Euripides never had. His verses are in every mouth; his memory is revered; and his works, in spite of their defects, contain the purest spirit of poetry, which the world will not willingly let die.

SCHILLER SPAR occurs crystallized. Primary form an oblique rhombic prism. Cleavage parallel to the lateral planes and both the diagonals. Fracture uneven. Hardness, scratches calcareous spar, is scratched by quartz. Colour olive, blackish, greyish, yellowish-green. Lustre metallic. Nearly opaque; translucent on the edges. Specific gravity 2·692.

When exposed to a strong heat it becomes hard, and forms a mass resembling porcelain.

Found at Baste in the Harz, at Zöbletz in Saxony, in Piedmont, Cornwall, &c. Occurs generally in serpentine.

Analysis of the mineral from Baste by Vauquelin—Silica, 62·00; alumina, 13·00; magnesia, 10·00; lime, 0·00; oxide of iron, 13·00.

SCHILLING. [MONEY.]

SCHIRAS. [SHIRAS.]

SCHIRVAN. [SHIRVAN.]

SCHISM, SCHISMATICS. The Greek word *schism* (*σχίσμα*) is used several times in the New Testament in its literal sense of a rent or rupture *in one and the same object* (*Matt.*, ix. 16; xxvii. 51; *Mark*, i. 10; ii. 21; *Luke*, v. 36; xxiii. 45; *John*, xix. 24; xxi. 11); and also in a figurative sense for a division of opinion among a number of persons considered collectively as constituting a whole (*John*, vii. 43; ix. 16; x. 19; *Acts*, xiv. 4; xxiii. 7). In reference to the Christian church, *schism*, in the abstract sense, is never mentioned. *Schisms* are spoken of twice only (1 *Cor.*, i. 10; xi. 18); and in a third passage, where the union of the members of the church is compared to that of the parts of the human body, the object of this union is stated to be, 'that there should be no *schism* in the body.' (1 *Cor.*, xii. 24-26.) From a comparison of these passages, it clearly appears that *a schism*, in the New Testament sense, does not imply the *open separation* which exists between Christians and unbelievers, nor that between the members of different Christian communions, but it denotes something existing *within one and the same church;* and further, it does not appear to designate any difference of opinion respecting doctrines or ceremonies or forms of government, but rather to refer to a *state of mind*, to the absence of a spirit of united Christian love. (*Dissent not Schism*, a discourse by T. Binney; Campbell *On the Gospels*, disc. ix., part 3.)

The common use of the word in ecclesiastical writers is different from this. With them *schism* is nearly synonymous with *separation;* but in its stricter use schism is a separation from the communion of a church on the part of certain of its members who do not differ from its other members on any point of religious doctrine. *Heresy* consists in a dissent from the *doctrines* of a church; *schism* in a dissent from its *government*. From this definition it clearly appears that any attempt to enumerate the schisms of the Christian church would be fruitless, since every community is considered schismatical by all the rest.

The event which ecclesiastical historians call *the great Schism of the West* occurred in the fourteenth and fifteenth centuries. After the death of Gregory XI. (A.D. 1378), the cardinals, being compelled by the clamour of the people of Rome to elect an Italian to the popedom, chose Urban VI.; but afterwards the leading members of the college retired to Fondi in Naples, and elected Clement VII., who set up his court at Avignon, while Urban remained at Rome. Clement was recognised as pope by France, Spain, Scotland, Sicily, and Cyprus, and Urban by the rest of Europe. This schism continued till the year 1417, when it was healed by the Council of Constance, which elected Martin V. to the papacy. (Mosheim's *Ecclesiastical History*, cent. xiv., pt. ii., c. ii., sect. 14, &c.; Waddington's *Church History*, c. xxiii.)

The other great schism is that between the Greek and Latin churches. [GREEK CHURCH.]

SCHISMA (from *σχίσμα, cleft, division*), an interval, used only in mathematico-musical calculations, equal to half a comma. [COMMA.]

SCHIZANDRA (from σχίζω and ἀνήρ), a genus of plants belonging to the natural order Anonaceæ. The flowers are monœcious; sepals 9; no petals; the male flowers having 5 anthers, which are joined at the apex; female ones with an indefinite number of ovaries; berries arranged in spikes along an elongated receptacle. This genus with two others have been made by Blume into a natural order called Schizandreæ. They form a natural group, which are distinguished from Anonaceæ by their toothed leaves, the less constant number of their floral envelopes, their usually combined stamens, and their even, not ruminated, albumen.

S. coccinea, the Scarlet Schizandra, is one of our most beautiful greenhouse climbers. It has alternate, oval-lanceolate leaves, pointed at both ends, rarely toothed, of a beautiful green, smooth above, and pale beneath; scarlet flowers disposed in spikes in the axils of the leaves. It is a North American plant, and is found in woods in Georgia, Florida, and Carolina. It is easily propagated by cuttings, and grows best in a light sandy soil.

SCHIZODESMA, Mr. Gray's name for a genus composed of those *Mactræ* which have the ligament placed in an external slit.

SCHIZO′PODA, M. Latreille's name for a division of Macrurous Crustaceans, or Cleft-footed *Malacostraca*, consisting of the genera *Nebalia* and *Mysis* (*Opossum Shrimps*). These last form probably the only genus of the division; for it is the opinion of Mr. J. V. Thompson and other zoologists that *Nebalia* is most probably a crustaceous animal in its progress to a more perfect state. [STOMAPODES.]

SCHLEGEL, JOHANN ELIAS, was the eldest of three brothers, all of whom distinguished themselves by their literary exertions, and acquired some celebrity for a name which has since been rendered more illustrious by two writers (also brothers), August Wilhelm and Friedrich von Schlegel. Johann Elias was born at Meissen, where his father was 'appellations-rath,' Jan. 28th, 1718. At the age of twelve he began to display a taste not only for reading but composing poetry; and was greatly encouraged in his studies by his father, who was himself a man of superior capacity and of a very literary turn. While he was at the university of Leipzig, his talents recommended him to Gottsched, then looked up to as the arbiter in matters of poetical taste, to whose 'Kritischen Beiträgen,' &c. he contributed several pieces, as he did also to the miscellany entitled 'Belustigungen des Verstandes,' &c., besides writing various dramatic compositions. Neither did he neglect his severer academical studies, but on the contrary applied to them with great diligence; as he did likewise to French, English, and Italian literature. On quitting Leipzig, he accompanied Von Spener (who had married his uncle's widow) to Copenhagen as his secretary, the latter being sent as envoy to the court of Denmark. All his leisure from his official employments he now devoted not only to studying the language thoroughly, but to making himself acquainted with the history and condition of the country, both by reading and conversation. The information he thus collected, together with his own remarks, he gave to the public in the form of a weekly periodical, entitled 'Der Fremde,' which obtained for him considerable notice. He afterwards became acquainted with Holberg, who procured him the professorship of modern history and the appointment of librarian at the academy of Soroe, founded by himself. [HOLBERG.] But his excessive application to his duties and to his private studies proved too much for his constitution, which was not a very strong one, and in the course of the following year he was carried off by a fever, Aug. 13th, 1749, at the age of thirty-one. A complete edition of his works, in 5 vols., was published by his brother Johann Heinrich, 1761-70.

JOHANN ADOLPHUS, the second brother, born at Meissen, Sept. 18th, 1721, studied at Leipzig with Elias, and, like him, then began to make himself known in the literary world by his contributions to the two publications above mentioned. For a time he bestowed far more attention on merely literary pursuits than on the studies more immediately connected with his future profession; but if he did not distinguish himself by profound theological learning, he acquired very great popularity as a preacher, both by the style of his sermons and by his emphatic and animated delivery. At Zerbst, where he was pastor primarius, and professor of theology and metaphysics, from 1754 to 1759, he was frequently called upon to preach before the court. Of his pulpit compositions, several collections appeared at different times, the earliest being that in three volumes, 1754-58. As a poet he must be estimated rather according to the standard of his own day than that of the present. He may rank among those who exerted themselves to introduce a better taste; and his odes, and religious and moral pieces, though by no means free from defects, abound with fine passages. He survived both his brothers many years, not dying till Sept. 16th, 1793.

JOHANN HEINRICH, born in 1724, studied, like his brothers, at Leipzig, and, through the influence of Elias, obtained an appointment as secretary in the chancery at Copenhagen. He afterwards became professor of history at the university there, and Danish historiographer royal; and died in that capital, October 18th, 1780. Although not so distinguished as either of the preceding, he was a writer of some ability, and published a history of the sovereigns of Denmark of the house of Oldenburg, and several other works relative to that country. He also translated Thomson's 'Sophonisba' and some other tragedies from the English.

SCHLEGEL, FRIEDRICH VON, was born at Hanover on the 10th of March, 1772. His father, Johann Adolph Schlegel, was brother of Johann Elias and Johann Heinrich Schlegel, and all these, together with August Wilhelm von Schlegel, who is still alive, are illustrious names in the literature of Germany. Frederic Schlegel received a very liberal education, although his father wished him to engage in mercantile pursuits. Accordingly he was placed as apprentice in a mercantile house at Leipzig, but he showed so little inclination and ability for the business, that the father sent him to Göttingen to study philology, though in the course of his education he had not shown any promising talents. After a year's residence in this place, Schlegel went to Leipzig, where he continued his studies with such zeal, that on leaving the university he had read all the more important antient writers in the original language. His first publication of any importance was 'Griechen und Römer,' Hamb., 1797, of which his 'Geschichte der Griechen und Römer,' Berlin, 1798, may be considered as a continuation. This was only a fragment, and it has never been completed. At this time all his thoughts seem to have been absorbed by antient literature, with which, as his early works show, he had formed a most intimate acquaintance. About the same time he undertook, together with Schleiermacher, to translate Plato into German; but after the first sheets were printed, he abandoned the undertaking, and left the whole in the hands of Schleiermacher. In 1796 he began editing, with his brother August Wilhelm, a literary periodical, called the 'Athenæum,' of which however only three vols. appeared. The object of this publication was to produce an entire change in the literature of Germany. It was of a polemical character, and directed against the most popular authors of the time, especially Kotzebue and Iffland. The papers which it contained were very valuable, but written in an arrogant and contemptuous tone. Another work, with the same object, was 'Kritiken und Charakteristiken,' which he likewise edited with his brother. In 1799 Schlegel published at Berlin the first volume of a novel called 'Lucinde,' which created a great sensation. It was admired and commended by men of the highest eminence, such as Schleiermacher, while it was most severely censured by others, who saw in it nothing but an exaltation of sensual pleasure. The justice of the censure appears to have been felt by Schlegel himself, for he never completed the work. In the year 1800 he left Berlin and went to Jena, where he delivered a course of lectures on philosophy, which were received with great applause. In 1802 he published at Berlin a tragedy called ‘Alarkas,’ grand in its conception, but romantic and rather mystic in its whole character. In the same year he travelled with his wife, the daughter of the celebrated M. Mendelsohn, to Paris, where he delivered lectures on philosophy, and edited a monthly periodical called ‘Europa,’ of which only two volumes appeared (Frankfort, 1803-5). At Paris he also studied the arts, the languages of Southern Europe, and more especially the language and literature of the antient Indians. The fruits of the latter study appeared in his little essay, ‘Ueber die Sprache und Weisheit der Indier,’ Berlin, 1808, one of the first works which appeared in Germany on the literature of India: it had great defects, and among others it contained the usual exaggerated notions respecting the civilization of the Indians. The results of his other studies at Paris may be seen in his ‘Geschichte der Jungfrau von Orleans,’ Berlin, 1802; ‘Sammlung romantischer Dichtungen des Mittelalters,’ Berlin, 1804; and ‘Lother und Maller,’ Berlin, 1805. After his return to Germany he published a collection of his poems, Berlin, 1809, which are partly of a dithyrambic and partly of an elegiac character. All these works, as well as his ‘Poetisches Taschenbuch,’ Berlin, 1806, and his epic poem ‘Roland,’ show the author's deep veneration for the arts, the poetry, and the whole social life of the middle ages. This feeling had taken strong hold of him, as appeared more manifestly from his wife and himself embracing the Roman Catholic religion at Cologne in 1801. He now went to Vienna, where, in 1809, he was appointed imperial secretary at the head-quarters of the archduke Charles, and in this capacity he exercised a great and beneficial influence upon the national spirit of the Germans by his inspiring proclamations. After the political wreck of Austria he returned to his literary occupations, and delivered a course of lectures on modern history (‘Ueber die neuere Geschichte,’ published at Vienna, 1811), and on the history of antient and modern literature (‘Ueber die Geschichte der alten und neuen Literatur,’ published at Vienna, 1815, in two vols.). The latter work has been translated into English. In the years 1812 and 1813 he edited the ‘Deutsche Museum,’ of which only two volumes appeared. Schlegel also tried his strength as a politician and diplomatist, and his writings on subjects of this kind were so highly valued by Prince Metternich, that he appointed him councillor of legation to the Austrian embassy at the German diet at Frankfort. But he resigned this office in 1818, and returned to Vienna, where he began to edit a new periodical called ‘Concordia,’ Vienna, 1820-21, with a view of reconciling the various opinions respecting church and state. About this time he also began to prepare a complete edition of his scattered works, which was published in twelve vols., Vienna, 1822, &c. In 1827 he delivered a course of lectures on practical philosophy (‘Philosophie des Lebens,’ published at Vienna, 1828), and in 1828 another course on the philosophy of history (‘Philosophie der Geschichte,’ Vienna, 1829, 2 vols.). Towards the close of this year Schlegel made a journey to Dresden, with a view to deliver a series of lectures, but while he was working them out, he died on the 12th of January, 1829. The Dresden lectures, as far as they were finished, were published in 1830 at Vienna, under the title of ‘Philosophische Vorlesungen, insbesondere über die Philosophie der Sprache und des Wortes.’ His friend Professor Windischmann of Bonn undertook the editorship of such works as were left in MS., and the first vol. appeared at Bonn in 1836, under the title of ‘Philosophische Vorlesungen aus den Jahren 1804-6, nebst Fragmenten, vorzüglich Philosophisch-theologischen Inhalts.’ But the death of Windischmann has prevented the completion of this collection.

Frederic von Schlegel, together with Tieck and Novalis, were, at the end of the last and the commencement of the present century, at the head of a literary revolution in Germany, which endeavoured to promulgate its principles in the two works above mentioned, the ‘Athenæum’ and ‘Kritiken and Charakteristiken.’ The new school which these writers endeavoured to establish is characterised by the name of the *Aesthetico-critical*, or that of the *romantic* school of poetry. The predilection for the middle ages and Roman Catholicism was common to all of them, but in none of them so strong as in Frederic von Schlegel, who would gladly have restored the middle ages, with their arts, their literature, and their religion. This tendency, and the great names by which it was supported, led to very injurious consequences; but some writers of this school have produced poems which will live as long as the German language, and to their exertions we are indebted for a more correct knowledge of the nature of romantic poetry, and its relation to the antique or classical poetry. These writers also established the fact, that the middle ages, though generally looked upon with contempt, were not all darkness. But whatever may be the errors into which Schlegel was led by his peculiar turn of mind, no one has ever accused him of insincerity. It has indeed sometimes been said that he should not have lent himself as an agent to the Austrian government. Now it is true that he did so, but this should not be made a particular charge against him, as it was a natural consequence of his general views and principles. The poetical works of Frederic von Schlegel are of less value than his critical and philosophical writings, which are distinguished by acuteness, profundity of thought, and great learning. His style however is not always as clear and lucid as that of many of his contemporaries. There are some very good remarks on Frederic von Schlegel in Mrs. Austin's ‘Characteristics of Göthe,’ vol. i., p. 298, &c., and in Carlyle's ‘Miscellanies,’ xii., p. 274, &c.

SCHLEIERMACHER, FRIEDRICH ERNST DANIEL, was born on the 21st of November, 1768, at Breslau. His parents belonged to the religious sect called Moravians, and the son accordingly received his first instructions in the educational establishment of that body at Niesky. He began his theological studies at Barby, where the Moravians possess a seminary for young theologians. But when he was eighteen years old he left this sect, and began a fresh course of study in the university of Halle, where he devoted himself with no less zeal to the study of philology than to theology, though the latter department was that to which he intended to devote his life, for he was thoroughly convinced that theological studies cannot be pursued with advantage without a knowledge of antiquity and its literature. In 1790, when he had finished his studies, he undertook the education of the children of Count Dohna-Schlobitten, who lived at Finkenstein in Prussia. He did not however remain long in this situation as private tutor, but went to Berlin, and was for some time engaged as teacher in the seminary for teachers, which was then conducted by Gedike. In 1794 he was appointed assistant preacher at Landsberg on the Warthe, but two years after he returned to Berlin, where he was engaged as preacher to the great hospital called the ‘Charité,’ until the year 1802. Here he became acquainted with the celebrated theologian F. S. G. Sack, who was then engaged in translating Blair's ‘Sermons’ into German (Leipzig, 1781-1800, 5 vols.). Schleiermacher took an active part in this under taking, and the greater part of the last volume was translated by him alone. On the suggestion of Sack he also translated Fawcett's ‘Sermons,’ Berlin, 1798, 2 vols. Th first original works of Schleiermacher were some essays in the ‘Athenæum,’ which was edited by the Schlegels. [SCHLEGEL, F. VON.] Among the papers which he contributed to this publication were his ‘Vertraute Briefe über die Lucinde’ (‘Confidential Letters on the Lucinde’), a novel of Fr. von Schlegel.) They were published without the author's name, and bestowed the highest commendation on the novel, though it seems to be clear that Schleiermacher was not aware of the dangerous principles that lay at the bottom of the work which he praised. Soon after the death of Schleiermacher these letters were republished by Carl Gutzkow (Hamburg, 1835), one of the writers of the school called Young Germany, with the malignant intention of vilifying the noble character of their author, and of drawing censure upon him for long-forgotten youthful aberrations. This publication at first created a very great sensation, but the voice of Germany rose against the unworthy conduct of Gutzkow, and the work has since fallen into well deserved oblivion. In 1799 Schleiermacher published his ‘Discourses on Religion’ (‘Reden über die Religion, an die Gebildeten unter ihren Verächtern’), a third edition of which appeared in 1821, with notes. These discourses contain some of the finest specimens of German oratory, are full of profound thoughts, and more calculated than any other work to convince the educated classes of society of the necessity of religion. In 1800 he published a work called 'Monologen, eine Neujahrsgabe' (a fourth edition of which appeared at Berlin in 1829), and 'Briefe eines Predigers ausserhalb Berlin.' The last of these two little works was a reply to a public letter (Sendschreiben) addressed by some Jews to the Protestant theologian W. A. Teller. About this time Schleiermacher conceived the plan of translating with Fr. Schlegel the works of Plato, and when Schlegel abandoned the undertaking, Schleiermacher continued it by himself. This translation, which however unfortunately does not comprehend all the works of Plato, appeared at intervals, from 1804 to 1828, and consists of 3 vols., in 6 parts. A second edition of the first 5 parts appeared at Berlin from 1817 till 1827. This translation of Plato is the most correct and most beautiful that has ever been published in any European language. Each of the dialogues is moreover preceded by a most valuable introduction, in which the author develops the spirit and principle of the dialogue. These introductions, some of which have been translated into English, show that Schleiermacher was most deeply acquainted with the spirit of the Platonic philosophy. In 1801 he published his first collection of sermons, a third edition of which appeared in 1816. This collection of sermons was in subsequent years followed by six other collections, which were published between the years 1808 and 1833. Of the second, third, and fourth collections, second editions appeared in 1816-1826. All these collections together make seven small octavo volumes. Besides these collections Schleiermacher published a great number of single sermons delivered on particular occasions. All the sermons of Schleiermacher are distinguished for a clearness and perspicuity of style and thought such as are seldom found in any modern writer of sermons. Their prevailing characteristics are, that they address themselves more to the understanding of his hearers than to their feelings or imagination, whence Schleiermacher and his followers have been designated by the name of the 'Denkglaübigen,' in contradistinction from the 'Wort-' or 'Altglaübigen,' and the mystical Pietists. In 1802 Schleiermacher went to Stolpe with the title of court preacher, and here he wrote an admirable work called 'Grundlinien einer Kritik der bisherigen Sittenlehre,' Berlin, 1803, a second edition of which appeared in 1834, and another called 'Zwei unvorgreifliche Gutachten in Sachen des Protestantischen Kirchenwesens,' Berlin, 1803. The latter work appeared without the author's name. He had not been long at Stolpe when he received an invitation to a professorship in the university of Würzburg, but he declined the offer at the request of the Prussian government, which in return appointed him professor of theology and philosophy in the university of Halle (1802). After the political catastrophe of 1806, when Halle was made a part of the new kingdom of Westphalia, Schleiermacher went back to Berlin, where he began to deliver public lectures on theological and philosophical subjects. During this period of the political humiliation of Prussia, Schleiermacher showed himself a true patriot, and in the pulpit, as well as on other occasions, he fearlessly endeavoured to rouse the spirit of his hearers against the foreign oppressors. During this period he wrote the following little works:—'Die Weihnachtsfeier, ein Gespräch,' Halle, 1806, 2nd edition, Berlin, 1827; 'Ueber den sogenannten ersten Brief des Paulus an den Timotheus,' Berlin, 1807; 'Gelegentliche Gedanken über Universitäten im Deutschen Sinne,' Berlin, 1808; and an essay on Heraclitus, which appeared in F. A. Wolf's 'Museum der Alterthumswissenschaften.' In 1809 Schleiermacher was appointed preacher at Trinity Church in Berlin; and in 1810, when the new university of that capital was opened, he was appointed professor of theology, and at the same time he began to take an active part in the business of the ministry for public instruction. His lectures in the university gained for him universal admiration, for here he combined with the great oratorical powers which he had already displayed in the pulpit, the most profound thought and the most extensive learning; here he had an opportunity of unfolding all the treasures of his great mind, and he followed out the most abstruse investigations into their minutest details with luminous order and distinctness. In 1811 he was created a member of the Academy of Sciences at Berlin, and furnished some of the best papers on various subjects, but especially on particular points of the history of antient philosophy. They are published in the 'Transactions' of the Academy. In 1811 Schleiermacher published 'Kurze Darstellung des Theologischen Studiums.' In 1814 he was made secretary to the philosophical section of the Academy, and on this account he was released from his duties in the ministry for public instruction. During the period which now followed, Schleiermacher was partly engaged in new editions of former works, or their continuations, and partly in publishing a number of smaller polemical writings, especially against F. A. H. Schmalz and C. F. von Ammon. Among the greater works which he wrote during the last period of his life we shall mention 'Ueber die Schriften des Lukas, ein Kritischer Versuch,' Leipzig, 1817, which was translated into English in 1825, and 'Der Christliche Glaube, nach den Grundsätzen der Evangelischen Kirche im Zusammenhange dargestellt,' Berlin, 1821-22, 2 vols., a second edition of which appeared in 1830. In the autumn of the year 1833 Schleiermacher visited England, and opened the new German chapel at the Savoy. He died on the 12th of February, 1834. A most moving account of the death of this great man was sent over to England, and published in the 'Journal of Education,' No. XX. The whole of the works of Schleiermacher have been collected and published since his death (1835, &c.), in three sections. The first section (called 'Zur Theologie') contains, in four volumes, those theological works which are of a scientific character; the second (also called 'Zur Theologie') contains his sermons, in four volumes; the third (called 'Zur Philosophie') contains his philosophical works, in five volumes. The works which Schleiermacher left in MS. were edited by Zabel, Berlin, 1835, 2 vols. 8vo.

Schleiermacher was equally great as a theologian, a philologer, a critic, an orator, and a translator; and the influence which his writings had on the intellectual part of Germany was and is still exceedingly great, but it was far surpassed by that which his oral instruction, and the purity, piety, and sanctity of his personal character exercised over those who had the happiness to live near him. Our space does not allow us to enter into an examination of his theological system, which is most amply explained in his 'Der Christliche Glaube.' It may be sufficient here to state, that he neither belonged to the old superstitious and word-splitting school, nor to the modern Pietists or Rationalists.

(Compare Lücke; 'Erinnerungen an Dr. Fr. Schleiermacher,' in the theological journal called 'Theologische Studien,' for 1834; and Mrs. Austin, 'Fragments from German Prose Writers,' p. 336, &c.)

SCHLESWIG, sometimes called South Jutland, is a duchy belonging to the crown of Denmark, situated between 54° 20′ and 55° 20′ N. lat. and between 8° 40′ and 10° 5 E long. It is bounded on the north by Jutland, on the east by the Little Belt, on the south by Holstein, from which it is divided by the river Eider and the Kiel Canal, and on the west by the German Ocean. The area is 3450 square miles. It is in general a level country. A range of low hills enters it from Holstein, and, traversing it from south to north, passes into Jutland. The length, from north to south, is about 70 miles, and the breadth, from east to west, varies from 30 to 56 miles, not including the islands on the east and west coasts. On the west coast there are low and rich marsh lands, which are protected by dykes, twenty feet high, against the spring tides, which often rise to the height of thirteen feet. As the sea in many places deposits alluvium, new dykes are erected from time to time, to secure these additions. The principal rivers are the Eider, the Widau, and the Aue. The east coast is not so low as the west coast, but it is equally fertile. The climate is on the whole temperate and healthy, but damper and less salubrious on the west than on the east coast. The country produces corn, pulse, flax, hemp, rape-seed, hay, clover, garden vegetables, and potatoes. The breed of horned cattle and that of horses are excellent. The country in short produces much more than is required for its own consumption, and exports annually 150,000 lasts of corn, great numbers of oxen, above 3000 horses, and large quantities of butter and cheese. Fish too are an important article of exportation. Wood is scarce, both for building and fuel. There are limestone, chalk, slate, and turf, but no metallic minerals. The chief occupations of the inhabitants are agriculture, the breeding of cattle, and the fisheries. There are no manufactories except in the large towns, and these are of little importance. The most considerable are those of lace and stockings, in Tondern, Hüsum, Friederichstadt, and some other places. The inhabitants, who profess the Protestant religion, are partly of German, partly of Danish or Frisian descent. According to Stein, in his 'Gazetteer,' published in 1821, there were, in 1817, 300,000: of whom 55,000 spoke German; 42,000, on the west coast, a very corrupt Frisian dialect; 15,000, on the east coast, the language of the Angles; and 176,000 Danish. The present population may be 340,000 (it was 338,000 in 1835) on the mainland, and 40,000 in the islands.

The islands on the east coast are Arroe, Föhr (which have already been described), and Femern, which is separated from the north-east point of Holstein by a narrow channel, the Femersund; it is about 16 miles long and 12 broad, the area 63 square miles, and the population 8200. This island produces abundance of wheat, barley, and peas. The inhabitants manufacture large quantities of barley-groats and peeled barley for exportation; they likewise export annually 20,000 pairs of worsted stockings to Mecklenburg. The fisheries are very productive, and the islanders have about 40 vessels at sea, from 12 to 56 tons burden. There is a lighthouse, 100 feet high, on the island. The chief town is Burg, or Borg, which has 1700 inhabitants. On the west coast are Romöe, or Röm, of which only the southern part belongs to Schleswig, and the northern to Jutland: Sylt, 20 miles long, 15 broad, has 4000 inhabitants; most of the men are sailors and fishermen; the business of agriculture is chiefly performed by the women, who also manufacture worsted stockings. Nordstrand was a large island, which was visited by a dreadful inundation on the 11th of October, 1634, when 6408 persons and 50,000 head of cattle perished, and the island was broken into fragments, of which only two, Nordstrand and Pellworm, have been secured by dykes. The inhabitants have a fine breed of cattle. These islands are the resort of seals and water-fowl. Many thousands of these water-fowl are annually taken, boiled in vinegar, and packed in barrels for exportation. Between these larger islands there are many small ones, without dykes, the construction of which would be too expensive. They are inhabited by descendants of the Frieslanders, whose language they still speak, and who, during the inundations, have their abode on the tumuli called Warfen, which were thrown up in remote ages, and on which the churches are built.

Schleswig, the chief town of the duchy, is situated in 54° 30′ N. lat. and 9° 35′ E. long., in a pleasant country at the mouth of the river Sley, which forms a small shallow bay obstructed by sand-banks. It is a long irregularly built town; the houses are mostly of brick, and resemble in neatness those of a Dutch town. The principal public buildings are the churches, of which the cathedral deserves notice on account of a screen before the altar, admirably carved in wood by Hans Brüggemann in 1521; the town-house, the orphan asylum, the poor-house, and the nunnery of St. John. Among the numerous public institutions are the cathedral school, the Bible Society for the duchies, and the deaf and dumb asylum, in which there is a printing-office with six presses, where Bibles and New Testaments are printed. The population is 11,000. There are manufactures of china, earthenware, lace, cambrics, thread, leather, sailcloth, woollens, starch, and refined sugar. On an island in the bay is the castle of Gottorp, formerly the residence of the dukes of Schleswig-Holstein, and now of the prince, who is governor of the duchies of Schleswig and Holstein.

The mouth of the Sley having been rendered navigable by means of a canal, the navigation is considerable.

Besides Apenrade and Flensburg, the following are the most considerable towns in the duchy:—Eckernforde, with 3500 inhabitants, has a good harbour, and a trade in corn with England; Friedrichstadt on the Eider, a well-built town, founded by Dutch settlers, has 3000 inhabitants, who have manufactures of silk, cotton, hosiery, starch, and lackered wares. Hüsum, on the Aue, with 4500 inhabitants, has a grammar-school, distilleries of brandy from potatoes, breweries, manufactures of leather and tobacco, and a considerable trade in corn and cattle. Tondern or Tundern, on the river Widau, has 3600 inhabitants. It has a good port, with a trade in corn and cattle, an oyster-fishery, and manufactures of cotton and lace; the last employs, in the town and the environs several miles round, 10,000 or 12,000 persons. Tönningen, a seaport and trading town at the mouth of the Eider, has 2200 inhabitants.

(Stein; Hassel; Cannabich; *Conversations Lexicon*.)

SHLÖZER, AUGUST LUDWIG VON, was born on the 5th of July, 1737, at Jagstadt on the Jaxt, in the principality of Hohenlohe-Kirchberg. His father died very early, but the boy received a good education, and in 1751 was sent to the university of Wittemberg to study theology. Here he conceived a most ardent wish to travel into Asia, and for this purpose he began the study of Oriental languages. In 1754 he went to Göttingen, where he continued the study of theology for two years, at the end of which time he engaged himself as tutor to a Swedish family, with which he went to Sweden. He spent three years and a half partly at Stockholm and partly at Upsala. Although theology had been his principal study, he opened his literary career with a 'History of Commerce,' in Swedish ('Versuch einer Handelsgeschichte,' Stockholm, 1758), and history henceforth remained his favourite pursuit. In 1759 he returned to Göttingen, and now began seriously to prepare himself for his journey to Asia by intense application to the Eastern languages and to the study of medicine. But in 1761, Müller, the historiographer of the Russian empire, offered him the place of tutor to his family, and of a literary assistant in his own pursuits, at the same time holding out to Schlözer the hope of obtaining a professorship in the academy of Petersburg, and the support of the government for his intended journey. These hopes induced Schlözer to accept the offer. On his arrival in Petersburg he immediately began to study the Russian language and the history of the empire; but his great progress provoked the jealousy of his principal, and rendered the situation of Schlözer very unpleasant. In 1762 Schlözer was made adjunctus to the academy and teacher in a public establishment, which induced him to quit his place in the house of Müller, who now became his avowed opponent. Michaelis of Göttingen, in the meanwhile, had not forgotten his young friend, and it was through his influence that in 1764 a professorship in the university of Göttingen was offered to him. Schlözer would have gladly accepted it, but his adversary contrived to induce the Russian government to refuse him permission to leave the country. After many negotiations he was however, in 1765, appointed professor of Russian history to the academy of Petersburg, and he also obtained leave of absence for three months to visit his native country. He returned to Petersburg, but only remained there two years longer, after which, in 1767, he was invited to the university of Göttingen, as professor of political science. Here he commenced a new and very active life, and wrote several historical works, some of which still rank among the best in the German language. His style is interesting, but sometimes rather coarse and without taste. His lectures on history, political science, statistics, and other subjects were heard with great admiration. At the age of seventy he withdrew from his office; in 1804 he was raised by the emperor of Russia to the rank of a nobleman and received the title of privy councillor of justice. He died on the 9th of September, 1809. His Life has been written by his son, Christian von Schlözer, under the title of 'A. L. von Schlözer's Oeffentliches und Privatleben, aus Originalurkunden,' Leipzig, 1828, 2 vols. 8vo.

The works of Schlözer are partly historical and partly political. Among the former are, a 'General History of the North' ('Allgemeine Nordische Geschichte,' Halle, 1772, 2 vols. 8vo.); a German translation of Nestor's 'Chronicle' down to the year 980, Göttingen, 1802-9; 'Weltgeschichte im Auszug und Zusammenhange,' Göttingen, 1792-1801, 2 vols. 8vo.; 'Vorbereitung zur Weltgeschichte für Kinder,' a fifth edition of which appeared at Göttingen, 1800. As a political writer Schlözer had great influence in Germany. His views are laid down in his correspondence ('Briefwechsel') which he published at Göttingen, 1776-1782, in 10 vols. 8vo., and in a political journal called 'Staatsanzeigen,' which he edited from 1782 till 1793, in 18 vols. The main object of this last publication was to expose the evils and abuses in the administration of the various states of Germany.

SCHLÜSSELBURG, the capital of a district of the same name in the government of St. Petersburg, is situated on the left bank of the Neva, at the spot where that river issues from Lake Ladoga: the fortress is on Catherine Island, at the entrance of the river, and its guns command both banks. The town was founded by the Russian grand-duke George Danielowitsch, in 1324, but afterwards taken by the Swedes. In the sequel it frequently changed masters, till Peter the Great finally conquered it in 1702. Since this country has ceased to be the theatre of war, the fortress has often been used as a state prison. The population is 3000. They have a manufactory of printed calicos, and also of porcelain. There is a brisk trade on the Neva and Lake Ladoga, 3000 barks and 1000 rafts annually passing this town to Petersburg. The fishery on the lake is very productive.

(Stein, *Geographisches Lexicon*; Schnitzler, *La Russie, la Pologne, et la Finlande*.)

SCHMALKALDEN. [Fulda.]

SCHMALKALDEN LEAGUE. [Luther; Reformation.]

SCHNEEBERG is a mining town in the circle of the Erzgebirge, in the kingdom of Saxony, situated in 50° 18′ N. lat. and 12° 30′ E. long. It stands on a mountain called the Schneeberg, about a league from the river Mulde, from which there is a canal, on which timber is floated to Schneeberg. The town is said to have been built in 1471, when some new and very rich veins were discovered in the silver-mines that had been worked for a long period. One vein, called the Georgenzeche, was particularly rich, but great doubts are entertained of the correctness of a tradition that on the 23rd of April, 1477, duke Albrecht with his councillors dined in this mine, when a block of silver ore served as the table, which when melted yielded 400 cwt. of silver. It is however certain that the produce of the Schneeberg mines was so great that a share cost 5000 dollars. In the sequel these mines became much less productive; as a compensation for their loss the attention of the people was devoted to cobalt, the art of manufacturing smalt having been discovered, as it seems, at the beginning of the sixteenth century by Peter Weidenhammer, and perfected between 1540 and 1560, by Schurer, a Bohemian glass-manufacturer. At present cobalt and silver are the chief products of these mines. Bismuth, lead, tin, and iron are likewise found in the neighbourhood. Schneeberg is a very well built town; the principal church, the handsomest in the Erzgebirge, and the largest in Saxony, is adorned with paintings by Lucas Kranach. Among the public institutions are a gymnasium, several schools, in some of which lace-weaving is taught, a Sunday-school for young mechanics, an orphan asylum, and an hospital. The inhabitants, now about 7000, besides those in the mines, manufacture bone lace, blond, gold and silver lace, morocco paper, and lackered wares. There are also manufactures of chemicals and beer breweries. Schneeberg is the seat of a mining court, and the depository of the produce of the royal smalt-works at Oberschlema. The smalt is chiefly exported to England and Holland, and frequently to China. Engelhardt says that the value of the smalt annually produced is from 300,000 to 400,000 dollars.

(Hassel; Stein; Cannabich; Engelhardt; *Sachsen*, seventh edition, by Schlieben, 1835.)

SCHNEIDER, CONRAD VICTOR, was born at Bitterfield in Saxony, in 1610, and died in 1680 at Würtemberg, where he had been for many years professor of medicine and physician to the elector. He appears to have been a very learned man, and to have possessed much skill and industry in forming compilations from the writings of other physicians. His works are very numerous: the most important is that entitled 'De Catarrhis' (Witteb., 1660), which consists of six books, devoted chiefly to an anatomical description of the cavities of the nose, and to the refutation of the antient and generally received opinion that the mucus in a catarrh flows from the brain through apertures in the ethmoid bone into the nose and to the fauces. In this refutation it may be easily believed that he was successful; for the most superficial examination of the parts is sufficient to prove that such a passage of fluid is impossible, and that there are no holes in the skull which are not accurately closed by membranes, nerves, &c. In Schneider's time however the general reception of a different opinion must have rendered some intellectual energy necessary for the establishment of even so obvious a fact as this; and he has therefore been justly rewarded by the name of Schneiderian membrane having been since appropriated to that lining of the cavities of the nose of which he was the first to describe the structure and some of the functions.

SCHNEIDER, JOHANN GOTTLIEB, was born on the 18th of January, 1750, in the village of Kolm, near Wurzen in Saxony, from which circumstance, in the title-page of all his works, he added to his name the epithet of 'Saxo.' His father was a poor village mason, and could do nothing for the education of his son. At the age of four years the boy was received into the house of an uncle, who was in better circumstances, and afterwards sent him to the public school of Schul-Pforte. Here he was subjected to a stricter discipline than he had hitherto been accustomed to, and his unwillingness to submit to it nearly brought upon him the disgrace of being sent away. The threat however roused his energies and ambition, and from this moment he began with the most unwearied diligence to study the antient languages, which then formed the only subjects of instruction in that establishment. At the age of eighteen, his uncle sent him to the university of Leipzig to study law. But the acquaintance which he here formed with some of the most eminent philologists, induced him to resume the study of antient literature, which he had so successfully commenced at school. His first work, 'Anmerkungen über den Anacreon,' Leipzig, was published in 1770, and in the following year appeared the 'Periculum Criticum in Anthologiam Constantini Cephalae.' To the latter work was added a series of emendations of the text of Aristotle's 'Natural History,' which from this time became his favourite study. In the same year Schneider left Leipzig for Göttingen; but as his uncle either would not or could not any longer supply him with money, he lived for several years in the greatest poverty, and gladly accepted the offer of Brunck, to whom Heyne introduced him, and who wished to have the assistance of a young scholar for his edition of the Greek poets. Schneider accordingly went to Strasburg, where he spent three happy years. The influence of the bold and sometimes rash criticism of Brunck is manifest in many of Schneider's works, especially his earlier publications. At Strassburg he first began to pay attention to anatomy, botany, and zoology, which he did principally with a view to elucidate the antient writers in these departments of knowledge. Here he also published a work on Pindar, 'Versuch über Pindars Leben und Schriften,' 1774, 8vo.; and Plutarch, 'De Puerorum Educatione, acced. bina ejusd. et Marcelli Sidetae Fragmenta,' 1775, 8vo. Conjointly with Brunck he made an edition of Oppian's Poems, 1776, 8vo., and a collection of the fragments of Pindar, 1776, 4to. In the same year Schneider was invited to the professorship of philology and eloquence in the university of Frankfort on the Oder. He considered the lectures in the university to be of much less importance than they were generally supposed to be, and accordingly he not only encouraged his pupils to private study, but himself set a most active example. His principal attention however was directed to natural history, and those antient works on this subject which were totally neglected by scholars; and he not only availed himself of everything that was within his reach, but undertook journeys to most of the great towns of Germany, where he thought he might collect information from the public and private collections of natural objects. The first work that he published at Frankfort was an essay, 'De dubia Carminum Orphicorum Auctoritate et Vetustate.' In 1811, the university of Frankfort was transferred to Breslau. Schneider followed the university, and continued to hold the same office. In 1816, on the death of Bredow, who was chief librarian to the university, Schneider gave up his professorship, and became Bredow's successor, a post much more suited to his taste. In this office he continued until his death, on the 13th of January, 1822.

Schneider was a man of simple habits often bordering on coarseness, which was probably the consequence of his residence with his uncle, who had no time to attend to his education, and left the boy to the influence of his rough companions. But he was free from pride or pretension, and took a delight in assisting young men in their studies. As a philologer he ranks in some respects among the first of modern times, and in the department to which he principally devoted his attention he stands almost alone. The criticisms of his maturer age are much more sober and sound than those of his earlier years, though in his German works on natural history he often shows much more learning than judgment and good sense.

The works which he published after he settled at Frankfort on the Oder may be divided into two classes:—1, those of a philological and critical character, most of which relate to the subject of natural history as known to the antients; and 2, works on natural history, both antient and modern. The works of this latter class are for the most part written in German. Among the former we shall mention his editions of Demetrius Phalereus 'De Elocutione

Liber,' Altenburg, 1779, 8vo.; Aelian, 'De Natur. Animal.,' Græce et Lat., Leipzig, 1784, 2 vols. 8vo. In 1790 he undertook the revision of the works of Xenophon, edited by Zeune, and added himself a new and critical edition of the other works of Xenophon with valuable notes. The whole collection of Xenophon's works edited by Schneider consists of 6 vols. in 8vo., and the last edition of them appeared in 1815-1825 at Leipzig. Nicander, 'Alexipharmaca, seu de Venenis, &c., Carmen, cum Vers. Lat., Schol. Graec.' &c. Halæ, 1792, 8vo.; Nicander, 'Theriaca,' Leipzig, 1816, 8vo.; 'Scriptores Rei Rusticæ, cum comment. illustr., et fig.,' Leipzig, 1794-97, 4 vols. 8vo.; 'Aristotelis De Animalibus Historiæ Libri X., Graec. et Lat., cum comment. et indice,' Leipzig, 1812, 4 vols. 8vo. In 1797 he published the first edition of his 'Greek Dictionary,' the best that had appeared since the days of Henry Stephens. A second edition appeared in 1805, and a third in 1820, 2 vols. 4to.; and in the following year, he published a supplement to it. He also edited 'Theophrasti Characteres, cum viror. doct. conject. correcti,' Jena, 1799, 8vo.; 'Eclogæ Physicæ,' 1801, 2 vols. 8vo., comprising the most important parts of natural history known to the antients, with very valuable notes. 'Argonautica Orphei,' Jena, 1803; Vitruvius, Leipzig, 1807, 3 vols. 8vo.; 'Aristotelis Politica,' with a Latin translation, Frankf. on the Oder, 1809, 2 vols. 8vo.; Æsop's 'Fables,' Breslau, 1812, 8vo.; 'Epicuri Physica et Meteorologica,' Leipzig, 1813, 8vo.; Oppianus, Cynegetica et Halieutica,' with a Latin translation, Leipzig, 1813, 8vo. In this edition he has withdrawn many of the bold corrections of his former edition. 'Anonymi Œconomica, quæ vulgo Aristotelis falso ferebantur,' Leipzig, 1815, 8vo.; 'Theophrasti Opera omnia,' Leipzig, 1818-21, 5 vols. 8vo., to which in 1822 a sixth volume was added. His German works on natural history, and his short essays on various subjects, are extremely numerous: a complete list of them is given in Meusel's 'Gelehrtes Deutschland.'

SCHNURRER, CHRISTIAN FRIEDRICH, was born October 28, 1742, at Canstadt in Würtemberg. He studied at Tübingen, where, in 1762, he began his career as an academical teacher. Four years later he went to Göttingen, and afterwards made a journey through Holland, England, and France. On his return, in 1770, he was appointed professor of philosophy at Tübingen, where he subsequently lectured on the Greek and Oriental languages. For some time he was ephorus of the theological faculty, and in 1805 he was appointed chancellor of the university. After the French were driven from Germany, Schnurrer became a member of the Chamber of Deputies in Würtemberg, and although his official position prevented him from joining either party, he was always an advocate of liberal principles, and was from the first opposed to the design of the government to restore the constitution of Würtemberg as it had been previous to the year 1806. In 1817 the king of Würtemberg, in accordance with the promise made at the Congress of Vienna, gave a new constitution to his kingdom, and on this occasion Schnurrer declared that he would willingly vote for its acceptance, provided the king would introduce it in the form of a contract between himself and his subjects. In consequence of this boldness Schnurrer was deprived of his office, though two years afterwards the government was obliged to adopt the plan proposed by him. After his dismissal Schnurrer sold that part of his extensive library which consisted of Arabic literature, and which he had chiefly collected during his stay in England, to Mr. Knatchbull. Schnurrer died on the 10th of November, 1822.

Schnurrer was a man of great and accurate learning, especially in Oriental literature, but his official duties prevented him from producing many great works. His writings, though numerous, are mostly small dissertations on historical and theological subjects, written on various occasions and in programs. From the year 1793 he took an active part in a literary journal called 'Tübinger Literarische Nachrichten.' His 'Bibliotheca Arabica,' the last edition of which appeared at Halle, 1811, is a work of great learning and diligence. His 'Orationum Academicarum Delectus Posthumus,' was edited by Paulus, Tübingen, 1828. The Life of Schnurrer has been written by Weber, under the title of 'C. F. Schnurrers Leben, Charakter, und Verdienste, Canstadt, 1823.

SCHÖFFER, PETER, one of the inventors of printing, was a native of Gernsheim in the country of Darmstadt. In early life he followed the trade of a copyist at Paris; but, about 1450, removing to Mayence, gained employ in the printing-office recently established there by Gutenberg and Fust; upon the dissolution of the partnership between whom, he joined Fust as a principal, and by inventing the puncheon gave completion to the discovery of printing. He afterwards married Fust's daughter.

Schöffer's name first appears with Fust's at the end of the Psalter of 1457, and they continued to print jointly till Fust's death in 1466. The list of their books has been already given in a former volume. [Fust.]

The list of books printed by Schöffer alone after Fust's death is a long one. It will be found in Panzer's *Annals*, vol. ii., 4to., Norimb., 1794, p. 117-136, with an enumeration of other works known as his by the type, but without his name.

The following were printed by him previous to 1470, namely, the 'Secunda Secundæ' of S. Thomas Aquinas; and the second edition of the 'Constitutions of Clement V.,' 1467; the 'Institutions of Justinian,' 1468; St. Thomas Aquinas's 'Commentary on Peter Lombard,' fol., 1469; and the second edition of the 'Sixth Book of the Decretals of Pope Boniface VIII.'

His last work of all was a Latin Psalter, fol., 1502; in which year he is supposed to have died; leaving behind him John Schöffer his son, and successor in his business, whose name appears alone as the printer of 'Mercurius Trismegistus,' in 1503, and of many subsequent works.

(Panzer, ut supr., tom. ii., p. 117-136; tom. vii., p. 406, Meerman, *Orig. Typogr.*, 4to. Hag. Com., 1765; *Biogr. Universelle*, tom. xli., pp. 208, 209.)

SCHŒNANTHUS. In the article Juncus odoratus reference has been made to Schœnanthus for an account of this substance, which is Lemon Grass, as well as of Calamus aromaticus, which Dr. Royle is of opinion belongs to the same genus, that is, Andropogon. As many writers on this substance and on the spikenard of the antients have confounded together much of what refers to these two very distinct substances, it will be preferable to treat of both under the more popular head of Spikenard.

SCHŒPFIA, a small genus of the natural family of Loranthaceæ, named after Schöpf, a German botanist, who described the plants in the neighbourhood of Ulm. The genus is characterised by having the flowers hermaphrodite, margin of the calyx entire, tube adnate to the ovary, very narrow, caliculate at the base. Corol tubular, united into one piece; limb 5- rarely 4- to 6-cleft. Stamens equal in number to the lobes of the corol, and inserted before them into the tube of the corol. Anthers ovate or roundish, dehiscing laterally by a double chink. Style erect. Stigma capitate or 3-lobed. Ovary 3-celled, with an ovule in each. Leaves alternate, petiolate, entire, feather-nerved. Peduncle axillary, usually many-flowered. The genus Schœpfia is found in the West Indies and in the Andes of Peru, also in the Pundua Mountains near Lower Assam, and in Nepal, thus being common to both the old and new world.

SCHOLASTIC PHILOSOPHY. [Theology.]

SCHOLIUM (Σχόλιον), (Mathematics), a name given in the older mathematical writers to the remarks which follow a proposition. A scholium must be distinguished from a corollary, inasmuch as the latter necessarily contains some deduction from the demonstration which precedes; which is not the case with the former. A scholium is an appendix containing general remarks upon the scope of a proposition, its application, or its history: everything in short which is not an absolute corollary. The word is used by Cicero (*Ep. ad. Att.*, xvi. 7) in its general sense of remark, commentary, or explanation.

SCHOMBERG, ARMAND FREDERIC DE, was of German family, but born of an English mother, of the house of Dudley, in or about 1619. Bred a soldier, he began his career in the Swedish army, during the Thirty Years' War, and was punished by the Emperor for the part which he took by confiscation of his property. He then entered the service of the Netherlands, and afterwards that of France, in which, from 1650 to 1685, he led an active and distinguished life, and rose to the rank of marshal. In 1685, the revocation of the Edict of Nantes drove him, with many other of the best and most useful subjects of France, to seek liberty of conscience in another country; and he betook himself first to the service of Portugal, then to that of the Elector of Brandenburg, and lastly to that of the Prince of Orange, when about to make his descent upon England in 1688. In our own country the course of events gave little opportunity for the exercise of military talent. Schomberg was sent to Ireland in 1689, as commander-in-chief; where, during ten months, his successes fell short of the expectation raised by his high reputation. Age perhaps had made him over-cautious. He was killed, July 1, 1690, by a pistol-shot, at the battle of the Boyne, while gallantly leading a regiment of French Protestants across the river.

SCHÖNBURG is a part of the kingdom of Saxony, consisting of the possessions of the antient house of Schönburg, situated between the circles of the Erzgebirge, Leipzig, and Meissen, and the principality of Altenburg. The members of this family had formerly a seat and vote in the bench of counts of the Wetterau, but they never were able to acquire all the rights of independent princes of the empire, and were constantly at variance with the princes of the house of Saxony. The differences between the two parties were arranged by an agreement in 1740, which continued in force with some modifications till 1815, when it was confirmed by the Congress of Vienna. The sovereignty is vested in the king of Saxony, but many important rights are retained by the members of the houses of Schönburg, such as the establishment at Glauchau of a distinct government and administration for all the possessions of the family. The family of Schönburg is now divided into two principal lines, that of the princes of Schönburg-Waldenburg, and that of the counts of Schönburg-Penig, which is again subdivided into two branches. The territories of the whole are 345 square miles in extent, with 112,000 inhabitants. The country is mountainous, but very fertile, producing corn, timber, flax, fruit, potters'-clay, cinnabar (which is not found in any other part of Saxony), and slate. The inhabitants are very industrious, and, besides their agricultural occupations, have considerable manufactures of linen, woollen, cotton, paper, and earthenware. The chief towns are Waldenburg on the Mulda, the residence of the prince, which, including the suburbs, has 4500 inhabitants; near it is the prince's country-seat Greenfield, with a fine park. Glauchau, the chief town of all the territories of Schönburg, is the seat of the joint government; it is situated on the Mulda, over which there are two bridges, and lies, in the form of a semicircle, on seven low hills. There are two palaces, the residences of the counts of Schönburg-Penig, a church with a celebrated organ, an orphan asylum, a theatre, iron and copper works, and manufactures of linen, woollen, cotton, leather, and needles. There are many handsome houses in this town, which has 6000 inhabitants. George Agricola was born here in 1494.

SCHONEN. [SWEDEN.]

SCHOOLS, PRIMARY. The education supplied by primary schools may be considered as embracing not only that of young children, but that of the children of the poor in general. The consideration of it involves the whole matter of what is generally termed 'popular education,' comprising the Sunday-school, the Day-school, and the Infant-school.

The theory of the English church establishment supposes that the youth of the country are directly or indirectly under the care of the clergy for the purposes of education; and there was a period in which none but the clergy were engaged in the business of instruction. Various circumstances however, added to the increase of population, its growth in wealth, the rise of new commercial interests, together with the spread of dissent, caused the people to outgrow the very scanty provision made for their education, so that towards the end of the last century an opinion became prevalent of the urgent necessity both for the extension and the improvement of the means for the education of poor children. The result was the commencement in England of a series of efforts which have led both here and abroad to the most beneficial results.

Raikes of Gloucester is generally considered the founder of Sunday-schools, but other persons preceded him in the benevolent effort to make the Sunday subservient to the education of neglected children. The Rev. Theophilus Lindsey, shortly after he had taken possession of his vicarage of Catterick in Yorkshire, in 1763, employed in this way a portion of each Sunday. Mrs. Cappe, in her 'Autobiography,' says, 'At two o'clock, before the commencement of the afternoon service, Mr. Lindsey devoted an hour alternately to catechising the children of the parish and to expounding the Bible to the boys of a large school to the number of about 200. After evening service, Mr. Lindsey received different classes of young men and women in his study for the purpose of instruction; and Mrs. Lindsey, in like manner, in another apartment, had two classes of children, boys and girls alternately.' Mrs. Cappe, wife of the Rev. Newcome Cappe of York, then Miss Harrison, 'endeavoured,' she observes in her Life, 'to imitate at Bedale the example which I so much admired at Catterick I established a sort of Sunday-school there, collecting together a number of poor children, whom I assisted in learning to read, giving them books, &c., teaching them Dr. Watts's shorter catechism, together with his devotional hymns, and endeavouring to give them such general instruction as might enable them to read their Bible with more intelligence. I had no place in which to receive them but the back kitchen, which being small, we were exceedingly crowded; but they grew attached to me, and liked to attend; and in order to prevent confusion, I divided them into classes, which succeeded each other; so that on the Sunday I was occupied by a succession of children nearly the whole day, except the time which was spent at church.'

In the year 1769 a Sunday-school was commenced by Miss Ball at High Wycombe, Bucks. She was a lady of great piety, and very earnest in doing good. Her custom was to assemble as many as thirty or forty children on Sunday morning, in order to hear them read the Scriptures and repeat the Catechism and the Collect, preparatory to going to church.

The idea of Sunday instruction was communicated to Mr. Raikes by the Rev. Mr. Stock, curate of St. John's, Gloucester. The following is Mr. Stock's own account, in a letter, dated February 2, 1788:—'Mr. Raikes meeting me one day by accident at my own door, and in the course of conversation lamenting the deplorable state of the lower classes of mankind, took particular notice of the situation of the poorer children. I had made, I replied, the same observation, and told him, if he would accompany me into my own parish, we would make some attempt to remedy the evil. We immediately proceeded to the business, and, procuring the names of about ninety children, placed them under the care of four persons for a stated number of hours on the Sunday. As minister of the parish, I took upon me the principal superintendence of the schools and one-third of the expense. The progress of this institution through the kingdom is justly to be attributed to the constant representations which Mr. Raikes made, in his own paper (the 'Gloucester Journal'), of the benefits which he perceived would probably arise from it.' The following is a copy of the inscription on a handsome marble monument, erected several years ago in the chancel of the parish church of St. John the Baptist, by a subscription of the inhabitants of the parish, written by the Rev. F. T. Bailey, the present rector and Mr. Stock's successor:—'In memory of the Rev. Thomas Stock, A.M., rector of this church, who first suggested the institution of Sunday-schools, and, in conjunction with Mr. Robert Raikes, established and supported the four original Sunday-schools in this parish and St. Catherine's in 1780 He died December 27th, 1803, and was interred in St. Aldate's Church.'

Mr. Raikes's views may be gathered from the following paragraph which he inserted in the 'Gloucester Journal' of November 3, 1783, of which he was proprietor and editor:—'Some of the clergy in different parts of this county, bent upon attempting a reform among the children of the lower class, are establishing Sunday schools for rendering the Lord's-day subservient to the ends of instruction, which has hitherto been prostituted to bad purposes. Farmers and other inhabitants of the towns and villages complain that they receive more injury in their property on the Sabbath than all the week besides; this in a great measure proceeds from the lawless state of the younger class, who are allowed to run wild on that day, free from every restraint. To remedy this evil, persons duly qualified are employed to instruct those that cannot read; and those that may have learned to read are taught the catechism and conducted to church. By thus keeping their minds engaged, the day passes profitably and not disagreeably. In those parishes where this plan has been adopted, we are assured that the behaviour of the children is greatly civilised. The barbarous ignorance in which they had before lived being in some degree dispelled, they begin to give proofs that those persons are mistaken who consider the lower orders of mankind as incapable of improvement, and therefore think an attempt to reclaim them impracticable, or at least not worth the trouble.' For nearly thirty years Raikes survived to witness the growing effects of his benevolent undertaking, which to the present hour has not ceased to diffuse benefits over the land and over the world at large.

The 'National Schools' took their rise from the impulse given by Dr. Andrew Bell. He was a native of St. Andrew's in Scotland. After having gone through his studies at the university of that place, and taken holy orders in the English Church, he proceeded to the East Indies as a chaplain in the East India Company's establishment. Becoming superintendant of the Male Asylum at Madras, he was struck with the Hindu mode of writing in sand, and other peculiarities in tuition, which on his return to England he made known by several publications. The advantages of the methods which he recommended were ultimately acknowledged, and the system was adopted; but a similar project having been set on foot by Joseph Lancaster, a controversy arose, which eventually led to the formation of two societies, namely, the National Society, and the British and Foreign School Society, the former of which is chiefly supported by the Establishment, and is designed to further popular education in connection with teaching the doctrines of the English Church; the second, which is chiefly supported by dissenters, offers education to all whose parents are willing that their children's instruction should be based on the Bible. Dr. Bell, after having been rewarded with honours and emoluments in the church, died at Cheltenham, Jan. 28, 1832, bequeathing 120,000*l.* for the encouragement of literature and the advancement of education.

Joseph Lancaster, born in 1771, was a member of the Society of Friends. His father was a soldier in the foot-guards. Moved by a benevolent feeling towards the neglected children that surrounded his father's residence in the Borough Road, Southwark, he opened a school for their benefit, and obtaining a room without cost from his father, he fitted it up at his own expense; and before he was eighteen years of age had ninety children under his care. This was in 1798, a period of scarcity as well as of general ignorance; and necessity prompted him to make experiments in education, with a view to economy in teaching. He early attracted the attention of the Duke of Bedford; and in 1805 was honoured by an audience on the part of George III., who on this occasion expressed the memorable words, 'I wish that every poor child in my dominions may be able to read his Bible.' Being a conscientious dissenter, he declined flattering overtures of worldly advantages which could be enjoyed only by his joining the established church. From 1807 to 1811, he travelled in the kingdom nearly seven thousand miles, and lectured to nearly 50,000 persons; and thus he gave a great impulse to elementary education. In 1812 he attempted to establish a school for children of opulent parents; but he became insolvent, and in 1818 emigrated to the United States, where he was well received. In this country he rendered much service to education, but the effect of his labours was lessened by his want of prudence. In 1829 he visited Canada, and was honourably welcomed. The parliament of Lower Canada voted him several grants for educational purposes. Again he experienced great pecuniary difficulties, but some of his old friends united to purchase for him a small annuity. He died at New York, on the 23rd of October, 1838, having essentially contributed to the establishment of the system of mutual instruction in most parts of the civilized world, under the name in England of 'Lancasterian Schools,' and under the patronage of the British and Foreign School Society.

Infant-schools are designed to prevent evil, and to train young children in the practice of virtue and kind feeling, as well as to the pursuit of knowledge, particularly in those cases in which the parents from their occupation are unable, or from their dispositions are unwilling, to take proper care of their offspring. At present having been found o great service in the humbler ranks of society, they are slowly extending themselves among the middle classes. If the whole of English education were planned with similar foresight and care, and conducted on similar principles, so as to make one connected series from infancy to manhood, extending through all ranks, modified only by the peculiar facilities and destination of each, the highest advantages would follow. The infant-school system makes the school-room into a nursery and a playground, in which virtue, intelligence, and love preside, direct the movements, and regulate and foster the emotions. The scholars are instructed while they play, and learn to associate pleasurable feelings with their school pursuits.

The real founder of Infant-Schools appears to have been the Pastor Oberlin, who appointed conductrices in each commune of the Ban de la Roche, and paid them at his own expense: he also procured rooms where children from two to six years old might be instructed and amused. (*Journal of Education*, vol. i., p. 367, &c.) An infant-school (Bewahrschule) was also founded in Germany by the Princess Pauline of Lippe-Detmold, at Detmold, in 1802, for children from one to four years of age.

If Mr. Owen was the first Englishman to establish an infant-school on a large scale, and for definite purposes—and certainly the school which he founded at New Lanark in Scotland at least ranks among the earliest—he was aided in forming the idea by the wife of the Rev. William Turner of Newcastle-on-Tyne, who in the year 1818, when in conversation with Mr. Owen, remarked, that in her attention to the education of girls, she had frequently wished some means could be adopted for getting poor children taken out of the hands of their parents at an earlier age, before they had formed bad habits at home and among the idle children around them Much was said on both sides on the desirableness of infant-schools, which Mr. Owen immediately established on his return to Lanark. Much credit is also due to Lord Brougham for the interest which he manifested and the valuable aid which he gave in the establishment of infant schools. Mr. Wilderspin has however laboured more than any other person, and with more success, in the founding of these institutions, and also in perfecting their discipline.

To no one however can the impulse which has been given to early education be so justly ascribed as to Pestalozzi, whose labours were characterised by an earnestness which was the result of a profound conviction, and who has infused into education his own enlightened views and benign spirit.

Henry Pestalozzi was born at Zürich in 1745, of respectable parents. Having lost his father at an early age, he was left to the care of his mother, who was extremely poor. Eccentricity seems to have been a marked feature in his early character, which was distinguishable rather for kindness and gentleness than strength of intellect. A deep dissatisfaction with existing modes of education, resulting from his own reflections, was increased by the study of the 'Emile' of Rousseau. This work confirmed him in the pursuit of what may be termed educational truth, and gave a stimulus to his inquiries; but it gave him no positive knowledge, except that of his own ignorance, and of the prevalent ignorance on the subject. A severe illness, the result of the intense action of his mind, ended in bringing him to a fixed determination to abandon himself, as his biographer terms it, 'to the education of providence.' He apprenticed himself to a farmer: in due time he became master of a tract of waste land, applied himself to its cultivation, became interested in a cotton manufactory, and was, by the experience which he acquired in going through these concerns, convinced that the prevailing system of popular education was not fitted to prepare men either for the duties or the enjoyment of life. He resolved on an educational experiment. He selected his pupils from the very dregs of the people. His establishment was converted into an asylum, where 50 poor children were provided with food, clothing, and instruction. His object was national, and he desired to show the state how the poor might be taught to instruct and improve themselves; and hence one of his great principles—self-education. His plan was defeated, but not without having been attended with beneficial results to upwards of one hundred poor children, and a great increase of experience to himself, which he communicated to the world in several attractive and instructing works. After many difficulties, Pestalozzi, with the aid of government, entered on another educational experiment, under circumstances of the most unfavourable nature both within and without the establishment. Deprived of all the ordinary supports of authority, he threw himself on the power of love in the children's hearts, as the only available means of securing obedience. The effect corresponded to the expectation of the teacher. The whole of his school apparatus consisted of himself and his pupils. How was he to teach them? At last, after many trials and failures, he was led to teach them by word of mouth instead of books, by realities instead of signs.

A war broke up his establishment. His mind and circumstances were embarrassed, and ridicule assailed him. But he persevered, and became an assistant in a dame-school. A wider sphere however opened out before him. The Swiss government gave him a small pension, and an empty castle, which contained rooms enough, but hardly anything else. He set to work, and the school at Burgdorf was soon a scene of activity, in which teacher and disciples were trained as well as children. But he had offended the aristocratical canton of Bern by his liberality, and he was obliged to remove into the Canton de Vaud. Here, at the castle of Yoerdon, he had nothing but bare walls and beautiful scenery. Yet even this soon became a busy and a happy spot, for he made his school a Christian family, in which persons of all ages, of all ranks, and of the most opposite character were united by the unaffected love of Pestalozzi. But he was more fitted to theorise and originate, than to work out his own ideas: his last establishment fell to pieces for want of a proper director. He died at the age of 80, after having reaped no other reward for his labours than his own inward satisfaction.

Were the conviction universal that the children of the poor ought to be educated, the devising of a suitable method of instruction would be comparatively easy. Undoubtedly those who admit the utility and necessity of educating the poor are a large, a powerful, and an increasing body. But even of those who take part in the promotion of popular education, there are many who act rather from compulsion than choice, who would not advance the cause if they could retain their social influence without doing so, and who consequently must not be expected to do more for it than their own party interests may seem to require. And if, on the one side, there is a large body of persons who wish to educate the people because it is for the general interest that they should be educated, and from the assurance that there is no evil which may not be feared from ignorance, and no good which may not be anticipated from a well-educated community; there is on the other side a considerable number of persons who desire to resist the diffusion of popular education. 'It is impossible,' says the assistant poor-law commissioner, Edward Twisleton, Esq. (*Reports on the Training of Pauper Children*, 1841), 'to shut one's eyes to the fact that a certain portion of the upper and middling classes harbour a rooted distrust of any plan for the education of the poor. In discharge of my ordinary duties I have often had an opportunity of seeing this feeling manifested in an undisguised form. . . . Amongst many small farmers and some of the gentry, unwillingness to educate the poor is openly defended by argument; and a merchant of a seaport town gravely assured me, not long ago, that an agricultural labourer was very little above a brute, and that to educate him would merely have the effect of rendering him dissatisfied with his situation in life.'

A correct description of what the advocates of popular education mean by that term would be the best answer to many current objections, and the general tenor of these observations may perhaps do something to that effect. Many persons confound education with instruction, whereas instruction is only an instrument in education. Education is the leading out, the unfolding, the training of all the human faculties under such an instrumentality and with a view to such ends as the capacity of each individual, his position in society, opportunities, and prospects may justify or require; and it seems difficult to understand how such a discipline can be injurious either to the individual himself or to society. Experience however has decided this question. The authority whose words have just been given emphatically declares 'there is reason to believe that half the pauperism and crime which prevails in the world arises from the corruption of stagnant ignorance and from defective moral and religious training, and that to remove and remedy these causes of vice is the only expedient which affords the least prospect of success for promoting the moral health of the rising generation.' The following quotation is from the Report of the Inspector of National Schools, the Rev. Edward Field (*Twenty-ninth Report of the National Society, for* 1840, p. 144):—'Let it not be forgotten, that the persons most actively employed in the agricultural riots of 1830 were uneducated and ignorant in the last degree. From two adjoining parishes in Wilts, fifteen agricultural labourers, I was told, were at that time transported for life. It cannot, I fear, be doubted that the materials for such an explosion yet remain in some of the rural parishes of Dorset and Wilts. Those materials are poverty and ignorance, which may again, whenever the match is applied by artful and designing men, spread waste and terror through the land. At present, in the parishes alluded to, the poor labourers know not (and how without instruction should they know?) either how to better their condition or to bear it. On the occasion of the last assizes, the following important and valuable remarks are reported to have been addressed by Judge Coleridge in his charge to the grand jury at Devizes:—"Having disposed of the calendar, he would now advert to a subject connected with the county. He had before him a comparative table of the committals in the different counties in England from 1834 to the present time; and he found that in Wiltshire in 1834 there were 384 committals, and that in 1839 there were 428. This was not a very large increase, considering the increase of population; but still it would have been more pleasing to have found a decrease. He had then looked to see in what manner these parties had been educated, and he found that out of the whole 428 only 32 could read and write well. This spoke negatively pretty strongly in favour of education. It was not therefore an unfair inference, that if they increased the amount of education, they might probably diminish the number of those who made small attempts on the property of others. There were 250 who could read and write imperfectly, *but reading and writing imperfectly was no education at all;* they could read their Bible to very little effect; a very large proportion must be in the very beginning of education. This showed how desirable it was to advance the sound and religious education of the poorer classes." Such remarks from such a quarter must help to shake the prejudices which still unhappily remain in some places against the education of the poor.'

There is also most valuable testimony in 'Evidence of employers of labourers, on the influence of training and education on the value of workmen, and on the comparative eligibility of educated and uneducated workmen for employment,' given in the 'Report to the Poor-Law Commissioners on the Training of Pauper Children,' 1841. Albert Escher, Esq., one of the firm of Escher, Wyss, and Co., of Zürich, employing from six to eight hundred men in their machine-making establishment at Zürich; employing also about two hundred men in their cotton-mills there, and about five hundred men in their cotton-manufactories in the Tyrol and in Italy, these men being of different nations, Swiss, Germans, French, English, Scotch, &c., states, 'As workmen only, the preference is due to the English, because they are trained to special branches; as men of general usefulness, I should prefer the Saxons, because they have had a very careful general education, which has rendered them fit to take up any employment to which they may be called. . . . The Scotch get on much better on the Continent than the English, which I ascribe chiefly to their better education, which renders it easy for them to adapt themselves to circumstances. Knowing their own language grammatically, they have good facility in acquiring foreign languages. They have a great taste for reading, and always endeavour to advance themselves in respectable society, which makes them careful of their conduct and eager to acquire such knowledge as may render themselves acceptable to better classes. . . . The Dutch are, like the English, quite specially trained, but their education is not of a very high order, but very sound, and decidedly superior to the English. It is an education in which economy and domestic and public respectability of conduct are particularly enforced; and we have found them to be particularly honest, economical, orderly, and trustworthy men. . . . The English are in conduct the most disorderly, debauched, and unruly, and least respectable and trustworthy of any nation whom we have employed (and in saying this I express the experience of every manufacturer on the Continent to whom I have spoken, and especially of the English manufacturers, who make the loudest complaints). These characteristics of depravity do not apply to the English workmen who have received an education, but attach to the others in the degree in which they are in want of it. Refinement produced by education would be beneficial to workmen, for in the present state of manufactures, when so much is done by machinery and tools, and so little by mere brute labour, mental superiority, system, order, punctuality, and good conduct—qualities all developed by education—are becoming of the highest consequence. . . . The uneducated English workmen at Zürich were so disagreeable as lodgers, having such disorderly and bad habits, spoiling the rooms, emptying vessels out of the windows, offending people in the streets, contravening the police regulations, that they found it difficult to get lodgings, and are obliged to pay more for them. Some of the best description of the English workmen—one of the most superior, to whom we gave 5*l.* a week wages, had so lowly bred a family (he came from Oldham, where they are notorious for want of education) that his salary scarcely sufficed for his expenses—do not take so high a standing as foreign workmen who only receive 50*l.* a year. ...I invariably find that the best educated of our workmen live in the most respectable manner at the least expense, or make their money go the farthest in obtaining comforts. Of the English, the educated workmen are the only ones who save money out of their very large wages. The most educated of our British workmen is a Scotch engineer, who has a salary of 3*l.* a week, of which he spends about one-half; he lives in very respectable lodgings; he is always well dressed; he frequents reading-rooms; subscribes to a circulating library, purchases mathematical instruments, studies German, and has every rational enjoyment. We have an English workman, a single man, also of the same standing, who has the same wages, also a very sober person; but as his education does not open to him the resource of mental enjoyment, he spends his evenings and Sundays in wine-houses, because he cannot find other sources of amusement which presuppose a better education, and he spends his whole pay.... What pilfering we detect among our workpeople is invariably amongst the class which is lowest in education.'

James Kempson, of Philadelphia, cotton manufacturer, states that they do not like to take English workmen in the New England factories, because they are so dissipated and discontented. They are noted as the greatest drunkards in the country, and are much worse educated than Americans of the same class. Schools in the United States are encouraged, because they are regarded as of the greatest importance to the welfare of the community. William Fairbairn, Esq., of Manchester, states that a preference is always given to workmen who have received the best education; that in all questions respecting wages, the best educated are the most reasonable in their demands, and the most peaceable in their behaviour; and that the educated are more sober and less dissipated than the uneducated. Another employer, who had provided schooling for upwards of 200, stated in private conversation that at first the expenditure was given chiefly from a desire to make the people happy; but he subsequently found that had it all been done simply as an investment of capital, it would have been a highly profitable one; adding that he would not as a pecuniary speculation take less than 7000*l.* for his set of workmen, upwards of 800, in exchange for the uneducated and uncultivated workmen of another manufacturer opposite.

The Select Committee of the House of Commons on Education, 1838, declare that 'to the neglected education of the children of the working classes in populous places is to be chiefly attributed the great increase of criminals, and consequently of cost to the country.' From returns to parliament the committals for crime in England and Wales were in

1805	4,600	1828	16,500
1810	5,100	1832	20,090
1815	7,800	1836	20,984
1821	13,000	1837	23,612

That is, in 20 years (from 1810 to 1832) the committals increased fourfold, while the population increased only 32 per cent.

The following very important evidence on the effects of knowledge and ignorance was given before the Educational Committee, 1838, by John Corrie, Esq., a magistrate residing near Birmingham:—

'Are you chairman of the West Bromwich Union?—I am.

'What number does the West Bromwich Union comprise?—At the time the Union was made, the returns were 34,000, grounded on the census of 1831, and I believe there are now upwards of 40,000.

'From your knowledge of the poorer classes within that district, first of West Bromwich or the neighbourhood, do you think that education for the humbler classes is much wanted?—From what little experience I have had as a magistrate and as chairman of the Union, I should say it is greatly wanted, lamentably wanted.

'Does imprudence and drunkenness prevail among the humbler classes for want of some moral and better education?—There is very little education of any sort; that which there is, is of the most elementary kind; reading and indifferent writing; most of those (and especially the young) who come before the magistrates, and before the Union Board, are unable either to read or write; they have no knowledge of moral obligation, or very little; many of them have never been at any place of worship.

'Do you not consider that the neglect of any education, both moral and religious, which you describe, must be the source of much crime and cost to the country in consequence, and to the district in which they live?—Undoubtedly.

'Do you not think that a good system of improved education for these humbler classes, although it might in the first instance be the subject of some cost, would repay itself by a saving that would accrue from their improved habits in a few years?—I have no conception of any other means of forcing civilization downwards in society except education; there is a slight surface of civilization; these in certain circumstances have a little education, but the mass have none.

'Do you not think that if a tolerable education were provided for the humbler classes, that they would be more likely to enter into those provident societies which have been so much spoken of lately; savings'-banks and benefit societies, for providing against sickness and those other calamities which are incident to the situation of the poor?—The educated classes have the benefit of all the recorded experience of the past to guide them; these poor people have no recorded experience; their own feelings, or the little experience of their fathers and mothers, is all they have to guide them.

'Do you think it would be beneficial to them, and that they would be much more likely to enter into these provident societies, supposing the means of education were afforded?—I have no doubt on the subject whatever.'

Dr. J. P. Kay, 1841, thus speaks of the effect of education on pauper children: 'Ignorant of all that is good, but trained and practised in all evil; unintellectual, debased, and demoralised, the work of instruction and reformation sometimes appeared almost hopeless. But the rapid improvement of the children under a system of religious and moral teaching and of industrial training; their general decency of deportment; the proofs they afford of the influence of sound principles; and the apparent state of comfort in which they live, the simple result of cleanliness, discipline, and regularity, attracted observation, and are now beginning to excite a feeling of jealousy out of doors.'

It is only very recently that correct notions respecting the actual state of popular education in this country have begun to prevail; and even now, in cases where its deficiency in amount is acknowledged, there often exist very erroneous conceptions of its value. These false ideas are to be mainly attributed to the fact that no means have existed by which a knowledge of the general state of education could be acquired. The statistics of education are quite a recent study; and even now, although something has been done by parliamentary committees, by 'The Manchester Statistical Society,' and other similar institutions, by 'The Central Society of Education,' and by the 'Committee of Council on Education,' still there are no means by which exact information on this subject can be obtained with respect to the country at large; and all that can be done is to present some facts ascertained in relation to particular places, from which some rude idea of the general condition may be deduced, and to make a rapid review of the quality of the education that is given.

The Parliamentary Committee on Education (1838) give it as their opinion, that as regards the children of the working classes, it would be desirable to afford education to them from the age of three to thirteen; deducting from this number all the children of the rich or middle classes, they conclude that daily school education should be provided for one-eighth of the population. They proceed to report that in five parishes in London, situated along the Strand and round Charing-Cross, 'some sort of daily instruction is afforded to about one in fourteen of the population, instead of one in eight.' In Bethnal Green, they state, 'there are from 8000 to 10,000 children for whom no means of daily instruction are provided. In that parish thousands are growing up uninstructed in their duty to God or man. . . . In this populous parish less than one in twenty are under daily education.' They furnish the following table:—

PLACE			Population.	Children of Working Classes at Daily Schools: viz. Day and Dame Schools, Very indifferent.	Other better schools.	TOTAL.
1836.	Liverpool		230,000	11,336	14,024	25,000
1834.	Manchester		200,000	11,520	5,680	17,100
1835.	Salford		50,810	3,340	2,015	5,350
—	Bury		20,000	1,648	802	2,451
1835.	Ashton . . . . Duckenfield . . . Staley Bridge . . .		47,800	. . .	. . .	2,496
1837.	Birmingham . . .		180,000	8,180	4,697	12,877
1837.	Bristol		112,438	- - not including scholars in private schools . .	5 to 15 . . Total . .	4,135 5,254
1838.	Brighton . .	B. & F. National	40,634 in 1831	1,367 863	3,033 3,247	4,400 4,110
1837.	West Bromwich	. .	. . . .	- - of 6,375 childⁿ under 14 years old.	. . .	1,554
1838.	Leeds . .	B. & F.	123,393 in 1831	- - no return of Dame or Day, but only Public schools.	2,971	
1838.	Sheffield . . .		96,692 in 1831	3,359	5,905	9,314
	Northampton .	B. & F. National	20,000	1,011 986	1,215 1,202	2,226 2,198
	Reading . .	B. & F.	15,595 in 1831	297	962	1,259
	Exeter		28,242 in 1831	2,045	1,830 including evening.	3,875
1836.	York		25,359 in 1831	1,494	2,697	4,191

Note.—The general result of all these towns is, that about one in 12 receive some sort of daily instruction, but only about one in 24 an education likely to be useful. In Leeds only one in 41; in Birmingham, one in 38; in Manchester, one in 35.

In regard to the most important of the places mentioned in the preceding table, the details are worked out to other interesting results in the following table taken from the same Report:—

BOROUGH OF	Estimated Population at period of Inquiry.	Children from 3 to 13 estimated, without deducting any from Number living between 3 and 13, according to Population Returns.	Number attending superior Private Schools, and belonging to Middle, and Upper Classes.	Number of Children of Working Classes from 3 to 13 for whom Education should be provided, One-third being deducted from the whole Number between 3 and 13 for those privately educated, or employed, or sick, or prevented by Casualties from attending School, and also deducting the Number attending superior Private Schools.	Number of Children of Working Classes attending Endowed and Charity Schools, and Schools attached to Public Institutions and Infant Schools.	Very ill Educated	Uneducated in Day Schools.	Total Uneducated and very ill Educated.	Annual Outlay required for Education by an efficient method, of Children now Uneducated, or very ill Educated, supposing the School-rooms to be built and kept in repair.	Number of Children very ill Educated.	Cost of providing for the foregoing Number of Children a worthless or indifferent Education by existing method, without Deductions for Losses by irregular Payments, &c.	One-fifth which may be deducted for irregular Payments and difference in Rate of Payment, &c.
						Number attending Dame Schools and common Day Schools.	Number Uneducated in Week-day Schools.					
									£.		£.	£.
Manchester .	200,000	50,000	2,934	30,400	4,103	11,624	14,641	26,265	19,500	11,624	17,398	3,479
Salford . .	55,000	13,750	882	8,285	1,776	3,357	3,172	6,509	4,800	3,357	5,215	1,043
Liverpool .	230,000	57,500	4,080	34,254	13,500	11,336	9,418	20,754	15,300	11,336	16,408	3,281
Bury . .	20,000	5,000	174	3,160	652	1,648	860	2,508	1,800	1,648	2,097	419
	505,000	126,250	8,070	76,099	20,031	27,965	28,091	56,036	41,400	27,965	41,118	8,222
				Ratio to population . .	1 in 25	. . .	. . .	1 to 9				
				Ratio to children of working classes who ought to be in attendance on school . .	1 in 3¼	. . .	. . .	5 to 7				
York . .	28,000	7,000	716	3,951	1,926	1,294	731	2,025	1,500	1,294	1,399	
				Ratio to population . .	1 in 14	. . .	. . .	1 to 14				
				Ratio to children of working classes who ought to be in attendance on school . .	1 in 2	. . .	. . .	1 to 2				

The Christian Instruction Society caused a district in London, near Barbican, to be visited, which contains 4577 children, of whom 3299 were not receiving any education whatever. Another district examined by the agents of the London City Mission contained 812 children under twelve years of age, and of that number only 65 were receiving education. They have stated generally also, that in thirty-four districts they found many thousands who went to neither day nor Sunday schools; and that they found 2744 adults who confessed that they could not read a letter. In the parish of Bethnal Green, out of 14,000 children, 4820 were educated, whilst 9180 had no daily education; and deducting the children who are receiving an education which scarcely deserves the name, there are less than 3000 who are properly instructed. By the following tabular view it appears that in the four places to which it relates there are not fewer than 32,697 children between five and fifteen years of age not attending any school whatever.

Numbers Receiving Instruction.	In the City of York, 1836.			In Four Parishes of the City of Westminster, 1837.*			In the Borough of Birmingham, 1838.		
		Per Centage			Per Centage			Per Centage	
Number Attending.	Scholars.	Of the whole Population, estimated at 28,000.	Of the Total Number of Scholars.	Scholars.	Of the whole Population, estimated at 43,000.	Of the Total Number of Scholars.	Scholars.	Of the whole Population, estimated at 180,000.	Of the Total Number of Scholars.
Day or evening schools only	2,228	7·96	39·85	3,215	7·46	67·40	10,902	6·05	39·41
Both day or evening and Sunday schools . .	2,521	9·00	45·09	889	2·06	18·63	4,141	2·30	14·97
Day and evening schools	4,749	16·96	84·94	4,104	9·52	86·03	15,043	8·35	54·38
Sunday-schools only .	842	3·01	15·06	666	1·55	13·97	12,616	7·01	45·62
Total {Day or evening and Sunday scholars}	5,591	19·97	100·00	4,770	11·07	100·00	27,659	15·36	100·00
Number of scholars estimated to be under 5 or above 15 years of age	1,020	. .	. .	1,112	. .	. .	5,835		
Children between 5 and 15 years of age attending school	4,571	. .	. .	3,658	. .	. .	21,824		
Estimate of the total number of children between 5 and 15 years of age .	7,000	. .	. .	10,750	. .	. .	45,000		
Number between 5 and 15 years of age not attending school	2,429	. .	. .	7,092	. .	. .	23,176		
	34·7 per cent.	. .	. .	65·9 per cent.	. .	. .	51·5 per cent.		

The agricultural districts are no better provided with the means of education. In the county of Kent the Central Society of Education caused eight parishes near Maidstone to be investigated, and they report that, of 262 children, 111 can neither read nor write; that, of 1300 children under fourteen years of age, 728 did not go to school; of these 728, 372 only attended day-schools; 513 children are returned as playing in the streets. In the Tendring Union in the county of Essex, out of 706 children, only 88 could read and write, and not more than 109 frequented a day-school. Of 2440 children in the Hay Union in Herefordshire, 612 only could read and write, not fewer than 1038 attended no school. In the locality where, in the year 1838, the fanatic who called himself Sir William Courtenay raised a tumult which ended in the loss of his own life and the life of several of his deluded followers—at Herne Hill, out of 45 children above fourteen, only 11 were on investigation found able to read and write, and out of 117 under fourteen, but 42 attended school, and several of these only occasionally; out of these 42, not more than 6 could read and write;—at the villa of Dunkirk no school whatever existed, though it comprised 5000 acres of land, and had a population of 700 persons;—at the village of Boughton, out of 35 children above fourteen years of age, 7 could read and write; of 119 under that age, 32 attended chool. In February, 1840, Mr. Seymour Tremenheere, assistant poor-law commissioner, reported on the state of education in that part of Wales in which the Chartists under Frost made a sudden rising; he supplies the following table, which shows the number of common day and dame schools in each of these parishes respectively; the number of children frequenting them, and the proportion they bear to the whole population.

PARISHES.	Common Day Schools for the Elementary Education of the Working Classes.	Dame Schools, and Schools for Children of from Two to Five Years of Age.	Total Children attending Day and Dame Schools.	Total Population.
Merthyr . .	15	8	1,322	34,000
Bedwelty . .	13	10	825	20,000
Aberystruth .	2	4	300	8,000
Trevethin . .	13	7	638	16,000
Mynnyddyslwynn	4	4	223	7,000
	47	33	3,308	85,000

There is no conflicting evidence in respect to the amount of popular education; all authorities agree in representing it as utterly inadequate. From the Report of the Diocesan Board of Education for Lancashire (1840) it appears that in the Macclesfield district, including a population of 129,541, education under the church is not more than 7 per cent. on the gross population; in the Liverpool district, including a population of 257,284, it amounts to no more than 6½ per cent.; and in the Manchester district, including a population of 504,672, it falls to 5½ per cent. on the gross population. The general statement is thus made, it having been premised that the returns of children not connected with the church only approach to the truth. Of the parishes or districts from whence returns have been received, the gross amount of population being 1,694,981, it appears that there are—

---

* The parishes of St. Martin in-the-Fields, St. Clement Danes, St. Mary-le-Strand, and St. Paul, Covent Garden, including the Savoy.

	Schools.	Scholars.
In connection with the church	1725	164,388
Not in connection with the church	986	108,082

being at the rate of rather more than 9 per cent. under education in connection with the church, and of rather more than 6 per cent. under education in schools unconnected with the church. It must be remarked that these returns include schools of all kinds; and that the proportion per cent. would have been very much less had the number been given of those only who receive daily education. The Diocesan Report for the Diocese of Peterborough (1840) speaks thus—

'The Board has also ascertained that there is a lamentable deficiency in the amount of church-education, both daily and Sunday, for the poorer classes. Thus, in Leicester only one-seventeenth of the population, as calculated according to the census of 1831, is receiving instruction from national or other parochial schools in any direct and recognised connection with the church. A like deficiency is seen to exist in other places of a smaller size and population, as *e.g.* in one parish of 6491 inhabitants the proportion of children receiving church-education to the whole population is one-seventeenth; and in others as follows:—

Population.	Proportion.	Population.	Proportion.
2402	one-twenty-second.	842	one-seventeenth.
2174	one-tenth.	726	one-fourteenth.
2017	one-twentieth.	627	one-sixteenth.
1638	one-sixteenth.	545	one-eighteenth.
1602	one-sixteenth.	518	one-sixteenth.
1500	one-thirty-fifth.	442	one-seventeenth.
1245	one-seventeenth.	342	one-seventeenth.
1211	one-fifteenth.		

Another painful circumstance brought to light by the researches of the Board is, that 'there are no fewer than eighty parishes, nearly one-third, that is, of those from which the returns have been received, where there is at present no daily church-school for the education of the poor: and amongst these cases there are instances of parishes with 3000, 2000, several of 1000 inhabitants, and from eighteen to twenty with a population varying from 500 to 900.

'Nor must it be supposed that the wide field for education in this county has been filled up by the different denominations of dissenters. Such a supposition would be altogether erroneous; for although the returns which the Board have received with regard to dissenting schools are not nearly so full and explicit as they could have wished to possess, yet do they nevertheless abundantly warrant this conclusion at least, that three-fourths of such schools are only Sunday-schools, and that there seems to be no machinery whatever among them for any general and regular system of daily instruction.'

The Report for the Diocese of Salisbury states 'that besides parishes of small population, there are some with a population of above 600 destitute of any school; and a few even much larger, where the education is altogether insignificant; and that above 20,000 children attend Sunday-schools only.' The last Report of 'the National School Society,' in the 'extracts' which it gives from applications made to it from all parts of the kingdom, supplies the following and other similar facts:—'Immense educational destitution in this populous parish, 20,000 souls without a single national school:' 'The condition of this large parish, now estimated at above 100,000 souls, is, in respect to the want of schools, most deplorable; at least six school-rooms are wanted:' 'There is only one small school for the daily education of the poor in the whole parish, containing about 12,000 inhabitants; that school educates about 100. As one result of this neglect, the parish became last year the focus of Chartism; and the most bitter spirit of disaffection still exists among the lower classes:' 'The population of the village of which I am the incumbent is not less than 20,000; there is no free-school in the whole place; hundreds of children receive no education whatever:' 'I am vicar of a parish which contains a population of 10,000 souls, and I grieve to say there is but one school-room in it:' 'Our situation is briefly as follows: the parish contains 1500 souls: there is nothing which can with propriety be called a school; the demoralization and extreme ignorance which prevail among this mass of human beings is truly deplorable; no language of mine can convey any idea of its extent:' 'I find a population of 10,000 souls committed to my charge with only one church, and a still smaller school in connection with the church:' 'The population of the township is about 15,000; we have no definite school; we rent two small places, which swallows up the subscriptions:' 'The district belonging to my church contains a population of 5000, and I regret to say that the children are in a state of darkness and ignorance beyond description:' 'This parish is without a building of any kind wherein to assemble the children either for a Sunday or a week school:' 'I am the curate of a poor parish, with 3000 of population; and there is no school-house of any kind:' 'This district has a population of 8000; the only instruction which the children receive is given to about 100 for an hour or two on the Sunday:' 'Population 1100; there is an excellent boys' school, but no means whatever of educating the girls, who are left idling all the day, and falling continually into immoral habits:' 'The population is about 12,000; almost exclusively poor journeymen silk-weavers; provision exists for the education of not more than 400 boys and 400 girls; of that number only about 200 are educated on week-days, and those in schools not connected with the Church.'

The tests which have been applied to discriminate between the educated and the uneducated are very imperfect and often deceptive. It does not follow because on a particular day a child is at school, that he remains under instruction a sufficient length of time. Education is a work of years, and few of the children of the poor are kept under instruction as long as is indispensable for the acquiring of the requisite knowledge and the formation of the necessary habits. 'In the Borough-Road School, London, there are always in attendance from five to six hundred children, and yet that number come in and go out every year, arising either from the shifting of the population or the carelessness of the parents. Now if the mass of the children are in that school for only one year, and in large country towns only about a year and a half, and in the villages not more than two years, while from that must be deducted times of absence at harvest and other periods, it is evident that the children cannot be for a sufficient time under any influence to derive the necessary benefit, so that there is a vast deal of delusion as to the extent of education in this country.' (Henry Dunn, Esq., secretary to the British and Foreign School Society, in his evidence before the Educational Committee.) On the same occasion the Rev. J. C. Wigram stated, in relation to the National Schools, that two-thirds of the scholars are constantly fluctuating, and that a master gave him a list of 15 or 16 boys who had been re-admitted above twelve times in the course of the year.

The child who can read is classed among the educated, without its being ascertained whether he has acquired such a skill in and taste for reading as will lead him to pursue his own improvement. It is well known that many who could read in their childhood have lost the ability before they have reached manhood. Mr. Wood, in his evidence before the Committee on Education, declares, 'I asked one man the other day, 'Can you read?" "Yes; I learned to read the Bible at school, but I dinna like to read it now." Another I asked respecting his reading; he said, "Yes, I can read;" I said, merely as a test, "Can you read the Bible?" He said, "No; I dinna want to read that any more." "What is your objection to the Bible?" "I read it backwards and forwards when I was at school."'

When writing is added, a less insufficient guarantee is obtained, and the only way to avoid being grossly misled by statistical reports is to rank among the uneducated all who cannot write. But even the ability to write is frequently lost, and it may be retained in connection with no small degree of ignorance.

The existing schools themselves however must be looked into in order that a just opinion may be formed of the quality of popular education. The Manchester Statistical Society, in their Report on the State of Education in York, remark, that 'however imperfect the education received at Sunday-schools may be, when compared with a reasonable or a foreign standard, it affords nevertheless the most valuable training within the reach of the great mass of the industrious population of England.' Yet this training extends only to a few hours every week, is given by persons who are generally elevated only a little above their scholars, and whose only valuable recommendation is, that they are in general animated by a benevolent and pious spirit. There are however indirect effects which abate the good of Sunday-schools, particularly in the spirit of sectarianism and bigotry which, as at present constituted, they tend to foster; the undue opinion of themselves which they are apt to engender in the minds of the teachers; the rivalry which they excite and the jealousies which they keep up between different schools; and, above all, the pauperising influence which, more than other charity-schools, they exert on the scholars. Yet are there 750,000 children in England and Wales who have no other opportunity of gaining useful knowledge. So long indeed as scarcely any other book than the Bible is employed in Sunday-schools, the training which they afford must be very defective, unapproached in its excellence as is that holy book when well understood and rightly used. But an exclusive acquaintance with it is not sufficient to expand the mind and prepare it for the duties of life. Without the aid of other knowledge it is not possible that those distinctions and qualifications should be made which parts at least of the Sacred Scriptures require, and which are rendered necessary by the lapse of ages and the existence of a totally different order of circumstances. If these distinctions and qualifications are not made, the most erroneous conclusions may be drawn from the Bible, and the most unrighteous purposes may be in appearance made to receive a sanction from it. The Scottish Covenanters justified their murders by appealing to the severities practised by the Israelites. The German Anabaptists made use of the disinterestedness of the first Christians in sharing their property with the destitute in an emergency, in order to authorise their spoliation of the goods of others. The madman Thom, alias Courtenay, appealed to the Bible in support of his delusions. Chartism flourished most vigorously, and in its most offensive form, in cases where the Scriptures were the text-book.

Indeed on inquiry it has been found, that many who have gone through the Sunday-school have, in after-life, derived little advantage from the discipline, having forgotten the scraps of religious instruction which had been presented to their memory, and out-grown the bare mechanical ability of reading, which they had more or less imperfectly acquired, perhaps lost also, because not sufficiently impressed on the character, the moral tone and influence which is nearly the only good thing of a decided nature that Sunday-schools in general effect. In regard to the result, the ensuing quotation from the third publication of the 'Central Society of Education' may be considered as representing a large class of the scholars: 'My name is Thomas Diprose. I live at the village of Ash (Kent). I went to the Sunday-school at Mospham Church for three years. Used to learn to read and repeat the Catechism. Was not taught to write. Cannot now either read or write. Have forgotten the Catechism. I think I could read a little in the New Testament, but not in any other book.' At the same time, in some schools superior influences are kept in operation with a corresponding beneficial result, and it would be very unjust to deny that Sunday-school teachers as a class possess many excellent points of character, and are deserving of high esteem, especially in a country where the love of money is the predominant passion.

The National and the Lancasterian schools—the two great instruments of daily education for the children of the poor—are not essentially dissimilar in respect of the intellectual advantages which they offer, and they labour under the serious defects which are inseparable from what is called 'the monitorial system,' the employment of which, under existing arrangements, is rendered necessary by the number of pupils, from 100 to 1000, which are placed under one master. The best qualified teacher is unequal to such a task, if anything more is to be attempted than a sort of mechanical routine. Education does not consist in movements and evolutions, with whatever precision they may be performed. The idea of monitors in these schools is obviously taken from the army, where the commander maintains discipline throughout a large body by an extensively graduated subordination of officers; but mere precision and order are not education, nor does it consist in the communication to hundreds of the will and the directions of a head, especially when, as in the case of monitors, the teacher is only a little less ignorant, a little less self-willed, uninformed, and mechanical than the taught. In such circumstances it is impossible that there should be anything which deserves the name of mental and moral training.

Instruction in these schools is for the most part confined to reading or writing and arithmetic, with occasionally a very little geography badly taught. Indeed little intellectual improvement is found to be communicated in any way. A friendly reporter, Rev. Edward Field, thus speaks of the proficiency which he recently found in the National Schools in the diocese of Salisbury: 'Arithmetic was rather a matter of amusement than of practical utility. This was particularly the case in the girls' schools. In some of these, what was called Dr. Bell's first sum, seemed to be the alpha and omega. I could not help expressing my opinion that the attempt in many cases was a mere loss of time. If it be said that a knowledge of arithmetic is of little importance to poor children, and especially to girls, surely then time need not be wasted on it. I could not but note a deficiency generally in the schoolmistresses with regard to this branch of instruction, and not the least in those who had been trained in London.' 'Much importance is attached to writing in most schools, and yet the methods of teaching it, and the progress made, were not generally satisfactory. I did not perceive generally any attempt at science or system in teaching to write.' 'Reading may be considered the staple commodity of our national schools. The same remark as before, with regard to the monitorial system, applies here, namely, that this important branch *generally* does not flourish under that system, but that in *particular cases* great proficiency is made. One great defect in schools of this kind appeared to be, that the masters or mistresses could not or would not specially instruct the monitors or pupil teachers *how to instruct*.' 'The attempts to make the children, by any particular process of instruction, understand the matters they read and learn by wrote, were few and far between. The study of grammar was rarely if ever carried far enough to show the structure of words and sentences, and the explanatory method which has produced such excellent and admirable results in the sessional and other schools in Scotland was rarely known. Indeed the want of explanation seems to be the common great and crying defect of our national schools.' 'Works of industry are not much practised or known.' 'The list of books in use was generally small.' 'The moral and religious discipline of schools is confessedly a subject of first importance; the more important it is, the more difficulty I felt in forming conclusions upon it.' 'I met with so many instances in which the Lord's Prayer only is said, with the Apostle's Creed (the latter, I am afraid, too commonly considered and used as a prayer), that this matter requires and deserves particular attention.' 'If the monitorial system fails anywhere, here is confessedly the weak point.'

That these remarks are not less applicable to the British and Foreign Schools, is made clear by the evidence given by Mr. Wood, before the Committee on Education, 1838.

Dr. Kay stated before the Educational Committee (1838)·—'I once went with Monsieur Malac, member of the French Board of Instruction, to visit one example of each of the public schools in a large town of the North. We visited a National school, a Lancasterian, a foundation school, a private charity-school, and an infant-school; and before leaving our house in the morning, we put down two series of questions, the first part of which related to one of the parables of our Saviour, and the second to the obligation of speaking the truth, and particularly the obligation of an oath. On entering each of the schools, we requested that the parable should be read by the children, and then we put the questions (which were perfectly familiar) to the children in the class in succession, having selected the most advanced class in each school. The questions were not answered in the National school, in the Lancasterian school, in the foundation school, or in the private charity-school, but they were all answered in the infant-school.'

By general admission, the infant-schools give the best daily instruction to the children of the poor. A less inconsiderable number of the teachers receive some training for their office. A better spirit presides over their teaching and discipline. In theory they are admirable for the most part, but their actual worth is much overrated. Few persons are more competent to speak on the point than Mr. J. R. Wood, who gave his opinion before the Educational Committee to the following effect:—

'One of the defects of the present system is the assembling so many children together, and the constant appeal that is made to their emulation; it brings them out into publicity, and there are certain children who are brought prominently forward; of course, the natural disposition of the teacher would induce him to put those who are apt and quick before the others, and these frequent exhibitions to strangers visiting the school have all an injurious effect upon the mind of the child, and also an injurious effect upon the minds of other children, discouraging and disheartening them, and the great mass are generally of the latter kind. Then I consider the generality of the lessons in infant-schools are by no means sufficiently simple; there is a great deal of what is complicated; the children learn it by rote; one child sings it after the other, and thus they have no more idea of what they learn than the children in dame-schools. The number of children is also too large for efficient moral training. No valuable education can go forward without the teachers considering the intellectual development and the particular habits of the scholars, and in these large schools that is impracticable.

'The examination into a large number of infant-schools has led me to alter the favourable opinion I once held; at the same time, I see nothing that I can suggest in the place of infant-schools; I consider therefore that infant-schools are among the most valuable means we do at present possess, with all their faults, for acting upon the education of the lower classes, and one reason why infant-schools have not effected all they might have done, has arisen from the fact of there being so many persons masters and mistresses of these schools who are totally unqualified. Infant-schools became popular under the management of two or three talented individuals; infant-schools were established, and there was an immediate demand for masters and mistresses, and persons were sent for a month or six weeks to hear Mr. Wilderspin lecture, and they came away with the worst parts of the system, the noise and confusion of singing, and so on, but the really valuable points they seemed to have left out very much, consequently the infant-schools which are scattered up and down the country are not what they ought to be, and are not conducted in the way they should be. I do not conceive the system to be by any means perfect, but it is the best means I have met with or seen in operation for the education of the lower classes.'

From the preceding review of the state of popular education in England, the inference is inevitable that, in the words of Mr. Dunn, secretary to the British and Foreign School Society Educational Committee, 1838, 'it is wretchedly deficient both in quantity and quality.' To the same effect is the opinion stated in the Report of the Chester Diocesan Board (1840):—'But if the quantity of education be deficient from the want of schools, the quality of such as is given is not less disproportionate to the legitimate demand. On this point the Diocesan Board appeals with confidence to almost universal experience. How few are those schools in which the scholars are well educated according to their several degrees; in which knowledge is so imparted as to fit them for their various duties in after-life!' The Parliamentary Committee on Education (1838), after referring for particulars to the evidence taken before them, declare,—

1. That the kind of education given to the children of the working classes is lamentably deficient.
2. That it extends (bad as it is) to but a small proportion of those who ought to receive it.
3. That without some strenuous and persevering efforts be made on the part of government, the greatest evils to all classes may follow from this neglect.

The quality of the education may be partly learnt from the fitness of the teachers. All the best authorities agree in representing the existing body of teachers, with some exceptions, as almost totally disqualified. If this be the case, our existing education must be as bad in kind as it is deficient in quantity. The substance of the evidence in this matter given before the Educational Committee of 1838 was to the following effect:—The mistresses of the dame-schools are very imperfectly instructed; they have no acquaintance whatever with any correct methods of conveying religious and secular instruction; they have no idea of the proper mode of conducting the moral and industrial training of children; they resort to the business of education from necessity, and, under the pressure of adverse circumstances, are in great poverty, and very ill supplied with books and other instruments of teaching; they have often some other pursuit, such as needlework, washing, &c., and are generally of sour tempers and severe in their discipline. Of day-schools generally it is stated that the instructors are extremely unequal to the duty; that many are only half-informed themselves; that they are persons who are unable to obtain employment elsewhere, and that the worst consequences follow to the children who are placed under their instruction. The masters are generally ignorant of the depressing and unhealthy effects of the atmosphere which surrounds them, and do not consider it desirable that their schools should be better ventilated. In the poorest schools no pretence is made to teach morals, and many masters have no idea what teaching morals can possibly mean. One master, being asked if he taught morals, answered, 'That question does not belong to my school, it belongs more to girls' schools.'

It is not unusual to find the mistress of a dame-school gone out for the day, and her school left in charge of some neighbour or neighbour's child; sometimes she is found washing at the back of the house; at other times the washing and drying are carried on in the school. 'In a garret, up three pair of dark broken stairs (in Liverpool), was a common day-school, with forty children, in the compass of ten feet by nine. On a perch, forming a triangle with the corner of the room, sat a cock and two hens; under a stump-bed, immediately beneath, was a dog-kennel, in the occupation of three black terriers, whose barking, added to the noise of the children and the cackling of the fowls on the approach of a stranger, was almost deafening; there was only one small window, at which sat the master, obstructing three-fourths of the light. There are several schools in the same neighbourhood which are in the same condition, filthy in the extreme.' 'One master, who stated that he used the globes, was asked if he had both or one only. "Both," was the reply; "how could I teach geography with one?" It appeared that he thought both necessary, because one represented one half and the other the remaining half of the world. "He turned me out of his school," says the agent, "when I explained to him his error." It is thought unlucky for teachers to count their scholars. "It would," said a mistress, "be a flat flying in the face of Providence. No, no, you sha'n't catch me counting; see what a pretty mess David made of it when he counted the children of Israel."'

The masters of the day-schools were by no means sensible of their deficiency; one of them said, 'I hope the government, if they interfere, will pass a law that nobody that is not high larnt shall teach for the future; then we shall have some chance.' To the same effect is the statement of Dr. J. P. Kay, in his paper on 'The Training School at Battersea:'—'Very little inquiry confirmed what was previously suspected, that the number of English schoolmasters acquainted with the organization and discipline of elementary schools, and skilful in the application of approved methods of instruction, is exceedingly small, and by no means on the increase. Successive applications were made to those sources from which teachers are usually obtained in England, but these applications were almost invariably unsuccessful, for a variety of reasons. The attendance of the teachers trained in the model schools of the metropolitan and other societies seldom exceeds six months, and often does not extend beyond three. Experience of the motives by which the class of schoolmasters now plying their trade in this country are commonly actuated, is a graver source of want of confidence in their ability to engage in this labour than the absence of skill in their profession. A great number of them undertake these duties either because they are incapacitated by age or infirmity for any other, or because they have failed in all other attempts to procure a livelihood, or because, in the absence of well-qualified competitors, the least amount of exertion and talent enables the most indolent schoolmasters to present average claims on public confidence and support.' Insufficient how ever as most of them are for giving such an education as the children ought to receive, the teachers of the National and British and Foreign Schools are superior to the instructors of ordinary day and dame schools. On this point the Rev. Edward Field, M.A., Inspector of National Schools, reports (1840):—'I have pleasure in being able to report that many of the mistresses of united schools of girls and boys were fulfilling their arduous and important task with zeal, fidelity, and success. In a few instances I had to report that the masters seemed too young for their difficult and responsible duties. Some mistresses of infant-schools were sinking under the continued pressure upon their strength and spirits.' This guarded and qualified praise he is unable to extend to the teachers of dame-schools: 'Too often the rule of such schools, when any profitable instruction is given, is a harsh one, and in others the honest declaration of one dame would apply to many,—"It is but little they pays me, and it is but little I teaches them."' The following table will serve as an illustration of the extent to which the want of a previous training in teachers prevails, particularly among the poorer classes:—

Number of teachers of various classes of day and evening schools, and the number who have received any education for their employment in the undermentioned boroughs.

BOROUGH OF	Dame schools.			Common boys' and girls' schools.			Superior Private schools.			Evening schools.			Infant schools.			Endowed and charity schools.		
	Number of teachers.	Number educated for the employment.	Number not ascertained.	Number of teachers.	Number educated for the employment.	Number not ascertained.	Number of teachers.	Number educated for the employment.	Number not ascertained.	Number of teachers.	Number educated for the employment.	Number not ascertained.	Number of teachers.	Number educated for the employment.	Number not ascertained.	Number of teachers.	Number educated for the employment.	Number not ascertained.
Manchester	230	..	..	179	16	..	144	25	..	86	7	..	5	2	..	21	5	..
Salford .	65	10	..	42	8	..	29	14	..	28	7	..	3	..	..	13	2	..
Liverpool .	244	2	..	194	18	2	143	71	11	43	6	..	17	1	..	50	18	7
Bury .	30	2	..	17	2	..	8	6	..	6	..	..	2	..	..	4	2	..
York .	37	..	..	23	2	..	30	10	3	2	..	..	3	1	..	31	19	3
Total .	606	14	..	455	46	2	324	126	14	165	20	..	30	4	..	119	46	10

The ignorance of the adult population is also a proof of the insufficiency of the existing means for education. In the district in Wales where Frost made his outbreak, 'of the adult population a large proportion could neither read nor write; very many had only acquired the art of knowing the letters and words, and very few could read with ease to themselves and understanding.'

'Similar investigations in other parts of the district gave similar proofs of the insufficiency in the means of mental and moral culture. These received confirmation from the representations of the few booksellers who are the medium of the regular supply of such books and periodicals as may be required by the labouring portion of the community in the two parishes of Merthyr and Bedwelty, containing together 54,000 persons. Of the seven booksellers in these two parishes, two receive little or no demand from the working-classes; one has only a few second-hand books in a shop, filled chiefly with shoes; one keeps a stall in a market, to aid his sale of Welsh song-books, hymn-books, and small books for children, in which the chief part of his trade consists. The shops of the remaining three are from twelve to fifteen feet square. They all stated that they could not live by their book-trade alone. The first depended on his sale of stationary, and on the employment he obtained as secretary to several benefit societies; he said he could not pay his small rent by the sale of Welsh or other books; he was agent for three Welsh newspapers, of which he distributed, on the whole, 72 copies monthly; he also sold 62 copies weekly of English newspapers, printed in Welsh towns, and circulating chiefly in Wales. The last monthly invoice of the second contained orders on his London agent for 22 small religious periodicals, eight copies of 'Chambers's Journal,' one 'New Monthly,' one 'Monthly Chronicle,' one 'Medical Gazette,' two 'Mechanics,' eight 'Penny' and four Saturday' Magazines; his general orders and retail trade amounted to about 10*l.* per month. The invoice of the third for January consisted of orders for 20 small religious periodicals, 33 periodicals and small books for children, and 36 periodicals of general literature; among which the most important were, one 'Chambers's Edinburgh Journal,' four 'Taits,' one 'Mechanics,' and ten 'Penny Magazines.' There was also an order for one part of the 'Pictorial History of England.' The value of the whole, at the publishing price, including general orders, was 5*l.* 6*s.* 8*d.* These two parishes being situated in the heart of the hill district, and distant several miles from any town beyond its limits, the regular demand for books and periodicals on general subjects among the labouring population is not unfairly represented by the preceding statement.' (Tremenheere's *Report.*)

From Reports made by the Rev. John Clay, chaplain of the house of correction at Preston, it appears that of 349 men charged with felony in 1835 and 1836, 150, or 43 per cent., were altogether unable to read; 82, or 23 per cent., were barely able to read, so that two-thirds, or 66 per cent., might be considered wholly uneducated. Of 78 women, 33, or 42 per cent., were unable to read; 28, or 36 per cent., could barely read, and only 5, or 6½ per cent., could read well; four could write their names, two others could write a little, and two only could write well. His Report for 1836-7 comprehends the cases of 935 individuals charged with various offences: of these, 460 were unable to read, 212 were barely capable of reading, and not more than 18 could read and write well. The amount of religious knowledge possessed by these prisoners is very small: 466 were quite ignorant of the simplest religious truths; 821 could repeat the Lord's Prayer, but were obviously incapable of understanding its import; 12 only had any acquaintance with the principles of religion.

The ignorance does not arise from want of resources, but from the habit on the part of the workmen of devoting their earnings to objects of immediate and sensual enjoyment. The following is given as exhibiting a fair specimen of the mode in which high wages are appropriated:—

Expenditure of two steady workmen, living in their own cottages, each with a wife and four children, the eldest in both cases thirteen years of age, and helping the father:—

Collier, per Month:

	£	s.	d.
3 bushels flour, 13*s*, 6*d*. .	2	0	6
8lbs. butter, 1*s*. . . .	0	8	0
8lbs. sugar, 8*d*. . . .	0	5	4
7½oz. tea, at 6*d*. . . .	0	3	9
½lb. tobacco	0	2	8
6lbs. soap, 7*d*. . . .	0	3	6
10lbs. cheese, 7½*d*. . .	0	6	3
8lbs. bacon, 8*d*. . . .	0	5	4
1lb. candles for house . .	0	0	7
8lbs. do. for labour, 7*d*. .	0	4	8
12lbs. powder for do. . .	0	6	6
Potatoes	0	6	0
20lbs. fresh meat, 7*d*. . .	0	11	8
½lb. currants	0	0	5
Raisins	0	0	3
Blue, starch, pepper, &c. .	0	0	10
Clothes and shoes, about .	0	16	0
Beer	0	6	0
	£6	8	3

Furnace-man, per Month:

	£	s.	d.
3 bushels flour . . .	2	0	6
3 pecks malt . . .	0	9	4½
12lbs. butter . . .	0	12	0
10lbs. sugar	0	6	8
½lb. tea	0	4	6
4lbs. soap	0	2	4
6lbs. cheese	0	3	9
12lbs. ham	0	8	0
1lb candles	0	0	7
24lbs. fresh meat . .	0	14	0
½lb. raisins	0	0	3½
½lb. currants . . .	0	0	5
Pepper, mustard, &c. .	0	0	10
½lb. tobacco	0	2	8
Clothing, shoes, &c. . .	0	18	0
	£6	3	11

The following is taken from 'The Thirty-Fifth Report (1840) of the British and Foreign School Society:'—

'Your committee cannot conclude this brief sketch of their domestic operations, without adverting again to the evidence of the extent of popular ignorance still prevailing in England. The following statements, drawn from official sources, need no comment:—

'In the three months of July, August, and September, 1838, there were 27,670 couples married in England and Wales, whose marriages were duly registered, and copies of the registers transmitted to the General Register Office.

'Of these, the number who did not write their names, but signed with a mark, was—men, 8733; women, 13,624.

'The proportion per cent. of those who signed with a mark in the whole of England and Wales, in the metropolis, in North Wales, and in South Wales, together with Herefordshire and Monmouthshire, is as follows:—

	Men.	Women.	Mean.
'England and Wales . . .	32	48	40
Metropolis	11	25	18
North Wales	39	70	54·5
South Wales, including Hereford and Monmouth.	46	56	51

'At the Marlborough sessions of October last, out of

107 prisoners put on trial, 44 could neither read nor write, and 38 were under twenty years of age.

'At the Salford October sessions there were 127 prisoners charged in the calendar with felony. Of this number 53 could neither read nor write; 35 could read imperfectly; 34 could read well, and write imperfectly; and only 3 could read and write well. There were also 22 charged with misdemeanors, of whom 8 could neither read nor write, 7 could read imperfectly, and only 1 could read and write well.

'In the house of correction at Lewes, of 846 prisoners, 48 only could read and write well; 252 could read and write a little; only 8 had any idea of Christian doctrine; 294 knew nothing of our Saviour; 490 had heard of him, but knew little more than his name; 54 knew something of his history.'

Dr. J. P. Kay stated before the Education Committee, in 1838:—'I have been very strongly impressed indeed with the extreme ignorance of the poorer classes in the large towns and in the agricultural districts, especially of the south of England; and being desirous to obtain minute information on that subject, I transmitted to the masters of workhouses in Norfolk and Suffolk a circular, requesting them to give me an account of the number of adult paupers in their respective workhouses who could read in a superior manner, decently, or imperfectly, and the number who could write in a superior manner, decently, or imperfectly, for each of the respective class of paupers. I am able to present the committee with the results of that investigation:'—

Return respecting the paupers above the age of 16 *in the workhouses of the Norfolk and Suffolk Unions and Incorporations, on the* 12*th day of June*, 1837.

Description of pauper.	Number of paupers of each class now in the workhouse.	Number of these paupers who can read			Number of these paupers who can write			Number of those paupers who can neither read nor write.	Number of each class who had been in a workhouse previously to the formation of the Union.
		In a superior manner.	Decently.	Im-perfectly.	In a superior manner.	Decently.	Im-perfectly.		
Men:									
Able-bodied . .	123	2	36	10	1	14	7	68	36
Temporarily disabled .	50	5	14	4	2	11	7	24	28
Old and infirm . .	513	12	112	58	3	69	37	307	329
Women:									
Able-bodied . . .	355	18	95	75	3	18	27	153	167
Temporarily disabled .	69	5	16	13	1	1	11	34	47
Old and infirm . .	349	4	53	40	0	18	16	232	243
Total . . .	1459	46	326	200	10	131	105	818	850
			572			246			

The officiating clergyman in the parish of Haxey, in Lincolnshire, ascertained from the parish register that of each 100 persons married between 1754 and 1838, 53 were unable to write their names. During this period there had been solemnised 1008 marriages, and out of the 2016 individuals united, 933 could sign their names, 1083 could not. If from these 983 there are deducted the names of the gentry, professional men, and shopkeepers, there remain not more than one-third of the peasantry in a condition to give so simple a proof of education as signing their names.

The deficiency which has existed in the school-education of the poor is now found to exert an injurious influence on even the most popularly constituted of the mechanics' institutions. For want of good early training, the young men for whom these establishments are designed, are indisposed and unable to derive from them all the advantages which they are fitted to convey. Such of the opportunities of improvement which they offer, as require little effort of mind and little attention, those which appeal chiefly to the senses, and afford immediate pleasure—lectures on certain subjects, music, tea-parties, recitations, &c., are sought after, while little attention comparatively is given to the studies which the classes are intended to carry on in grammar, arithmetic, mathematics, and science generally. As might be expected under these circumstances, the support given to these institutions is fluctuating and uncertain. At the commencement of each quarter there is a rush of subscribers; the librarian is oppressed with applications for books, the classes fill, the supply of newspapers is deficient. Scarcely a month passes when there is 'room and range enough,' especially in the class-room. In addition to this, each quarter nearly two-thirds are new members. Many of those who leave return after an absence of three or six months; but very few remain long connected with the institutions. In the library, works of fiction are chiefly in demand; even poetry is little in request, and scientific books generally remain quietly on the shelves.

The true *Theory of Education* can only be developed by considering what the being is on whom it is designed to operate. Education is, according to its etymology, the leading out or unfolding of the human powers. It is obviously therefore a means for a certain purpose. To learn what that purpose is we must refer to experience, and we must investigate the capacities of the human being. These being ascertained, it follows that education is, in any particular case, an instrument for developing them. Now we know that man has not only physical and intellectual, but also moral and spiritual faculties, all of which education ought to take under its care. That education is incomplete which neglects any one of these faculties; and that education discharges its functions imperfectly which does not cultivate the faculties in such degree that their action may be well adjusted, and their general working be harmonious. But if there appear to be any one of the faculties apart from whose influence the rest work indifferently or produce baneful results, and which is found when in healthful vigour to strengthen, refine, and control the whole nature, this power ought to receive primary and chief attention. The work then of education is to foster, strengthen, and raise the physical, intellectual, moral, and spiritual capabilities of man. Some important deductions flow from these principles. Education ought to be universal both in relation to each individual and the community at large; for it ought to be co-extensive with the capabilities on which it is intended to act. It is contrary to the constitution of man and to the designs of God for any one of our capacities to remain undeveloped. They err who neglect to educate the body, and they also who neglect to educate the mind. These errors represent two different classes of men. A certain school of philosophy at least makes light of religious education; physical education has been lamentably neglected by the recognised teachers of religion. The latter error is now disappearing, but the former has been gaining ground; and this error is the more to be deplored because its consequences must be serious and lasting. If any one, certainly the religious faculty may be considered as the moving-power of the human being. Religion indeed rightly understood is the central science, round which all other branches of knowledge and all other pure influences are grouped, towards which they gravitate, and from which they receive their light, their heat, and their highest value. But for the peculiar political circumstances of England, any system of popular education which omitted direct religious culture would probably have been considered by thinking men as defective. The difficulties which stand in the way of an adjustment of conflicting claims may be numerous and great, and they may account for the diffusion of the mistake in question; but no difficulties can excuse, much less justify, a departure from truth. Principles must be steadily asserted under adverse as well as favourable circumstances, and the result will at last prove far more satisfactory than anything which can ensue from expediency. Religion in education is all-important and indispensable, nor must the friends of a progressive civilization be deterred from proclaiming the fact by any apprehension that it may in some respects be turned to a bad account.

There is in truth no other way than that which is afforded by a religious training for forming such a character as the trials and duties of life require both among the rich and the poor. The mere communication of knowledge, and even habits of reflection and inquiry, can do very little towards real happiness. What the people want is true wisdom and moral power, without which life is a scene of conflict and misery; but wisdom and moral power are the peculiar gifts of religion.

Morality therefore should be taught in the schools in connection with the sanctions of religion. Apart from religious influence morality may direct but cannot control. Morality may enlighten and it may enjoin, but of itself it is powerless to govern; it is preceptive, not impulsive, pointing out our path, but not urging us on to pursue it. Now it is power rather than knowledge that man wants; and all genuine power for moral purposes has its source in religion. It may be well to remember that these distinctions of morality and religion are factitious and arbitrary; they are not recognised in the records of the Christian revelation; they find no authority in the human mind. Religion includes morality, or rather, is morality as well as religion, comprising in itself whatever is necessary for man to know, do, and be, whether in this state or the next, in order to fulfil the divine will, to perfect his character, and work out his highest good. Consequently, he that is well trained in the knowledge and practice of the Christian religion has received both a moral and a religious education, and is fitly prepared for the duties of life.

From this it will be seen that the religious education here demanded is not of a dogmatical, much less a sectarian kind; but such instruction as may enlighten the mind of the child and the adult as to their capacities, their duties, and their hopes; and such a discipline as may work the instruction into the character till it 'leaven the whole lump.'

It is not a little curious that in regard to education we may take a lesson from the antient Persians,* who, according to Xenophon, removing education from the hands of the parents into the hands of the state, gave the same attention to the moral training of the young as is now under the best circumstances given to their intellectual instruction, and so brought them up under the influence of precept and example, that the state was saved from the painful necessity of inflicting punishment, in consequence of having taken such preventive measures as relieved the youth from the desire of what is low and unjust. Morals with them were a practical science, the principles of which were first taught by word of mouth, and then by actual examples and by daily practice.

The morals taught in primary schools should have a regard to personal, domestic, and social duties, or the obligations which an individual owes to his family and to the state. The instruction should consist not of a mere dry detail of precepts, but should appeal to the reason and affections, that it may both develop them and gain such a reception in the breast of the scholar as to become the living power which governs his conduct. It is strange that a subject such as moral instruction and training, which is of paramount importance, should hitherto have been almost neglected in the education of the children of the poor. Nor is it much less strange that the nation should have passed through dangers and difficulties of no insignificant kind within the last half-century, suffering so little from outbreaks on the part of a population who had never been instructed in their social duties.

The preceding remarks lead also to the conclusion that the culture which ensues from education is in itself an end, if indeed it is not the primary and great end of education. The husbandman sows the seed in order to produce grain; the educator disciplines the faculties that he may bring them into vigorous, healthful, and pleasureable activity. In both cases there is an adequate end, a result in which the agents may satisfactorily rest. Education can have no higher object than the creation of happiness by means of the formation of character. This is the great object of the Deity himself; and if even the power which education gives is regarded as an instrument, as a means to some outward result, still the pursuit of mental and moral culture as a good in itself, can have no other than a beneficial result. It is important therefore that the purposes for which education is sought should be placed and kept in their proper rank. That which is secondary must not, however good, be thrust into the first place; and above all that must not be altogether lost sight of, which in reality is in itself a most important result, if not the great end of education. The formation of character then, to make (so to speak) true men and women, beings with their faculties complete, and, in consequence, with all their internal sources of happiness, entire, full, and active—this should be an object carefully studied and diligently pursued by the educator. But here even superior minds halt behind the truth, making the chief object of education some extrinsic result—such as, in the case of males, fitness for the duties of their station in life; in the case of females, such as may prepare them to be pleasing wives and useful mothers—aims excellent in themselves, but scarcely entitled to hold the first rank, if for no other reason than this, that an outward accomplishment does not of necessity imply such an inward culture as will ensure health and vigour of character, and that durable and growing happiness which attends on genuine personal excellence.

The real nature of education considered as an instrument may also be gathered from these remarks. If the subject on which education operates is mental and moral in its character, and the effects which it labours to produce and the aims which it ought to pursue, also mental and moral, the instrument must be of a similar kind. Setting aside then so much of it as is designed for a physical result, education is a mental and a moral influence; in other words, it is mind acting on mind; it is a superior acting on an inferior character; it is human thought and human sympathies brought to bear on kindred elements in the bosoms of the young; it is the power of religion living and breathing in one soul, going forth into another, and kindling within that other corresponding vitality. Whence it is obvious that much of what is called education does not deserve the name; that a mechanical routine is not education, nor dexterity of hand, nor skill in shaping certain forms, nor the utterance of articulate sounds. If so, then reading, writing, and arithmetic, how well soever they may be taught, ought not to be dignified with the name, though they may in favourable circumstances contribute something to education. It is equally clear that no genuine education can be imparted by one educator to large numbers of pupils of different ages and different capacities assembled together in the same place. Little can be done except each scholar comes into immediate contact with the educating mind. From that mind each pupil must draw the power which will quicken and call forth his own powers; and to determine how, in the case of the education of the children of the poor, this communication is to be secured, ought to be an object of paramount importance.

The tenor of these observations has determined another thing, namely, what ought to be the prevailing spirit and what the discipline of a school. School in reality holds the place of home; home is God's school, but since present modes of life do not permit the parent to give his child a suitable training, he transfers education to the school. The school therefore should approximate as closely as possible to the home. Now in theory the homes of this land are Christian homes; the school in consequence should be a sort of Christian home. Such a union of terms calls up in the mind ideas of gentleness, forbearance, and affection. These then are the moral qualities which ought to prevail in the school. If so, severity and harshness must be banished as incompatible with the objects for which schools are instituted. Nor are they only incompatible, but they are actually preventive and subversive of those objects. The display of every moral quality produces its like in those who habitually witness it; and unless the aim in school-training is to produce a severe, harsh, and unloving character, severity and harshness must be studiously avoided.

So also the intellectual influence employed should be such as is likely to call out and strengthen the mental powers. The chief good of education is not to be looked for in outward results, nor even in the amount of knowledge communicated, but rather in such habits of mind,—

---

* Not that we suppose Xenophon represents a real state of society; but the opinions are just as valuable as if he did.

power to fix the thoughts on any given object, to comprehend many particulars at one view, to resolve a complex subject into its component elements, to endure lengthened exertion, to carry determinations into practice, to find resources for thinking and for happiness within—as may fit a young person for discharging his duty under all circumstances. Mere instruction therefore is not education, but simply an instrument of education. The aim should be so to inform the mind, as by the very act of informing to develop and strengthen its powers. The instruction then that deadens the appetite for knowledge and overloads the powers is not education, but something foreign to its nature.

There are two modes, corresponding with two processes, by which the mind carries on its own education, namely, synthesis and analysis, which should be studied and employed by the educator as his great instruments. By synthesis he will, both orally and by means of manuals, offer knowledge to the mind in a simple, attractive, yet systematic form, rising by degrees from the more to the less easy, and from the simple to the complex. By analysis he will lead the child to decompose the matter of instruction which he has received, to trace out the relations of the several portions to one or more elementary principles, their connections with other branches of knowledge, and the more obvious deductions which may be made from them. Thus will he at once ascertain that he has succeeded in communicating his lessons to the pupil, and in making those lessons themselves prolific in additional information.

In the employment of these instruments the educator must be careful to follow nature in her order of unfolding the faculties; he must address those first which appear first, and he must carefully abstain from anything calculated to force any natural power into premature activity, or to overwork any faculty when it has come forth. Now the sight, the hearing, and the touch are the gifts of nature which are earliest developed. The power of reflection comes at a later period, and only as a result of the operation and influence of the senses. The mind of a child is an empty storehouse; the eye, the ear, and the touch are the portals through which this storehouse is supplied with matter, which, received and laid up, is afterwards operated upon by the mind, pursuant to its own laws. If then the senses are the first of our faculties which are fit for use, the senses should receive the earliest attention of the educator. A child can immediately observe; therefore the power of observation should be first cultivated. It is important that all the senses should receive cultivation, not merely for the information of which they may be made the vehicle, but also with a view to that training which is first among the purposes of education; but the eye may take some precedence, as the sense of sight comes first in the order of natural sensibility. At a very early period the educator should begin to teach his scholar how to use his eyes and other senses, both by words and by examples; and as the other faculties are found to expand themselves, so should they be from the first taken under his fostering care, that by exercise he may bring them to act harmoniously and efficiently.

It is however necessary that education should be also regarded as a means to some outward result, and here at once the social distinctions of life present themselves to our attention and modify our views. It is obvious that a child should learn that which will best prepare him for the labours, the trials, and the duties through which he will have to pass. In other words, the children of the poor ought to be taught what most concerns them to know, what they will have immediately to do, and what, other things remaining the same, will prove the most fruitful source of happiness. At the same time, the primary object of education,—the formation of character,—should also be kept in view; and the discipline through which a child ought to be conducted and the subjects of knowledge to be placed before him, must be determined by a joint reference to his capacities and his probable future station in life.

Now in treating of the mere external parts of education, health of the body is the first thing that demands our attention. The body is the instrument by which the mind executes its purposes, and by which therefore much of the good which education does, makes itself felt. It would consequently seem to be of the first importance that this instrument should be kept in the highest state of efficiency. But this is an end which cannot be attained if men are brought up in total ignorance of the structure of their bodies and of the laws of health. From the first therefore children should be habitually taught to know the conditions on which health depends; such as relate to the state of their dwellings, the condition of their persons as to cleanliness and other matters of the like kind, of which not only the labouring classes, but many others are extremely ignorant. Yet knowledge of this kind possesses no place hitherto even among the plans which have been propounded for improving popular education. There is no peculiar difficulty in communicating the requisite knowledge, and on the part of the young the reception of it would be easy and pleasant. If we measure knowledge by its real usefulness, that is, its power to promote happiness, what comparison is there between this information and a knowledge of geography, history, or other things of the kind? A man may be ignorant of all these matters, and yet live a virtuous, happy, and long life, but he cannot with impunity remain ignorant of the laws of health. The most absurd and the most injurious prejudices prevail on this point among the people; and in general they imagine that sickness, disease, and death depend on causes altogether beyond their reach, on luck or chance, and that they have no other resource than passive submission.

It is also by means of the body that the children of the poor will have to get their bread. They should be taught to know this as a fact, as a simple piece of information, which involves neither merit nor demerit, neither honour nor dishonour. For such exercises of the body as they are likely to be called to, they ought from an early period to be prepared while at school by an industrial training.

This remark comprises much more than a demand of bodily labour from the young. It involves such a course of instruction as may best prepare them for their future occupations. There is no pursuit in life—not even that which is most mechanical—which does not depend on, or is not connected with certain principles; for all manual labour is only the carrying out and realization of results for which science has prepared the way. It is equally certain that there is no labour which may not be lightened or relieved by knowledge. A good education therefore would make the labourer acquainted with the facts and principles on which his art is built; and thus enable him to enjoy the rational and sustaining pleasure of working understandingly, with a view to a given result, and labouring therefore in a manner fitted to improve his character as a man as well as his efficiency as a workman.

But no improvement can be expected in popular education until a better race of teachers is provided. Great as is the deficiency of schools, yet if they were filled with competent instructors, the chief evil would be remedied.

In the houses too of the working classes, particularly in the manufacturing districts, a change is most desirable. Whatever time may be occupied in school duties, there are many hours which a child spends during which the educator has no influence over him; and these are the very times which the young are most susceptible of impressions; when the moral and intellectual capacities open to surrounding influences, and receive them readily and retain the impression deeply. In the actual state of things then, the real educators of the young are their parents, their brothers and sisters, their playmates, their casual companions—in one word, their home. And what must that home be for moral or for intellectual instruction, from which the mother is absent the greater part of her time, being occupied in the factory from five in the morning till six or seven at night? Another mother is indeed at home (a rare case), but she has from her girlhood up to her motherhood been trained in a factory, and knows scarcely anything of good housewifery, and still less of the moral obligations under which she stands to her children. The children themselves also are sent to the factory to work long before they could under any system have received a proper training. But they soon earn enough to make them feel independent of their parents, who, having perhaps for years derived the chief means of supporting the family from the earnings of three or four elder children, have become idle, lost their character, and have now to struggle with these elder children for the maintenance of their own authority, instead of being, at the most critical period of their lives, their guides and friends.

No small part of these evils results from the employment of females in mills and factories; nor can they be effectually removed by any other means than an act of the legislature, which should prohibit such an occupation to females altogether, or at least to the mothers of families. Great would be the change effected in hundreds of families which are supported by factory labour if such a law were to pass, and if it were accompanied by an efficient system of education for females of the working classes. In the ordinary state of society all that should be peculiar in a female's education would be left to her mother. But among a large part of the manufacturing classes there are not mothers who could give anything approaching to the requisite education. There is then no other resource but the school. It is altogether impossible that the labouring classes, at least of the manufacturing districts, can ever be happy until a new and improved race of mothers appears. In addition therefore to the educational requisites already mentioned, it is necessary that there should be a sufficient number of girls' schools in which the ordinary arts of domestic life—baking, brewing, cooking, sewing, knitting, making and mending, should be taught; in which the children should be trained to personal neatness and propriety; to command their temper, to regulate their passions, to know and feel the importance of their actual and their coming duties. And since it is obvious that the mind of a child cannot understand many of the duties of women, there should be institutions to receive the children when they leave the school, institutions so ordered that their hours and discipline may be suited to young women engaged in and destined for manual labour; and presided over by matrons whose character would be a guarantee that all would be done to instruct and train their scholars for their future duties, whether as domestic servants or mothers of labourers' families. This matter is of vital interest to the working man, and therefore to the country, for it matters little what the labourer's earnings are, what his own intelligence is, if he has not a thrifty, kind-hearted, sensible, and industrious wife.

Among the changes desirable on the part of the parents is the existence of a disposition to provide out of their own resources suitable means for the education of their children. That it is their duty to make this provision when they have the power is unquestionable; and although it is too much to expect at the present, yet something may be done towards it, and the complete fulfilment of the claim may be looked to as an ultimate end. There is nothing but their own exertions which can bring to the labouring classes all the good which education can convey. The charity of education, like charity of every kind, tends to pauperise those whom it aims to benefit: and so long as the education of the poor depends on the efforts of rival and conflicting parties in religion or in politics, it is impossible that the power thus gained should not be used in order to further the opinions and interests of the several factions. In the meantime the people are regarded and treated as instruments for a purpose, and their education is shaped and varied not by a regard to what is absolutely best, but to what is conducive to the ends of the party which directs it. It is true that some good has resulted from the efforts of individuals and societies by which such education as the poor have received has been conducted during a century. It is equally true that these voluntary exertions have in many cases sprung from pure and enlarged benevolence. Still they could not under the circumstances fail to be accompanied by a large amount of sectarian and party feeling. At the present hour this is peculiarly the case. The church is arrayed against dissent, dissent is arrayed against the church, in competition for the largest share in the education of the children of the poor; and the rivalry is in greater or less activity through every city and village of the kingdom.

The magnitude of the evil and of the interests which are at stake seem to demand the intervention of the government by means of a general catholic and truly national education. But the conflict of parties gives little reason to expect this at present. Still the government is doing something; but the remedial measures employed cannot overtake the disorder. Perhaps after all, the end to be aimed at is, that the people should seriously take the education of their children into their own hands, or entrust it to proper persons of their own choice. This end may be facilitated by that love of independence which has hitherto been a marked feature in the character of Englishmen, who do not like either a government or individuals to be obtruding on their private concerns.

Nor are the pecuniary means of the poor altogether insufficient for this important object. Exceptions at present must be made for large classes of workmen, but in general there are comparatively few families in which, with a wise economy, something could not be spared for education. If however the principle of association could be brought into operation in connection with education, the difficulties would be much diminished. Already there are self-supporting dispensaries—hospitals for the body, why not self-supporting nurseries for the mind? As it is, the poor now pay in the large towns (see table, p. 41) nearly the same sum of money for a bad education for half the children, which under proper arrangements would secure an excellent education for all their children. Let us suppose popular schools to be established, each containing one hundred children; and that each family supplies two scholars. Fifty families would constitute a school-union. The several unions in each neighbourhood might be formed into a district-union, the district-unions formed into county-unions; the county-unions into one grand national-union. Let sixpence a week be, by the laws of the union, paid for each child, and an income is secured for each school of 130*l.* per annum. For the guaranteed salary of 130*l.* a year, a competent master would in time be obtained, who should be required to procure an assistant. School-rooms and school apparatus might be supplied by the state either as a gift or by loans. Then there are the rooms in which Sunday-schools are taught, the greater part of which are left unoccupied during 160 hours out of 168 of which every week consists. With the aids that would present themselves, the people in the larger towns at least could, without serious difficulty, provide school-rooms for themselves in time, if they did little more to repay loans than lay up the savings which would ensue from their making use in each district of their own school-room in which to transact the business of their existing clubs and unions, instead of resorting, as they now generally do, to the public-house, where all have to pay a rent, not the less exorbitant for being mostly indirect, and where many barter away their resources and their character for present gratification, to be followed by future pain to themselves and their families.

One sign of the interest which the people are beginning to take in the education of their children appears in the proposal which has lately been made, and partly indeed responded to, in an excellent pamphlet by Lovett and Collins, 'written in Warwick Gaol,' entitled 'Chartism, a new organization of the people, embracing a plan for the education and improvement of the people politically and socially.' The main objects of this publication are thus set forth:—

'To erect public halls or schools for the people throughout the kingdom, upon the most approved principles, and in such districts as may be necessary. Such halls to be used during the day as infant, preparatory, and day schools, in which the children shall be educated on the most approved plans the association can devise; embracing physical, mental, moral, and political instruction; and used of an evening for public lectures on physical, moral, and political science; for readings, discussions, musical entertainments, dancing, and such other healthful and rational recreations as may serve to instruct and cheer the industrious classes after their hours of toil, and prevent the formation of vicious or intoxicating habits. Such halls to have two commodious playgrounds, and where practicable a pleasure-garden attached to each; apartments for the teachers, rooms for hot and cold baths, for a small museum, a laboratory and general workshop, where the children may be taught experiments in science, as well as the first principles of the most useful trades.

'To establish in such towns or districts as may be found necessary, normal or teachers' schools, for the purpose of instructing schoolmasters and mistresses in the most approved systems of physical, mental, moral, and political training.

'To establish, on the most approved system, such agricultural and industrial schools as may be required for the education and support of the orphan children of the association, and for instructing them in some useful trade or occupation. To establish circulating libraries, from a hundred to two hundred volumes each, containing the most useful works on politics, morals, the sciences, history, and such instructive and entertaining works as may be generally approved of. Such libraries to vary as much as possible from each other, and to be sent in rotation from one town or village in the district to another; there to be placed in the hands of a responsible person, to be lent out according to the rules, and after a stated time forwarded to the next district.

'To print, from time to time, such tracts and pamphlets as the association may consider necessary for promoting its objects, and when its organization is complete, to publish a monthly or quarterly national periodical.

'To offer premiums, whenever it may be considered adviseable, for the best essays on the instruction of children; for the best description of school-books for infants, juveniles, and adults; or for any other object promotive of the social and political welfare of the people.

'To appoint as many missionaries as may be deemed necessary to visit the different districts of the kingdom, for the purpose of explaining the views of the association, for promoting its efficient organization, for lecturing on its different objects, for visiting the different schools when erected, and otherwise seeing that the intentions of the general body are carried into effect in the several localities, according to the instructions they may receive from the general board.

'To devise, from time to time, the best means by which the members in their several localities may collect subscriptions and donations in aid of the above objects, may manage the superintendence of the halls and schools of their respective districts, may have due control over all the affairs of the association, and share in all its advantages, without incurring personal risk, or violating the laws of the country.'

In order to effect these important purposes, it is proposed that a national association should be formed, and on the supposition that as many persons would join it as signed 'the national petition,' namely, one million two hundred and eighty-three thousand, each subscribing a penny per week, or one shilling a quarter, an annual sum would be produced of two hundred and fifty-six thousand six hundred pounds. This amount would enable the association to effect every year the following important objects:—

To erect eighty halls, or normal or industrial schools, at 3000*l.* each . . .	£240,000
To establish seven hundred and ten circulating libraries at 20*l.* each . . .	14,200
To employ four missionaries at 200*l.* per annum	800
To circulate twenty thousand tracts per week, at 15*s.* per thousand . . .	780
For printing, postages, and salaries . .	700
	256,480
Leaving for incidental expenses .	120
	256,600

The plan, though somewhat immature in its details, is presented in such a manner as to show that it is not a hopeless thing to expect that the working classes will make provision for the education of their children, and it proves that by very small individual efforts they can effect objects of the greatest importance.

In giving a brief notice of what has recently been done for the improvement of education in England, the efforts of government claim chief attention. These efforts have proceeded on the principle of stimulating and expanding the agencies which are already in existence, rather than of supplying the means for establishing a general and uniform system of education, under the control of the state. For several years past, grants of 20,000*l.* per annum have been made by parliament, and distributed chiefly through the National and the Lancasterian schools, in furtherance of education. The following are the chief regulations made by the 'Committee of Council on Education,' as given in a document ordered by the House of Commons to be printed, Oct., 1840. The sum to be disbursed was 30,000*l.* Every application for a grant is to be made in the form of a memorial, addressed 'To the Right Honourable the Lords of the Committee of Council on Education.' The right of inspection will be required by the Committee in all cases: an arrangement has been made by which the Established Church, through its spiritual head, the archbishop of Canterbury, concurs with this regulation: the inspectors will not interfere with the religious instruction, or discipline, or management of the school, it being their object to collect facts and information, and to report the result to the Committee in council. Before any application for aid is entertained, the Committee require to be satisfied, by reference either to the Inspectors or to the National or British and Foreign School Society, that the case is deserving of assistance, that there are no charitable or other funds or endowments which might supersede the necessity of a grant, that the site of the school-house has been obtained with a good legal tenure, and that, by conveyance to trustees, it has been duly secured for the education of the children of the poor; that it is reasonable to expect that the school will be efficiently and permanently supported. In the buildings not less than six square feet are to be provided for each child. Recipients of grants must bind themselves to submit to an audit of their building account, and to furnish reports of their schools. For every 10*s.* to be granted by the Committee, the means of educating one child at least must be provided. If any school is not in connection with either of the Societies before named, the Committee will not entertain the case, unless some special circumstances are exhibited 'to induce their lordships to treat the case as special.'

The aid of the State is thus confined, so far as it concerns pecuniary means, to giving assistance in building new school-houses; but, indirectly, other important advantages will ensue from it. The inspectors are instructed in the case of schools which they are invited to visit, to offer advice for their improvement; to give encouragement to no plan of education in which intellectual instruction is not subordinate to the regulation of the thoughts and habits of the children by the doctrines and precepts of revealed religion. 'The reports of the inspectors are intended to convey such further information respecting the state of elementary education in Great Britain as to enable parliament to determine in what mode the sums voted for the education of the poorer classes can be most usefully applied. With this view, reports are to be made on the state of particular districts, and how far the interference of government or of parliament can be beneficially exerted by providing additional means of education.' 'Acting on the principle of assisting local exertions, the Committee of Council have prepared (and published) a series of plans of school-houses, in which are exhibited those improvements which are suggested by an extensive comparison of the results of experience,' accompanied by 'specifications, working drawings, and estimates, as well as forms for making contracts with builders, &c.'

The aid thus given by the State has produced beneficial results. The grants made by the Committee of Council since 1839, amounting to 56,000*l.*, have been expended in the erection of schoolrooms, the outlay for building which amounts to nearly 190,000*l.*, the surplus beyond the grant having been supplied by private benevolence. By these means school accommodation has been acquired for 300,000 children. The government inspectors have been welcomed in every county into which they have been sent. In England, besides the schools which have been aided by public grants within these two years, 380 schools have recently invited inspection.

The National Society has of late assumed a degree of vigorous activity which promises to lead both to the extension and to the improvement of elementary education. The chief instrument to effect these purposes has been the establishment of Diocesan Boards, whose object in each case 'is to awaken a disposition in the rich to impart bountifully, and in the poor to receive gratefully, the means of education; to impress on wealthier places the duty of assisting others; and to provide that the instruction given shall be of a proper kind, and shall include an elementary knowledge of all the principles necessary to prepare the young as well for time as for eternity.' An inspector for the diocese of Salisbury, and one also for the diocese of Chester, have been appointed; several other dioceses 'desire to participate in the advantages of this measure.' Training-schools have been established in some dioceses, and others are preparing to establish them. The Diocesan Boards give attention to educational statistics. Some of them appropriate a part of their funds to the erection of school-houses; others assist in increasing the salaries of teachers and improving the routine of schools. Extending their care beyond the labouring classes, the Diocesan Boards intend to establish schools ('Middle Schools') for the children of the commercial and middle classes, and have already made some progress.

Something has been effected for the improvement of the system of mutual instruction which is universally employed in the Bell and Lancasterian schools, by the introduction, in a few instances, of the educational improvements commenced by John Wood, Esq., and detailed in his 'Account of the Edinburgh Sessional School,' the great merit of which consists in the tendency they have to make the processes of instruction an intellectual discipline, as well as a pleasurable occupation, by means of judicious methods of tuition and suitable moral influences. A more recent improvement, and one more fitted for large numbers, is found in what is termed the 'mixed method,' a method which combines simultaneous instruction on the part of the master with the mutual instruction conducted under his supervision by the scholars themselves; and in some instances efforts are made by means of instruction given out of school-hours to the better pupils, to train up a less insufficient class of assistants.

The most important results may be anticipated from the enlightened spirit with which Dr. J. P. Kay, secretary to the Committee of Council on Education, presides, under the direction of that council, over the changes that are in progress. Among his many efforts, those which he has made to provide a suitable education for the pauper children of the country, amounting in number to 56,835 under sixteen years of age, are of great moment, not only for the direct good which they will effect for a neglected class, but also for the impulse which the improvement of such a class must give to education in general. Most valuable information as to what is being done, as well as to what is needed, is contained in 'Report to the Secretary of State for the Home Department, on the Training of Pauper Children,' 1841. The volume comprehends a full account of what has been accomplished, and of what is attempted in the Training School at Battersea near London, established and for the most part hitherto supported by Dr. Kay and Mr. Tuffnell. The work should be in the hands of every friend of popular education, as presenting the results of inquiries made in the best popular schools on the Continent, and particularly

Daily Routine.

		Monday.	*Tuesday.*	*Wednesday.*	*Thursday.*	*Friday.*	*Saturday.*
½ past 5 .	Rise, wash, dress, and make beds.						
¼ to 6 . .	Household work, viz. scouring and sweeping floors, cleaning grates, shoes, knives, &c., pumping water, and preparing vegetables.						
¼ to 7 . .	March into garden, and commence garden-work, feed pigs, poultry, and milk cows.						
¼ to 8 . .	March from garden, deposit tools, and wash.						
8 . . .	Reading of Scriptures and Prayer. (In the spring, half an hour was commonly occupied in a familiar exposition of the passage of Scripture read.)						
After Prayer	Superintendents present reports.						
½ past 8 .	Breakfast.						
9 to ½ past 9	Classes united	Reading in the Bible and religious instruction. Old Testament History.	Reading in the Bible and religious instruction. The Gospels.	Reading in the Bible and religious instruction. The Acts of the Apostles.	Reading in the Bible and religious instruction. The Epistles.	Committing to memory texts of Scripture.	Committing to memory texts of Scripture, or examination on the Scriptoral reading of the week.
½ past 9 to ½ past 10	1st class .	Mechanics	Arithmetic.	Mechanics.	Arithmetic.	Mechanics.	Weekly examination.
	2nd class .	Arithmetic	Mechanics.	Arithmetic.	Mechanics.	Arithmetic.	
½ past 10 to 11 . .	1st class .	Mental arithmetic.	Etymology.	Mental arithmetic.	Etymology.	Mental arithmetic.	
	2nd class .	Etymology.	Mental arithmetic.	Etymology.	Mental arithmetic.	Etymology.	Ditto.
1 to 12 .	Classes united	Geography.	Geography.	Music.	Geography.	Geography.	Music.
12 to 1 .	Garden work, feeding the animals, &c. &c. March to the house at 1, wash and prepare for dinner.						
½ past 1 .	Dinner.						
2 to 3 .	Classes united	Mechanical Drawing.	Map Drawing.	Mechanical Drawing.	Common and Isometrical Perspective.	Map Drawing.	Weekly examination.
3 to 4 . .	1st class .	Algebra.	Use of the Globes.	Mensuration.	Use of the Globes.	Algebra.	Ditto.
	2nd class .	Grammar.	. .	Algebra.	. .	Grammar.	
4 to 5 .	1st class .	Natural History of Birds.	Grammar	Object Lesson.	Grammar.	. .	Ditto.
	2nd class .	Do.	Committing to memory arithmetical tables and rules of grammar, or mechanical formulæ.		Committing to memory arithmetical tables and rules of grammar, or mechanical formulæ.	Committing to memory.	
5 . . .	March to garden work, feed pigs, poultry, &c., and milk cows.						
6 . . .	March from garden, wash, and prepare for supper.						
½ past 6 .	Supper.						
7 . . .	Drill and gymnastic exercises.						
8 . . .	Copying music or notes on geography, or mechanical formulæ in the upper class-room. During this period the History of England is read aloud. Another class practising singing in the lower class-room.						
9 . . .	Reading of Scripture and Prayer.						
20 minutes past 9 .	Retire to rest.						

Sunday.

After divine service one of the sermons of the day is written from memory. In the evening the compositions are read and commented upon, and the catechism or some other portion of the formularies of the church is repeated, with texts of Scripture illustrating it.

Some of the elder students teach in the village Sunday-school.

as presenting the best of what has hitherto been effected for supplying a well-trained class of teachers. The design is to educate—1, preparatory classes of students and pupils; 2, a class of candidates; 3, a class of scholars. Pupils of the first class are examined at the end of the first year, and if approved, receive a certificate as candidates of the training-school: the candidates who make due proficiency pass at the end of the second year into the rank of scholar; and in their turn, the scholars in the third year, on evincing suitable improvement, receive the certificate of master. Hitherto the training-school has not passed the preparatory stage; the routine for the classes in this stage is given in the preceding table.

Similar tables for the education of the more advanced classes, as conducted in Continental schools, are given in the book; in which tables, among other points worthy of commendation, two subjects of instruction deserve special mention: 'The means of improving the health and condition of the people;' 'Instruction in the law and duties of a citizen.' Not only however is the range of instruction in the school at Battersea commensurate with the duties for which the young men are training, but the methods pursued are no less effective than new in relation to the great branches of instruction which now constitute and those also which ought to enter into the elementary education of the country. The religious department appears to be conducted in the least satisfactory manner. Hitherto no sufficient evidence appears that those who are likely to give the tone to popular education in England are impressed with the necessity and convinced of the practicability of making that education a medium for instructing the people in the laws of health and their rights and duties as citizens.

Prussian Schools.—The following remarks on the Prussian Schools are inserted here for the purpose of enabling a person to contrast what has been done in that country with the state of education in this country. It is a fact generally admitted by all competent judges, that the system of public education established by the Prussian government is the most complete and most efficient in Europe The advantages which the people derive from the Prussian system arise not only from the large amount of knowledge which is diffused, but also from the circumstance that a portion of this knowledge has reference to the future pursuits of the pupils. In the system of instruction in this country, the latter object is hardly ever kept in view, and the education given in the British schools in general has no reference to actual life. In Prussia parents choose a school for their children, with a view to prepare them for the pursuits which are to form their future occupation. As soon as the boys have acquired the rudiments of knowledge, the parents determine what shall be their business in life, and by this decision determine their choice of the school in which the education of the boys is to be finished. In all the schools, not excepting the elementary schools in the country, a portion of the instruction is of a general nature, but those branches of knowledge are always taught which have reference to the future destination of the larger part of the pupils. Bearing in mind this arrangement of the Prussian schools, the whole system of instruction will be duly appreciated.

In comparing the English universities with those of Prussia and of Germany in general, the difference is most striking. The Prussian universities are institutions erected by government for the purpose of providing fit persons for the several duties which devolve on the officers of administration. These institutions are subjected to frequent changes, in order that they may meet the demands of the government and the necessities of the times. In Prussia the whole body of the clergy, the judges, the magistrates, the physicians and surgeons, are considered as officers of government. All must be licensed, in order to be able to practise their profession, and the greater part of them are appointed to places by government. Thus the government has erected and maintains the universities for the purpose of giving an opportunity to all persons of acquiring the requisite knowledge for the performance of the duties incident to the various branches of administration. The universities of Prussia therefore are not institutions in which only general knowledge is to be acquired; they are schools of divinity, of jurisprudence, and of medicine. The professors who teach the sciences and arts belonging to these three great divisions or faculties, are considered as constituting the university, and the professors of philosophy or of arts are only an appendage to it. Every student must enter into one of the three principal faculties; by doing which he acquires a claim on government, after the termination of his studies and the customary examination, if he desires to be employed as a clergyman, judge, or physician. There is indeed always a small number of persons who are considered as belonging only to the faculty of arts, who have no other object than their own pleasure, and who claim no employment under government, except they may so far have distinguished themselves in some branch of philosophy as to merit an appointment to a professorship. In modern times however even this faculty of arts has supplied two sets of men, who are so educated as to be enabled immediately to enter into the service of government, namely, officers of internal administration and teachers. But they generally declare, on entering the faculty of arts, that they intend to belong to those branches of the faculty which comprehend political science and philology, and this is expressly stated in their matriculation.

It is evident that the different schools of which each Prussian university may be considered as composed, might be separate establishments. But it has been considered, that there are certain branches of knowledge, which, though not indispensably necessary to be acquired by persons who are employed by government, may still be considered useful to clergymen, judges, physicians, teachers, and officers of internal administration. These branches may be useful either as a mental discipline, as the mathematics and metaphysics, or, on account of the positive knowledge which they convey, as natural history, natural philosophy, and chemistry. In order to give the students an opportunity of acquiring this knowledge, the philosophical faculty has been instituted, which may be considered as the bond that unites the other parts of the institution and constitutes them into one body.

The object for which the Prussian universities have been established, being so different from that of similar institutions in England, and the internal organization consequently being also quite different, it may easily be supposed that the whole course of studies is different; and so in reality it is. The number of persons at the German universities who study Greek and Latin, and attend the lectures of the professors of these languages, is comparatively small, and mostly limited to those who wish to be teachers, and to know something more of the matter than is learned in the grammar-schools. Other students do not attend these lectures, nor is it necessary. For it is required by law, and must be proved by strict examination at the time of admission into the university, that the student has previously obtained such a knowledge of the Latin language as to be able to read the classical authors with ease, and to write Latin prose correctly, and also that he has made such progress in Greek as to understand an easy author. It is considered that the youth who has so far acquired the antient languages has had discipline enough of that kind in the grammar-school, and that on entering the university the objects of his studies should be changed. The attention of the student who has leisure to apply himself to branches of knowledge not immediately connected with his future pursuits is mainly directed to the investigation of nature, natural philosophy, physiology, and chemistry, with mathematics. Others however who prefer the investigation of the human mind enter with zeal on the study of the metaphysical and moral sciences, and others apply themselves to the various branches of the political sciences. The student however is well aware that all these studies constitute only a preparatory course, and that at the examination which he must undergo before he can claim to be employed by government, he never will be asked whether he has studied these sciences or has acquired any of these branches of knowledge. For that reason the number of those who apply themselves to these studies is comparatively small. By far the largest part of the youths turn their attention immediately to those branches of knowledge with which they must be acquainted before they can enter on the business of life as ministers, lawyers, and physicians.

It is not usual for the students at the German universities to take a degree, except for those who intend to practise as physicians, and who by taking the degree obtain the title of doctor, and are exempt from all further examination. There are persons who take the degree of doctor of divinity, of law, and of philosophy, but they are only a few and they are generally persons who aspire to professorships in the universities. It is rare that a person who has no such views aspires to this distinction merely for the sake of the honour.

The time which a student must spend at the university is not determined by law. Experience however has shown that a knowledge of law cannot be acquired in less than two years; that the branches of knowledge which comprehend the science of theology require three years; and that the information which a good physician should possess can hardly be obtained in the course of four years. Most of the students remain somewhat longer than the times which have been mentioned. In each year two courses of lectures are read, and these two periods are called semesters. Each semester lasts five full months. Thus the youths at the Prussian universities are occupied there at least thirty-eight weeks, which is about fifteen weeks more than the terms of Oxford or Cambridge.

From this account of the Prussian universities it will appear that nearly all the students, during the whole time of their residence at the university, apply themselves to the acquisition of that knowledge which is intimately connected with their future station in life. Before they are permitted to practise the professions, they must prove that their acquirements are such as to give them a just title to do so. As a specimen of the knowledge required from those who enter the learned professions, we give that which is required from the clergyman. When he is admitted to holy orders, he must be thoroughly acquainted with ecclesiastical history, and consequently must be familiar with all the changes which the church of Christ has undergone from its establishment to the present time, and by what events these changes have been produced. He must also be acquainted with the most distinguished writers of the earlier ages of Christianity, and their different opinions respecting the constitution of the church. The practical part of his knowledge he is expected to draw from what is called Dogmatic, which explains the tenets of the Protestants as established by Luther, with the changes which they have undergone since his death, and the difference in the tenets professed by the different denominations of Christians. He must have read the whole of the New Testament in Greek, and studied critically one of the Gospels and two of the Epistles of St. Paul. A knowledge of the Hebrew language is not indispensable, but if the student knows it, he is considered to have additional merit. The moral sciences must have formed part of his studies, and he must be well acquainted with those passages of the Bible in which Christian duties are inculcated. When a student shows, by undergoing a strict examination, that he is well versed in these four parts of theology, he may be admitted to holy orders.

The age of admission into the universities is fixed by law on the completion of the eighteenth year. It happens however very frequently that even at that age the student has not acquired the knowledge which would enable him to attend the lectures of the professors with advantage, especially if his education has been neglected in early youth. Many youths therefore do not go to the university before the completion of their twentieth or twenty-first year; and this delay has a good effect on their conduct. At the university most of them are free from all control as to the employment of their time, and nearly so with respect to their conduct. It might be expected that this liberty would be followed by bad consequences, but experience has shown that young men in general, after the completion of their eighteenth year, have too much good sense to abandon themselves altogether to idleness and debauchery, and to neglect those studies which are indispensable to enable them to follow a profession.

Academical education in Prussia is finished at the universities: it begins in the gymnasia. The gymnasia were originally designed for preparing pupils to attend the lectures of the professors at the universities with ease and profit, and with this view Greek and Latin, with some mathematics, formerly constituted nearly the only objects of instruction. At this time they had a great resemblance to the English grammar-school. But government soon perceived that the time which the young men passed at the universities was hardly more than sufficient to enable them to acquire a complete knowledge of their profession; and it was frequently almost impossible for them to find time to make themselves acquainted with some branches of knowledge, which, though not strictly necessary for the practice of their professions, are considered as parts of a liberal education, and give to those who possess them an advantage over others in society. Accordingly it was considered that an instruction in Greek and Latin, with some mathematics, if conducted on a good system, could not occupy all the time of young men to the completion of their eighteenth year, and this consideration led to the introduction of many other branches of knowledge into these schools. At present hardly more than one-third of the time which the pupils pass at these schools is employed in teaching them those branches of knowledge which were formerly the only objects of instruction. The teachers opposed these changes, and created difficulties, but as they are appointed by government, their resistance was soon overcome. Thus many branches of knowledge have gradually found their way into these schools, among which are the first principles of natural philosophy and chemistry, natural history, especially the physiological parts, and a pretty extensive course of geography and of history, both antient and modern. Nothing however is taught which has an immediate reference to the future occupation of the pupils, with the exception of the Hebrew language, the elements of which those who are intended to be clergymen are obliged to acquire at school The age of admission to the gymnasia is established by law at the completion of fourteen years, and the boys must remain there till they have completed their eighteenth year, but they frequently stay, as already observed, two or three years longer. Before they leave school, they must submit to a strict examination, in which they must show that they have acquired those branches of learning which are required by law from those who go to a university.

These two kinds of institutions, the universities and gymnasia, are, strictly speaking, established and supported by government for the purpose of supplying the state with a sufficient number of men capable of conducting all the branches of administration. The other Prussian schools are designed to give the people that instruction which is considered necessary for them.

The Prussian government has for many years paid the greatest attention to the best means of obtaining a sufficient supply of good teachers for all kinds of schools. These persons, having been trained up as teachers, have no prospect of succeeding better in any other occupation. When they are appointed to a place by government, they know that they are to remain there for several years, and that the improvement of their condition depends solely on the opinion which the state may form of their industry, ability, and their success in teaching. It is not easy for them to break off their engagement, as in that country there are very few institutions of education in which the choice of the teachers does not materially depend on government. Thus they are compelled to remain where they are, and to exert themselves to the utmost to attract the attention of government by instructing their pupils in the respective branches of knowledge prescribed by law. It will easily be admitted that even persons of moderate talents must become excellent teachers in such a situation in the course of ten years; and such persons will be able to continue to work efficiently at least to their fifty-fifth or sixtieth year.

Without entering into further details on this point, it is certain that the advantages which the Prussian schools have over similar institutions in this country, are mainly owing to the teachers having been trained for the business, and to the circumstance of their devoting their labours to the same school for twenty or thirty years.

The Prussian schools for the instruction of the people at large are divided into middling (or city) schools and elementary schools. The city schools are designed for the education of all those who, from their station in society, require to be better instructed than the lower classes, but do not require an academical education to qualify them for their future occupations. As the occupations for which the pupils are to be prepared in these schools are very various, there is a corresponding difference in the schools appropriated to this class with respect to the subjects of instruction. There are certainly some branches of knowledge which are properly considered as belonging to general instruction, and these are common to all the schools, but in each of them subjects are taught which have reference to the locality, and to the wants of the inhabitants and the neighbourhood. It is obvious that many kinds of instruction which are useful in a seaport would be quite out of place in a province two hundred miles from the sea, and that the population of a manufacturing district requires to be instructed in some branches of knowledge which are of no use to agriculturists and others. The largest establishments of this kind are called schools of practical knowledge (realschulen). As a general rule, six or seven teachers are regularly employed in them. The antient languages are not taught, with the exception of Latin, which however is taught to a less extent than in the gymnasia. On the other hand, more time is employed in the acquisition of scientific knowledge, but it is taught in a practical and not strictly scientific way. The principal objects of instruction are the mathematics (including commercial arithmetic), the natural sciences (which comprehend natural history, experimental philosophy, and chemistry, with special reference to the arts and manufactures), geography, history, the German and French, and sometimes the English languages, writing and drawing. Before the pupils enter these institutions, they must have acquired a sound and complete elementary education, and only youths who have attained the age of eleven or twelve years are admitted. They stay at these schools between three and four years. The smallest of the schools comprehended under this division are very little superior to the elementary schools as to the general instruction, except that a more extensive course of arithmetic, with an elementary knowledge of geography and the history of the country, is added. Such schools are frequently managed by a single teacher. The schools between these two extremes vary greatly in the number of teachers, in the branches of knowledge taught, and in the extent to which they are taught. But in all of them great attention is paid to the wants of the inhabitants of the place and the vicinity.

The elementary schools in Prussia are the most numerous, and by far the greater part of the people receive their education in them. The Prussian government has conferred a great benefit on the people by bestowing much attention on the improvement of these schools during the last thirty years, and the effects of this care are already perceptible. Though the number of these schools is very large, all of them are now provided with teachers, who are acquainted with the best methods of imparting to children the elements of knowledge, and of accustoming them to labour. The skill of these teachers in instructing the youths in elementary knowledge has enabled the government to increase the subjects of elementary education, and accordingly in most of these schools, in addition to religion, reading and writing, the elements of arithmetic, the history and geography of the country, and some notions of natural history begin to form part of the regular course of instruction.

An elementary school is generally, though not always, attached to a city school, and a city school always to a gymnasium. In such cases both schools are under the direction and management of the same persons, from which circumstance there results a closer connection between the subjects taught in both schools. For instance, when a gymnasium is united to a city school, there are six classes, but it is only in the two upper classes that subjects are taught which refer exclusively to university studies. The third class constitutes an intermediate stage, in which pupils designed for the university are mixed with others who are not. In this class the boys generally begin to learn the Greek language, but those who do not intend to go to the university are not compelled to attend the Greek class.

We have before observed that the Prussian schools have attained their present state of excellence mainly from the circumstance that all the teachers have been trained regularly for the business. Long experience has convinced the government that no real improvement in the education of youth can be effected without providing competent teachers. It has however been found that it is not necessary to be at any pains to get academical teachers. There are always persons who have such a decided inclination to some particular branch of knowledge, as willingly to make some sacrifice for the sake of pursuing it, and when such persons know that while they satisfy their inclination they can obtain a competent income and an honourable station in society, they gladly devote themselves to such a pursuit. The government therefore has considered that by attaching a sufficient salary to the different professorships in the universities, persons will never be wanting to fill those chairs with advantage to the state; and this opinion has proved to be well founded. The case is different with school teachers. It is their business to impart to their pupils the elements of knowledge, which have generally very few attractions for anybody, though it is impossible to make any progress in the acquisition of knowledge without being well acquainted with them. It often happens that persons well acquainted with these elements are not capable of communicating them to others, at least not to children, unless they have been trained to the occupation. When therefore the government began seriously to consider how the teaching in the gymnasia could be improved, and found that the most difficult part of the instruction in these schools was that of the antient languages, it conceived the idea of preparing the teachers for those schools by a training under the best Greek and Latin scholars of the age. This led to the erection of the Philological Seminaries, which are constituted simply thus:—The professors of the Greek and Latin languages at the universities explain to the students who have been admitted as members of the seminaries a classical author in such a manner as they think that it ought to be explained in the upper classes of the gymnasia. After proceeding in this way for two or three months, they direct those pupils who have made most proficiency to continue where they have left off, giving them the necessary time for preparation. The pupils do this as well as they can, and the professors point out the difficulties which they may have overlooked, by asking questions and by adding some few observations. Every member of the seminary must submit to this task by turns, and it will easily be supposed that by this method of proceeding the acquaintance of the students with the language must be increased, and much more so than if the professors were merely to lecture on the author. It has been observed that the first attempts of young men, even of those who have talents for teaching, are rarely attended with success, and this has been ascribed to their limited acquaintance with mankind in general, and the character of children in particular. It is obvious that knowledge of this description cannot be acquired from books, and that it can only be acquired by continual intercourse with children, and by early opportunities of practising the art of teaching.

This led to the establishment of the pedagogic seminaries, which are also connected with the universities, and placed under the direction of that professor of the theological or philosophical faculty who has distinguished himself by his zeal for the promotion of education. After having made the future teachers acquainted, by way of introduction, with the character of children, the professor introduces them into the school which is attached to each pedagogic seminary, and in which the future teacher has abundant opportunity of practising the art of teaching, and of seeing how it is practised by others. He also derives another advantage from attending this school. Passing successively through all the divisions of the school in this way, he soon becomes aware of the deficiency of his knowledge, and this conviction comes upon him at a time when he can remedy the deficiency without difficulty. As the university has the best teachers in every branch of knowledge, he has only to place himself under the professor of that science in which he wishes to improve himself, and thus he may soon acquire the necessary proficiency. It will easily be conceived that when a young man who is designed to be a teacher has attended this institution six or eight hours a week for three years, and is frequently ordered to instruct the pupils under the direction of the professor, he will acquire such skill in the management of children, that when he has to act independently, he has only to take up the task where he has left it off at the seminary. Without such opportunity of being initiated in the art of instruction, he might for a long time remain as it were in the dark, and he would only find out the right way after committing numerous mistakes, and making many useless experiments. The attendance on the philological and pedagogical seminaries takes up a considerable part of the future teacher's time during his stay at the university. The greater part of the young men who have been trained up in this way, are afterwards appointed teachers at the gymnasia, but many of them are also employed in the city schools, in which many branches of knowledge are taught that can hardly be acquired to a certain degree of perfection without going to the university. Formerly all the teachers in these two classes of schools were young clergymen, who were required to be teachers before receiving an appointment to a living; and although at present this is occasionally done, most of the teachers have been merely trained for that vocation. Young clergymen are only employed as teachers in these schools when they have regularly attended the seminaries, and have there shown considerable aptitude for teaching, but few of them are able to prosecute both pursuits with success. Thus the young men who are designed for teachers may be said to constitute at present as distinct a body in the Prussian universities as those who are designed to be clergymen. This is a great step gained, and the consequences cannot fail to be highly beneficial to education.

Having succeeded so well in providing a sufficient number of teachers for the gymnasia and upper classes of the city schools, the Prussian government began to direct its attention to make the same provision for the elementary schools. The seminaries for schoolmasters, as those institutions are called, have grown up during the last thirty years. They are not connected with the universities, inasmuch as the knowledge required from the teachers of these schools may be obtained without an academical education. Most of these institutions are established in small towns, and some of them in villages, in order that the attention of the young men who attend them may not be distracted. Young men who have been educated in elementary schools are admitted into these institutions between the ages of sixteen and twenty years; but they must have previously acquired that amount of knowledge which is taught in the lower schools. If they are deficient in this respect, they are obliged to go through a preparatory course before entering the seminary. They remain in the institution from two to three years. Besides the director of the establishment, two or three regular teachers are employed, and a school is attached to it. The time of the future teacher during his stay in the seminary is divided between improving his knowledge, and acquiring the art of teaching children. The first half of the time that he remains in the institution is principally employed in attaining the former object, and the second half is devoted to the latter object. His studies are directed by the teachers and the director, who frequently call upon him to give an account of what he is doing. When he is admitted into the school, he is at first only a spectator, and the teachers of the seminary instruct the children in his presence. In course of time the seminarists are called upon to continue the work begun by the teachers. They are also generally present when other seminarists instruct the class, and this affords them many opportunities of comparing the different modes of teaching, so far as they depend on the different characters of the teachers. At the meetings of the teachers, which regularly take place after the children have left the school, the teachers, under the direction of the head master, make their observations on the teaching of the seminarists, on the mistakes they have committed, and point out to them what they ought to do, in order to obtain their object with greater certainty. It is generally found that after having practised teaching for a year or a year and a half in this manner, these young men have so far acquired the art, that an elementary school may be safely entrusted to them. When these institutions were established, the instruction was limited to the common subjects taught in the lower schools, which are reading, writing, arithmetic, and the principal tenets of religion; but the seminarists were of course obliged to learn all these subjects to a greater extent than they are usually taught in the lower schools. But as soon as it appeared that the acquisition of this amount of knowledge did not entirely fill up the time of the seminarists, government extended the plan, and added the elements of geometry, the study of the native language, the geography, and principal historical events of the country, and music. These subjects are also now in course of being introduced into the elementary schools themselves. Before the seminarists leave the institution, they must submit to an examination, which is conducted by a committee composed of the director of the seminary, and one or more deputies sent by the provincial government. According to the result of this examination, they receive their testimonials, in which the degree of their talent and ability for teaching is stated, and also in what kinds of knowledge they have distinguished themselves, or in what they have been found deficient.

The Prussian government controls all the public schools and institutions for education, but not all of them to the same extent. The Universities, being considered only as schools in which the different functionaries of government receive the requisite instruction, are in all respects subject to the immediate control of the state, which determines what those persons must learn, and by whom they are to be taught; and the same principle applies to the Philological and Pedagogical Seminaries. If the Gymnasia were attended by those only who are designed for an academical education, they would probably be directed and entirely superintended by government; but as a City School is always united to these institutions, government appoints only the teachers, and determines the subjects of instruction, entrusting a portion of the superintendence to the local authorities and the heads of the communities in which the schools are situated. As to the Seminaries for Schoolmasters, if these institutions were left to the direction of the public at large, no intimate connection between them and the elementary schools could be effected, and the control would be either incomplete or capricious. Hence government has assumed the entire direction and superintendence of these schools. But when the teachers who have been brought up in these institutions have left them, the government does not interfere as to the mode of their being employed or engaged. The choice of the teachers for the city schools and the elementary schools is always left to a committee composed of certain deputies of the community and of the local authorities, which committee has the immediate superintendence of the schools, and is in some measure responsible for the instruction. But though the government does not interfere with the internal arrangement of these schools, it reserves the exclusive power of determining the subjects which are to be taught in every kind of schools, and, as far as respects the city schools, in every particular school. Every committee is also bound by law to draw up an annual report of the condition of the school during the last year, in which are stated all the changes that have taken place in it; and the government, if it thinks it advisable, proposes alterations.

(Cousins's *Report on the State of Public Instruction in Germany*, &c.; Harnisch, *Handbuch für das Deutsche Volksschulwesen*; Ohlert, *Die Schule, oder Elementarschule, Bürgerschule, und Gymnasium*; and *Journal of Education*, vols. vi., viii., and x.)

SCHOOLS, ENDOWED. An Endowed School in England is a school which was established and is supported by funds given and appropriated to the perpetual use of such school, either by the king or by private individuals. Endowed schools may be divided, with respect to the objects of the founder, into grammar-schools, and schools not grammar-schools. A grammar-school is properly a school in which the learned languages, the Latin and the Greek, are taught, as will hereafter be more fully explained. Endowed schools may also be divided, with respect to their constitution for the purposes of government, into schools incorporated and schools not incorporated. Incorporated schools belong to the class of corporations called eleemosynary, which comprehends colleges and halls, and chartered hospitals or almshouses.

Endowed schools are comprehended under the general legal name of Charities, as that word is used in the act of the 43rd of Elizabeth, chap. 4, which is entitled 'An Act to redress the Misemployment of Lands, Goods, and Stocks of Money heretofore given to Charitable Uses.' Incorporated schools have generally been founded by the authority of letters patent from the crown, but in some cases by act of parliament. The usual course of proceeding has been for the person who intended to give property for the foundation of a school, to apply to the crown for a licence. The licence is given in the form of letters patent, which empower the person to found such a school, and to make, or to empower others to make, rules and regulations for its government, provided they are not at variance with the terms of the patent. The patent also incorporates certain persons and their successors, who are named or referred to in it, as the governors of the school. This was the form of foundation in the case of Harrow School, which was founded by John Lyon, in the fourteenth year of Elizabeth, pursuant to letters patent from the queen. Sometimes the master and usher are made members of the corporation, or the master only; and in the instance of Berkhampstead School, which was founded by act of parliament (2 & 3 Edw. VI., reciting certain letters patent of Henry VIII.), the corporation consists of the master and usher only, of whom the master is appointed by the crown, and the usher is appointed by the master. The lands and other property of the school are vested in the corporation, whose duty it is to apply them, pursuant to the terms of the donation, in supporting the school, that is, in paying the master and usher such sums as they are entitled to receive, and for other purposes necessary for the support of the school. Many school endowments are of a mixed nature, the funds being appropriated both to the support of a free-school and for other charitable purposes. These other purposes are very various; but among them the union or connection of an hospital or almshouse with a free-school is one of the most common.

Where there is no charter of incorporation, which is the case in a great number of school endowments, the lands and other property of the school are vested in trustees, whose duties as to the application of the funds are just the same as in the case of an incorporated school. If the founder has declared that there shall always be a certain number of trustees, or that the original number shall always be filled up whenever it is diminished by death to a certain amount, it is necessary from time to time for the actual trustees to add to their numbers by such legal modes of conveyance as shall vest the school property in them and the new trustees jointly. These conveyances sometimes cause a considerable expense; and when they have been neglected, which is often the case, and the estates have consequently become vested in the heir-at-law of the surviving trustee, some difficulty is occasionally experienced in finding out the person in whom the school estates have thus become vested by operation of law. When the school property consists of money, the same kind of difficulty arises; and money is also more liable to be lost than land.

Every charity, and schools amongst the rest, seems to be subject to visitation. We shall first speak of incorporated schools.

The founder may make the persons to whom he gives the school property on trust also the governors of his foundation for all purposes; and if he names no special visitor, it appears that such persons will be visitors as well as trustees. If he names a person as visitor, such person is called a special visitor; and it is a general rule that if the founder names no special visitor, and does not constitute the governors of his foundation the visitors, the heir-at-law of the founder will be visitor; and if there is no heir-at-law, the crown will visit by the lord keeper of the great seal. The king is visitor of all schools founded by himself or his ancestors. The duties of trustees and visitors are quite distinct, whether the same persons are trustees and visitors, or the trustees and visitors are different. It is the duty of trustees to preserve the school property, and to apply it to the purposes intended by the founder. In respect of their trust, trustees are subject to the jurisdiction of the Court of Chancery, like all other trustees; and of course they are answerable for all misapplication of the funds. It is the visitor's duty to inquire into the behaviour of the master and usher in their respective offices, and into the general conduct of the school. He must judge according to the founder's rules, which he cannot alter unless he is empowered by the terms of the donation to do so. There seems to be no reason for supposing that the king, in respect of royal foundations, has any further power than other persons, and consequently he cannot alter the terms of the donation, unless this power was originally reserved to the founder and his successors; but on this matter there may be some difference of opinion. The visitor, or those who have visitorial power, can alone remove a master or usher of an endowed school. The Court of Chancery never removes a master or usher, when they are part of the corporate body, on the general principle that this court has no power to remove a corporator of any kind; and when there is a visitor, or persons with visitorial power, the Court never attempts directly to remove a master or usher, even if they are not members of the corporation.

This is the law on the subject. (17 Ve., Att.-Gen. *v.* the earl of Clarendon.) But law does not always regulate the decrees of a court of equity. In the case of the Attorney-General *v.* Brown, which does not appear to be reported, the Master of the Rolls decreed that Brown, who was a member of the corporation of Tideswell school, both in his capacity of vicar of the parish of Tideswell and in his capacity of master of the school, should resign one of the two places.

Trustees of endowed schools which are not incorporated, are accountable in a court of equity for the management of the school property. But the internal management of the school still belongs to the special visitor, if there is one; and if there is no special visitor, it belongs to the founder's heir. Trustees of endowed schools, simply as such, are merely the guardians of the property, as already observed; and it is their duty to take care of it, and to apply the income according to the founder's intention. It has however happened that in schools not incorporated the jurisdiction of the Court of Chancery and the visitorial jurisdiction have not been kept quite distinct; and cases have arisen in which it has been found very difficult to determine what ought to be the proper mode of proceeding. It will perhaps be difficult to find an instance (except that of the Attorney-General *v.* Brown, and even the effect of that was only to put the master to his election) where the Court of Chancery has affected to remove a master even of a school not incorporated, though there are cases in which it has been attempted indirectly.

In the case of Atherstone school, which was founded by letters patent of Elizabeth, 1593 (*Reports of Charity Commissioners*, 29th Rep., part ii., p. 955), no express power was given to the governors to remove the master. On an information being filed by the master, the chancellor thought that the power of suspension and amotion of the master ought to have been vested in the governors and the bishop of the diocese concurrently; and he referred it to the master, to approve of some convenient form of such joint regulation. But this and other similar cases are of very doubtful authority. Properly, the removal of a master is only effected by a person appointed as visitor by the founder; and if there is no such visitor, and no founder's heir, the proper mode of proceeding in such case is to apply by petition to the keeper of the great seal as visitor on behalf of the crown, and not to the chancellor by bill, or by bill and information. There is no doubt that a special visitor, who receives the proper power for that purpose from the founder, can remove the master of a school; and it is equally certain that if the founder has appointed no special visitor, the visitorial power belongs to his heir-at-law, if one can be found. It may however be true, as it is sometimes asserted, that it would be difficult to find an instance in which the founder's heir has exercised such visitorial power.

A free grammar-school is an endowment for teaching the learned languages, or Greek and Latin, and for no other purpose, unless the founder has prescribed other things to be taught besides grammar. This legal meaning of the term grammar-school has been fixed by various judicial decisions, and it is quite established, that if the founder merely expresses his intention to found a grammar-school, the school must be a school for teaching Latin and Greek only. If it should happen that the endowment has for a long time been perverted from its proper purposes, this will not prevent the Court of Chancery from declaring a school originally designed for a grammar-school, to be still a grammar-school, and it will give the proper directions for carrying into effect the founder's intentions, whatever may be the length of time during which they have been disregarded. This was the case with the grammar-school of Highgate, in the county of Middlesex, which was founded by Sir Roger Cholmeley, under letters patent of queen Elizabeth, under the title of the Free Grammar-school of Roger Cholmeley, Knight. The statutes were made in 1571 by the wardens and governors, with the consent of the Bishop of London, under the authority of the letters patent. The first statute ordered that the schoolmaster should be a graduate, and should teach young children their A B C, and other English books, and to write, and also in their grammar as they should grow up thereto. An information which was filed against the governors, charged that the school had been converted from a free grammar-school into a mere charity school, and that the governors had in other ways abused their trust. The facts of the abuse were established, but it was shown that so far back as living memory could go, the school had been merely a place of instruction in English, writing, and arithmetic; and also that in other respects the statutes had not been observed as far back as the year 1649. Notwithstanding this, it was declared by the chancellor (Eldon) that this was a school originally intended for the purpose of teaching grammar, and a decree was made for restoring the school according to the intention of the founder.

As to teaching something besides Latin and Greek in an endowed school, Lord Eldon observes (Att.-Gen. *v.* Hartley, 2 J. & W., 378), 'if there was an antient free grammar-school, and if at all times something more had been taught in it than merely the elements of the learned languages, that usage might engraft upon the institution a right to have a construction put upon the endowment different from what would have been put upon it if a different usage had obtained.' When the founder has only intended to establish a grammar-school, and has applied all the funds to that purpose, none of them can be properly applied to any other purpose, however useful it may be, such as teaching the modern languages or other branches of knowledge. This legal position cannot be disputed. When the funds of a school have increased so as to be more than sufficient for the objects contemplated by the founder, the Court of Chancery will direct a distribution of the increased funds, but it will still apply the funds to objects of the same kind as those for which the founder gave his property. If then a founder has given his property solely for the support of a grammar-school, it is inconsistent with his intention to apply any part of the funds to other purposes, such for instance as paying a master for teaching writing and arithmetic; and yet this has been done by the Court of Chancery in the case of Monmouth school (3 Russ., 530) and in other cases. The foundation of Monmouth school consists of an almshouse, a free grammar-school for the education of boys in the Latin tongue, and other more polite literature and erudition, and a preacher. The letters patent declared that 'all issues and revenues of lands to be given and assigned for the maintenance of the almshouse, school, and preacher, should be expended in the sustentation and maintenance of the poor people of the almshouse, of the master and under-master of the school, and of the preacher, and in repairs of the lands and possessions of the charity.' Notwithstanding this, the Court of Chancery appointed a writing-master at a salary of 60*l.* per annum, to be paid out of the issues and revenues, and thus it took away 60*l.* per annum from those to whom the founder had given it. This was done on the authority of a case in the year 1797, which was itself a bad precedent, and notwithstanding that Lord Eldon, during the long time that he held the great seal, had constantly opposed such application of funds which were appropriated solely to grammar purposes.

Lord Eldon's decision in the case of Market Bosworth school (Attorney-General, *v.* Dixie, 3 Russ., 534) established an usher in the school, whose sole occupation was to be to instruct the scholars in English, writing, and arithmetic, and it gave the usher a salary of 90*l.* per annum out of the school funds. But in doing this Lord Eldon merely did what the donor intended. Market Bosworth is one of those grammar-schools in which the founder has directed that other things should be taught besides Latin and Greek. According to the statutes, the school was to be divided into two branches, the lower school and the upper, and 'in the first form of the lower school shall be taught the A B C, Primer, Testament, and other English books.' In the upper school the instruction was confined to Latin, Greek, and Hebrew. It is therefore in this case as clear that the founder's intention was carried into effect by the decree of the court, as it is clear that in the case of the Monmouth school such intention was violated. The case of Monmouth school however furnished a precedent, which has been followed in other cases; and Sir J. Leach, in the case of Sherburn school and hospital (Att.-Gen., *v.* Gascoigne, 2 M. & K., 647), said, that 'he was glad of an opportunity of holding, upon the authority of the case before Lord Lyndhurst (the Monmouth school case), that the teaching of writing and arithmetic might be well introduced into a scheme for the management of a free grammar-school.'

There are many grammar-schools, probably a considerable majority of the whole number, in which nothing is provided for or nothing intended by the founder except instruction in grammar, which, as the term was then understood, appears to have meant only the Latin and Greek languages. Where provision is made for other instruction in addition to, or rather, as preparatory to the grammar instruction, similar modes of expression have often been used by the founder or the makers of the statutes. In the founder's rules for the grammar-school of Manchester, which has now an income of above 4000*l.* per annum, it is said, 'The high-master for the time being shall always appoint one of his scholars, as he thinketh best, to instruct and teach in the one end of the school all infants that shall come there to learn their A, B, C, Primer, and sorts, till they being in grammar,' &c. In all cases of grammar-schools where this instruction is to be given, it was evidently intended as a preparation for and not as a substitute for grammar. It was therefore clearly an abuse in the case of the Highgate school to have converted it into a mere school for reading, writing, and arithmetic; but it is equally an abuse in the case of the Manchester school to make the following regulation as to the admission of pupils, which was in force at the time of the Charity Commissioners' Inquiry: 'All boys who are able to read are admitted on application to the head master into the lower school, where they are instructed in English and the rudiments of Latin by the master of that school. They are so admitted about the age of six or seven.'

Grammar-schools have now for a long time been mainly regulated by the Court of Chancery, which, though affecting merely to deal with them in respect of the trusts and the application of the trust-monies, has in fact gone much farther. On the whole it has perhaps done as much against the intention of founders—and therefore wrongfully, its professed doctrine being to carry the founder's intentions into effect—as it has for furthering the intentions of founders. In saying this, we do not mean to say that it has done more harm than good. The court may be applied to for the purpose of establishing a school where funds have been given for the purpose, but the object cannot be effected without the aid of the court. It may also be applied to for the purpose of correcting such a misapplication of the funds as in the case of the Highgate school, which in that instance was equivalent to establishing it. The court may also be applied to, which is a common case, in order to sanction the application of the school funds when they have increased beyond the amount required for the purposes indicated by the founder. In this last case however, if the school is a grammar-school, though the court will apply part of the funds to other purposes than grammar, as appears by the case of the Monmouth school, still it keeps mainly in view the fact of such school being for grammar, in directing the application of surplus funds. Accordingly such surplus funds are often applied in establishing exhibitions or annual allowances to be paid to meritorious boys who have been educated at the school, during their residence at college. The master's scheme for the regulation of Tunbridge school in Kent, which was confirmed by the Court of Chancery, established sixteen exhibitions of 100*l.* each, which are tenable at any college of either university, and payable out of the founder's endowment. It also extended the benefits of the school beyond the limits fixed by the founder, and made various other regulations for the improvement of the school, having regard to the then annual rents of the school estates.

When the application has been an honest one, the schemes sanctioned by the Court of Chancery may generally be considered as aiming at least to carry the founder's intention into effect, and as calculated on the whole to benefit the school. But in some cases decrees have been obtained by collusion among all the parties to the suit, against which it is no security that the attorney-general is a necessary party to all bills and informations about charities. The founder of a school and hospital in one of the midland counties, among other things appointed that 'the schoolmaster should be a single person, a graduate in one of the universities of Oxford or Cambridge,' &c.; and he did 'further will that if any schoolmaster so to be chosen should marry or take any woman to wife, or take upon him any cure of souls, or preach any constant lecture, then in every of the said cases he should be disabled to keep or continue the said school.' The trustees dispensed with these restrictions and qualifications, but afterwards finding that they could not do this, they applied to the Court of Chancery, conceiving that the court had full power, or would at least assume the power, to alter the founder's rules. And they judged right. The court ordered, among other things, that a clergyman should be the head master, though the founder did not intend to exclude laymen; and that the head master was not to be restricted from marrying or taking upon him the cure of souls, &c. This mode of dealing with a founder's rules has not much appearance of an attempt to carry them into effect. If the court can dispense with the restriction as to marriage in such case, there seems no reason why it might not assume a similar dispensing power in the case of fellowships in colleges.

This clause about marrying occurs in the rules of several grammar-schools, for instance in those of Harrow school. The rule may be wise or unwise; but it was once observed, and it ought to be observed still until it is altered.

It remains to mention another matter that concerns the management of grammar-schools and the qualification of the masters. It appears from the rules of many grammar-schools that religious instruction according to the principle of the Church of England, as established at the Reformation, is a part of the instruction which the founder contemplated; and when nothing is said about religious instruction, it is probable that it was always the practice to give such instruction in grammar-schools. That it was part of the discipline of such schools before the Reformation cannot be doubted, and there is no reason why it should have ceased to be so after the Reformation, as will presently appear. It is generally asserted that in every grammar-school religious instruction ought to be given, and according to the tenets of the Church of England; and that no person can undertake the office of schoolmaster in a grammar-school without the licence of the ordinary. This latter question was argued in the case of Rex *v.* the Archbishop of York. (6 *T.R.*, 490.) A mandamus was directed to the archbishop directing him to license R. W. to teach in the grammar-school at Skipton in the county of York. The return of the archbishop was that the licensing of schoolmasters belongs to the archbishops and bishops of England; that R. W. had refused to be examined; and he relied as well on the antient canon law as upon the canons confirmed in 1603 by James I. (*The Constitutions and Canons Ecclesiastical*, 'Schoolmaster,' 77, 78, 79.) The return was allowed, and consequently it was determined that the ordinary has power to license all schoolmasters, and not merely masters of grammar-schools. As to school-masters generally, the practice is discontinued, and probably it is not always observed in the case of masters of grammar-schools.

The form of the ordinary's licence is as follows:—'We give and grant to you, A. B., in whose fidelity, learning, good conscience, moral probity, sincerity, and diligence in religion we do fully confide, our licence or faculty to perform the office of master of the grammar-school at H., in the county, &c., to which you have been duly elected, to instruct, teach, and inform boys in grammar and other useful and honest learning and knowledge in the said school allowed of and established by the laws and statutes of this realm, you having first sworn in our presence on the Holy Evangelists to renounce, oppose, and reject all and all manner of foreign jurisdiction, power, authority, and superiority, and to bear faith and true allegiance to her majesty Queen Victoria, &c., and subscribed to the thirty-nine articles of religion of the United Church of England and Ireland, and to the three articles of the thirty-sixth canon of 1603, and to all things contained in them, and having also before us subscribed a declaration of your conformity to the Liturgy of the United Church of England and Ireland as is now by law established. In testimony,' &c.

From this licence it appears that the master of every school who is licensed by the ordinary must be a member of the Church of England, and must take the oath and make the subscriptions and declarations which are recited in the licence.

It is a notion not uncommon at the present day, that the master of a grammar-school must be a graduate of one of the universities and in holy orders; and such is certainly the present practice. But it is by no means always the case that the rules of endowed schools require the master to be in holy orders. The founders seem generally to have considered this a matter of indifference, but many of them provided that if the master was in orders, or took orders, he should not at least encumber himself with the cure of souls. The principle clearly was, that the master of a grammar-school should devote himself solely to that work, and it was a good principle. The Court of Chancery, as we have seen, has in various cases ordered that the master should be a clergyman, where the founder has not so ordered; but such order may be safely neglected. Dean Colet, the founder of St. Paul's School, London, ordered by his statutes, that neither of the masters of that school, if in orders, nor the chaplain, shall have any benefice with cure or service which may hinder the business of the school. He appointed a chaplain to the school (who, we believe, has since been turned into a master), thereby appearing to intend that the religious instruction should not be given by the masters of grammar, who would be fully employed otherwise.

It has sometimes been doubted whether a master of a grammar-school could hold ecclesiastical preferment with it. If the founder has not forbidden this, there is no rule of law which prevents him. If the holding of the two offices should cause him to neglect the duties of either, the remedy is just the same as if he neglected either of his offices for any other cause.

Many grammar-schools are only free to the children of a particular parish, or of some particular parishes; but this privilege has occasionally been extended to a greater surface, as in the case of Tunbridge school. Some are free to all persons, which is the case with some of King Edward VI.'s endowments. Sometimes the number of free boys is limited, but the master is allowed to take pay scholars, either by usage or by the founder's rules. Harrow school was intended for the free instruction of the children of Harrow parish, but the governors, with the consent of the master, can admit other children into the school. At present the practice is for all masters of grammar-schools to take boarders if they choose, but in some cases the number is limited. Abuses undoubtedly have arisen from the practice of the master taking boarders, and the children of the parish or township for which the school was intended have been neglected or led to quit the school sometimes in consequence of the head-master being solely intent on having a profitable boarding-school. But it is certain that in most cases the school has benefited by the master taking boarders; and this has frequently been the only means by which the school has been able to maintain itself as a grammar-school. When the situation has been a good one, an able master has often been found willing to take a grammar-school with a house, and a small salary attached to it, in the hope of making up a competent income by boarders. As this can only be effected by the master's care and diligence in teaching, a small neighbourhood has thus frequently enjoyed the advantage of its grammar-school, which otherwise would have been lost.

There has never been any general superintendence exercised over the endowed schools of this country. The Court of Chancery only interferes when it is applied to, and then only to a certain extent; and visitors are only appointed for particular endowments; they are also often ignorant of their powers, and they rarely exercise them. As many of these places have only small endowments, are situated in obscure parts, with the property vested in unincorporated trustees, who are ignorant of their duty, and sometimes careless about it, we may easily conceive that these schools would be liable to suffer from fraud and neglect, both of trustees and masters; and this has been the case. The object of the statute of Elizabeth was to redress abuses in the management of charities generally; but a great many endowments for education were excepted from the operation of that statute, which indeed seems not to have had much effect, and it soon fell nearly into disuse. Applications for the redress of abuses have, from time to time, been continually making to the Court of Chancery, and Berkhampstead school has now, for a full century, been before the court. In many cases the governors of schools have obtained acts of parliament to enable them better to administer the funds. This was done in the case of Macclesfield school by an act of the year 1774, and another for the same school has recently been obtained. An act of parliament was also obtained in 1831 for the free-school of Birmingham, the property of which had at that time increased considerably in value, and is still increasing. Both these schools were foundations of Edward VI., and were endowed with the property of suppressed religious foundations.

The condition of the endowments for education in England may now be collected from the Reports of the Commissioners for Inquiry into Charities. In 1818 commissioners were appointed under the great seal, pursuant to an Act passed in the 58th year of the reign of George III., entitled 'An Act for appointing Commissioners to inquire concerning Charities in England for the Education of the Poor.' A great many places were excepted from the operation of this Act. The commission was continued and renewed under various acts of parliament, the last of which (5 and 6 William IV., c. 71) was entitled 'An Act for appointing Commissioners to continue the Inquiries concerning Charities in England and Wales until the 1st day of August, 1837.' All the exceptions contained in the first Act were not retained in the last; but the last Act excepted the following places from inquiry: 'The universities of Oxford and Cambridge, and the colleges and halls within the same; all schools and endowments of which such universities, colleges, or halls are trustees; the colleges of Westminster, Eton, and Winchester; the Charter House; the schools of Harrow and Rugby; the Corporation of the

Trinity House of Deptford Strond; cathedral and collegiate churches within England and Wales; funds applicable to the benefit of the Jews, Quakers, or Roman Catholics, and which are under the superintendence and control of persons of such persuasions respectively.' Under the last act the commissioners completed their inquiries into endowments for education, with the exceptions above specified. The reports of the commissioners contain an account of the origin and endowment of each school which was open to their inquiry, and also an account of its condition at the time of the inquiry. The reports are very bulky and voluminous, and consequently cannot be used by any person for the purpose of obtaining a general view of the state of these endowments; but for any particular endowment they may be consulted as being the best, and, in many cases, the only accessible sources of information.

The number of grammar-schools reported on by the commissioners is about 440. What is the number of those exempted from the inquiry, we cannot state; but it must be considerable. The total income of these 440 schools is about 88,000*l.* In this estimate the gross income of the school estates is generally that which has been taken, except when the charity is applicable to other purposes besides education, in which cases the income of the school is estimated at that sum which is actually paid in salaries and for other school purposes. Of these schools, 65 had an income not exceeding 20*l.* per annum; and 15 had an income above 1000*l.* per annum; and 38 (including the 15) had an income above 500*l.* per annum. This total income of grammar-schools would be greatly increased if the income of the excepted schools were added; and there is no doubt that the income of the whole number of grammar-schools must exceed or at least come near to 100,000*l.*

As to the total income of the schools not grammar-schools we are not able to state anything with precision; but from an estimate formed upon the commissioners' reports, before they were completed under the last Act for continuing the inquiry, it seems to be a safe conclusion that the gross income of endowed schools, not grammar-schools, is about double that of the grammar-schools.

The previous remarks on grammar-schools must be taken subject to the provisions contained in a recent act of parliament, which is the only attempt that has been made by the legislature to regulate schools of this class. This Act (3 and 4 Vic., c. 77) is entitled 'An Act for improving the condition and extending the benefits of Grammar-Schools.' The Act recites, among other things, that the 'patrons, visitors, and governors of such grammar-schools are generally unable of their own authority to establish any other system of education than is expressly provided for by the foundation, and her Majesty's courts of law and equity are frequently unable to give adequate relief, and in no case but at considerable expense.' The Act then declares that the courts of equity shall have power, as in the Act provided, 'to make such decrees or orders as to the said courts shall seem expedient, as well for extending the system of education to other useful branches of literature and science, in addition to or (subject to the provisions thereinafter contained) in lieu of the Greek and Latin languages, or such other instruction as may be required by the terms of the foundation or the then existing statutes, as also for extending or restricting the freedom or the right of admission to such school, by determining the number or the qualifications of boys who may thereafter be admissible thereto as free scholars or otherwise, and for settling the terms of admission to and continuance in the same, and to establish such schemes for the application of the revenues of any such schools as may in the opinion of the court be conducive to the rendering or maintaining such schools in the greatest degree efficient and useful, with due regard to the intentions of the respective founders and benefactors, and to declare at what period, and upon what event, such decrees or orders, or any directions contained therein, shall be brought into operation; and that such decrees and orders shall have force and effect, notwithstanding any provisions contained in the instruments of foundation, endowment, or benefaction, or in the then existing statutes;' but it is provided, that if there shall be any special visitor appointed by the founder or other competent authority, he shall be heard on the matters in question, before the court makes any orders or decrees.

This enactment extends the power of the court over grammar-schools very considerably, as will appear from what has been said; not so much however, if we view what the court has done, as if we take the declarations of the most eminent equity judges as to what the court can do. The power however of changing a grammar-school into one not a grammar-school, which is given by this Act, is a considerable extension of authority; but the power is limited to cases (§ 3) where the necessity of such a change arises from insufficiency of the revenues of a grammar-school for the purpose of such school. But this provision, as it has properly been remarked, will be of very difficult application; for in many successful grammar-schools the revenue is small, and in some which are not successful it is large. Smallness of revenue therefore will not of itself prove 'insufficiency of revenues' in the sense intended by the Act. The same section contains also a provision, that except in this case of insufficient revenues, the court shall not by this Act be authorised to dispense with any statute or provision now existing, so far as relates to the qualification of any schoolmaster or under-master. The dispensing power then which the court has often assumed, as shown in some instances above mentioned, remains as it was; that is, it does not exist at all.

When a grammar-school shall have been made into another kind of school under the provisions of this Act, it is still to be considered a grammar-school, and subject to the jurisdiction of the ordinary as heretofore.

In case there shall be in any city, town, or place, any grammar-school or grammar-schools with insufficient revenues, they may be united, with the consent of the visitor, patron, and governor of every school to be affected thereby. The legal meaning of city and town (township) is sufficiently precise, but 'place' has no legal meaning, and the framers of the Act have forgotten to give it one in their 25th section, which treats of the construction of terms in that Act.

The court is also empowered (§14) to enlarge the powers of those who have 'authority by way of visitation or otherwise in respect of the discipline of any grammar-school;' and where no authority by way of visitation is vested in any known person, the bishop of the diocese may apply to the Court of Chancery, stating the facts, and the court may, if it so think fit, give the bishop liberty to visit and regulate the said school in respect of the discipline, but not otherwise. This provision, for various reasons, will prove completely inoperative.

The Act gives a summary remedy against masters who hold the premises of any grammar-school after dismissal, or after ceasing to be masters. Such masters are to be turned out in like manner as is provided in the case of other persons holding over, by the act of the first and second of Victoria, entitled 'An Act to facilitate the Recovery of Possession of Tenements after due Determination of the Tenancy.'

All applications to the court under this Act may be (not *must*) made by petition only, and such petitions are to be presented, heard, and determined according to the provisions of the 52 Geo. III., c. 101.

The Act saves the rights of the ordinary. It is also declared not to extend 'to the universities of Oxford or Cambridge, or to any college or hall within the same, or to the university of London, or any colleges connected therewith, or to the university of Durham, or to the colleges of St. David's or St. Bees, or the grammar-schools of Westminster, Eton, Winchester, Harrow, Charter-House, Rugby, Merchant Tailors', St. Paul's, Christ's Hospital, Birmingham, Manchester, or Macclesfield, or Lowth, or such schools as form part of any cathedral or collegiate church.' But the exemption does not extend to the grammar-schools of which the universities of Oxford or Cambridge, or the colleges and halls within the same, are trustees, though these schools were excepted from the commissioners' inquiry by the 5 and 6 Wm. IV., c. 71.

It is not necessary to make any comment on an Act the general purport of which is intelligible enough; its technical defects will be discovered as the Act comes to be applied. In the present state of this country, it is perhaps a wise measure to give those enlarged powers to the Court of Chancery, the officers and judges of which are better acquainted with the subject of grammar-schools than any other existing authorities.

Endowments for Education are probably nearly as old as endowments for the support of the church. Before the Reformation there were schools connected with many religious foundations, and there were also many private endowments for education. Perhaps one of the oldest schools of which anything is known is the school of Canterbury. Theodore, who was consecrated archbishop of Canterbury in 668 (according to some authorities), founded a school or village by licence from the pope. This school certainly existed for a long time; and there is a record of a suit before the archbishop of Canterbury in 1321, between the rector of the grammar-schools of the city (supposed to be Theodore's school or its representative) and the rector of St. Martin's, who kept a school in right of the church. The object of the suit was to limit the rector of St. Martin's in the number of his scholars. This school probably existed till the Reformation, at least this is the time when the present King's school of Canterbury was established by Henry VIII., and probably on the ruins of the old school. Before the Reformation schools were also connected with chantries, and it was the duty of the priest to teach the children grammar and singing. There are still various indications of this connection between schools and religious foundations, in the fact that some schools are still or were till lately kept in the church, or in a building which was part of it. There are many schools still in existence, which were founded before the Reformation, but a very great number was founded immediately after that event, and one object of king Edward VI. in dissolving the chantries and other religious foundations then existing, was for the purpose of establishing grammar-schools, as appears from the recital of the Act for that purpose (1 Ed. VI., c. 14). But as Strype observes, in his 'Ecclesiastical Memorials,' 'this Act was grossly abused, as the Act in the former king's reign for dissolving religious houses was. For though the public good was pretended thereby (and intended too, I hope), yet private men in truth had most of the benefit, and the king and commonwealth, the state of learning and the condition of the poor, left as they were before, or worse.' It appears also that in the confusion consequent on these violent changes, and the eagerness of all persons to get something of the spoil, schools were even suppressed which did not come with the terms of the Act. It is also certain that new schools were not always established in those places where a school had previously been connected with a religious foundation. There was a chantry at Sandwich in Kent, in the school belonging to which Roger Manwood received the rudiments of his education. The chantry was suppressed under the Act of Edward VI., and no school was established in its place. The want of a school there subsequently led to the foundation of the present grammar-school, for which the said Roger Manwood obtained a licence in the usual form from queen Elizabeth.

The king however did found a considerable number of schools, now commonly called King Edward's Schools, out of tithes that formerly belonged to religious houses or chantry lands; and many of these schools, owing to the improved value of their property, are now among the richest foundations of the kind in England. In these, as in many other grammar-schools, a certain number of persons were incorporated as trustees and governors, and provision was made for a master and usher. At that time the endowments varied in annual value from twenty to thirty and forty pounds per annum.

A large proportion of the grammar-schools were founded in the reigns of Edward VI. and Elizabeth, and there is no doubt that the desire to give complete ascendency to the tenets of the Reformed Church was a motive which weighed strongly with many of the founders. Since the reign of Elizabeth we find grammar-schools occasionally established, but less frequently, while endowments for schools not grammar-schools have gradually increased so as to be much more numerous than the old schools. Foundations of the latter kind are still made by the bounty of individuals from time to time; and a recent act of parliament (2 & 3 W. IV., c. 115) has made it lawful to give money by will for the establishing of Roman Catholic schools. The statute of the 9th Geo. II., c. 36, commonly called the Mortmain Act, has placed certain restrictions on gifts by will for *charitable* purposes, which restrictions consequently extend to donations by will for the establishment or support of schools. [MORTMAIN.]

The history of our grammar-schools before the Reformation would be a large part of the history of education in England, for up to that time there were probably no other schools. From the time of the Reformation, and particularly till within the last half-century, the grammar-schools of England were the chief places of early instruction for all those who received a liberal training. From these often humble and unpretending edifices has issued a series of names illustrious in the annals of their country—a succession of men, often of obscure parentage and stinted means, who have justified the wisdom of the founders of grammar-schools in providing education for those who would otherwise have been without it, and thus securing to the state the services of the best of her children. Though circumstances are now greatly changed, there is nothing in the present condition of the country which renders it prudent to alter the foundation of these schools to any great extent; and certainly there is every reason for supporting them in all the integrity of their revenues, and for labouring to make them as efficient as their means will allow. In the conflict of parties who are disputing about education, but in fact rather contending for other things, in the competition of private schools, which from their nature must be conducted by the proprietor with a view to a temporary purpose, and in the attempt made to form proprietory establishments which shall combine the advantages of grammar-schools and private schools, and shall not labour under the defects of either—we see no certain elements on which to rest our hopes of a sound education being secured to the youth of the middle and upper classes of this country. The old grammar-schools, on the whole, possess a better organization than anything that has yet been attempted, and though circumstances demand changes in many of them, they require no changes which shall essentially alter their character. In the present state of affairs, these are specially the schools for the middle classes, and it is their interest to cherish and support them.

The voluminous Reports of the Commissioners appointed to inquire into Charities contain, as already observed, the most complete accessible information on the several schools which were visited by the commissioners. But this vast mass of materials is only useful for those who wish to inquire into some particular endowment, or for the few who have leisure to study the Reports and the knowledge necessary to enable them to make a right use of them. A good deal has been written on the subject of endowments for education from time to time. There are several articles on endowed schools in the 'Journal of Education,' and an article on endowments in England for the purposes of Education, in the second volume of the publications of the Central Society of Education, by George Long. The evidence before the select committee of the House of Commons in 1835, contains much valuable information. In 1840 a sensible pamphlet on grammar-schools appeared in the form of a letter to Sir R. H. Inglis, by the Honourable Daniel Finch, for twenty years a charity commissioner. We are indebted to this letter for several facts and suggestions.

SCHOONER. [SHIP.]

SCHOOTEN, FRANCIS, a Dutch mathematician of the seventeenth century, of whose life scarcely any particulars have been preserved. He was professor of mathematics at Leyden, and was one of the young philosophers, chiefly natives of Holland, who, rising superior to the prejudices of the age in favour of the antient geometry, contributed most to the establishment and promotion of what was then called the New analysis—the algebra of Descartes and the infinitesimal calculus.

In 1646 he published a small tract on conic sections, in which are given several ways of describing those curves by a continuous motion; and in 1649 he gave to the world a Latin translation, accompanied by a learned commentary, of the geometry of Descartes. Ten years afterwards he published, with numerous additions, a second edition of the commentary in two volumes. This work has met with general approbation, as it presents a clear explanation of the subject without the prolixity which usually accompanies the writings of a commentator; it is also enriched with the researches of several distinguished mathematicians of the age. It contains two letters from Hudde (burgomaster of Amsterdam) on the reduction of equations, on the method of tangents, and on propositions concerning maxima and minima; and one from Van Heuraet on the rectification of curves. There are also two tracts by M. Beaune on the limits of equations, and one entitled 'Elementa Curvarum,' by the unfortunate minister De Witt.

In 1651 he published his 'Principia Matheseos,' and in 1657 his 'Exercitationes Mathematicæ.' The latter work, which is now scarce, contains, besides the solutions of several curious and intricate propositions, many useful and instructive applications of algebra to geometry, particularly a restoration, in part and in an algebraic form, of the treatise on 'Plane Loci,' from the works of Apollonius.

The year of Schooten's birth is not known, but he died in 1659, while the second volume of the commentary above mentioned was in the press.

SCHOPS. [OWLS.]

SCHOREL, or SCHOREEL, JOHN, was born in 1495, at Schorel, a village near Alkmaar in Holland. His parents dying when he was very young, he was put to school by some near relations; and as he very early manifested a decided inclination for the art of design, they placed him, at the age of fourteen, under William Cornelis, an indifferent painter, with whom he remained three years, and made much greater progress than might have been expected. He afterwards studied under James Cornelis at Amsterdam, a much abler artist, who took great pains to instruct him. The fame of John de Mabuse, who was living in high esteem at Utrecht, induced Schorel to place himself under him; but he was soon obliged to leave him, on account of his dissolute manners, which disgusted the young artist. He then travelled through Germany, and passed some time at Nürnberg with Albert Durer, who treated him with great kindness. He next went to Venice, where he met with an ecclesiastic, his countryman, who persuaded him to join a company of pilgrims to the Holy Land. In Palestine he made numerous sketches of Jerusalem and the environs of the country about Jordan, and whatever appeared worthy of his attention. On his way to the Holy Land he landed at Cyprus; and on his return, at Rhodes, where he was received with much distinction by Villiers, the grand-master of the knights of St. John. In these islands he likewise enriched his portfolio with numerous sketches, which were of great use to him in his future compositions. On returning to Europe he passed three years at Rome, studying the works of Raphael and other great masters and the antique. He was the first of the artists of the Netherlands who introduced the Italian taste into his own country. He settled at Utrecht. His works were very numerous, and are spoken of in the highest terms of praise, among which the Baptism of Christ, Christ's Entry into Jerusalem, the Passage of the Israelites over Jordan, and some others, are particularly mentioned. Unfortunately all his great works in the churches and convents were destroyed by the fanatical Iconoclasts, in 1566, only four years after his death. Though many in private collections escaped destruction, his works are now excessively scarce. In the collection of old paintings made by Messrs. Boisserée, now in the possession of the king of Bavaria, are four of his pictures; and in Lord Methuen's gallery at Corsham House there is one, of which Dr. Waagen speaks in high terms of praise, and adds, that it is the more valuable as a genuine work of that celebrated master, no well authenticated performance of whom has hitherto been anywhere found. Dr. W. has probably not seen the four above mentioned. Schorel, who, besides his eminence as a painter, was one of the most accomplished men of his time, died at Utrecht, in 1562, in the sixty-eighth year of his age. (Pilkington; Bryan; Johanna Schopenhauer *I van Eyck und seine Nachfolger.*)

SCHOTT, ANDREW, was born on the 12th of September, 1552, at Antwerp. He studied at Louvain, where he afterwards taught rhetoric. But the disturbances in the Netherlands obliged him to withdraw; and about 1577 he went to Paris, where for some time he assisted Busbecq in his literary occupations. After a stay of two years in France he went to Spain, where he became acquainted with some persons of influence at the court of Philip II., in consequence of which he obtained a professorship of Greek literature at Toledo. Schott gained so high a reputation, that in 1584 he was invited to the professorship of Greek and rhetoric in the university of Saragossa. In 1586 he entered the order of the Jesuits, and in consequence of this began the study of theology, which he subsequently taught at Saragossa, until he was invited to Rome as professor of rhetoric in the college of the Jesuits. Here he remained for three years, and at the close of this period he asked and obtained permission to return to Antwerp. The remainder of his life he spent at Antwerp, devoting himself entirely to literary pursuits. He died on the 23rd of January, 1629

Schott was a man of great industry and sincerity: he was kind and obliging to all persons, whether Catholic or Protestant, his only object being to advance the interests of learning and science. As a scholar he is more remarkable for his great and accurate learning than for his genius or critical talents. His works amounted to the number of 47: we shall only give a list of the more important among them. 'Laudatio Funebris Ant. Augusti, Archiep. Tarraconensis, in qua de ejus Vita Scriptisque disseritur,' Leyden, 1586, 4to.; 'Vitæ Comparatæ Aristotelis ac Demosthenis, Olympiadibus ac Præturis Atheniensium digestæ,' Augsburg, 1603, 4to.; 'Hispania Illustrata, seu rerum urbiumque Hispaniæ, Lusitaniæ, Æthiopiæ et Indiæ Scriptores varii,' Frankfort, 1603, 1618, 4 vols. fol.: the first two vols. of this very important work were edited by Schott himself, the third by his brother, and the fourth by Pistorius. 'Thesaurus Exemplorum ac Sententiarum ex Auctoribus Optimis collectus, in centurias quatuor divisus,' Antwerp, 1607, 8vo.; 'Hispaniæ Bibliotheca, seu de Academiis et Bibliothecis, item Elogia et Nomenclator Clarorum Hispaniæ Scriptorum, qui Latine Disciplinas omnes illustrarunt,' Frankfort, 1608, 4to.: this work, though of great value for the literary history of Spain, has many defects; and as the author's name does not appear on the title-page, it has been thought that the work was not written by Schott himself. 'Adagia, sive Proverbia Græcorum ex Zenobio, Diogeniano, et Suidæ collectaneis partim edita, partim nunc primum Latine reddita; accedunt Proverbiorum Græcorum e Vaticana Bibliotheca Appendix et Jos. Scaligeri Stromateus,' Antwerp, 1612, 4to.; 'Observationum Humanarum Libri Quinque, quibus Græci Latinique Scriptores emendantur et illustrantur,' &c., Hanau, 1615, 4to.; 'Tabulæ Rei Nummariæ Romanorum Græcorumque ad Belgicam, Gallicam, &c. monetam revocatæ, cum brevi Catalogo eorum qui apud Græcos Latinosque de Ponderibus, Mensuris et Re Nummaria scripserunt,' Antwerp, 1616, 8vo.; 'Selecta Variorum Commentaria in Orationes Ciceronis,' Cologne, 1621, 3 vols. 8vo. Schott also took a part in the edition of the 'Bibliotheca Patrum,' which appeared at Cologne in 1618, &c. He also published editions of several antient writers, such as Aurelius Victor, Pomp. Mela, Orosius, St. Basilius, Theophylactes, and wrote notes upon Valerius Flaccus and Corn. Nepos. He also edited, with additions, the 'Annales Romani' of Pighius, the 'Itinerary' of Antoninus, Goltzius's 'History of Sicily,' Rosini's 'Antiquitates Romanæ,' and the 'Lettres' of Paul Manutius.

SCHRECKHORN. [ALPS.]

SCHREVE'LIUS, CORNE'LIUS, was born at Haarlem in South Holland, about the year 1615. He was brought up as a physician, but it is not stated if he ever practised this profession, and he is only known by his literary labours. In 1662 he succeeded his father as rector of a school at Leyden, which place he held till his death in 1664, according to some, or in 1667 according to others. Schrevelius published editions of many of the Latin classical writers with notes collected from various critics; Juvenal, Persius, Terence, Virgil, Horace, and Cicero are among the number. He also published a Hesiod and Homer in the same way. He also edited the 'Lexicon' of Scapula, and that of Hesychius which bears date the year 1668, after the death of Schrevelius, as appears from the dedication of the printer. Schrevelius is best known by his 'Lexicon Manuale Græco-Latinum,' the fourth edition of which is said to have appeared in 1645. Works of this kind should be estimated by the period to which they belong, and in this view the 'Lexicon Manuale' had the merit of furnishing the young scholar with a cheap dictionary of the Greek language. This dictionary however is of very limited use, as it is only applicable to a few authors. Perhaps few school-books have been more extensively used; the editions both English and foreign are innumerable. The work is still used in the schools of this country, but as it is formed on a plan fundamentally bad, and is full of errors of all kinds, it has long been one of the obstacles to the acquisition of a sound knowledge of the Greek language.

SCHULTENS, ALBERT, a learned divine, was born at Groningen, in 1680. He studied at that place till 1706, and made rapid progress in theology, Hebrew, Syriac, and Arabic. He then visited Leyden, and attended the lectures of the most eminent professors at that university. Thence he passed to Utrecht, where he met Reland and profited by his lessons. On his return to Groningen in 1708, Schultens took holy orders, and in 1711 became curate of

Wassenaar. Two years after he was appointed professor of the Oriental languages at Franeker, where he remained till 1720. He was then invited to Leyden, where he taught Hebrew and the Oriental languages with great reputation till his death, which happened on the 26th January, 1750, in the 64th year of his age. He left a son, named John Jacob, who was professor of divinity at Herborn, and who afterwards succeeded him in the chair of Oriental languages at Leyden. Schultens published several works on various subjects connected with Biblical or Oriental literature. The principal are: 'Commentarius in Librum Job, cum novâ versione,' Leyden, 1737, 2 vols. 4to.; 'Vetus et regia via Hebraïzandi contra novam et metaphysicam hodiernam,' ib., 1738, 4to.; 'Origines Hebreæ,' Franeker, 1724-38, 2 vols. 4to. In these last two works Schultens upholds the doctrine that the Hebrew, Arabic, Syriac, and Chaldee are only the remains of a more antient language taught to man by his Creator; and refutes the opinions of Gousset and his disciples, who maintained the divine origin of the Hebrew. 'Proverbia Salomonis cum versione integrâ et commentario,' Leyden, 1748, 4to.; 'Monumenta vetustiora Arabiæ,' ib., 1740, 4to., or a collection of poetical fragments of the times preceding Mohammed, as preserved in the works of Nuwayrí, Masúdí, Abú-l-fedá, &c., with a Latin translation and copious notes. He published also the 'Life of Saladin,' by Boháu-d-dín, in the original Arabic, with a Latin translation, and an excellent geographical index, Leyden, 1755, folio; a portion of the *Makamát*, or sessions of Harírí; and a new edition of Erpenius's Arabic Grammar, with numerous additions. A short account of the life and writings of Schultens may be read in the 'Athenæ Frisiacæ,' by Vriemoet.

SCHULTENS, HENRY ALBERT, grandson of the preceding, was born at Herborn, 15th February, 1749, at the time when his father (John Jacob) was professor of divinity at that place. He was educated at Leyden, where he applied himself with great diligence to the study of Hebrew and Arabic under his father and Everard Scheid, who then lodged at his house. He also studied the Greek and Latin classics under Hemsterhuis, Rhunkenius, and Walkenaar, and cultivated English literature, being remarkably fond of Pope and an enthusiastic admirer of Shakspere. In 1722, when he was only in his twenty-third year, he published his 'Anthologia Sententiarum Arabicarum' (Leyden, 4to.), with a Latin translation and notes. Shortly after he visited England, for the purpose of consulting the Arabic MSS. in the Bodleian Library, and resided for some time at Oxford as a gentleman commoner of Wadham College. In May, 1773, the University conferred on him the degree of M.A. by diploma. He also visited Cambridge, and made several corrections and additions to the catalogue of the Oriental MSS. in the University Library. During his stay in England, Schultens published his 'Specimen Proverbiorum Meidani ex versione Pocockianâ' (1773, 4to.), which he had transcribed while at Oxford from the original manuscript of Edward Pocock, preserved in the Bodleian. On his return to Holland, Schultens was appointed professor of Oriental languages in the academical school of Amsterdam, where he remained for five years, until, in December, 1778, he was called to succeed his father in his chair, and in 1787 was elected rector of the university. At the expiration of his functions in 1788, he delivered his remarkable peroration 'De Ingenio Arabum,' which was afterwards printed. In November, 1792, he was attacked by a slow fever that terminated in a consumption, of which he died in August, 1793, at the age of forty-four.

Besides his Anthologia of Arabic sentences, and several articles in the 'Bibliotheca Critica,' edited by Wyttenbach (Amst., 1779-90), Professor Schultens wrote 'Pars versionis Arabicæ Libri Colaïlah wa Dimnah,' Leyden, 1786, 4to., or the Arabic translation of the Fables of Bidpay, or Pilpay, made by Abdalla Ibn Mokaffa. [BIDPAY.] 'Meidanii Proverbiorum Arabicorum pars, Latinè cum notis,' ibid., 1795, 4to. This work, which is different from that published in 1773, was not printed till after the death of the author, by the care of his friend Nicholas William Schröder. It contains only a portion of the proverbs of Meydani, of the whole of which Schultens had made a translation. 'De Finibus Litterarum Orientalium Proferendis,' Amst., 1774, 4to. 'De Studio Belgarum in Litteris Arabicis Excolendis,' Leyd., 1779. These are two inaugural orations read on the occasion of his taking possession of the chairs which he filled at Amsterdam and Leyden. He left also a Dutch translation of the Book of Job, which has never been printed. The life of Henry Albert Schultens, accompanied by his portrait, appeared in Wagenaar's collection, entitled 'Series Continuata Historiæ Batavæ,' part i., pp. 364-80.

SCHULTING, ANTONIUS, was born at Nymegen in Guelderland, in 1659. He received a learned education under Rycquius and Græevius, and afterwards studied law at Leyden under Voet, and under Noodt, to whom he was related. After being employed as a teacher of law in his native province and also in Friesland, he was removed to the university of Leyden in 1713, where he became the colleague of Noodt. He died at Leyden in 1734. Schulting was a laborious student, and he had a right perception of the necessity of studying Roman law in its historical development. Besides some orations delivered on public occasions, he wrote 'Enarratio partis primæ Digestorum, Leyden, 1720, 8vo.; 'Thesium Controversarum juxta seriem Digestorum decades C.,' Leyden, 1738, 8vo.; and 'Notæ ad Veteres Glossas Verborum Juris in Basilicis,' inserted in the third volume of the Thesaurus of Otto. But the work by which he is best known is the 'Jurisprudentia Vetus ante-Justinianea' (Lugd. Bat., 1717, and Lips., 1737), which contains the remains of the four books of the 'Institutiones' of Gaius, the 'Sententiæ Receptæ' of Paulus, the twenty-nine 'Tituli ex Corpore Ulpiani,' the fragments of the 'Codices Gregorianus et Hermogenianus,' the 'Mosaicarum et Romanarum Legum Collatio,' and some few other matters. Though this work has been superseded either altogether or in part, so far as regards the text, by the 'Jus Civile ante-Justinianeum,' &c., published at Berlin in 1815, by the 'Corpus Jur. Rom. ante-Justinian.,' &c., Bonn, 1835 and 1837, and by the various discoveries and labours of more recent jurists, it is still very valuable for the learned notes of Schulting and other scholars which accompany it.

SCHULTZE, ERNST CONRAD FRIEDERICH, a young German poet, no less remarkable for the enthusiasm of his character, and for the peculiar application of his genius, than for his genius itself. He was born at Celle, March 22nd, 1789, and was so far from giving early indications of a studious disposition, that while at school he was considered exceedingly negligent and wayward, and impatient of restraint or order. Neither did he distinguish himself by diligence at the University of Göttingen, whither he proceeded in 1806; for though he gained the notice and friendship of Professor Bouterwek, by the superiority of his college exercises, and by the talent displayed in the poetical compositions he ventured to submit to his criticism, he benefited little by the public lectures he attended, even those on classical and modern literature. A year or two before going to the university he had indulged in reading romances of chivalry and legends of fairy fiction, of which he had met with an ample store in an old library to which he had access, and their influence is plainly perceptible in his productions. The first was a poem, composed by him while at Göttingen, on the story of Psyche, in which he seems to have proposed to himself Wieland as his model, and in which he caught the charming style and versification of that master.

Had he prosecuted the career thus begun at the age of eighteen, he would probably have become one of the most popular as well as the most gifted of German poets. Circumstances however converted him into a visionary enthusiast. He conceived a deep attachment for an amiable and accomplished girl, named Cecilia, the daughter of one of the professors; and her death, within a year or two afterwards, left him inconsolable. He resolved to immortalise his passion and her name and perfections: accordingly, with only an interval during which he served as a volunteer in the war of 1813-14, he applied himself to the composition of 'Cecilia,' a romantic poem in twenty cantos, completed by him in December, 1815. Unfortunately the intensity of his own feelings overpowered his judgment; for the plan of the work is so complex, and so wild and improbable, that the fancy and genius displayed in it have been wasted upon a subject which scarcely any poetical power could invest with interest for the public. It is rich in striking scenes and incidents, in beautiful details, in graceful imagery, in harmonious versification; but it is wanting in that which fixes attention, and which is especially required in a work of such length. It is impossible not to admire the talent which it displays, and it is equally impossible not to regret that it should have been so ill applied.

His subsequent romantic poem, 'Die Bezauberte Rose,' or 'Enchanted Rose,' in three cantos, in regular *ottava rima*, which obtained the prize offered by the publishers of the 'Urania' for the best production of the kind, and first published in that pocket-book, 1818, is the production by which he will continue to be known. It has already passed through several editions, and may now be considered a standard work of its class in German literature. The poet himself however did not live to enjoy the honour it conferred upon his name; for after having been long in a gradually declining state, he died at his father's house at Celle, June 22nd, 1817, the victim of consumption, but also of morbid and overstrained feeling, and of a passion that 'loved not wisely, but too well.' A collection of his poems and literary remains was published by his friend and instructor Bouterwek, in 4 vols. 8vo.

SCHUMLA. [SHUMLA.]

SCHWABACH is a thriving manufacturing town of Bavaria, in the circle of Middle Franconia (formerly the circle of the Rezat), on both banks of the river of the same name, which falls into the Regnitz at Erlangen. It is a well built town surrounded with walls, with four gates, and has 1 French Protestant and 2 Lutheran churches, 2 chapels, a synagogue, an hospital, a lunatic asylum, a well-regulated house of correction, and a poor-house. There are numerous manufactories, several of which were established by French refugees, who settled here in 1686, after the revocation of the Edict of Nantes. The principal are those of cotton and of needles. The latter produces every week 4,000,000 common needles, 100,000 English darning, packing, and other needles, and employs about 500 workmen. There are also manufactures of gold and silver lace, gold and silver articles, stockings, tobacco, paper, hats, sealing-wax, soap, and many others. The breweries are considerable. The number of inhabitants is nearly 8000, who have a profitable export trade in their own manufactures.

It is probable that the Italic type, called Schwabach type, was invented in this town, which was employed by the printers at Mainz soon after 1480. The Schwabach Articles are the confession of faith of his party, drawn up by Luther for the assembly of German Protestant princes and cities, at Schwabach, in October, 1529, which the cities of southern Germany, adhering to the Swiss doctrine, would not subscribe, on account of the strongly expressed opinion of Luther of the real presence of Christ in the Lord's Supper. These articles, which were adopted by the confederates at Schmalkalden, were a chief obstacle to the union of the parties of Luther and Zwingli. (Stein; Hassel.)

SCHWARZ, CHRISTIAN FRIEDRICH, was born Oct. 26, 1726, at Sonnenburg, in the Prussian province of Brandenburg. He was educated at the schools of Sonnenburg and Cüstrin till his twentieth year, when he entered the University of Halle, where he obtained the friendship of Herman Francke, who was a warm supporter of missionary labours. Schwarz and another student were appointed to learn the Tamul, in order to superintend the printing of a Bible in that language, which however was not carried into effect; but the knowledge of the Tamul which Schwarz had acquired induced Francke to propose to him that he should go out to India as a missionary. Schwarz had been educated with a view to the Christian ministry: his own religious impressions had early seconded the wishes of his father, and the proposal of Francke was immediately acceded to. Having been ordained at Copenhagen, he embarked at London, Jan. 21, 1750, and in July arrived at Tranquebar, on the Coromandel Coast, the appointed scene of his labours, and the seat of a Danish mission.

Schwarz continued to reside chiefly at Tranquebar, and to labour with the Danish mission till 1766, when he devoted his services to the Society for Promoting Christian Knowledge, to which the Danish mission was soon afterwards transferred. He now took up his abode at Trichinopoly, where he had founded a church and school in 1765. Here he performed the duties of chaplain to the garrison, for which he received 100*l.* a year, a sum which he devoted entirely to the service of the mission.

Schwarz continued to reside for several years at Trichinopoly, occasionally visiting other places, especially Tanjore. Small congregations of Hindu converts gradually grew up under his care, and in 1777 another missionary was sent from Tranquebar to assist him. His visits to Tanjore now became more frequent, and he obtained the friendship of the raja Tulia Maha, who gave him leave to build a church in Tanjore. He proceeded with the work till his funds were exhausted, when he applied to the presidency of Madras for assistance. In reply he was requested to proceed immediately to the seat of government in order to receive the appointment of ambassador, for the purpose of treating with Hyder Ali for the continuance of peace, a task to which he was summoned by Hyder himself. 'Do not send to me,' said Hyder, 'any of your agents, for I do not trust their words or treaties; but if you wish me to listen to your proposals, send to me the missionary of whose character I hear so much from every one: him I will receive and trust.' Schwarz was startled by the novelty of the proposal, but after requesting time to consider of it, he accepted the offer. He proceeded to Seringapatam, and resided at the court of Hyder for three months. His mission was entirely successful; the terms of the peace were settled, and he then returned to Tanjore.

The peace however was of short continuance, and Schwarz complained that the British were guilty of the infraction. Hyder invaded the Carnatic, and during the years 1781, 1782, and 1783 the sufferings of the inhabitants were dreadful; they fled to the towns for protection; Tanjore and Trichinopoly were crowded with starving multitudes; at Tanjore especially numbers died in the streets of famine and disease, and the garrison itself was enfeebled by want, and dispirited by knowing that a powerful army was outside the walls. There were provisions in the country, but the exactions both of the British and the Raja had destroyed the confidence of the cultivators, and they would not bring them to the fort. At length the Raja said, 'We all have lost our credit. Let us try whether the inhabitants will trust Mr. Schwarz.' Schwarz was accordingly empowered to treat with the cultivators. He sent out letters, in which he promised not only to pay for what was brought in, but for any bullock which might be taken by the enemy. In two or three days a thousand bullocks were obtained, and in a short time 80,000 kalams of grain. By this means the town was saved.

In 1784 the East India government sent Schwarz on a mission to Tippoo Saib, but the son of Hyder would not receive him. Another church was built in the neighbourhood of Tanjore, which the increase of his congregation had rendered necessary; and in 1785 he engaged in a scheme for the establishment of schools throughout the country for the purpose of teaching the natives the English language, which was carried into effect at Tanjore and other places; and the good faith and good sense with which Schwarz conducted them, no 'deceitful methods' being used to bring over the pupils, who were chiefly children of the upper classes, to the doctrines of Christ, proved highly beneficial, not only from the instruction and moral principles communicated, but from the confidence and good feeling which were created in the natives generally.

In 1787 the Raja of Tanjore lay at the point of death. He had adopted as his successor a boy yet in his minority, and now sent for his friend Schwarz as the only person to whom he could with confidence entrust him. 'He is not my son, but yours,' said the dying Raja; 'into your hands I deliver him.' Ameer Sing, brother of Tulia Maha, was appointed regent and guardian; but he was disposed to be treacherous, and he was supported by a strong British party; so that it required all Schwarz's care and influence with the East India Company to establish the young prince in the possession of his inheritance. Maha Sarbojee, the raja, some years afterwards manifested his filial affection for his tutor and protector by erecting a monument to his memory in the mission church at Tanjore, on which the Raja is represented as grasping the hand of the dying saint, and receiving his blessing. The monument is by Flaxman. The success of Schwarz in the education of his pupil is shown by the terms in which Bishop Heber spoke of him (the Raja) in 1826. Heber calls him 'an extraordinary man,' and says that he quoted Fourcroy, Lavoisier, Linnæus, and Buffon fluently, that he had formed an accurate judgment of the merits of Shakspere, that he wrote tolerable English poetry, and was 'respected by the English officers in the neighbourhood as a real good judge of a horse, and a cool, bold, and deadly shot at a tiger.' Heber sums up his description by remarking that 'he looked and talked like a favourable specimen of a French general officer.'

Schwarz died February 13, 1798. Besides the monument already mentioned, which the Raja sent a commission to Flaxman to execute, another by Bacon was sent out by the East India Directors, and was erected in St. Mary's church at Madras.

For several years Schwarz's labours in the conversion of the Hindus were apparently attended with little success, which was not owing to persecution or opposition, but almost entirely to the peculiar mental character of the natives of India, cool, subtle, fond of argument, and slow to be convinced; but the effect of his preaching and the influence of his virtuous and disinterested life were attended by a slow but steady advance of the cause of Christianity. Congregations were formed in numerous villages, and preachers were established at Caddalore, Negapatam, and other towns, besides those at the earlier stations of Tranquebar, Trichinopoly, and Tanjore. The memory of Schwarz is regarded with a feeling of veneration both by Mohammedans and unconverted Hindus, as well as by the Christian converts. Bishop Heber says of him, that 'he was one of the most active and fearless, as he was one of the most successful missionaries who have appeared since the Apostles. To say that he was disinterested in regard of money is nothing; he was perfectly careless of power, and renown never seemed to affect him, even so far as to induce an outward show of humility. His temper was perfectly simple, open, and cheerful, and in his political negotiations (employments which he never sought, but which fell in his way) he never pretended to impartiality, but acted as the avowed though certainly the successful and judicious agent of the orphan prince committed to his care.'

(*Gallery of Portraits*; Heber's *Journey through the Upper Provinces of India.*)

SCHWARZBURG is a German principality consisting of two considerable portions detached from each other, of which the southernmost is called the Upper County and the northernmost the Lower County. The Upper County lies on the north side of the Thüringer Wald, between 50° 34′ and 50° 55′ N. lat., and between 10° 50′ and 11° 20′ E. long. It is bounded by the Prussian territory and the Saxon duchies, and is traversed by the rivers Gera, Saale, Ilm, and Schwarze. The Lower County lies between 51° 13′ and 51° 25′ N. lat., and between 10° 30′ and 10° 17′ E. long. It is almost surrounded by the Prussian territories, but on the south-west it borders on Gotha, and on the south-east on Weimar. It is watered by the rivers Wipper and Helbe. The total area of the two counties is 745 square miles, and the number of inhabitants is 112,000, who, with the princes, are of the Protestant religion, excepting about 350 Roman Catholics and 200 Jews. The surface of the country is diversified with mountains, valleys, and plains, and is on the whole fertile. The Lower County is however more productive than the Upper, which is traversed by a part of the Thüringer Wald. In the Lower County is the Kyffhäuser, 1458 feet high, and the Hainleite, a wooded mountain-chain which begins at the river Unstrutt and extends eight leagues to the west. The natural productions are corn, fruit, potatoes, flax, and pulse. The forests furnish timber for every purpose, and abound in game. The mineral productions are silver, copper, iron, lead, vitriol, sulphur, alum, saltpetre, salt, marble, alabaster, freestone, slate, potters'-clay, porcelain-clay, and lime. The inhabitants have most of the usual domestic animals. Oxen and swine are numerous, and of late years the breeding of sheep has been much attended to.

The family of the princes of Schwarzburg is very antient, and is mentioned in the earliest period of the middle ages. It is now divided into two branches, Rudolstadt and Sondershausen, each of which has a part both of the Upper and the Lower County.

Schwarzburg-Rudolstadt has a territory of 400 square miles in extent, with 60,000 inhabitants, and a revenue of 180,000 dollars. In the Upper County the prince has the lordship of Rudolstadt, including the capital, a well-built town in a valley on the Saale, the residence of the prince and the seat of government. Within the walls is Ludwigsburg, the prince's palace, which contains some considerable scientific collections. There are in Rudolstadt two churches, a gymnasium, a theological seminary, and 4100 inhabitants, who manufacture some cloth and flannel, and carry on a little trade. In the Lower County the prince of Rudolstadt possesses the lordship of Frankenhausen, the capital of which, of the same name, situated on an arm of the Wipper, has two churches within the walls, and two without, a palace, a Latin high school, and 4700 inhabitants.

Schwarzburg-Sondershausen has a territory of 345 square miles in extent, and 52,000 inhabitants. In the Lower County, the prince has the lordship of Sondershausen, with the capital of the same name, which is situated in a pleasant valley on the Wipper. The palace, situated on an eminence, contains a good cabinet of natural history. The town has a theatre, a gymnasium, an orphan asylum, an hospital, and other public institutions. The population is 4000. In the Upper County, the prince has the lordship of Armstadt. This town has also a palace of the prince, a gymnasium, 4 churches (of which that of the Virgin Mary is a valuable monument of the antient German style), 2 hospitals, and 5000 inhabitants, who have some trade in timber and corn, and considerable breweries. The public revenue amounts to 325,000 florins. Both provinces belong to the German confederation; they have, with Oldenburg and Anhalt, the fifteenth place in the select council, and in the full council one vote each. The contingent of Sonderhausen to the army of the Confederation is 451 men, and that of Rudolstadt 539 men; they form part of the reserve division. Each contributes 200 florins annually to the chancery of the Confederation. Rudolstadt has had ever since 1816 a representative constitution with an assembly of the states, consisting of 18 deputies. The prince of S. Sonderhausen is not limited by a constitution, that which was proposed in 1831 having been rejected by the Upper County.

SCHWARZENBERG is a lordship in Middle Franconia (late the circle of the Rezat), in the kingdom of Bavaria, from which the princes of Schwarzenberg take their title. This illustrious family is one of the most antient of the noble houses of Franconia, and has the same origin as that of the counts of Seinsheim. Erkinger von Seinsheim purchased, in 1420, the county of Schwarzenberg, of which he assumed the name and title. He died in 1427, and his family was divided into the two houses of Schwarzenberg and Seinsheim. Adolphus von Schwarzenberg was raised, in 1599, by the emperor Rudolf II., to the dignity of count of the empire, as a reward for his bravery in the wars with the Turks. His grandson John Adolphus was raised by Leopold I., in 1670, to the rank of prince of the empire, and the county to that of a principality. In 1698 this family obtained by inheritance the landgraviate of Klettau, in Swabia, and in 1723 Prince Adam Francis was elevated to the rank of Duke of Kruman in Bohemia. By an imperial diploma of December 8, 1740, the princely dignity was extended to all the male and female descendants of the family. In 1806 the principality of Schwarzenberg and the landgraviate of Klettau were mediatised, and the latter was sold in 1813 to Baden. The present possessions of the family, which is of the Roman Catholic religion, are the county or principality of Schwarzenberg, 105 square miles in extent, with 10,000 inhabitants; in Swabia it possesses the county of Illereichen and Kellmünz; and several lordships, 30 square miles, with 3500 inhabitants, under Bavaria, Würtemberg, and Baden. The other possessions are in the Austrian dominions: 1, the duchy of Krumau, in Bohemia, contains 45,000 inhabitants, and 336 square miles; 2, the lordship of Muran, in Styria, 21 square miles, and 2000 inhabitants; 3, sixteen lordships in Hungary, 440 square miles, with 65,000 inhabitants. These possessions are now divided between two families: the first has the estates in Franconia and Swabia, and the duchy of Krumau and 20 lordships in Austria, with a revenue of 600,000 florins; the other has the remaining possessions, with a revenue of 100,000 florins.

SCHWARZWALD. [Germany.]

SCHWARZWALD, one of the four circles of the kingdom of Würtemberg, derives its name from the principal range of mountains, the Schwarzwald, or Black Forest. It is situated between 47° 55′ and 48° 55′ N. lat., and between 8° 15′ and 9° 15′ E. long., and is bounded on the north by Baden, on the north-east by the circle of the Neckar, on the east by the circle of the Danube and by Hohenzollern, and on the south-east, south, and west by the grand-duchy of Baden. Its area is 1840 square miles, with 425,000 inhabitants, of whom nearly three-fourths are Protestants, one-fourth Roman Catholics, and 1600 Jews. The face of the country is mountainous and woody. The Black Forest covers all the western part, and many offsets from it run into the interior, and on the east the Alb extends as far as Salz. The soil is much more stony and the climate more ungenial than in the circle of the Neckar. It is therefore more calculated for pasturage than for agriculture, and does not grow sufficient corn for the inhabitants a great part of whom subsist on potatoes, which are very abundant. Flax is a chief product of the circle; but its most valuable articles are the timber from the extensive forests and the fine breed of cattle, of both of which large quantities are exported. Game and fish abound, and the mineral kingdom yields iron, some salt, fine marble, and alabaster. Though this circle is inferior in its natural productions to that of the Neckar, it far excels it in manufacturing industry. There are not, it is true, any manufactories on a great scale; but the country-people spin yarn, thread, and worsted, and manufacture ticking, worsted stockings, caps, and muslin. This circle is the seat of the woollen manufactures. The tanneries are extensive. There are many paper and oil mills. The inhabitants prepare potashes, pitch, tar, and lampblack; they make wooden clocks and various wooden-wares. There are great iron-works and some glasshouses. The trade is chiefly retail. The exports are timber, cattle, yarn, and some manufactures. On the whole, the town of Kalw has more trade than any other place in this circle. The circle is divided into seventeen bailliwicks. [Calw; Reutlingen; Tübingen.] Rothenburg, on the Neckar, with the old town or suburb of Chingen, has 6000 inhabitants; it is the see of the Roman Catholic bishopric of the kingdom. The town has broad streets and a spacious market-place; among the public buildings are a handsome town-house, 6 Roman Catholic churches, and several dissolved monasteries.

SCHWATZ is a large and handsome market-town in Tyrol, on the right bank of the Inn, in 47° 33′ N. lat. and 11° 40′ E. long. This town was founded in antient times, and owed its prosperity to the very rich silver, iron, and copper mines in its neighbourhood: these have however become much less productive. On the 15th of May, 1809, it was taken by the Bavarian troops under the command of Marshal Wrede, and set on fire: on that occasion 360 houses, two churches, two hospitals, and 45 barns were consumed. It has been partly rebuilt, and, according to Hassel (in 1819), handsomer than before; but Blumenbach, in 1836, and the 'Austrian National Encyclopedia,' 1838, say that it has never recovered since 1809, and that the population, which before that time was 8000, is now only 3000. It has a handsome parish church, which escaped the fire, as did also the Franciscan convent, in which there is a philosophical seminary of that order. The inhabitants derive their subsistence from the manufacture of cotton-yarn, stockings, cutlery, wire, and tobacco, of which there is a large manufactory belonging to the government. There are likewise one manufactory of smalt and one of verdigris. Many of the people find employment in the neighbouring silver and copper mines.

SCHWEIDNITZ, the capital of the principality of the same name, is situated in 50° 47′ N. lat. and 16° 30′ E. long., on the left bank of the Weistritz, in one of the most beautiful parts of Silesia. It was formerly one of the strongest fortresses in the Prussian monarchy, and sustained several memorable sieges in the Thirty Years' War. It was very much strengthened by Frederic II., was taken in 1757 by the Austrians, in 1759 by the Prussians, in 1781 by the Austrians, and afterwards recovered by the Prussians, in whose hands it remained till, after a wretched defence from the 16th of January to the 16th of February, 1807, it fell into the hands of the French, who blew up the greater part of the fortifications, which have not since been restored. The internal works however remain. Among the public buildings are two Roman Catholic churches, one of which is 327 feet high; two Lutheran churches, a convent of Ursuline nuns, an hospital, a poor-house, and an orphan asylum. There are in the town a Protestant gymnasium, a Protestant elementary school, a girls' school in the convent of the Ursuline nuns, and numerous private schools. The manufactures are woollen, linen, leather, starch, gloves, hats, silk, ribbon, and paper. The inhabitants have also three breweries, twenty-five distilleries, five vinegar manufactories, eight dye-houses, and twenty-two tanneries. The corn, cattle, and wool fairs are very much frequented. Not far from the town are copper-works. The population is 9476, besides the garrison.

SCHWEITZ. [Switzerland.]

SCHWERIN, the capital of the grand-duchy of Mecklenburg-Schwerin, is situated in 53° 45′ N. lat. and 11° 30′ E. long., on the west side of the lake of Schwerin. The external appearance of the town is very striking; the palace, the cathedral, the theatre, and some other fine buildings, and the great length of the town, give it a look of importance with which the interior by no means corresponds. The city is neither regular nor handsome, but the streets in the new town are straight and broad; those in the old town and the suburb, though the latter is of recent origin, are for the most part crooked and narrow. There are however some handsome public buildings: 1, the grand-ducal palace, situated on an island in the lake, is fortified, and communicates with the town by a drawbridge; the interior is fitted up in an antiquated style, but contains a fine picture-gallery and a museum; 2, a large building, said to be the finest modern edifice in Mecklenburg, for the public offices; it was commenced in 1825 and finished in 1835; 3, the theatre; 4, the cathedral, an old Gothic edifice 305 feet in length, 135 in breadth, and of considerable height; 5, the town-house. Besides the cathedral, there are two other Lutheran churches, a Roman Catholic church, and likewise a synagogue. There are a gymnasium, a veterinary school with a remarkable collection of anatomical preparations, a lunatic asylum, a Bible Society; many distilleries and vinegar manufactories, and some manufactories of cloth, pottery, and tobacco; they are not however of much importance. The number of inhabitants is about 13,000, of whom a considerable proportion are of the poorer class, for whom there are several well-endowed charitable institutions.

SCHWYZ, one of the cantons of the Swiss confederation, which has given its name to all Switzerland, called 'Schweiz' in German. The canton called Schwyz is the wealthiest and most populous of the three Waldstätten, or forest cantons (Uri and Unterwalden are the other two), which were the first to assert their independence, in January, 1308, and to form a confederacy, which repulsed the force of the house of Austria at Morgarten; the men of those cantons became known by the name of Schwyzern or Schweizern, which name continued to be applied to the Confederation in general after it was enlarged by the successive junction of other cantons; and lastly, the whole country formerly known in the Roman times by the name of Helvetia has been called Schweiz or Schweizerland. The early history of the canton of Schwyz is given under Switzerland.

The canton of Schwyz lies on the west side of the high Alps of Glarus, of which the Glärnisch, 9000 feet high, is the loftiest summit. It consists of several long valleys between lower offsets of the Alps, the summits of which are from 4000 to 6000 feet high, and of a plateau or table-land in the centre of the canton. The principal valleys are the Wäggi Thal in the north, the Sihl Thal in the middle, and the Muota Thal in the south. The waters of the northern part of the canton of Schwyz run in a north direction into the lake of Zürich; those of the central part flow north-west by the river Sihl into the Limmat; and those of the southern part run southwards into the Waldstätten lake. Besides bordering on those two lakes, the canton embraces within its territory the southern part of the lake of Zug, and it also entirely encloses the small lake of Lowerz, which is about two miles long and one mile wide, and the waters of which have an outlet southward into the Waldstätten See. The small island of Schwanau, on which are the ruins of a feudal castle, rises in the middle of the lake. North-west of the lake of Lowerz, and between it and the lake of Zug, is the valley of Goldau, between Mount Rigi and the Rossberg. On the 2nd of September, 1806, an enormous fragment of the Rossberg detached itself from the mountain, and rolled down into the valley, which it covered, destroying the villages of Goldau, Röthen, and Busingen. One hundred and ten houses, four hundred and fifty-seven persons, and two hundred and five head of horned cattle were buried under the ruins. Most of the cattle which were out in the fields ran away in time, and flocks of birds fled across the valley to the Rigi previous to the fall. The loss of property, including the land, which was very fertile, especially in pasture, has been valued at two millions of francs. The country still exhibits all the marks of this destruction.

The canton of Schwyz is bounded on the east by the canton of Glarus; north-east by St. Gall, from which it is separated by the river Linth; north by the lake of Zürich; west by Zug, from which it is separated by the ridge of Morgarten and by the Rossberg; south-west by Luzern, the group of the Rigi lying on the borders of the two cantons; south partly by the Waldstätten lake, which separates it from Unterwalden, and partly by the canton of Uri, an offset of the Alps called the Rosstock, from 6000 to 7000 feet high, forming the boundary. The area of the canton of Schwyz, according to Meyer of Knonau, is 360 square miles; but according to Guinaud (*Description de la Suisse*, 1839) only 279 square miles. The population, which was about 30,000 at the beginning of the present century, is now 40,650. It is the thickest peopled and most fertile of the mountain cantons, with the exception of Appenzell. None of the mountains of Schwyz being covered with perpetual snow, the cold is not so severe as in the other Alpine valleys, and the cattle are able to feed in summer as far as the summits. The horned cattle amount to 15,000 head in winter, and about 20,000 in summer; the number of sheep is about 6000; and there are also large herds of pigs, mostly in the March, and of goats. In the district of Einsiedeln the breeding of horses is attended to, and the monastery has a stud for the purpose. A considerable quantity of cheese and butter is made. Corn is only partially cultivated; potatoes are a common article of food. Flax and hemp are produced in several districts. Artificial grass is sown in some places. There are vineyards near the borders of the lake of Zürich, but cider is the common drink of the people. Kirschwasser is distilled, though not in a great quantity. The forests form a considerable source of wealth. The canton exports butter, cheese, timber, and wood for fuel, cattle to the amount of about 1,200,000 francs yearly (the greater part of which goes to Italy), horses, sheep, and pigs. It imports corn, wine, brandy, salt, coffee (which is become an article of general use), sugar, and manufactures of various sorts. The manufactures of the canton consist chiefly of linens, potash, soap, walnut-oil, wax candles, tobacco, and gunpowder. There are also some breweries, and many saw-mills, and lime and brick kilns.

The people of Schwyz are remarkable for their square athletic forms and muscular strength; the complexion is generally fair; the females, though they cannot be called generally handsome, look healthy; many persons attain a very great age. The peasantry live chiefly on bread, potatoes, milk, and coffee; they eat meat only on holidays. Most of the houses are built of wood and covered with tiles, and are warmed by stoves. The canton contains six towns, twenty-six villages forming parishes, and fifty-eight hamlets. The whole number of houses is about 5000.

There are elementary schools in the various communes, but they are under no uniform system, and there is no compulsory attendance of the children. The schoolmasters are miserably paid, and are obliged to follow other occupations. There is a college or gymnasium in the town of Schwyz, under the direction of the Jesuits, and a clerical seminary at Einsiedeln. There is also at Einsiedeln a deaf and dumb school.

Notwithstanding the little encouragement given to education, the canton of Schwyz has produced several learned men, such as the historians Ulrich Wagner and Albert von Bonstetten, in the fifteenth and sixteenth centuries; Paracelsus, who died in 1541; the naturalist Kälin; Thomas Fassbind, who died in 1824, and wrote a history of the canton; the poet Zay, who has written a description of the catastrophe of Goldau; the painters Af der Mauer, Ab Iberg, Ospenthaler, Steiner, and Triner; F. Schmid, a painter of panoramas; the sculptors Hedlinger and Bodenmüller; and Baumann, who makes topographic maps in relief, after the manner of General Pfyffer of Luzern.

The language of the people of Schwyz is a Swiss-German dialect, which differs little from that of Zürich; it is full of guttural sounds, and the people accentuate the words strongly. The population of Schwyz, as well as of the neighbouring mountain cantons, is probably formed from an admixture of Teutonic or German colonists with the original Helvetians, who escaped in these remote parts both from the Roman conquests and the irruptions of the Alemanni who ravaged Northern Switzerland at the fall of the Western Empire.

Schwyz, the capital of the canton, is situated at the junction of the valley of Muota with two other valleys, one of which runs southwards to Brunnen on the shore of the Waldstätten Lake, and the other westward towards the little lake of Lowerz. Schwyz is not quite three miles distant from the Waldstätten Lake. The curiously shaped mountain called Mythen, nearly 6000 feet high, rises immediately north-east of the town, and seems to threaten to overwhelm it by its fall. The country around Schwyz is beautiful and very fertile, and the scenery is splendid. Schwyz is an open town: it has two good streets, a large square, a very handsome church, dedicated to St. Martin, which is one of the finest in Switzerland, two or three convents, a college kept by the Jesuits, a town-house, a repository of the archives, an hospital, which serves also as a prison, a library belonging to the town, which is rich in works relative to the history of the country, a cabinet of medals belonging to the family of Hedlinger, several good inns, and about 4000 inhabitants. In the burying-ground annexed to the parish church is the monument of Aloys Reding, who fought bravely for the independence of his country against the French in 1798-99. Zchokke, a contemporary writer, has given an affecting narrative of that memorable struggle in his 'Geschichte vom Kampf und Untergang der Schweizerischen Berg und Wald Kantone.' The family of Reding, one of the principal of Schwyz, has an historical reputation, several of its members having distinguished themselves at various times either in the wars of Switzerland or in foreign service. The parish church contains the rich banner given by Pope Julius II. to the Swiss troops which he had taken into his pay in the war of the Holy League. An old MS. chronicle of Schwyz mentions that colonies from Denmark and East Friesland came at a remote epoch, the date of which however is not ascertained, to settle near the shores of the Waldstätten See. One of these colonies, the legend says, was led by two brothers called Tschey and Schwyter, who quarrelled about some arrangements concerning their new settlement, when Schwyter, having killed his brother, remained sole leader, and gave his name to the country. Traditions of a Danish or Scandinavian origin are also retained by the mountaineers of the Ober Hasli in the Bernese Alps. The town of Einsiedeln, situated about 10 miles north of Schwyz, is a thriving place, with a good paved street, numerous shops, inns, and public-houses, and about 2500 inhabitants. The prosperity of Einsiedeln is owing to its celebrated sanctuary in the church of the abbey, which attracts a number of pilgrims every year. The Benedictine abbey of Einsiedeln was founded in the tenth century, and is very rich both in land and other capital. The abbot is, for spiritual matters, under the immediate jurisdiction of the pope. The monastery, which is outside of the town, is a square building three stories high, and 476 feet long and 414 wide, with spacious gardens and numerous offices and outhouses. The church has several fine altars, besides the chapel or sanctuary, which contains the image of the Virgin which is the object of the pilgrimage. The treasures belonging to it were plundered by the French in 1798, but have been since replaced in part. The library of the monastery contains 26,000 volumes. It is calculated that no less than 150,000 pilgrims repair to Einsiedeln every year.

Gersau, a small town on the shore of the Waldstätten See, was formerly a distinct republic, the smallest in Europe, with a population of about 1300 inhabitants, but it is now united to the canton of Schwyz. The people are industrious and thriving: they have manufactories of silks, leather, and potash, and they carry on a considerable trade with other parts of Switzerland and with foreign countries.

Lachen, the head town of the district of the March, on the south shore of the lake of Zürich, 16 miles north-east of Schwyz, has a handsome church, a town-house, some iron-forges, several mills, and about 1500 inhabitants. Arth, a pretty little town at the south extremity of the lake of Zug, has a good parish church, a library in the Capuchin convent, and about 1300 inhabitants.

The canton of Schwyz is divided into seven districts:—1, Schwyz Proper, which is by far the largest, and contains nearly one-half of the whole population of the canton. 2, Einsiedeln. 3, Gersau. 4, The March. 5, Küssnacht. 6, Wolrau. 7, Pfäffikon. Formerly the district of Schwyz Proper, or 'alte landschaft,' was sovereign of the rest, the other districts having no voice in the landsgemeinde, or legislative assembly of the canton, although they had their own respective assemblies and councils and magistrates, subordinate however to the cantonal authorities of old Schwyz. In 1833 a new constitution was framed upon the basis of political equality. All the citizens of the canton who have completed their eighteenth year, and who are neither bankrupts nor under a sentence of degradation, are members of the landsgemeinde, or general assembly, which meets every other year, in the month of May, in the valley of Rothenthurm, or oftener if required. The landsgemeinde appoints the landamman, or president of the canton, the statthalter or lieutenant, and the treasurer; it sanctions or rejects the projects of law or bills which are laid before it by the great council, as well as treaties with other states, gives instructions to the deputies sent by the canton to the federal diet, and it examines the financial accounts or cantonal budget. The votes are taken by show of hands, and a simple majority decides.

The great council consists of 108 members, who are elected by the various districts in proportion to their respective population for the term of six years. It publishes the laws which have passed the landsgemeinde, prepares the projects of law to be laid before the latter, it names the two deputies to the federal diet, the members of the executive commission, which constitutes the administration of the country, and who are appointed for four years, and the various officers of the cantonal administration; it votes the annual budget of the canton, audits the accounts of the revenue and expenditure, and issues ordinances for the maintenance of good order and security of the country.

The cantonal council or executive consists of 36 members, including those of the executive commission. It meets four times a year under the presidence of the landamman.

The cantonal tribunal, or supreme court of justice, consists of 14 members, besides supplementary ones, named by the various districts for the term of six years. In criminal trials of capital cases, fourteen more members are added to the ordinary ones, being chosen by the great council from among its own members. In every district there are district councils, with their respective landamman, statthalter, treasurer, and other officers for the district, besides district tribunals.

The yearly revenues of the canton amount to between 25,000 and 30,000 florins (the florin is worth about 1*s.* 10*d.* English), two-thirds of which are derived from the sale of salt, which is a government monopoly. The only regular force consists of fifteen gendarmes, but every citizen from 19 to 50 years of age belongs to the militia. The canton is bound to furnish 600 men to the federal army when required, and as many as a reserve. Every commune has a society of riflemen, and meetings for firing at the target. There is also a Society of Public Utility and a Musical Society.

In the canton of Schwyz, as well as in the other small democracies of Switzerland, the number of persons who form part of the administration is disproportionately great; there is a multiplicity of councils and authorities of every sort, and yet it is complained that business does not proceed the better or quicker for this profusion of offices. It ought to be observed however that the public officers either receive very small salaries or are altogether unpaid.

The courts of justice are said to be not sufficiently independent and impartial. The older and wealthier families and the clergy exercise considerable influence. The population is zealously Roman Catholic, exclusive and intolerant. Popular education is neglected. There is no administrative system for the relief of the destitute, who are in considerable numbers; but a communal fund in some places, and private charity in others, supply their wants. The roads are in an indifferent state of repair. In 1835 there was not a single insurance-office in the canton, although the danger from fire is very great, owing to the houses being chiefly of wood; but there were three savings'-banks, one at Schwyz and two at Einsiedeln. There was no house of correction in the whole canton, and culprits are said to have been sometimes condemned to death as the shortest way of getting rid of them. Others were banished from the canton for life. There was no code, properly speaking, but a collection of decrees of the landsgemeinde and of the great council during the last four centuries, which is called the landbuch. Whipping and irons were still in use in 1835, in order to extort confession from the accused. (Leresche, *Dictionnaire Géographique de la Suisse.*)

The men of Schwyz are generally frank, cheerful, good-natured, and loyal, fondly attached to their country, and extremely jealous of their cantonal independence. Among the Swiss cantons, Schwyz is one of those which has shown the least federal spirit or federal sympathies. 'The democratic feeling of the people of Schwyz, as well as of the other forest cantons, is of a different nature from that of the democratic party in the towns or larger cantons; the latter being active, restless, meddling, and inclined to enlarge the sphere of its influence, whilst the democracy of the forest cantons is stationary and self-satisfied, and though intolerant and uninformed, yet unencroaching and unobtrusive, but at the same time extremely jealous of all intrusion from abroad. . . . The great dread of these small cantons is that of losing their separate existence as independent and sovereign states, and being merged into one huge republic with the rest of Switzerland, a project long entertained by the democrats of the French school in the larger cantons. The people of the forest cantons abhor the very idea of centralization, which, however accompanied by republican forms, they consider as tantamount to servitude. At the time of the French invasion in 1798, they stubbornly refused to be incorporated with the rest of Switzerland into a republic one and indivisible: the men of Schwyz, led by Aloys Reding, resisted and repelled the invaders for a time; and their countrymen of Unterwalden allowed themselves to be slaughtered rather than submit to the overbearing dictate. Still more recently, when the town cantons proclaimed, in 1830-31, the principle of equal political rights, the people of the forest cantons suspected that there was some analogy betwen that and the revolutionary spirit of 1798; and that the system of centralization and unity of administration, which they detest, was at the bottom of the movement. If this was liberty, it was not their liberty. They therefore kept aloof, and showed a stern front of opposition to all attempts at innovation in the federal pact. They exhibited the remarkable phenomenon, worthy of the attention of those who look beyond names and outward forms in social institutions, of the oldest and freest democracies of Europe ranging themselves on the same side with the partisans of the old aristocracy of the towns against the impulse of modern democracy, which with its organised masses and military-like discipline hurries on all questions towards an abrupt solution by numerical majority and physical force.' (*History of Switzerland*, by A. Vieusseux, published by the 'Society for the Diffusion of Useful Knowledge,' p. 277.)

The above sketch of the social and political state of Schwyz applies in great measure to the other mountain cantons of Switzerland, but more especially to the three Waldstätten, or forest cantons, Schwyz, Uri, and Unterwalden.

SCIATICA is a name often applied to all rheumatic affections about the hip-joint and the back of the thigh, but which is more properly adapted to a disease of the sciatic nerve, either inflammatory, or similar in its nature to those which in other parts are designated Neuralgia, or Tic douloureux. The pain in sciatica commonly follows, or is situated in some part of, the course of the sciatic nerve, extending from the inner portion of the buttock along the back of the thigh to the ham, and sometimes continued to the foot along the track of the nerves of the leg. It occurs especially in adults and in old persons, and more particularly in those that have been subject to rheumatism; the pain is generally remittent, and seldom ceases altogether; but is commonly aggravated in the evening. For the treatment and other circumstances connected with sciatica, we must refer to the articles NEURALGIA and RHEUMATISM.

SCIENCE. The word *scientia*, in real Latin, simply means knowledge, and we must attribute the subsequent application of the word to particular kinds of knowledge, to causes similar to those which have influenced the use of the equally general term MATHEMATICS [vol. xv., p. 11]. It does not appear that in the earlier parts of the middle ages *science* had any distinct meaning as opposed either to *literature* or to *art*. Almost at the earliest establishment of universities, the great preliminary branches of knowledge were separated from the rest under the name of *liberal arts:* that is to say, the Trivium, containing grammar, logic, and rhetoric; and the Quadrivium, containing arithmetic, geometry, astronomy, and music. If theology, law, and medicine were called sciences, it was not in any distinctive sense, and we are inclined to think that *scientia* must then have been rather a term subaltern to art, than opposed to it. We find Roger Bacon (*Op. Maj.*, cap. xv.) speaking of the nine mathematical sciences, and the six great natural sciences, which contain under them many other sciences: and his contemporary Robert of Lincoln (*Tract. de Art. Lib.*), after laying it down that the arts (not sciences), of which it is the office 'operationes humanas corrigendo ad perfectionem ducere,' are seven in number proceeds to describe them without a single use of the word science. How the word grew it is not our business to inquire closely; but by the middle of the sixteenth century the word *science* had begun to appear as denoting connected and demonstrated knowledge, in opposition to *art*, which signified digested rules of operation not connected with each other by deduction from common first principles. Thus Tartalea, a writer on algebra (which was then, and most properly, called only an *art*; ars magna, or arte maggiore), styles Euclid, in the preface to his edition of the Elements, 'the sole guide to the mathematical *sciences*.' By the middle of the seventeenth century, the term science was freely used in the sense which it has never since lost, namely, that in which it is opposed to literature. But the old distinction of science as opposed to art has still remained, though the two terms, in this sense, have been in great measure superseded by theory and practice; but improperly, for the distinction between science and art is one thing, and that between theory and practice another. [THEORY.]

A science, as distinguished from an art, is a body of truths, the common principles of which are supposed to be known and separated, so that the individual truths, even though some or all may be clear in themselves, have a guarantee that they could have been discovered and known, either with certainty or with such probability as the subject admits of, by other means than their own evidence. It is not necessary that these truths should have been discovered by a scientific process; it is enough that they admit of such treatment subsequently. The telescope, for instance, may have been discovered accidently; but it can now be demonstrated beforehand that such an instrument must produce the effect which it is known to produce, and the rules for its construction may be deduced from the simple fundamental properties of light. In the sense of the word above used, the number of perfect sciences is not so great as is commonly supposed; for many branches of knowledge which bear the name are not perfect sciences, such as medicine, zoology, and geology;—in all of these, large classifications have been made, many principles have been deduced which seem to be of universal application, and much has been done to make these known principles point out the direction of inquiry; but it would be idle to say that either of them is a science in the sense in which astronomy is a science.

Science, as opposed to literature, means any branch of knowledge in which the affections of mind or matter are to be made the subject of reasoning, with a view to discover and apply first principles. The distinctions of mental and physical sciences, the subdivision of the former into ethical and psychological, &c., whatever terms may be employed, are real and useful. But as it is not the object here to classify human knowledge, but only to give a slight account of the mode of using a word, we may pass on to its common signification.

By science, in popular language, is meant simply mathematical, physical, or natural science, not with reference to principles, but to results. Calculation, collection of natural objects, construction of models, use of philosophical instruments, any or either, is science, or part of science; and a man of science (man of *a* science, or man of the art which is built upon *a* science, would frequently be a correct description) may be either a mathematician, mechanist, engineer, medical practitioner, astronomer, geologist, electrician, zoologist, ornithologist, &c. To this sort of designation there can be no objection in itself, and it is convenient as distinguishing followers of science, or of a science, from those of literature. But it is not sufficiently precise in itself to distinguish the followers of different sciences from one another. When a literary man is named, his pursuit is generally indicated; the historian, the antiquary, the poet, the novelist, the politician, the scholar, and the linguist, are not confounded by means of a general term: insomuch that 'literary man,' by itself, generally implies one of information, but not of distinguished depth in any one particular branch. But the inquirer into the sciences of electricity and magnetism, for example, has no name to distinguish him from the observer and classifier of insects; that is to say, the proper technical names are not familiar to the world at large. But this is the least inconvenience. When the word science comes to be used in its high and proper sense, indicative of truth discovered, error prevented, inquiry organised, judicious habits formed, and mental energy strengthened, it must be difficult for those who are used to the common sense of the word to imagine the truth of many things which are said about it. 'All we require is, that he will hold his former opinions and judgments without bigotry, retain till he shall see reason to question them, be ready to resign them when fairly proved untenable, and to doubt them when the weight of probability is shown to lie against them. If he refuse this, he is *incapable of science*.' Now this, though the word of a good authority, and perfectly true, is nevertheless notoriously false in the common sense of the word science: a man may be incapable of the preceding state of mind, and may be a man of science. There is no remedy for this confusion of terms, except that which every one must make for himself, by attention to the different senses of the word, the higher and the lower.

SCILLA. (Botany.) [SQUILLA.]

SCILLA, or as Steinheil, who separates it and another species (S. Pancration) from the old genus, terms it, Squilla Maritima, or Sea-onion, is a plant common on the sandy shores of the Mediterranean, Portugal, and the Levant. It is imported into Britain from Malta and other parts of the Mediterranean, and also from Petersburg and Copenhagen. The officinal part is the bulb, of which there are two varieties: the one large and whitish externally; the other smaller, of a brownish-red colour. The former is preferred in England, the latter in Germany. The bulb part partakes in its outer part of the nature of a *tunicated*, in its inner, of the nature of a *scaly* bulb. It abounds in an acrid, mucilaginous juice, with an alliaceous odour, and a bitter, acrid, nauseous taste. It is imported whole, or cut in slices and dried. The bulb is not of equal potency in every part. The outer, dry scarious integuments are devoid of activity; the subsequent fleshy scales are the most powerful; while the internal young ones are mucilaginous, nearly insipid, and powerless. It is clear from this that the best mode of drying squill is to decorticate it by removing the outer segments, and carefully separating the intermediate large fleshy scales, to dry these quickly, and to leave the central ones as inefficient. The drying should be conducted quickly, but not by too high a temperature, lest some of the active principles be driven off. Putting the thick scales on sieves or willow-baskets in a moderately heated oven, or in a room fitted with a drying apparatus, is the best plan. Stringing them on threads and drying them slowly, by which they become paper-like and tasteless, is bad. The common method however is to cut the bulb into transverse slices, which, when dried, have a horny appearance, and are semi-translucent. In this case the active and inactive portions are blended together. After whatever means are used to dry them, it is necessary that the squills be kept in well-stoppered bottles in a dry place, as, in common with all bulbous plants, they quickly absorb moisture from the atmosphere. In the process of drying, four-fifths of the weight are lost.

The chief constituents of squill are—an acrid bitter principle (*Scillitin*), sugar, mucilage, salts of citrate or tartrate of lime, also phosphate of lime, and a volatile acrid principle, which in the process of decorticating fresh squill causes a flow of tears from the eyes, sneezing, &c., and severe itching, with burning pains of the hands and arms, yet without obvious swelling or inflammation. A scale of fresh squill applied to the skin rapidly excites rubefaction and vesication, like a sinapism. Squill in large dose is unquestionably poisonous, but in many cases it fortunately acts as its own antidote, by causing vomiting. But even in moderate doses it may still do much harm, by its stimulating effect, if prematurely employed, as it often is, as a popular or domestic medicine in the early stages of colds and coughs. It is for the second stage alone of these that it is suited. It augments the secretion from most mucous surfaces, and also stimulates the kidneys, and sometimes the skin. For the reason above stated, it is unsuited to inflammatory dropsies, but it is proper for the effusions occurring in leucophlegmatic subjects, depending on debility, and for general anasarca rather than local effusions. Its diuretic properties are increased by the previous moderate use of mild mercurials, and by uniting it with other diuretics, either vegetable or saline, and still more by adding bisulphate of quinia or other tonics. Its expectorant properties are greatly heightened by the addition of tonics, such as exist in the Mistura Cascarillæ Composita. Squill is a very improper emetic for young children, as it seriously irritates the coat of the stomach.

SCILLA. [CALABRIA.]

SCILLY ISLANDS, a remarkable group of islands lying off the Land's End in Cornwall; they are comprehended between 49° 51′ and 50° N. lat., and between 6° 11 and 6° 30′ W. long. The lighthouse on St. Agnes, one of the southernmost of the group, is, according to the Ordnance Survey, in 49° 53′ 38″ N. lat. and 6° 19′ 23″ W. long.

The antient condition of this group of islands has been the subject of much discussion. There is a local tradition that the extremity of Cornwall once extended farther towards the west than it does at present, and that a tract of land called, according to Camden, 'Lionesse,' was overflowed or washed away by the sea. This district, which is said to have contained 140 parish churches, is thought to have connected the Scilly Islands with the mainland of Cornwall. If the tradition and the supposition built upon it have any foundation, the event must have occurred long before the introduction of Christianity and the erection of 'churches;' for Strabo speaks of the number of islands as amounting in his time to ten. That these islands may at some remote period, antecedent to authentic history, have been united to the main, and have been separated from it by the encroachment of the sea, is not improbable, from the general violence of the sea, and the changes which it has wrought and is still working among the islands. It is observable too, that while the Scilly Islands are for the most part composed of granite, an insulated rock called the 'Wolf,' between the islands and the main, is composed of limestone, a rock of more yielding character. Notwithstanding their greater hardness, the islands themselves 'are undoubtedly undergoing a gradual diminution. At no great distance of time St. Mary's will probably be divided by the sea.' (*A Guide to Mount's Bay and the Land's End*, by a Physician (Dr. Paris), London, 1824).

At present there are more than 140 islands, but a large part of them are uninhabited. Thirty-eight are enumerated, and their estimated area and population given by the Rev. Geo. Woodley (*A View of the Present State of the Scilly Islands*, London, 1822). We add their relative position:—

Islands.		Area in Acres.	Population. 1821 (Woodley).	1831 (Pop. Returns).
St. Mary's	E.	1640	about 1400	1311
Tresco	N.W.	880	480	470
St. Martin's	N.E.	720	280	230
St. Agnes	S.	390	282	289
Bryher	N.W.	330	140	128
Samson	W.	120	34	37
		4080	2616	2465
Or, as given in the Population Returns .		5770		

Islands.		Acres.	Islands.		Acres.
St. Helen's	N.	80	Guahall or Gweall	N.W.	10
Teän	N.	70	Northwithel	N.	9
White Island, near St. Martin's	N.	50	Toll's Island	E.	7
Annet	S.W.	50	White Island, near St. Samson's	W.	7
Great Arthur	N.E.	30	Little Arthur	N.E.	7
Great Ganilly	N.E.	20	Pednathise	S.W.	7
Great Gannick	N.E.	18	Inaswiggick	W.	8
Crebawithen	S.W.	22	Little Ganilly	N.E.	6
Melledgan	S.W.	20	Little Gannick	N.E.	5
Gorregan	S.W.	20	Ragged Island	N.E.	5
Rosevean	S.W.	16	Innisvouls	N.E.	4
Minewithen	N.E.	15	Round Island	N.	3
Norenour	N.E.	13	Maiden Bower	N.W.	3
Mincarlo	W.	12	Penbrose		2
Rosevear	S.W.	12	Great Crebinack		2
Camperdeney	S.W.	10	Scilly	N.W.	1

The islands form a compact group, surrounded by a deep sea, from which they rise for the most part abruptly, with rugged sides. In the channels which separate the islands the depth of the sea is much less; and in several parts extensive flats, some of them dry at low water, and others covered with water only knee deep, extend from island to island. The islands and rocks consist almost entirely of granite, but there are some beds of porphyry and some of chlorite containing pyrites in St. Mary's. Detached stones of gypsum and alabaster are found in Tresco, St. Martin's, and St. Mary's. The granite is, according to Dr. Paris, a continuation of the Devonian range, though it presents a less porphyritic appearance. It is very liable to decomposition, and presents some interesting geological phenomena. The shores are covered in some parts by a coarse sand, the detritus of granite, occasionally agglutinated into a kind of sandstone; in other parts by a fine shining white sand. 'The climate of these islands is milder and more equable than that of Cornwall, but this advantage is counterbalanced by the frequent occurrence of the most sudden and violent storms. By those who have kept journals, it has been found that not more than six days of perfect calm occur in the course of the year, and that the wind blows from between south-west and north-west for more than half that period.' (Dr. Paris.)

St. Mary's, the most important island, consists of two portions, the smaller of which, called 'the Hugh,' is united to the other part by a low sandy isthmus, on which stands 'Hugh town,' the principal place in the island. The shore is generally steep, and there are some small inlets or coves, besides St. Mary's pool, on the north side, and Porth Cressa on the south side of the isthmus of Hugh Town. The whole island is about 2½ miles long, 1¼ mile broad, and about 8 miles in circumference. The soil is generally good; about one-half of it is in cultivation, and produces luxuriant crops of corn and potatoes. Hugh Town consists of one principal street, very crooked, and of several lanes, alleys, and courts: the houses, which are chiefly built of stone procured in the neighbourhood, are small and irregular; the better sort are covered with tiles or slates, the poorer with thatch. There are several shops, and a number of inns; and most kinds of handicraft are exercised in the island. There is a pier 430 feet long and 20 broad, extending into St. Mary's pool. A small building, sometimes called 'the court-house,' is occasionally used by the council appointed by the proprietor of the islands; beneath it are a small prison, and a butcher's stall dignified by the designation of 'market-house.' The other principal buildings are the steward's house and the post-office. About a mile from Hugh Town, eastward, is a hamlet or village called Old Town, once the principal place in the island, and still containing about 200 inhabitants, chiefly fishermen: and small cottages are dispersed over the island, occasionally grouped three or four together: one small group is called London, and another Bristol. The church, a miserable cruciform building of stone, without a tower, is near Old Town. The Hugh is a steep hill rising about 110 feet above the level of the sea, fortified by lines having a circuit of more than a mile, with eighteen bastions or batteries, and enclosing a small fort called 'Star Castle,' and barracks for the officers and troops. The works are not complete; above a hundred guns might be mounted upon them, and many more if they were completed. Some Druidical and other antiquities are found scattered over the island; and there are some remains of batteries or fortifications. A clergyman of the establishment resides at St. Mary's, and is supported by the Society for the Promotion of Christian Knowledge: he keeps the registers of the different islands. There were in 1833 six day-schools: two of them, with 60 children of both sexes, supported by the Society for the Promotion of Christian Knowledge; the four others, one of them having a small endowment, contained 152 children. There were two Sunday-schools, with 195 children, supported by the Wesleyan Methodists and Baptists, the former of whom have a meeting-house in Hugh Town, and the latter some preaching stations in the island.

Tresco or Trescow, the island next in importance, is inhabited chiefly by pilots and fishermen. Most of the houses are on the north-east side, near the beach, opposite a harbour called Old Grinsey harbour; and form a village called Dolphin Town, perhaps an abbreviation of Godolphin Town, from the Godolphin family, long the lessees of the islands. In the south part of the island, by the side of a fine sheet of fresh water, half a mile long and a furlong broad, are the remains of a religious house or abbey. Tresco has a small fort or blockhouse not garrisoned, a mission-house of the Society for the Promotion of Christian Knowledge, a small church, and a Wesleyan meeting-house. A stone tower called Oliver Cromwell's castle, now deserted, commands the harbour of New Grinsey on the west side of the island, and near it are the ruins of a fortress called King Charles's castle. There is a Druidical circle; and on the north side of the island is a remarkable subterranean passage called Piper's Hole. A clergyman is placed here by the Society for the Promotion of Christian Knowledge, by which a day-school (having, in 1833, 60 children) is maintained. There were in 1833 two dame-schools, with 23 children.

St. Martin's, nearly 2 miles long from east-south-east to west-north-west, and about 6 miles in circumference, is chiefly inhabited by pilots and fishermen. The houses form three groups: Higher Town, on a hill rising from a bay on the south shore; Middle Town, in the centre of the island; and Lower Town, near the south-west point of the island. Higher Town consists of nearly fifty small houses built of stone and thatched, with a small church much improved of late years. About the middle of the seventeenth century, the island was uninhabited; but there are indications that at an earlier period it was fully peopled. The cause of its depopulation is not known. The soil is chiefly waste land, or used as common pasturage; when cultivated it affords good pasture, and plentiful crops of corn and potatoes. Large flats or sands, dry at ebb tide, or covered with very shallow water, extend from St. Martin's to Tresco; but the passage is dangerous from the looseness of the sand. On St Martin's Head, at the eastern end of the island, is a tower twenty feet high, with a conical top, built on an earthen mound, and designed as a landmark for seamen. A day school, maintained by the Society for the Promotion of Christian Knowledge, had, in 1833, 51 scholars; and there were, at the same time, one infant-school, maintained by the Society of Friends, with 12 girls, and one Sunday-school, with 67 children.

St. Agnes has a very irregular outline; it is surrounded by rocks, and the shore is rocky and almost inaccessible, yet the soil is the best cultivated and most productive in the whole group. It consists of two parts, St. Agnes proper and the Gugh, separated from each other at high water, but connected, when the tide is out, by a narrow neck or isthmus of sand. St. Agnes proper is a mile in length, with an average breadth of half a mile, and four miles and a half in circumference; the Gugh is three-quarters of a mile long by one-quarter broad: it is stony and uncultivated, and affords only scanty pasturage to a few straggling sheep. The houses in St. Agnes are not grouped in villages, but scattered about according to the taste and convenience of the inhabitants; they are of stone, covered with thatch. There are a small church and a lighthouse, which latter stands on the highest point of the island, about 50 feet above the level of the sea: it is a substantial stone tower of a circular form, 100 feet in circumference at the base, and tapering towards the summit, which is 52 feet high, surrounded by a lantern of 20 feet additional height, with a revolving light.

Bryher extends about a mile and a half from north to south, with an average breadth of scarcely half a mile; it consists of several steep hills connected by tracts of low land, a considerable part of which is in cultivation. On the east side of the island, between it and Tresco, is New Grinsey harbour, formed by the shores of the two islands and by the flats, fordable at low water, which in one part connect them. Some of the houses are grouped in what is called 'the town of Bryher;' and there is a church, erected a few years since in place of a more antient one.

Samson lies south of Bryher, with which, as well as with Tresco, it is united by flats fordable at low water. But little land is cultivated or capable of cultivation: the few inhabitants support themselves by fishing, making kelp, and occasionally acting as pilots. The island affords no good water; and the encroachment of the sand has ruined what was formerly meadow-land. Both Bryher and Samson have some antient barrows.

The natural produce of the Scilly Islands consists of a thin short grass intermixed with chamomile, heath, and dwarf furze: fern and moss are found near the shore. The soil is commonly a black peat, mingled with granitic particles; though sandy, it bears in many places good crops of potatoes and barley; and considerable quantities of potatoes are sent to Gibraltar and the West Indies. Wheat and rye are also grown. The cultivated land might easily be extended. Fallows are not used, and the land is impoverished by the insufficiency of manure, for which sea-weed is commonly employed. The implements of agriculture are similar to those used in Cornwall, but of inferior construction. There are no timber-trees, and no fruit-trees, except in a few sheltered spots in St. Mary's. Garlic is much cultivated, and most kinds of vegetables and flowers which grow in England succeed here. Cattle and horses are small and poor: their food consists partly of sea-weed for cattle, and furze for horses: many in the course of the winter die of hunger. The sheep are of a peculiar breed and small size; hogs are numerous; poultry scarce and poor; and rabbits not so numerous as formerly. Wild birds, especially sea-birds, are numerous; but the puffin, once very plentiful, is now seldom seen. Fish are less numerous in the surrounding sea than formerly; several small sharks have been observed in the summer months of late years; porpoises are frequently seen.

The Scilly Islands belong to the duchy of Cornwall, and were long held on lease by the lords Godolphin, and since by the duke of Leeds, whose lease expired within the last ten or twelve years. The lessee has usually appointed a council of twelve to exercise a civil jurisdiction, but persons charged with capital offences are taken to Penzance to the justices of the county of Cornwall. A military commandant at St. Mary's and a collector of the customs are appointed by the authorities in London. We are not aware what changes have been introduced, if any, since the expiration of the lease. The islands are considered to be in the diocese of Exeter, but there has been no visitation either by bishop or archdeacon, unless it be quite of late years; neither has the rite of confirmation been at any time administered. Two clergymen, employed by the Society for the Promotion of Christian Knowledge, are employed here; they reside at St. Mary's and Tresco respectively: when they cannot visit the churches on the other islands, the service is performed by the clerks. The Society also supports schools on the principal islands; and distributes Bibles, Prayer-books, and other religious books. The yearly expense of the missions and schools is from 400*l.* to 500*l.* The tithes of the islands belong to the duchy of Cornwall.

The islanders are generally able to read and write: their pronunciation, though not unmarked by provincialism, is more correct than, from their remote situation, would be expected. They are a contented race; attentive to their religious duties, and generally correct in their moral conduct, especially in the smaller islands; and distinguished by personal independence of character. The charge of indolence, sometimes brought against them, is considered by Mr. Woodley as unfounded. Their general condition is poor; their employments are agriculture, fishing, making kelp, and pilotage. Woodley (A.D. 1822) estimated that the number of small vessels (most of them held in shares by from three to eight persons) employed in fishing and pilotage was about one hundred. In these pursuits many of the islanders perish.

The Scilly Islands are generally considered to have been the Καττιτερίδες or Κασσιτερίδες (Cassiterides) of the Greeks. [CASSITERIDES.] Diodorus Siculus distinguishes between the Cassiterides and Britain, and speaks of tin as brought from both. Strabo also distinguishes between the Cassiterides and Britain. But it seems probable that the western extremity of Cornwall must be included in the term Cassiterides, and that the chief supply of the metal was derived from it, for there are no traces of workings in the islands sufficient to countenance the opinion that much tin was ever obtained from them. The inaccuracy of the antient writers may perhaps be accounted for by the two different channels by which the Cornish tin-trade was carried on. One part of the metal was sent by sea to Spain; this was probably the most antient course of the trade opened by the Phœnicians and their colonists in Spain and Africa. The merchants who carried it on knew of no other part of Britain than the western, to which they gave, with the Scilly Islands, the general designation of Cassiterides; hence Strabo and Diodorus both describe these islands by their position relative to Spain, instead of their situation with regard to the much nearer island of Britain, of the proximity and indeed identity of which with the Cassiterides they appear to have had no idea. Another part of the metal was conveyed overland by the Britons themselves, and from thence, as Diodorus relates, to the opposite shore of Gaul, and, on horses, overland, through Gaul to Massilia and Narbo: this tin, though from the same district as the other, was reputed to come from a different quarter, viz. from Britain. If, as we are disposed to think, the island Ἴκτις (Iotis) of Diodorus, which was the emporium of the Gallic tin-trade, and beyond which the merchants from Gaul do not seem to have gone, was the same as the Οὐηκτις (Vectis) of Ptolemy (the modern Isle of Wight), the remoteness of this from the tin country, to which the merchants from Spain went, will account for the two classes of traders not having fallen in with each other, and for their not having ascertained that their supposed different sources of supply were really one and the same.

Mr. Woodley supposes these islands to be the Oestrymnides of Festus Avienus (*Ora Maritima*, 94, et seq.), and he is probably correct in this supposition. Also Dionysius Perigetes speaks of them under the name of the Hesperides, 'the parent of tin' (l. 563). Mr. Woodley's attempt to trace the antient history of these islands is a mass of confusion and inaccuracy.

The conquest of South Britain by the Romans must have led to the discovery of the proximity of the Cassiterides to Britain, if not of their identity with it. But neither Ptolemy nor Pliny the Elder appears to have examined into the matter; for both (Ptol., lib. ii., c. 5; Plin., *Hist. Nat.*, lib. iv., c. 36) describe the Cassiterides as being opposite to Spain, and do not notice them in their account of Britain. We gather from Pliny that the maritime or Hispano-Phœnician tin-trade had ceased; for he speaks of the account of that metal being sought in certain islands of the Atlantic, and brought in wicker boats covered with leather, as a mere fable. (*Hist. Nat.*, xxxiv. 47.) Indeed he gives no intimation of any tin being found in Britain, though he speaks of the lead that was obtained there. It is not unlikely that the confusion caused by the Roman conquests in Gaul, Spain, and Britain, had for the time at least put an end both to the working and sale of the metal.

From the time of the Romans, who used them occasionally as a place of banishment, there is no notice of the islands in history until their conquest by Athelstan, king of England, who expelled the Danes about A.D. 938. Of their antient importance these islands retain little trace. There are some Druidical monuments; but the antient inhabitants appear to have disappeared, from what cause is unknown, and to have been replaced by others of Saxon origin, as indicated by their names, language, and customs. The Scilly Islands do not appear to have always formed part of the duchy of Cornwall; at least they are not enumerated in the original grant of that duchy to the eldest son of the king of England. (12 Edward III.) Part of the islands, and the churches in all of them, belonged to the abbey of Tavistock, but the whole group were regarded in the middle ages as of little importance; and it was not until the Spanish wars in the time of Elizabeth that they attracted much notice. In the great civil war they were long held for the king by Sir John Greenville or Granville, who fitted out armed vessels, which made several captures. At length, A.D. 1651, a formidable armament, under Admiral Blake and Sir George Ayscue, was sent, which quickly effected the reduction of the islands. Sir Cloudesley Shovel was lost on the rocks which form the south-western portion of the group, with his own ship and some others, on their return from Toulon, A.D. 1707. (Troutbeck's, Borlase's, and Woodley's *Accounts of the Scilly Islands*.)

SCINCOÏDIANS, or LEPIDOSAURS, the names given by Oppel, Fitzinger, and MM. Duméril and Bibron to their last family of *Saurians*.

This family, observe MM. Duméril and Bibron, seems again to establish a sort of connection with or transition to the great division of Serpents, by the intervention of certain species, such as those of *Anguis* and *Acontias*. It is, they remark, a group of Lizards, whose numerous races are found spread over the most arid regions of temperate climates, as well as those where the temperature is always very high.

These *Lepidosaurs*, according to the distinguished herpetologists last above mentioned, join to the general character of the Saurians many peculiarities which distinguish them from the seven other families of that order. Thus, their cranium is covered with great plates, joined together at their edges, most frequently angular, whose sutures or lines of junction always remain distinct. Their trunk is completely covered with scales, more or less large and solid, of variable form, but always disposed like a coat of mail, placed quincuncially, and overlapping each other like tiles or slates, nearly like those of the greater part of the osseous fishes. The Scincoïdians have besides the tongue free, fleshy, not of much thickness, slightly notched at the point, and covered totally or partially with scaly papillæ. Their belly is cylindrical, without lateral folds, and covered with scales, having the same disposition, and, in general, the same form as those of the back.

All these characters suffice to distinguish the *Scincoïdians* from the whole of the other families. The great angular plates which are applied on the bones of the head and face are never seen in the *Chameleons*, the *Geckos*, the *Crocodiles*, the *Varanians*, nor in the *Iguanians*. They are, it is true, found in the *Lacertians* and in the *Chalcidians*, but the first have always the scales of the belly different from those of the upper part of the trunk, and, in the others, besides the disposition of the horny lamellæ so as to form verticillations or transverse rings, there is most frequently a fold on their sides throughout their length, from the cranium to the origin of the tail.

The form and the mode of insertion of the tongue, which in one part is free, or not attached by its circumference to the concavity of the lower jaw, serve to distinguish the Scincoïdians from the Crocodiles; on the other hand, as the tongue of the Scincoïdians cannot be withdrawn into a sort of sheath, this conformation removes them from the Chameleons, which have the tongue very long, cylindrical, and terminated by a concave and viscous tubercle. The same conformation serves to separate the Scincoïdians from the Varanians, which have this organ endowed with capability of re-entering into a sheath, at the same time that its free extremity is deeply divided into two points. Finally, the tongue of the Scincoïdians is not free, or disengaged from adhesion at its point only, as in the Geckos and the Iguanians. The lateral walls of the trunk are not hollowed with a longitudinal furrow, as in the *Chalcides*, and the skin of the belly below is not furnished with plates with four principal faces, or with quadrilateral scales more or less elongated, and larger than those of the back, as may be observed in the *True Lizards*.

MM. Duméril and Bibron thus sum up the essential characters of the reptiles which compose the family of the Scincoïdians:—

1. Head covered above by horny plates, which are delicate, angular, and opposed to each other (affrontées) by their faces (pans) in a singular manner.
2. Neck of the same form and size as the breast.
3. Trunk and limbs entirely clothed with imbricated scales, with many faces (pans), most frequently widened, and with the border slightly rounded, disposed quincuncially, back rounded, without crests or elevated spines, belly cylindrical, without any groove or lateral furrow.
4. Tongue free, flat, without a sheath, slightly notched in front, the surface covered entirely or partially with papillæ ordinarily all in the form of scales, but occasionally some are squamiform and others filiform.

Oppel included under his *Scincoïds*, which he made the fifth family of the order Saurians, the five following genera only, the *Scinks*, the genus *Seps*, the *Scheltopusiks*, the genus *Anguis*, and the *Orvets*.

Fitzinger, in adopting the same family name, introduced a greater number of genera, viz. *Spondylurus*, *Scincus*, *Mabuya*, *Tiliqua*, *Heteropus*, *Seps*, *Zygnis*, *Scelotes*, and *Pygodactylus*.

Cuvier's Scincoidians consisted of the genera *Scincus*, *Seps*, *Bipes* (Lacép.), *Chalcis*, and *Chirotes*.

Wiegmann divides the Scincoidians into two families:—1, that of the *True Scinks*, whose eyes are protected by lids; and 2, the *Gymnophthalms*, which have no moveable or visible eyelids. He divides the genera into those which, like the Lizards, have four well-formed feet, with five toes, and which have auditory holes, at the bottom of which the *membrana tympani* may be seen. Here he arranges *Spondylurus*, a genus established by Fitzinger on the incorrect statement of Daudin, that *Sloane's Scink* had pores on the thighs, the *Scinks*, *Sphenops*, *Trachysaurus*, and *Euprepes*, and, among the *Gymnophthalms*, *Ablepharus*.

Then come the genera which, like *Seps*, have the trunk slender, rounded, and still four limbs, but very short and very distant from each other. To this division, among the Scinks, he refers the genera *Lygosoma* and *Zygnis*, whose auditory holes are visible; and among those which have them not, the genera *Podophis*, *Seps*, and *Peromeles*. In this same division, but among the Gymnophthalms, two genera only are included by Wiegmann, viz. those of the Gymnophthalms properly so called, and *Lerista* of Bell.

In the third division are placed the genera which resemble the *Orvets*, and whose body is always furnished with anterior feet, whilst the posterior feet are sometimes wanting. Among the Scinks properly so called are arranged the genera *Pygodactylus*, *Otophis*, *Scelotes*, *Anguis*, and *Acontias*; and among the Gymnophthalms, the two last genera, *Pygopus* and *Typhlinus*.

Cocteau, whose premature death prevented the completion of his 'Monograph,' the first number of which was pubished in 1836, under the title (which MM Duméril and Bibron well characterise as modest, for few zoologists understood the subject more completely) of 'Etudes sur les Scincoïdes,' and which would have embodied the experience and labours of the five or six last years of his life, presented, in 1837, to the French Academy, his great table of the classification of this extensive group. These 'Tabulæ Synopticæ Scincoideorum' formed the prodromus only of an extensive work undertaken for the classification of the species which belong to three of the tribes of the family which Cocteau named *Cyprilepids*, or those covered with scales after the manner of a carp.

These species are distributed into three sections, according to the presence or absence of feet.

The two first, which have feet, are united under the common name *Pedotes*, and are subdivided into the *Scincidoïds*, which have four feet, and the *Hysteropods*, which have only posterior feet,—in other words, into *Tetrapods* and *Dipods*. A third section would comprehend those species which are deprived of feet, if any should be discovered, under the name of *Anguinoïds*.

The *Scincoïds*, or first family, consist of three tribes: 1, the *Saurophthalms*, whose eyes, like those of the True Lizards, are furnished with moveable lids; 2, the *Ophiophthalms*, which have no eyelids, or extremely short ones, giving their eye the appearance of that of Serpents; and, 3, the *Typhlophthalms*, which have the eyes entirely hidden, a tribe established for any species which might be so organized, but which had not been discovered.

The *Saurophthalms* comprise those genera which have, 1, a distinct tympanum or an external auditory canal, as the Lizards or the *Saurotites*; 2, those which have not this part visible, as in the Serpents, would be the *Ophiotites*; but of this last section no examples had been observed.

Among the *Saurotites* are genera which have the feet or toes complete, the *Teleodactyls*; these constitute only one great genus, that of the Scinks properly so called, subdivided by the author into thirteen series or subgenera. These are founded, in the first place, on the state of the surface of the tongue, which is sometimes covered with papillæ, all lamellar or scaly, and to such he gives the name of *Lepidoglosses*, whilst he calls those which have this surface partly composed of papillæ of a mushroom shape, and partly of lamellar papillæ, *Diploglosses*. These last consist of a single genus only, *Diploglossus* of Wagler.

The *Lepidoglosses* are further subdivided, according to the form of the muzzle, which is sometimes wedge-shaped (en coin); these are termed *Sphenopsides*, and Cocteau refers to them Fitzinger's two subgenera of *Scincus*, viz. *Scincus officinalis* and the *Sphenops* of Wagler, which differ from each other in the form and inequality of the toes. The *Conopsides*, or those with a conical muzzle, sometimes have the scales of the back smooth, or without projecting lines; these are the *Ateucholepides*, and they form the most numerous division, for they comprehend seven subgenera, subdivided into, 1, *Omolepids*, or those with flat dorsal scales; 2, *Strigolepids*, with striated dorsal scales. Among the *Omolepids* some are without palatal teeth, the *Anoplophores*; and some are furnished with them, the *Oplophores*. Both the one and the other are divided according to the disposition of their lower eyelid, which sometimes offers a transparent disk, the *Hyaloblepharides*, and sometimes, as in ordinary, is covered with small scales, the *Scleroblepharides*. Such are the subgenera *Tiliqua*, *Keneux*, *Euprepes*, *Rachites*, *Psammites*, *Heremites*, and *Arnes*.

The *Conopsides* with pointed dorsal scales, are named *Silubolepids*, and these scales are sometimes carinated, as in *Tropidosaurus*, Boié (*Tropidophorus*, Dum. and Bibr.), and sometimes rugose, as in *Trachysaurus*, Gray.

The *Saurotites* with imperfect feet either entirely or with regard to the number of the toes (*Ateleodactyls*) have in fact sometimes the toes on the four feet, but differing in number before and behind; such are the two subgenera of *Heterodactyls* named *Heteropus* and *Champsodactylus*; sometimes, on the contrary, as in the *Omodactyls*, the number of toes is the same on each foot, for example, four in *Tetradactylus* (Péron), or *Peromeles* (Wagler), and three only in *Tridactylus* and *Zygnis* (Oken).

The second tribe of Ophiophthalms, or the Scincoids which have the eyelids very short and immoveable, is divided, nearly in the same manner as that of the Saurophthalms, into *Saurotites* and *Ophiotites*. The first are either *Teleodactyls* or *Ateleodactyls*. In the first subdivision there is but one genus, the *Ablepharides*, which are again subdivided into *Ablepharides* properly so called, and *Cryptoblepharides*. In the second subdivision also there is but one genus, *Gymnophthalmus* (Merrem).

The only genus referred to the second subtribe, *Ophiotites*, is *Lerista* (Bell).

MM. Duméril and Bibron give the following synoptical analysis of this great work:—

Tetradactylus, *Seps*, *Siaphos*, *Heteromeles*, *Chelomeles*,

- CYPRILEPIDS.
  - Podotes.
    - Tetrapodes.
      - Saurophthalmes.
      - Ophiophthalmes.
      - Typhlophthalmes.
    - Dipodes.
      - Propodes.
      - Hysteropodes.
  - Apodes.

- SAUROPHTHALMES.
  - SAUROTITES.
    - TELEODACTYLS. . . Scincoids. *Scincus.*
    - ATELEODACTYLS.
      - Heterodactyls.
        - *Heteropus.*
        - *Champsodactylus.*
      - Omodactyls.
        - *Tetradactylus.*
        - *Tridactylus.*
  - OPHIOTITES.

- OPHIOPHTHALMES.
  - SAUROTITES.
    - TELEODACTYLS. . *Ablepharis.*
    - ATELEODACTYLS.
      - Heterodactyls. *Gymnophthalmus.*
      - Omodactyls.
  - OPHIOTITES. . .
    - Omodactyls.
    - Heterodactyls. *Lerista.*

- TYPHLOPHTHALMES.

In Mr. Gray's last arrangement, the Scincoid Lizards of MM. Duméril and Bibron are comprised under the families *Scincidæ*, *Gymnophthalmidæ*, *Pygopidæ*, *Rhodonidæ*, and *Acontiadæ*, which consist of the following genera:—

Scincidæ.—a, *Scincus*, *Sphenops*; b, *Celestus*, *Trachysaurus*, *Tropidophorus*, *Egernia*, *Tiliqua*, *Amphiglossa*, *Euprepes*, *Eumeces*, *Leiolopisma*, *Psammita*, *Cyclodus*, *Adaria*, *Aprasia*, *Kerinia*; c, *Riopa*, *Lygosoma*, *Chiamela*, *Brachymeles*; d, *Ophiodes*; e, *Anguis*, *Ophiomorus*, *Siguana*, *Stenostoma*, *Dorfia*.

Gymnophthalmidæ.—*Microlepis*, *Ablepharis*, *Gymnophthalmus*, *Cryptoblepharis*, *Lerista*.

Pygopidæ.—*Pygopus*, *Lialis*.

Rhodonidæ.—*Rhodona*, *Soridia*.

Acontiadæ.—*Nessia*, *Evesia*, *Acontias*, *Dibamus*, *Typhline*.

MM. Duméril and Bibron, like Cocteau, divide their *Scincoïdians* or *Lepidosaurs* into three great divisions:—1, *Saurophthalms*; 2, *Ophiophthalms*; and, 3, *Typhlophthalms*; with the following genera, which are subdivided according to the conformation of the feet, toes, tail, rostral plate, muzzle, teeth, nostrils, and tongue:—

1. Saurophthalms.—*Tropidophorus*, *Trachysaurus*, *Cyclodus*, *Scincus*, *Sphenops*, *Gongylus*, *Diploglossus*, *Amphiglossus*, *Heteropus*, *Champsodactylus*, *Tetradactylus*, *Hemiergis*, *Seps*, *Nessia*, *Heteromeles*, *Chelomeles*, *Brachymeles*, *Brachystopus*, *Evesia*, *Scelotes*, *Præpeditus*, *Ophiodes*, *Anguis*, *Ophiomorus*, *Acontias*.
2. Ophiophthalms.—*Ablepharus*, *Gymnophthalmus*, *Lerista*, *Hysteropus*, *Lialis*.
3. Typhlophthalms.—*Dibamus*, *Typhline*.

For the subgenera we must refer to the work itself.

Organization and Habits.—There is nothing requiring particular observation in the organization and habits of the Scincoidians beyond what may be collected in this article and in those which treat of the genera belonging to the family. The harmless race live upon insects and other small animals, and the smoothness of their coats and shortness of their legs enable them to glide easily through small apertures.

Geographical Distribution of the Family.—MM. Duméril and Bibron give the following interesting account of the geographical distribution of this extensive family. The Scincoidians are, so to speak, spread over nearly the whole surface of the globe, for they are found in very high latitudes, even in countries where the lowness of the temperature would seem to forbid the existence of Reptiles; such, particularly, is the *Anguis fragilis* [Blindworm], which occurs as far north as Sweden, and perhaps farther. But of all the countries which produce Scincoidians, Oceania and New Holland are those which count the greatest number of species, whilst the Saurians of the other families show themselves in much fewer numbers than in the other parts of the world. The locality of certain Scincoidian Lizards is far from being limited to any particular country of the globe; thus *Gongylus ocellatus*, *Seps chalcides*, *Anguis fragilis*, and *Ophiomorus miliaris* live in the south of Europe and in the north of Africa. The *Plestiodon** *quinquelineatum*, which was believed to be peculiar to North America, is found also in Japan; the *Lygosoma Quoyi*, *Lygosoma Labillardieri*, and many species of *Eumeces* are races common to Oceania and New Holland; and, what is still more worthy of the attention of naturalists, *Ablepharus Kitaibelii* exists in Hungary, Greece, and New Holland, whilst *Ablepharus Peronii* is found in both the two last countries equally, and moreover in the Isle of France and in South America.

Europe possesses *Gongylus ocellatus*, *Seps chalcides*, *Ablephari Menestriesii*, *Kitaibelii*, and *Peronii*, *Anguis fragilis*, and *Ophiomorus miliaris*.

Africa, with all these species except *Ablephari Menestriesii* and *Kitaibelii*, produces eighteen others, among which *Amphiglossus Goudotii* is a native of the Isle of Madagascar, and *Ablepharus Peronii* and *Leiolopisma Telfairi* are natives of the Isle of France.

Seventeen species are peculiar to Asia, and three others, one of which is also found in America, and the other two in Polynesia.

Fourteen Scincoïdians are natives of America, and of America only; and there are two others, one of which, *Plestiodon lineatum*, also inhabits Asia, and the other, *Abiepharus Peronii*, Europe, Africa, and Australia.

Polynesia possesses thirty-six species peculiar to itself, and to these must be added *Ablepharus Kitaibelii*, which is found also in Europe and in Asia; *Ablepharus Peronii*, which occurs also in Asia, Africa, and America; and *Lygosomata Quoyi* and *Labillardieri*, which belong also to Asia.

There is not a single Scincoidian whose geographical range is confined to Europe.

The genera *Scincus*, *Sphenops*, *Amphiglossus*, *Leiolopisma*, *Brachystopus*, *Scelotes*, *Acontias*, and *Typhline*, are peculiar to Africa; and *Tropidophorus*, *Champsodactylus*, and *Brachymeles* to Asia. The genera *Diploglossus*, *Ophiodes*, and *Gymnophthalmus*, are composed of American species exclusively; and *Tropidolopisma*, *Cyclodus*, *Trachysaurus*, *Heteropus*, *Tetradactylus*, *Hemiergis*, *Chelomeles*, *Nessia*, *Evesia*, *Præpeditus*, *Hysteropus*, *Lialis*, *Lerista*, and *Dibamus* belong to Polynesia.

The subgenus *Gongylus*, as well as the genera *Seps*, *Anguis*, and *Ophiomorus*, are common to Europe and Africa. *Eumeces* and *Lygosoma* are spread over Asia, America, and Polynesia. *Euprepes* is found in Africa, Asia, and Polynesia; *Plestiodon* in Africa, Asia, and America; and *Ablepharus* in Europe, Asia, Africa, America, and Polynesia.

We now proceed, as far as our space will admit, to attempt an illustration of some of the forms of this numerous group, from the division of *Saurophthalms*.

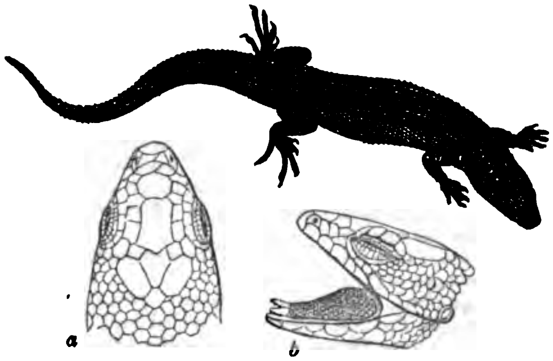
Tropidophorus, Dum. and Bibr. (*Leposoma*, Cuv., not Spix. *Tropidosaurus*, Gray, not Boié).

Generic Character.—Nostrils lateral, opening near the posterior border of the nasal plate. Tongue notched, squamous. Teeth simple, cylindrical, compressed at the summit. Palate not toothed, with a slight triangular notch situated rather backward. Auricular apertures closed by the membrane of the tympanum. Muzzle conical. Four feet, each terminated by five unequal, unguiculated toes, which are slightly compressed and without lateral dentilations. Body cyclotetragonal. Tail compressed, carinated. Scales of the upper parts lozenge-shaped, with a median carination prolonged into a point backwards.

Example, *Tropidophorus Cocincinensis*.

Description.—Upper part of the body brown-yellow, or inclining to olive, banded on the neck and back with much deeper brown, disposed so as to represent great ⧖ placed one after the other. On the tail are spots, more or less large, of deep brown; and there is a row of whitish points along the lower region of the sides.

Locality.—Cochinchina. (Dum. and Bibr.)



Tropidophorus Cocincinensis.

Animal. *a*, head, seen from above; *b*, profile; mouth open to show the tongue.

Scincus. *Fitzing.*

Generic Character.—Nostrils lateral, opening between the nasal and supero-nasal anterior plates. Tongue notched, squamous. Teeth conical, simple, obtuse, blunt at the summit. Palate toothed, and with a longitudinal groove. Auricular apertures operculated. Muzzle wedge-shaped, sharp, and truncated. Four feet, each terminated by five toes, which are tolerably equal, flattened, and serrated on the edges. Tail conical and pointed.

Example, *Scincus officinalis*.

Description.—MM. Duméril and Bibron remark that this species includes three varieties, which are very distinct in the colouring of their upper parts; for, in all cases, the lower and lateral regions, that is to say, the cheeks, the sides of the neck, those of the tail, as well as the sides, and, very often, the limbs, are of a silvery white, more or less pure.

Var. a.—General colour of the neck, back, and tail, yellow, or clear silvery grey, mixed with brown or blackish, which forms great spots dilated transversely, most frequently putting on the shape of transverse bands, the number of which is commonly seven or eight.

Var. b.—A yellow tint spread over the surface of the cranium. Neck, back, and a great part of the tail chesnut-brown, sprinkled with very small obscure whitish spots, two or three on each scale. Across the back five or six large white bands, with an irregularly dilated black spot at each of their extremities. These spots are not situated on the back, but on the most elevated part of the lateral regions of the trunk.

Var. c.—All the scales of the neck, back, and first half of the upper surface of the tail, silvery grey, widely radiated with white, with one or two brown spots on the posterior border of the radiations.

Locality and Habits.—MM. Duméril and Bibron state that this species, the Scink of the shops, appears to be peculiar to Africa, inhabiting the western and northern parts, but particularly the latter. They are certain that it is found in Senegal, from a fine specimen sent from that country by M. Heudelot to the Paris Museum. Bruce met with it in Syria and in Abyssinia. M. Rüppell observed it in the last country, and many travellers have seen it in Egypt, whence the greater portion of specimens with which collections are furnished are sent. It is at present rather common in Upper and Middle Egypt, and it appears from Belon and Rondeletius that it was there found abundantly in the sixteenth century, when it still was an object of commerce. In truth it was one of the most approved remedies in the antient Pharmacopœia, and was considered a sort of universal medicine, a specific against all kinds of maladies. Pliny (*Nat. Hist.*, xxviii. 8) proclaims the medicinal and renovating powers* of the *Scincus*, and quotes Apelles for its efficacy against wounds inflicted by poisoned arrows.

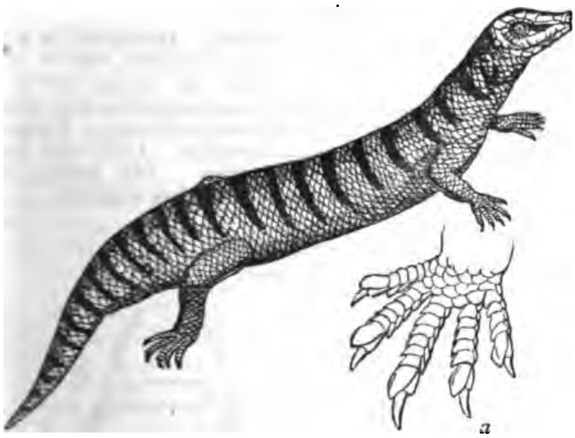
According to a communication made by M. Alexandre Lefebvre (who collected a number of individuals of this species in an excursion, undertaken in 1828, to the oasis of Bahrieh) to MM. Duméril and Bibron, this species is met with on the little hillocks of fine and light sand which the south wind accumulates at the foot of the hedges that border the cultivated lands, and of the tamarisks which try to vegetate on the confines of the desert. There it may be seen peaceably basking in the rays of a burning sun, or chasing from time to time the *Graphipteri* and other *Coleoptera* which pass within its range. It runs very quickly, and, when menaced, buries itself in the sand with singular rapidity, hollowing out for itself a burrow many feet deep in a few instants. When taken, it endeavours to escape, but does not attempt to bite nor to defend itself with its claws.

---

* One of the subgenera of *Gongylus*.

* 'Afferuntur salsi. Rostrum ejus et pedes in vino albo poti, cupiditates veneris accendunt,' &c.

The better opinion seems to be that this is the Σκιγκος of *Dioscorides* and the *Scincus* of Pliny; and though the descriptions given by the antients are not sufficiently accurate to enable us to pronounce positively on its identity, enough remains in tracing its history downwards to render it highly probable that such is the fact.



Scincus officinalis. Five-ninths of nat. size.
a, fore foot, seen from above.

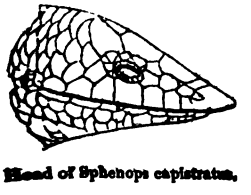
Sphenops. *Wagl.*

Generic Character.—Nostrils lateral, each opening between the nasal and the rostral plates. No supero-nasal plates. Tongue notched, squamous. Teeth conical pointed, straight, simple. Palate not toothed, but with a longitudinal groove. Two auricular apertures. Muzzle wedge-shaped, rounded. Four feet, each terminated by five unequal, subcylindrical, unguiculated toes, without lateral dentilations. Sides angular at their lower region. Tail conical, pointed.

Example, *Sphenops capistratus.*

Description.—Colour ferruginous grey, more or less yellow, or brownish on the upper parts. From nine to thirteen longitudinal stripes composed of so many successions of black points placed on the lateral borders of the scales. These stripes, which spring on the occiput and the posterior region of the temples, run along the neck, the back, and the tail throughout its whole length, or nearly so. The upper surface of the limbs presents also generally rows of black points. The scales are also fringed with brown. On the sides of the head is a small black band commencing at the nostril, passing upon the eye, traversing the temple, and losing itself upon the neck. The lower parts of the animal are white.

Locality and Habits.—This *Sphenops* is widely spread in Egypt, the only country known to MM. Duméril and Bibron where it has yet been found. M. Rüppell and M. A. Lefebvre sent specimens—the last-named traveller the most abundantly—to France, and M. Lefebvre informed MM. Duméril and Bibron that it was very common in the oasis of Bahrieh, at Zabou, Qasr, and Bahoueit. He brought home more than a hundred individuals which he captured himself. Both M. Lefebvre and Cocteau state that the animal only burrows to a small depth, for the slightest disturbance made by the feet of the passer by discovers its retreat.



Head of Sphenops capistratus.

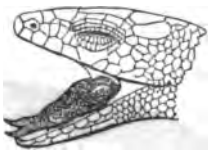
It is very active in its movements, but suffers itself to be taken without attempting to defend itself. M. Lefebvre brought an embalmed individual of this species from Egypt. This he gave to Cocteau, who drew up an interesting memoir (extracted by MM. Duméril and Bibron), which he was about to publish when death arrested him in his scientific career.

Diploglossus. *Wiegm.* (*Celestus*, part. *Tiliqua*, part. Gray).

Generic Character.—Nostrils lateral, each opening in a single plate (the nasal); supero-nasal plates; tongue notched, with squamiform papillæ in front, and filiform papillæ behind; conical teeth; palate not toothed, but with a longitudinal groove; muzzle obtuse; four feet, each terminated by five unequal, unguiculated, compressed toes without lateral dentilations; palms and soles of the feet tubercular; sides rounded; tail conical or slightly compressed, pointed; scales striated.

Example, *Diploglossus Sagræ.*—Form resembling that of *Seps* in the slenderness of the body, the length of the tail, and the shortness of the limbs; colour brown-ash, with metallic reflections on the upper parts of the head, trunk, tail, and limbs, more or less deep in different individuals; on each side of the body a black band which springs on the frenal region, passes on the eye and temple, extends the whole length of the side, and loses itself on the side of the tail, at some distance from its origin; the labial plates are yellowish, bordered with black, and the lower regions have also a yellowish tint, but with silvery reflections.

Locality and Habits.—Cuba, where it lives on land in cool places and light and humid lands. It is very quick in its motions



Head of Diploglossus Sagræ. Mouth open to show the tongue.

Gongylus. *Dum.* and *Bibr.*

Generic Character.—Nostrils lateral, pierced either in a single plate (the nasal) or in two plates (the nasal and the rostral); tongue notched, squamous; teeth conical, often slightly compressed, and, as it were, wedge-shaped, simple; palate toothed or not toothed, with a posterior notch or a longitudinal groove; auricular apertures; four feet, each terminated by five unguiculated, unequal, slightly compressed toes without dentilations; sides rounded; tail conical or slightly flattened laterally, and pointed.

Example, *Gongylus ocellatus.*

Description.—The form of this species is heavy and stout, and it varies greatly in colour. MM. Duméril and Bibron record the following varieties:—

Var. a.—Upper part of the body sprinkled, on a bronze ground, inclining more or less to yellow or brownish, with small black spots ordinarily relieved with a white or yellowish trait in the middle, whence the name, *ocellatus;* sometimes the white mark more or less obliterates the black spot, or exists alone. These marks uniting give place to the formation of small black bands relieved with white, directed more or less transversely to the axis of the body, forming angles more or less sinuous, and more or less suddenly interrupted. The number and disposition of these zigzags are very inconstant, and they are in general less frequent on the tail and limbs. Their width and length depend on the size and number of the spots which compose them. Sometimes these spots uniting laterally in a successive and regular manner, form also transversal lines with some space between them, which gives the animal an annulated aspect. On the tail especially this disposition is most frequent. At other times these spots correspond from before backwards, and define from ten to twelve longitudinal rows of white points, separated by rows of black spots. It sometimes happens that the white spots disappear, and the black ones only remain. Sometimes, on the contrary, the black spots are effaced, and the white spots remain. In general, the plates of the head are bordered irregularly with black.

Var. b.—A greater number of longitudinal rows of ocellations on the back, and a yellow band on each side of it.

Var. c.—Nearly the same as *Var. a,* but with a black band more or less spotted with white, and surmounted with a pale yellow or whitish line.

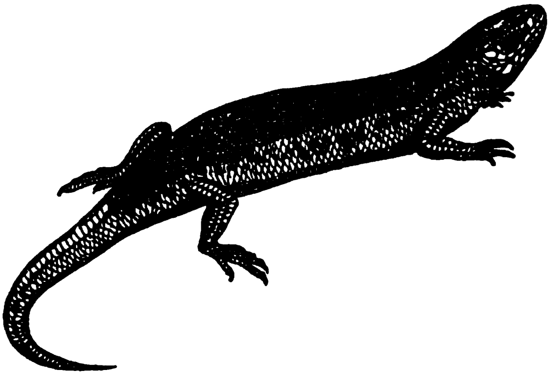
Var. d.—No ocellations on any part of the body. Back of a uniform bronze tint. A beautiful and large black band springs before or behind the eye, passes on the temple, then above the tympanum, along the neck, the side of the back, and ends on the tail, at a small distance from the origin of the thigh. This black band is made the more conspicuous by as large a whitish band above it. Labial plates white, bordered with black.

Var. e.—Upper part of the head, cervical region, back and upper part of the tail, of a bronze hue, strongly tinted with greyish, on which are perceptible traces of ocellations; but the lateral parts of the head and of the neck, the sides, the sides of the tail, and the limbs entirely, are deep ebony-black.

This is the *Scincus ocellatus* of authors; *Tiliqua ocellata* and *Lacépède's Galleywasp* of Gray.

Locality and Habits.—This species is spread over the whole of the shores of the Mediterranean; but it is in Sicily, Sardinia, Malta, the antient Cyprus, and Egypt, that it is especially found. MM. Quoy and Gaimard captured a specimen in the Isle of Teneriffe, and it is said to have been found in the south of France; but MM. Duméril and Bibron are not sure of this.

Dry and slightly elevated spots are chosen by this scink, and there it hides itself in the sand or under stones. Its food consists of small insects, which it seizes after the manner of the true Lizards. It suffers itself to be caught without defending itself; and though its movements are not so rapid as those of the Lizards, it possesses more agility than its form would lead one to expect.



Gongylus ocellatus. Five-ninths of nat. size.

Seps. *Daud.* (*Zygnis*, Oken, Fitzing., Wiegm.)

Generic Character.—Nostrils lateral, opening between two plates, the nasal and the rostral. Supero-nasal plates. Tongue flat, squamous, of an arrow-head shape, notched at its point. Teeth conical, simple. Palate not toothed, but with a very large groove in the second half of its length. Auricular apertures. Muzzle conical. Four feet, each having their extremity divided into three unequal, unguiculated, subcylindrical toes, without dentilations. Sides rounded. Tail conical, pointed. Scales smooth.

Example, *Seps Chalcides*, Bonap.

Description.—Form slender and serpentine. MM. Duméril and Bibron enumerate the following varieties:—

Var. a. Upper parts coppery or bronzed grey: two longitudinal lines on the back dotted with black.

Var. b. Two black stripes on the right and left of the back, instead of the two white lines.

Var. c. The two black stripes which extend on each side of the back wider and more distant, and separated from each other by a yellow or whitish band.

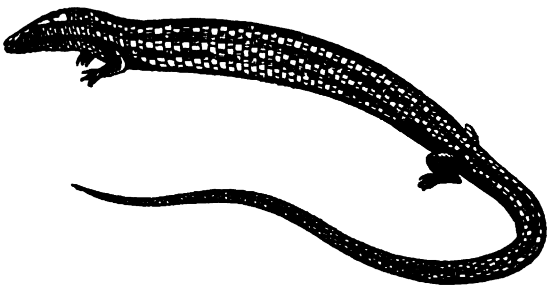
Var. d. Same as *Var. b*, with two additional black stripes on the middle of the back.

Var. e. Upper part of the body marked with eight or nine black stripes, alternating with as many yellow or whitish stripes.

Var. f. Apparently uniform olive-brown, so pale are the eight or ten greyish lines which run in a longitudinal direction.

In all these different varieties the lower parts are more or less greyish or whitish.

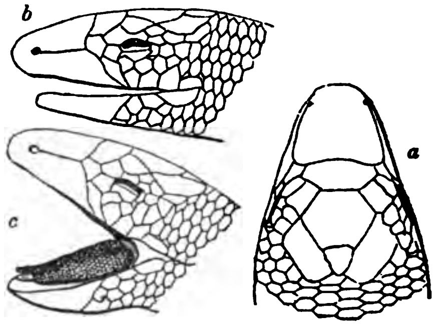
Locality; Habits.—The south of France, Italy, all the islands of the Mediterranean, Spain, and all the Mediterranean shore of Africa, claim this species as a resident. It is viviparous, and lives upon worms, small terrestrial mollusks, spiders, and, in short, all kinds of insects.



Seps chalcides.

Acontias. *Cuv.*

Generic Character.—Muzzle conical, inserted in a great plate. Nostrils opening on each side of this sort of rostral case, and having each, posteriorly, a longitudinal slit. Tongue flat, of an arrow-head shape, squamous, very slightly notched at the point. Teeth conical, obtuse. Palate not toothed, but with a longitudinal groove. Only one eyelid (the lower). No auricular apertures. No limbs. Tail short, conical, truncated as it were. Scales smooth.



Head of Acontias.

a, seen from above, *b*, profile; *c*, the same view, with the mouth open to show the tongue.

Example, *Acontias meleagris.*

Locality.—South Africa: very common near the Cape of Good Hope. [Acontias; Blindworm; Javelin-Snake.]

SCINDE. [Sinde.]

SCIO. [Chios.]

SCIOPPIUS, CASPAR, was born on the 27th of May, 1576, at Neumark in the Palatinate (Pfalz). His family was poor; but although he attacked Scaliger for his pretensions, he was very anxious to be considered of noble descent. At the age of seventeen he published some Latin poems, which were very favourably received. After the completion of his studies, he travelled into Italy, and in 1589 he was at Ferrara, where he wrote a panegyric on Pope Clemens VIII. and the king of Spain. The pope became his protector and patron, and Scioppius followed him to Rome, where he renounced the Protestant religion, and the pope gave him the title of a knight of St. Peter, and soon afterwards made him Comes Apostolicus de Claravalle. In consequence of his conversion, Scioppius studied theology, and published several little works, partly to justify his own conduct and partly to support the cause of the pope against the Protestants. But the study of antient literature was not neglected: he also published an edition of Varro, 'De Ling. Lat.,' Ingoldstadt, 1605, 8vo.; 'Commentaries on Appuleius and the Priapea,' Frankfort, 1606, 12mo., and reprinted at Padua, 1664, 8vo., with notes of Scaliger and Lindenbrog. Scioppius had hitherto been well disposed towards Jos. Scaliger, but some remarks respecting his conversion to Catholicism, and Scaliger's letter to Douza, provoked the enmity of Scioppius, which was displayed in his 'Scaliger Hypobolimaeus, hoc est, Elenchus Epistolæ Joan. Burdonis, pseudo-Scaligeri, de Vetustate et Splendore Gentis Scaligeræ,' Maynz, 1607, 4to. In this book he ridiculed with the bitterest satire the pretensions of Scaliger, and attacked king Henry IV. of France for having granted civil liberty to the Protestants. As the book was against Protestants in general, the dispute was taken up by several persons of both parties, and was carried on for many years. In 1608 Scioppius published several other works against the Protestants. In the year following he travelled to Italy, and at Venice, which was involved in some dispute with the pope, Scioppius endeavoured to persuade Paolo Sarpi to join the party of the pope. The consequence of this attempt was that Scioppius was thrown into prison; but being soon restored to liberty, he visited Vienna, where he found a more favourable reception. The emperor not only made him councillor to his court, but raised him to the rank of count palatine. In 1611 he published two works, one called 'Ecclesiasticus Autoritati Ser. D. Jacobi, Magnæ Britanniæ regis, oppositus,' Hartberg, in 4to., and the other called 'Collyrium Regium, Ser. D. Jacobo, Magnæ Britanniæ regi, graviter oculis laboranti, omnium Catholicorum Nomine, gratæ voluntatis causa, muneri misum: una cum Syntagmate de Cultu et Honore,' in 8vo. Both books were mainly directed against King James I. of England, but the first also contained fresh attacks on Henry IV. of France. In Paris and in London the books were publicly burnt by the hangman, and in London Scioppius was hanged in effigy (1612). Scioppius returned to Italy, but after a short stay there, he went, in 1613, to Madrid. Here he became acquainted with the grammatical work of Sanchez, commonly known under the name of Sanctii Minerva, which turned his attention to grammatical speculations, and which he subsequently made known in other parts of Europe. He had not been long in Madrid when one evening he was dreadfully beaten by some servants of the English ambassador, who, it is possible, had ordered his servants to punish Scioppius for his insolence towards his royal master. Scioppius, not thinking himself safe in Spain, fled to Ingolstadt, where he published his 'Legatus Latro,' addressed against the English ambassador. Casaubon had defended the King of England, and this circumstance gave Scioppius an opportunity of resuming his warfare against the Protestants. In 1617 he again went to Italy, and settled at Milan, ever continuing his bitter enmity against the Protestants, who, as he now declared, ought all to be exterminated, with their women and children. This proclamation of a religious war is contained in his 'Classicum Belli Sacri, sive Heldus redivivus,' Pavia, 1619. When his rage had become exhausted, he returned for a time to philological studies, and wrote several very good grammatical works. But this quiet mode of life did not suit his quarrelsome temper. In 1630 he returned to Germany, and requested from the diet of Regensburg a pension for his services, which being refused through the influence of the Jesuits, he became the most furious enemy of their whole order, though he had before frequently lent them his support. His first works against the Jesuits appeared without his name; but in 1634 he attacked them openly in a work called 'Astrologia Ecclesiastica.' When he saw that his own life became endangered by these ferocious attacks, he retired to Padua, where he began to occupy himself with writing a commentary on the Apocalypse, but before he had completed this work he died, on the 19th of November, 1649.

Scioppius was a man of immense learning, of a prodigious memory, and of great acuteness. In his knowledge of the Latin language he had no equal. With his talents and learning, he might have been as great a man as Jos. Scaliger; but his quarrelsome disposition, his strong inclination to satire, and his intolerance, constantly involved him in disputes which reflect discredit upon his character. There are nevertheless among his numerous works some which are still very useful to scholars, especially those on the Latin language. The number of his works is stated to be one hundred and four, but he did not publish them all under his real name; many appeared under the fictitious names Nicodemus Macer, Oporinus Grubinius, Pascasius Grosippus, Holofernes Krigsœderus, Mariangelus a Fano, and others. The following list contains the most important of his works which have not been already mentioned:—'Verisimilium Libri Quatuor, in quibus multa veterum Scriptorum loca emendantur, augentur, et illustrantur,' Nürnberg, 1595, and Amsterdam, 1662, 8vo.; 'Suspectarum Lectionum Libri Quinque, in quibus amplius ducentis locis Plautus, plurimis Appuleius, Diomedes Grammaticus, et alii, corriguntur,' Nürnberg, 1597, and Amsterdam, 1664, 8vo.; 'De Arte Critica et præcipue de altera ejus parte emendatrice, quænam ratio in Lat. Scriptoribus ex ingenio emendandis observari debeat Commentariolus,' Nürnberg, 1597, and Amsterdam, 1662, 8vo.; 'Elementa Philosophiæ Stoicæ Moralis,' Maynz, 1606, 8vo.; 'Grammatica Philosophica, sive Institutiones Grammaticæ Latinæ,' Milan, 1628, 8vo. (a new edition with additions appeared at Amsterdam, 1664, 8vo., and another at Franeker in 1704); 'Paradoxa Literaria, in quibus multa de literis nova contra Ciceronis, Varronis, Quinctiliani, aliorumque literatorum hominum, tam veterum quam recentiorum, sententiam disputantur,' Milan, 1628, and Amsterdam, 1659, 8vo. (this work was published under the assumed name of Pascasius Grosippus); 'Auctarium ad Grammaticam Philosophicam, ejusque Rudimenta,' Milan, 1629, and Amsterdam, 1664, 8vo. (published under the name of Mariangelus a Fano); 'Arcana Societatis Jesu publico bono vulgata, cum Appendicibus utilissimis,' 1635, 8vo.; 'Consultationes de Scholarum et Studiorum Ratione, deque Prudentiæ et Eloquentiæ parandæ Modis,' Padua, 1636, 12mo., and Amsterdam, 1660 and 1665, 8vo.; 'Mercurius Quadrilinguis, id est, de Linguarum ac nominatim Latinæ, Germanicæ, Græcæ, et Hebraeæ nova et compendiaria Discendi Ratione,' Basel, 1637, 8vo. Scioppius also wrote notes on the 'Minerva' of Sanctius, which first appeared at Padua in 1663, and which have subsequently been incorporated in the various editions of the 'Minerva.'

SCIOTO, River. [MISSISSIPPI, River.]

SCI'PIO is the name of a family belonging to the patrician gens Cornelia. This illustrious family produced some of the greatest men in Roman history; we shall subjoin a complete list of those members of the family whose names have been handed down by historical records. The first Scipio mentioned in Roman history is

1. P. CORNELIUS SCIPIO, whom, in 396 B.C., the dictator Camillus appointed master of the horse. (Liv., v. 19.) The Fasti of this year however do not mention him, but state that P. Cornelius Maluginensis was the magister equitum of Camillus. A short time afterwards (394 B.C.) Scipio is mentioned among the military tribunes (Liv., v. 24), and a second time in the following year. (Liv., v. 26.) In the year 389 he was appointed interrex (Liv., v. 31), and two years after he held the same office a second time.

2. P. CORNELIUS SCIPIO is mentioned as one of the first curule ædiles, which office was instituted in 366 B.C. He is probably the same man who was magister equitum under Manlius, 350 B.C. (Liv., vii. 24.)

3. L. CORNELIUS SCIPIO was interrex in 352 B.C. (Liv., vii. 21.)

4. P. CORNELIUS SCIPIO BARBATUS was, according to the Fast. Cons., consul with C. Plautius in the year 328 B.C.; but Livy (viii. 22) calls the colleague of Plautius P. Cornelius Scapula. Scipio Barbatus was made dictator in 306 B.C., to hold the comitia for the election of the consuls, for the actual consuls were engaged in a war against the Samnites. (Liv., ix. 44.) A year later he appears as pontifex maximus. (Liv., ix. 46.)

5. L. CORNELIUS SCIPIO was consul in 298 B.C., and gained a victory over the Etruscans in the neighbourhood of Fregellæ. (Liv., x. 12.) He is probably the same who, three years afterwards (295 B.C.), appears in another war against the Etruscans; and was left as proprætor at the head of the Roman camp while the prætor Appius went to Rome. (Liv., x. 25, 26.)

6. CN. CORNELIUS SCIPIO ASINA. He is the first member of the family from whom we are able to trace the pedigree of the Scipios with certainty. The story about the origin of his surname Asina is related by Macrobius. (*Sat.*, i. 6.) He was consul at the time of the first Punic war (260 B.C.), together with C. Duilius, and obtained the command of the fleet; but in his attempt to take the island of Liparæ, he was blocked up by the Carthaginians with seventeen vessels in a port of the island. His soldiers escaped on land, but Scipio himself surrendered to the enemy. (Polyb., i. 21.) Livy (*Epit.*, 17) gives another account of the manner in which he was made prisoner. He must however have obtained his liberty soon after, for he was consul a second time in the year 254 B.C. (Val. Max., vi. 9, 11), with A. Atilius Calatinus. He and his colleague took Panormus, the largest town in the Carthaginian part of Sicily, and then returned to Rome in triumph. (Polyb., i. 38.) Further particulars of his life are not known.

7. P. CORNELIUS SCIPIO ASINA, son of Cn. Cornelius Scipio Asina. He was consul, in 221 B.C., with M. Minucius Rufus, and made a successful campaign against the Istri, who harassed the Romans by their piracy. (Oros., iv. 13.) Four years after (217 B.C.) he was appointed interrex, to

hold the comitia for electing the consuls. (Liv., xxii. 34.) In the year 211 B.C., when the news arrived that Hannibal was advancing with his army towards Rome, it was Scipio's advice to give up all Italy, and to draw all the armies within the walls of the city. (Liv., xxvi. 8.)

8. L. Cornelius Scipio, a brother of Cn. Cornelius Scipio Asina. He was consul, in 259 B.C., with C. Aquillius Florus. He put the fleet of the Carthaginians to flight, and attacked them in Corsica and Sardinia, and destroyed the towns of Aleria and Olbia. For these services he was honoured with a triumph. (Liv., *Epit.*, 17; Flor., ii. 2, 16; Val. Max., v. 1, 2.) The year after his consulship (258 B.C.) he is mentioned in the *Fast. Cap.* as censor.

9. P. Cornelius Scipio, son of L. Cornelius Scipio. He was consul in the first year of the second Punic war (218 B.C.). While his colleague T. Sempronius Longus was sent with the fleet to Sicily, Scipio went to Spain; but when he heard that Hannibal was already preparing to cross the Rhodanus (Rhône), he returned by sea to Massilia. The sufferings of his soldiers from this voyage prevented him from going up the Rhône immediately; and when, after the lapse of three days, he set out to meet Hannibal, the latter had already advanced into the interior of Gaul. Scipio therefore sent a part of his troops, under his brother Cneius, who was his legate, to Spain, and with the rest he embarked for Italy, to join the other Roman forces there, and to attack Hannibal on his descent from the Alps. An engagement between the Carthaginian and Roman horse took place on the Ticinus, in which the Romans were defeated, and Scipio was wounded, and compelled to retire across the river Po. He took up a position near Placentia, but he was induced by the Gauls to fortify himself on the Trebia, and to wait for the arrival of Sempronius, who had been called back from Sicily. When the latter arrived, Scipio, still suffering from his wound, advised him not to engage in a battle with Hannibal; but Sempronius, anxious to strike a decisive blow, and seeing that the enemy only profited by delay, offered battle. He was defeated, and the Carthaginians became masters of nearly the whole of Northern Italy. (Polyb., iii. 40, &c.; Liv., xxi. 32, &c.)

In the summer of the year 217 B.C., Scipio, whose imperium was prolonged at the end of his consulship, went to Spain with a fleet of 20 ships and 8000 land-troops (Polyb., iii. 97), to join his brother Cneius, who had already achieved important things in that country. His intention was to drive the Carthaginians from Spain, and thus to cut off the supplies which Hannibal was to receive from that quarter. Cneius on his arrival from Massilia had landed at Emporium, and soon after the greater part of the eastern coast of Spain declared for him. His mildness also induced several of the inland tribes, who were discontented with the oppressive rule of the Carthaginians, to join the Romans. A battle near the town of Scissis, in which the Carthaginians were defeated and their general Hanno taken prisoner, made the Romans masters of nearly the whole country between the Iberus (Ebro) and the Pyrenees. Cneius now took up his winter-quarters at Tarraco (Tarragona). (Liv., xxi. 60, &c.; Polyb., iii. 76.) In the year following, a short time before his brother Publius arrived, Cneius defeated the Carthaginian fleet in the mouth of the Iberus. (Liv., xxii. 20; Polyb., iii. 96, &c.) About the middle of the summer Publius arrived, and the two brothers marched against Saguntum, where Hannibal had left the Spanish hostages on his setting out towards Gaul. The treachery of a Spaniard, called Abelux or Abilyx, delivered them up to the Scipios, who wisely sent them home to their relatives, and thus gained a hold on the affections of a great number of Spanish tribes, who gladly shook off the yoke of the Carthaginians. In 216 B.C. the Scipios gained a victory at Ibera over Hasdrubal, who, after the arrival of a fresh Carthaginian army under Himilco, intended to make a landing in Italy and to support his brother there. The whole army of Hasdrubal was defeated and routed, his camp was taken, and he himself escaped with only a few followers. (Liv., xxiii. 28, &c.) The Spaniards, who had been heavily taxed by the Carthaginians, willingly submitted to the Romans, but the Scipios knew the fickleness of the Spaniards, and, in order to keep up friendly relations with them, they did not levy any heavy contributions, but applied to the senate at Rome to provide them with the means of supporting their armies. In the meanwhile Mago arrived with another army from Africa, and laid siege to the revolted town of Illiturgi on the Baetis. Here again the Scipios gained a great victory, and soon after another near Intibili, where the Carthaginians on their flight from Illiturgi had taken refuge. In the year 214 B.C. the important town of Castulo deserted the cause of the Carthaginians and joined the Romans, and when the former made a new attempt against Illiturgi, they were beaten by Cneius, and completely defeated in the neighbourhood of Munda. They were not more successful in several other attempts. During the following year the Carthaginians were engaged in a war in Africa against Syphax, and the Scipios had time to strengthen themselves in Spain. But the uninterrupted series of brilliant victories of the Scipios was now at an end. In 212 B.C. the Carthaginians resumed the war in Spain, and took 20,000 Celtiberians into their pay. Publius Scipio commanded two-thirds of the Roman forces, and was arrayed against Mago, Hasdrubal, son of Gisco (who were supported by Massinissa), and the Spanish chief Indibilis. Cneius was opposed to Hasdrubal Barcas. Publius, in his assault on the ranks of Indibilis, was cut down with the greater part of his army. His brother Cneius, abandoned by the faithless Celtiberians, withdrew as far as he could. From the manœuvres of the enemy, he conjectured the fate of his brother. On his retreat he found himself at last compelled to make a stand upon a hill which was of such a nature that it was impossible for him to fortify himself. Nearly the whole of his army was cut to pieces, and Cneius himself fell among the rest, 29 days after the death of his brother. The catastrophe took place in the spring of the year 211 B.C. (Becker, 'Vorarbeiten zu einer Geschichte des Zweiten Punischen Krieges,' in Dahlmann's *Forschungen*, ii. 2, p. 113.)

10. Cn. Cornelius Scipio Calvus, the brother of P. Corn. Scipio (No. 9). His exploits in Spain have just been described. He was consul, in 222 B.C., with M. Claudius Marcellus, with whom he made an expedition against the Insubrians, and took Acerræ and Mediolanum. (Polyb., ii. 34; Plut., *Marcell.*, 6.) At the beginning of the second Punic war he went, as we have seen, to Spain as legate to his brother Publius.

11. P. Cornelius Scipio Africanus Major, the son of P. Cornelius Scipio (No. 9). If it be true that at the age of seventeen he fought in the battle of the Ticinus (218 B.C.), and rescued his wounded father, he must have been born in 235 B.C. He was in the battle of Cannæ (216 B.C.) as a tribune, and was among those who after the defeat escaped to Canusium. Here the chief command of the remaining troops was unanimously entrusted to him and Appius Claudius Pulcher. (Liv., xxii. 53.) On this occasion it was owing to his presence of mind that the remnants of the Roman army did not in their despair quit Italy. (Val. Max., v. 6, 7.) In 212 B.C. Scipio was curule ædile, though he had not yet attained the legitimate age. The tribunes of the people endeavoured to prevent his election, but they were obliged to give up their opposition, for the people, who seem to have perceived the extraordinary abilities of the young man, elected him almost unanimously. (Liv., xxv. 2.) In 211 B.C. his father and uncle fell in Spain, and the Carthaginians again took possession of the country, which they had almost entirely lost. When Capua had fallen again into their hands, and Italy no longer required their exclusive attention, the Romans determined to act with more energy against the Carthaginians in Spain. On the day of the election, no one ventured to come forward to undertake the command in this war. Young Scipio, then scarcely 24 years of age, at last offered to take the command of the army in Spain. The people were struck with admiration at the courage of the young man, and gave him the command, with proconsular power, which was afterwards prolonged to him for several years (210-206 B.C.).

The extraordinary power which young Scipio exercised over his contemporaries was perhaps partly owing to superstition, for he was believed to be a favourite of the gods. Ever since he had taken the toga virilis, he went every morning into the Capitol, where he spent some hours in solitude and meditation. Hence all he did was considered by the people to be the result of his intercourse with the gods. Scipio himself undoubtedly partook in this opinion, and cherished it; and the extraordinary success of all his enterprises must have strengthened his belief. Towards the end of the summer, in 210 B.C., or, as Livy (xxvi. 41) says, at the beginning of spring, Scipio set out for Spain with an army of 11,000 men, landed at the mouth of the Iberus, and undertook the command of the whole Roman forces in Spain. He was accompanied by his friend Lælius. His first object was to gain possession of New Carthage, where the Carthaginians kept their Spanish hostages. Lælius made the attack with the fleet from the sea-side, while Scipio conducted the operations on land. The town soon fell into the hands of the Romans, and the generosity with which Scipio treated the Spanish hostages gained over a great number of Spaniards. The hostages of those tribes who declared themselves allies of the Romans were sent home without ransom. A short time after the conquest of this place Scipio went to Tarraco, where he received embassies from various Spanish tribes, who offered to become the allies of the Romans or to recognise their supremacy. Scipio is said not to have set out against Hasdrubal until the year following, but it can scarcely be conceived why the Carthaginians should have been so long inactive, and it is a probable supposition that the battle with Hasdrubal, which Livy and Polybius assign to the year 209 B.C., was fought very soon after the taking of New Carthage. (Zonaras, ix. 8.) In this battle Scipio gained a great victory; 8000 Carthaginians were slain, and 22,000, with their camp, fell into the hands of the victor. Many of the Spaniards now wished to proclaim Scipio their king, but he refused the honour. (Liv., xxvii. 19; Polyb., x. 40.) Hasdrubal fled with the remainder of his army towards the Tagus and the Pyrenees. Scipio did not follow him, partly because he thought his enemy too much weakened to be dangerous, and partly because he feared lest he might expose himself to the combined attacks of the two other Carthaginian generals, Mago, and Hasdrubal, son of Gisco. Hasdrubal Barcas, the defeated general, however, had carried considerable wealth with him in his flight, and with these means he raised an army in Spain, to lead into Italy to the assistance of his brother Hannibal, hoping thus to bring the war to an end in Italy. During these preparations of Hasdrubal, Scipio was engaged against the two other Carthaginian generals, one of whom (Mago) was defeated, in 208 B.C., by the proprætor Silanus, in the country of the Celtiberians, and Hanno, who came with an auxiliary army from Africa, was taken prisoner. After this success of the proprætor, Scipio united his forces with those of Silanus to attack Hasdrubal, son of Gisco. But as this general had retired to the south of Spain, and had distributed his army in the fortified places on the Bætis as far as Gades, Scipio (through his brother Lucius) only took the important town of Oringis, and then gradually returned across the Iberus. The power of the Carthaginians in Spain was however already broken, and in the year following (207 B.C.) Scipio gained possession of nearly all Spain by a victory, the place of which is not clearly ascertained, some calling it Silpia or Bæcula, some Ilipa, and others Carmo. Scipio, now in the almost undisputed possession of Spain, began to turn his eyes to Africa, and, accompanied by his friend Lælius, he ventured to pay a visit to king Syphax, with whom Lælius had already commenced negotiations. Here Scipio is said to have met Hasdrubal, son of Gisco, and to have made a very favourable impression on Syphax as well as on Hasdrubal. After a short stay in Africa, Scipio returned to Spain, where he first punished several towns for their faithlessness, and subdued some of the Spanish chiefs who ventured to claim their former independence. During these occupations Scipio was attacked by a severe illness, from which however he recovered in time to quell an insurrection of 8000 Roman soldiers, who were discontented from not having derived from their conquests those advantages which they had expected, and who are said also to have been bribed by the Carthaginians. Mago had in the meanwhile withdrawn to the Balearic Islands, and thence to Liguria. Gades, the last place which the Carthaginians possessed in Spain, was now taken from them, and thus the war in Spain was at an end.

Towards the close of the year 206 B.C., Scipio surrendered the command of the Roman forces in Spain to the proconsuls L. Lentulus and L. Manlius Acidinus, and returned to Rome. (Liv., xxviii. 38.) He delivered to the aerarium the immense treasures which he brought from Spain. He evidently wished for a triumph, but the senate paid no attention to his wishes, for no one had ever triumphed at Rome before he had held the consulship. In the year 205 B.C., Scipio was made consul with P. Licinius Crassus, who was at the same time pontifex maximus, and was consequently not allowed to leave Italy. If therefore a war was to be carried on abroad, the command necessarily devolved upon Scipio. His wish was immediately to sail with an army to Africa, but the more cautious senators, and especially Q. Fabius, were decidedly opposed to his plan, partly because Hannibal, as long as he was in Italy, appeared too formidable to be neglected, and partly perhaps because they were influenced by jealousy. All that Scipio could obtain was that Sicily should be assigned to him as his province, with 30 vessels, and with permission to sail over to Africa in case he should think it advantageous to the republic. But he did not obtain from the senate permission to levy an army, and he therefore called upon the Italian allies to provide him with troops and other things necessary for carrying on the war. As they were all willing to support the conqueror of the Carthaginians in Spain, he was soon enabled to sail to Sicily with nearly 7000 volunteers and 30 ships. (Liv., xxviii. 45, &c.; Plut., *Fab. Max.*, 25.) Soon after his arrival in Sicily he sent his friend Lælius with a part of his fleet to Africa, partly to keep up the connection which he had formed there, on his visit from Spain, with Syphax and Massinissa (for to the latter Scipio had sent back a nephew who had been taken prisoner in the battle of Bæcula), and partly to show to his timid opponents at Rome how groundless their fears were. He himself employed his time in Sicily most actively in preparing and disciplining his new army.

Massinissa, dissatisfied with the Carthaginians, was anxious for the arrival of Scipio in Africa, but Syphax had altered his policy, and again joined the Carthaginians. The enemies of Scipio at Rome at last got an opportunity of attacking him, and they nearly succeeded in depriving him of his post. Without being authorized by the senate, Scipio had taken part in the conquest of Locri in Southern Italy, and had left his legate Q. Flaminius as commander of the Roman garrison in that place. The legate treated the Locrians with such severity and cruelty, that they sent an embassy to Rome to lay their complaints before the senate. As Scipio, although acquainted with the conduct of Flaminius, had nevertheless left him in command, his enemies attacked him on this and other grounds, and Fabius Maximus even proposed that he should be recalled. A commission was sent out to inquire into the state of affairs, and to bring Scipio home, if the charges against him were found true. Scipio proved that his army was in the best possible condition; and the commissioners were so surprised at what they saw, that instead of recalling the consul, they bade him sail to Africa as soon as he might think it proper, and to adopt any measures that he might think useful. Scipio in consequence of this sailed, in 204 B.C., as proconsul, with a large army, from Lilybæum to Africa, and landed in the neighbourhood of Utica. Here he made successful incursions into the neighbouring country, and Hasdrubal, who attempted to prevent them, suffered a great defeat. But Scipio could not gain possession of Utica, which was of the greater importance to him and his fleet, as the winter was approaching, and he was obliged to spend the season on a piece of land extending into the sea, which he fortified as well as he could. Towards the close of the winter the Carthaginians, united with Syphax, intended to make a general attack on Scipio's army and fleet, but being informed of their plans, he surprised the camps of Hasdrubal and Syphax in the night, and only a small number of the enemy escaped. Syphax withdrew into his own dominions, but was defeated by Massinissa and Lælius, and taken prisoner with his wife and one of his sons. Massinissa married Sophonisba, the wife of Syphax, who had formerly been engaged to him, but had been given to Syphax for political reasons. Scipio, fearing the influence she might have on Massinissa (for she was a Carthaginian), claimed her as a prisoner belonging to the Romans, and Massinissa poisoned her, to save her from the humiliation of captivity. The fears and apprehensions of the Carthaginians now increased to such a degree that they thought it necessary to recall Hannibal from Italy, and at the same time they sued for peace. The terms which Scipio proposed would have concluded the war in a manner honourable to the Romans. The Carthaginians however, whose only object was to gain time, made no objections to the conditions, but only concluded a truce of forty-five days, during which an embassy was to be sent to Rome. Before this truce was at an end, the Carthaginian populace plundered some Roman vessels with provisions, which were wrecked off Carthage, and even insulted the Roman envoys who came to demand reparation. Scipio did not resent this conduct, and allowed the Carthaginian ambassadors, on their return from Rome, to pass on to Carthage unmolested. About this time (it was the autumn of the year 203 B.C.) Hannibal arrived in Africa, and soon collected an army in numbers far exceeding that of Scipio. He first made a successful campaign against Massinissa. Scipio was at this time informed that the consul Tib. Claudius Nero would come with an army to Africa to co-operate with him against Hannibal. Scipio, who wished to bring the war to a conclusion, and was unwilling to share this glory with any one else, determined to bring Hannibal to a decisive battle. The Carthaginian at first avoided an engagement; but when Scipio, in order to deceive the enemy, hastily retreated as if he intended to take to flight, Hannibal followed him with his cavalry, and lost a battle in the neighbourhood of Zama. A tribune of Scipio soon afterwards cut off a large convoy of provisions which was on its way to the camp of Hannibal, and this suddenly threw him into such difficulties, that he began to negotiate with Scipio for peace. The conditions however which Scipio now proposed were so humiliating, that the Carthaginians would not accept them. Hannibal therefore, though he saw the impossibility of gaining any further advantages, was compelled to decide the affair by a last and desperate effort. In a personal interview between the two generals Scipio was inexorable as to the conditions. Hannibal's army was in a bad condition; and in the ensuing battle, to the west of Zama, the victory of Scipio was complete. This defeat (in 202 B.C.) was the death-blow to Carthage. The conditions of the peace which was now concluded between Rome and Carthage are stated in PUNIC WARS, p. 129.

Scipio, on his return to Italy, was received with the greatest enthusiasm: he entered Rome in triumph, and was henceforward distinguished by the name of Africanus. Scipio now for several years continued to live at Rome, apparently without taking any part in public affairs. In 199 B.C. he obtained the office of censor with P. Ælius Pætus (Liv., xxxii. 7), and in 194 B.C. he was made consul a second time with Tib. Sempronius Longus (Liv., xxxiv. 42), and princeps senatus, a distinction with which he had already been honoured in 196 B.C., and which was conferred upon him for the third time in 190 B.C. (Liv. xxxiv. 44; xxxviii. 28.) In 193 B.C., during one of the disputes between the Carthaginians and Massinissa, Scipio was sent with two other commissioners to mediate between the parties. But nothing was settled, though, as Livy (xxxiv. 62) observes, Scipio might easily have put an end to the disputes. It is well known that Scipio was the only Roman who thought it unworthy of the republic to support those Carthaginians who persecuted Hannibal; and there was a tradition that Scipio, in 193 B.C., was sent on an embassy to Antiochus, and that he met Hannibal in his exile, who in the conversation which took place declared Scipio the greatest of all generals. (Liv., xxxv. 14.) Whether the story of the conversation be true or not, the judgment ascribed to Hannibal is certainly just; for Scipio as a general was second to none but Hannibal himself. In the year 190 B.C. some discussions arose in the senate as to what provinces should be assigned to the two consuls, Lælius, and L. Cornelius Scipio, brother of the great Africanus. Africanus, although he was princeps senatus, offered to accompany his brother as legate, if the senate would give him Greece as his province, for this province conferred upon Lucius the command in the war against Antiochus. The offer was accepted, and the two brothers set out for Greece, and thence for Asia. Africanus took his son with him on this expedition; but by some unluckly chance the boy was taken prisoner, and sent to Antiochus. The king offered to restore him to freedom, and to give a considerable sum of money, if the father would interpose his influence to obtain favourable terms for the king. Africanus refused; but the king notwithstanding soon after sent the boy back to his father, who just then was suffering from illness, and was absent from the camp. To show his gratitude, Africanus sent a message to Antiochus, advising him not to engage in a battle until he himself had returned to the Roman camp. After the great battle near Mount Sipylus, Antiochus again applied to Scipio for peace, and the latter now used his influence with his brother Lucius and the council of war on behalf of the king. The conditions of the peace were tolerably mild, but they were afterwards made much more severe when the peace was ratified at Rome. [ANTIOCHUS.] The enemies of Africanus at Rome had now another charge against him. The peace with Antiochus, and the conditions proposed by Africanus and his brother Lucius, were regarded by the hostile party as the result of bribes from Antiochus, and of the liberation of the son of Africanus. A charge was therefore brought against the two brothers, on their return to Rome, of having accepted bribes of the king, and of having retained a part of the treasures which they ought to have delivered up to the aerarium. At the same time they were called upon to give an account of the sums of money they had taken from Antiochus. Lucius was ready to obey; but his brother Africanus with indignation snatched the accounts from the hands of his brother and tore them to pieces before the senate. (Liv., xxxviii. 55; Gellius, iv. 18; Val. Max., iii. 7, 1.) The tribune of the people, C. Minucius Augurinus, however fined Lucius; and when he was going to be thrown into prison until he should pay the heavy fine, Africanus dragged him away; and the tribune Tib. Gracchus, though disapproving of the violence of Africanus, liberated Lucius from imprisonment. (Gellius, vii. 19; Liv., xxxviii. 56.) Africanus himself was now summoned before the people by the tribune M. Nævius, and he only saved himself by reminding the people of his victory at Zama. After these troubles he withdrew to his villa near Liternum, and it was owing to the interposition of Tib. Gracchus that he was not compelled to obey another summons. The estates of his brother Lucius however were confiscated (187 B.C.); but the sum produced by their sale did not make up the amount of the fine. His friends and clients not only offered to make up the sum, but their generosity would even have made him richer than he had been before; but he refused to accept anything beyond what was absolutely necessary for his support. (Liv., xxxviii. 60.) Africanus never returned from his voluntary exile, and he spent the last years of his life in quiet retirement at his villa. (Senec., *Epist.*, 86.) He is said to have wished to be buried on his estate; but there was, as Livy says, a tradition that he died at Rome, and was buried in the tomb of his family near the Porta Capena, where statues of him, his brother Lucius, and their friend Q. Ennius, were erected. The year of his death is not quite certain; for according to Polybius he died in the same year with Hannibal and Philopœmen (183 B.C.); according to others, two years earlier (185 B.C.). In judging of Scipio Africanus as a general, we may adopt the judgment ascribed to Hannibal; but as a Roman citizen he is very far from deserving such praise. His pride and haughtiness were intolerable; and the laws of the constitution were set at nought whenever they opposed his own views and passions. As a statesman he scarcely did anything worth mentioning. By his wife Æmilia, daughter of Æmilius Paullus, he had two daughters: one of whom married P. Cornelius Scipio Nasica Corculum (Liv. xxxviii. 57); the other, the celebrated Cornelia, married Tib. Sempronius Gracchus, and was the mother of the two Gracchi, the tribunes of the people. Africanus had also two sons.

12. **P. Cornelius Scipio**, son of the great Scipio Africanus (No. 11). He was augur in 180 B.C. (Liv., xl. 42.) Cicero (*Brut.*, 19; *De Senect.*, 11; *De Off.*, i. 33) says that he was a man of great mental powers, but of a weakly constitution. He was the adoptive father of P. Cornelius Scipio Aemilianus Africanus Minor. His epitaph is given by Orelli (*Onomast. Tull.*, p. 187).

13. **Lucius or Cneius Scipio**, the second son of Scipio Africanus Major (No. 11). He was, as we have seen, taken prisoner in the war with Antiochus; he is described as a contemptible man. In 174 B.C. he became prætor urbanus, by the modest withdrawal of his competitor, who had been a scribe to his father, but he was in this same year expelled from the senate by the censors. (Liv., xli. 27; Val. Max., iii. 5, 1.)

14. **L. Cornelius Scipio Asiaticus, Asiagenes, or Asiagenus**, son of P. Cornelius Scipio (No. 9), and brother of the great Scipio Africanus (No. 11). He accompanied, as we have seen, his brother Africanus on his campaigns in Spain. In 193 B.C. he was prætor in Sicily. In 190 B.C. he was made consul with Lælius, and obtained Greece as his province, with the command in the war against Antiochus, with whom he had already had some negotiations in 196 B.C. (Polyb., xviii. 33.) The senate at Rome do not appear to have had any great confidence in his talents as a general (Cic., *Phil.*, xi. 7), as it was only owing to the offer of his great brother to accompany him as his legate that he obtained Greece as his province. After the conclusion of the war with Antiochus, he assumed the name of Asiaticus,

and entered Rome in triumph. (Liv., xxxvii. 58, &c.) According to Valerius Antias (Liv. xxxix. 22) he celebrated, in 185 B.C., magnificent games for ten days. The money expended on these games he is said to have collected in Asia, during an embassy, on which he had been sent to settle some disputes between Antiochus and Eumenes, shortly after his condemnation. In 184 B.C. he was a candidate for the censorship, but he was defeated by his competitor Cato, the great enemy of his family, who in his censorship took away from Scipio Asiaticus his horse. (Liv., xxxix. 44.)

15. **P. Cornelius Scipio Aemilianus Africanus Minor**, son of L. Aemilius Paullus, and adopted son of P. Cornelius Scipio (No. 12). He must have been born about 185 B.C., for in 168 B.C. Scipio, then a youth in his seventeenth year, took a very active part in the battle of Pydna, in which his father defeated king Perseus of Macedonia. (Liv., xliv. 44; Plut., *Aem. Paul.*, 22.) From his earliest youth he had an ardent love of intellectual occupations, and cultivated the friendship of men like Polybius, Panaetius, Laelius, and others. It was perhaps on this account that he appeared to his relatives to be wanting in youthful vigour, and no great hopes were entertained of him. But with his partiality for science and Greek refinement and art, he esteemed no less the stern virtues of the best of the Romans. Old Cato was in this respect his model. At the beginning of the third Punic war, 151 B.C., when no one was willing to enter his name either as an officer or as a common soldier for the campaign in Spain, Scipio, although he was at this same time requested by the Macedonians to settle some disputes among themselves, came forward and declared that he would gladly accept any post that might be assigned to him. This example inspired with courage even those who had hitherto kept back. (Liv., *Epit.*, 48; Polyb., xxxv. 4.) Scipio thus became military tribune under L. Lucullus. Two heroic deeds of Scipio in this expedition are recorded: he was the only Roman who ventured to accept the challenge of a huge Spanish chief, whom he slew in single combat; Scipio also was the first to scale the walls of the town of Intercatia while it was besieged by the Romans. These proofs of personal courage, and his other virtues, filled even the enemy with admiration, and gained for him a greater influence over the Spaniards than his avaricious general, Lucullus, was able to acquire. (Appian, vi. 54.) The year following, 150 B.C., Scipio was sent by Lucullus to Africa, to request Massinissa to send a number of elephants over to Spain. Scipio was most honourably received. Massinissa and the Carthaginians were just preparing for battle; Scipio beheld the contest from an eminence, and as soon as the Carthaginians were apprised of his presence, they entreated him to act as mediator between them and Massinissa. But he was not able to effect what they wished, and he returned to Spain with the elephants. (Appian, viii., 71, &c.) When the war between Carthage and Rome broke out, Scipio, then still military tribune, went to Africa, and here again distinguished himself so much by his courage, prudence, and justice, that he not only gained the unlimited confidence of his own countrymen and Massinissa, but even of the Carthaginians, who trusted no Roman but Scipio. Roman ambassadors who were sent to the camp in Africa to report on the state of affairs, on their return to Rome were unbounded in their praise of Scipio and of the attachment of the soldiers to him. (Appian, viii. 98, &c.) In 148 B.C., when the consul Calpurnius Piso undertook the command in Africa, Scipio returned to Rome, where everybody appears to have been convinced that he alone was able to complete the conquest of Carthage. Cato said that Scipio alone was alive, while all the other generals were mere shadows. (Liv., *Epit.*, 49; Polyb., xxxvi. 6.) The consul Piso made very little progress in Africa, and when Scipio was a candidate for the aedileship, he was unanimously elected consul for the year 147 B.C., though he had not yet attained the legitimate age: he obtained Africa as his province. On his return to Africa he was accompanied by Polybius and Laelius, and immediately after his arrival he saved a considerable body of Roman soldiers, who had penetrated into one of the suburbs of Carthage (Appian, viii. 113, &c.) He restored discipline in the Roman army. His first operation was to cut off all supplies which the Carthaginians had hitherto received from the interior of Africa, and in the following winter (147-46 B.C.) he succeeded in taking Nepheris, whence the Carthaginians till then had received their supplies by sea. His command of the army was prolonged for the year 146 B.C., and in the spring of this year he made his attack on the city, which was defended with the utmost despair, and by a decree of the senate he razed the city to the ground. [Carthage.] He is said to have wept over its ruins, and to have uttered the prophetic words of Homer:—

> *ἔσσεται ἦμαρ, ὅτ' ἂν ποτ' ὀλώλῃ Ἴλιος ἱρὴ,*
> *καὶ Πρίαμος καὶ λαὸς ἐϋμμελίω Πριάμοιο.*
>
> (*Iliad*, vi. 448, &c.)

After he had made the necessary arrangements in Africa, and annihilated an enemy who, though humbled, was still looked upon by Rome with jealousy, Scipio returned to Italy, and entered Rome in triumph. In 142 B.C. he was censor with L. Mummius, and at this time of increasing luxury he fulfilled the duties of his office with the greatest strictness, and without any respect to person or rank. In the lustrum which he performed at the close of his census, he did not pray, as had been customary before, for the increase of the republic, but only for its preservation. (Val. Max., iv. 1, 19.) It was probably after his censorship that he, together with Sp. Mummius and L. Metellus, travelled through Egypt, Syria, Asia, and Greece, to look into the state of affairs in these countries. (Cic., *De Rep.*, vi. 11; comp. *Acad.*, ii. 2.) The war against Numantia in Spain had been carried on for a long time without success; Scipio was considered the only man who could bring the war to a termination, and, although absent at the time of the elections he was made consul for the year 134 B.C. On his arrival in Spain he found the Roman army in a most deplorable state, and here, as in Africa, he had to restore military discipline before he could venture upon any enterprise. The brave inhabitants of Numantia held out against him until famine rendered further resistance impossible. The town fell into the hands of Scipio, after most of the citizens had put an end to their own lives. Fifty of the survivors were selected by Scipio to adorn his triumph; the rest were sold as slaves, and the city was razed to the ground. (Appian, vi. 84, &c.; Liv., *Epit.*, 57, 59.) While he was engaged in the siege of Numantia, the Gracchian disturbances began at Rome. Although his wife Sempronia was a sister of the Gracchi, Scipio approved of his brother-in-law being put to death, but still he was not, like many others, an obstinate advocate of the privileges of a class, for we find him supporting the lex Cassia tabellaria against the aristocrats (Cic., *Brut.*, 25), whence he was considered by some as a man of the people. (Cic., *Acad.*, ii. 5.) Scipio was opposed to all violent measures; caution was one of his prominent characteristics. He was certainly sincere and disinterested. But his opposition to the popular party deprived him of a great part of the favour and influence which he had hitherto possessed through the people. The consequence was, that when, in 131 B.C., he was inclined to undertake the command in the war against Aristonicus, he only obtained the votes of two tribes. (Cic., *Phil.*, xi. 8.) But notwithstanding this slight, he still possessed great influence, for when the tribune Papirius Carbo proposed a law that the people should be at liberty to re-elect their tribunes as often as they pleased, the eloquent speech of Scipio induced the people to reject the measure, though it was in their own favour. (Cic., *Læl.*, 25.) Soon after this however a circumstance occurred which called forth the bitterest opposition of the popular party against him. Scipio had made a proposal in favour of the old Italian veterans, which had been approved by the senate, and according to which the disputes arising out of the distribution of the public land should not be decided by the distributors, but by other persons. This measure produced a delay in the distribution itself, and the popular leaders, F. Flaccus, C. Gracchus, and Papirius Carbo, made the bitterest invectives against Scipio in the assembly, and called him the enemy of the people. When Scipio repeated his approval of the death of Gracchus, the demagogues cried out, 'Down with the tyrant!'

After these fierce debates Scipio went quietly home accompanied by the senate and a great number of Latins and Roman allies. (Cic., *Læl.*, 3.) In the evening he went into his bedroom with the intention of writing a speech to be delivered the following morning. But in the morning Scipio was found dead in his bed (129 B.C.). (Appian, *Civil.*, i. 19, &c.) An investigation into the cause of his death was prevented by the multitude, and the event remained a secret. Public opinion pointed out many who were suspected of having murdered him, and the heaviest suspicion fell upon Carbo. (Comp Dr. Fr. Gerlach, *Der Tod des P.*

Cornelius Scipio Æmilianus, eine Historische Untersuchung, Basel, 1839; and Zimmermann, *Zeitschrift für die Alterthumswissenschaft*, 1841, No. 52.)

16. **L. Cornelius Scipio**, son of L. Cornelius Scipio Asiaticus (No. 14). He was quæstor in 167 B.C. (Liv., xlv. 44; Val. Max., v. 1, 1; comp. Pighius, *Annal. ad An.* 591.)

17. **L. Cornelius Scipio**, son of L. Cornelius Scipio (No. 16). According to Pighius he was quæstor in 96 B.C., ædilis curulis in 92 B.C., and prætor in 89 and 88 B.C. In 83 B.C. he was consul with C. Junius Norbanus, and marched against Sulla, but he was suddenly abandoned by his whole army, which had been worked upon by the agents of Sulla. Scipio was taken prisoner with his son Lucius. He was then indeed let go, but in 82 B.C. he was sent into exile, and spent the remainder of his life at Massilia. (Appian, *Civil.*, i. 82, &c.; Liv., *Epit.*, 85; Cic., *Pro Sext.*, 3; *Ad Att.*, ix. 15.) Cicero (*Brut.*, 47) says of him, 'dicebat non imperite.

18. **P. Cornelius Scipio Nasica**, son of Cn. Cornelius Scipio Calvus (No. 10). In the year 203 B.C., when yet a young man, and even before he had been quæstor, he was declared by the senate to be the best of all good citizens, and commissioned to go with the Roman matrons to Ostia to receive the statue of the Idæan Mother, which had been brought from Pessinus. (Liv., xxix. 14.) In 200 B.C. he was one of the triumvirs to complete the number of colonists in Venusia. (Liv., xxxi. 49.) In 196 B.C. he was curule ædile (Liv., xxxiii. 25); in 194 B.C. he was prætor (Liv., xxxiv. 42), and the year following proprætor in Spain (Liv., xxxv. 1), where he fought several successful battles to the west of the Iberus. In 192 B.C. he was a candidate for the consulship, but he was not elected, notwithstanding his success in Spain, and notwithstanding the support of his cousin the great Africanus. (Liv., xxxv. 10.) But the following year he was more successful; he became consul with M. Acilius Glabrio (Liv., xxxv. 24), and gained a signal victory and a triumph over the Boians. (Liv., xxxvi. 38.) When L. Scipio Asiaticus was accused, Nasica came forward as his advocate. (Liv., xxxviii. 58.) In 184 B.C. he was a candidate for the censorship, but M. Porcius Cato was preferred to him. (Liv., xxxix. 40.) In 183 and 182 B.C. he was one of the triumvirs to establish a Latin colony at Aquileia. (Liv., xxxix. 55; xl. 34.) In 171 B.C. Spanish ambassadors came to Rome to complain of the extortions of their Roman governors, and when the senate granted them the privilege of chosing patrons to conduct their cause at Rome, Scipio Nasica was one of the patrons. (Liv., xliii. 2; compare Cic., *De Orat.*, iii. 33.)

19. **P. Cornelius Scipio Nasica Corculum**, son of P. Corn. Scipio Nasica (No. 18). He was married to a daughter of Scipio Africanus Major, and distinguished himself in the campaign of Aemilius Paullus in Macedonia. (Liv., xliv. 35, &c.; Polyb., xxix. 6.) In 162 B.C. he was consul, but only for a short time, for he and his colleague were obliged to abdicate, because a mistake had been made in the auguries for the election. (Cic., *De Nat. Deor.*, ii. 4; *De Div.*, ii. 35.) In 159 B.C. he was censor with C. Popillius Lænas, and they made a decree, that only the statues of those men should remain standing in the Forum who had held a magistracy, and that all the others should be removed. (Plin., *Hist. Nat.*, xxxiv. 14; Aurel. Vict., *De Vir. Illustr.*, 44.) Scipio in his censorship introduced at Rome the use of a public clepsydra, and built a portico on the Capitol. In his second consulship, 155 B.C., he gained a victory over the Dalmatians, and took the town of Delminium. (Liv., *Epit.*, 47; Aurel. Vict., *l. c.*) During this year there occurred a proof of the stern severity of his character, and of his influence: at his proposal the senate ordered a theatre to be pulled down, the erecting of which had been approved by the censors, and which was very near its completion. Scipio thought a theatre injurious to the morals of the Romans. (Liv., *Epit.*, 48.) When Cato insisted upon the destruction of Carthage, Scipio Corculum opposed him on the ground that the existence of such a rival as Carthage was most wholesome to Rome itself, as a check against corruption. (Plut., *Cat. Maj.*, 27.) In 150 B.C. he became pontifex maximus. Respecting his talents as an orator and his studies, see Cic., *Brut.*, 20, and *De Senect.*, 14.

20. **P. Cornelius Scipio Nasica Serapio**, son of P. Cornelius Scipio Nasica Corculum (No. 19). Before the outbreak of the third Punic war he was quæstor, and commissioned, with the consuls Censorinus and Manilius (149 B.C.), to demand from the Carthaginians the delivery of their arms to the Romans. (Appian, viii. 80.) His suit for the ædileship was unsuccessful. (Cic., *Pro Planc.*, 21; Val. Max. vii. 5, 2, in which passage however he is confounded with P. Corn. Scip. Nasica (No. 18.) In 138 B.C. he was consul with D. Junius Brutus Gallaicus. These two consuls were thrown into prison by the tribunes of the people, because they were too severe in raising soldiers for their armies. (Liv., *Ep.*, 55; Cic., *De Legg.*, iii. 9.) The chief enemy of Scipio among the tribunes was Curiatius, and it is he who is said to have given him the nickname Serapio. Scipio was a man of vehement and irascible temper (Cic., *Brut.*, 28), and of inflexible aristocratic principles. His hatred of the measures of Tib. Gracchus was so great, that during the election of the tribunes he placed himself at the head of his party in their attack upon Gracchus in the Capitol. This enraged the people so much against him, that the senate thought it advisable to send him on an embassy to Asia, although as pontifex maximus he was not allowed to quit Italy. He died at Pergamus soon after his arrival in Asia. (Plut., *Tib. Gracch.*, 21; Cic., *Pro Flacc.*, 31.)

21. **P. Cornelius Scipio Nasica**, son of P. Cornel. Scipio Nasica Serapio (No. 20). He was consul in 111 B.C. with L. Calpurnius Piso Bestia, who went out against Jugurtha, while Scipio remained in Italy. (Sallust., *Jug.*, 27.) He is described as a man who was inaccessible to bribes, and throughout his life behaved in the most exemplary manner. (Diodor., *Fragm.*, xxxiv., p. 214, ed. Tauchnitz.) He died during his consulship. (Cic., *Brut.*, 34.) Cicero says that in wit and humour he excelled everybody.

22. **P. Cornelius Scipio Nasica**, son of P. Cornel. Scipio Nasica (No. 21). He was prætor in 94 B.C. He is mentioned by Cicero (*Pro Rosc. Am.*, 27) as one of the advocati of Roscius of Ameria. His wife was Licinia, the daughter of the orator L. Crassus. (Cic., *Brut.*, 58.) He was the father of L. Licinius Crassus Scipio, whom Crassus the orator made his adoptive son, and of Q. Metellus Pius Scipio, who was adopted by Q. Metellus Pius, and was father-in-law of Pompey. Metellus Scipio was defeated by Cæsar, and fell in Africa.

23. **Cn. Cornelius Scipio Hispallus**, the son of a brother of the two Scipios who fell in Spain (No. 9 and 10). He was consul in 176 B.C., but during his consulship he was seized with a paralytic stroke, and died at the baths of Cumæ. (Liv., xli. 20.)

24. **Cn. Cornelius Scipio Hispallus**, son of Cn. Corn. Scipio Hispallus (No. 23). In 149 B.C. he was with Scipio Nasica (No. 20) among the commissioners to Carthage (Appian, viii. 80.) In 139 B.C. he was prætor, and promulgated an edict according to which all Chaldæans (astrologers) were to quit Rome, and Italy within ten days. (Val. Max., i. 3, 2, who calls him Caius Corn. Hispallus.)

25. **Cn. Cornelius Scipio Hispallus** son of Cn. Corn. Scipio Hispallus (No. 24). He is mentioned only by Valerius Maximus (vi. 3, 3), who says that he was compelled to give up his province of Spain, to which he had been sent as quæstor, on account of his inability, and that afterwards he was condemned for dishonest conduct.

26. **L. Cornelius Scipio Hispallus**, son of Cn. Corn. Scipio Hispallus (No. 24). Pighius (*Annal. ad An.* 646) thinks that he is the same of whom Appian (*Civil.*, i. 41) says that in the Marsian war he and L. Acilius were compelled to escape from Æsernia in the attire of slaves.

For the history of the family of the Scipios compare Orelli, *Onomasticon Tullianum*, p. 183, &c.; Paully, *Real-Encyclopædie der Alterthumswissenschaft*, vol. ii., p. 650, &c.

The family tomb of the Scipios was first discovered in 1616, but it was soon forgotten, as few of its ruins had been laid open, and doubts were raised as to its genuineness. In 1780 the tomb was again discovered close by the modern gate of S. Sebastian. Visconti and the pope took great interest in the discovery, and in the course of a year the whole catacomb, though in a dilapidated state, was cleared and laid open. The inscriptions and other curiosities, among which we may mention the beautiful sarcophagus of Scipio Barbatus, were transferred to the Museum Pio-Clementinum at Rome. The monuments with their inscriptions are described in *Monumenti degli Scipioni, publicati dal Cavaliere Francesco Piranesi*. Roma, 1785, fol.; and in Lanzi, *Saggio*, vol. i., p. 150, &c. For the inscriptions see Orelli, *Inscript. Lat.*, n. 550-559.

SCIRE FA'CIAS, a writ sued out for the purpose either of enforcing the execution of, or of vacating, some already existing record. It directs the sheriff to give notice ('Scire facias,' whence the name) to the party against whom it is obtained to appear and show cause why the purpose of it shall not be effected. A summons to this effect should be served on the party, whose duty then is to enter an appearance, after which a declaration is delivered to him, reciting the writ of scire facias. To this he may plead, or demur, and the subsequent proceedings are analogous to, and in fact are in law considered as an action. If the party cannot be summoned, or fail to appear, judgment may be signed against him. The proceedings under a scire facias are resorted to in a variety of cases. They may be divided into

1. Those where, the parties remaining the same, a scire facias is necessary to revive or set in operation the record.

2. Those where another party seeks to benefit, or becomes chargeable, or is injured, by it.

In cases where a year and a day have elapsed since judgment has been signed, and nothing (such as a writ of error, an injunction, &c.) has existed to stay further proceedings, it is a legal presumption that the judgment has either been executed, or that the plaintiff has released the execution. Accordingly in such case execution cannot issue against the defendant until he has had an opportunity, by means of the notice given him under a scire facias, of appearing and showing any cause which may exist why execution should not issue against him. If the plaintiff attempt to take out execution in such a case without having recourse to a scire facias, the execution may be set aside by a writ of error, or upon application to the court, or before a judge. If the judgment has been signed more than ten years, a scire facias itself cannot issue unless with the permission of the court or a judge; and it would seem that by the recent statute 3 and 4 William IV., c. 27, s. 40, proceedings are limited to a period of twenty years.

Upon a verdict for the plaintiff in debt on an instrument under seal, by which the defendant is bound in a penal sum for the performance of any acts, the jury assess the amount of damages actually incurred by the breach of performance which is the subject of the existing action. The judgment nevertheless is entered for the whole penalty, but execution is taken out for the amount only of the damages assessed. The judgment still remains as a security to the plaintiff in case any further breaches are committed. If further breaches are committed, the plaintiff sues out a scire facias to put the judgment again in force for the purpose of obtaining the further compensation which has become due to him. Where parties have entered into a recognizance [Recognizance], and either the conusor or conusee die within a year, or execution is not taken out within a year after the day of payment assigned by it, a scire facias must be sued the in order to have execution upon it. By 3 and 4 William IV., c. 42, s. 3, the scire facias must be brought some time within twenty years from the time when the party became liable. Where the plaintiff, having had execution by elegit, under which he obtains possession of a moiety of the rents and profits of the defendant's land, has had the debt satisfied by payment or from the profits of the land, scire facias may be brought to recover the land.

2. The cases of more ordinary occurrence under the second head are those where one of the parties to an action becomes bankrupt, or insolvent, or dies, or, being a female, marries, or where it is sought to enforce the rights of a plaintiff against the bail to an action, or to set aside letters patent. If a plaintiff become bankrupt after interlocutory and before final judgment, his assignees should sue out a scire facias to make themselves parties to it and have execution. If the bankruptcy occurs pending a writ of error brought by the defendant, the assignees should affirm the judgment in his name, and then sue out a scire facias. The same course is to be adopted in the case of insolvency. If either party to an action die between the verdict and judgment, the judgment may, by 17 Charles II., c. 8, be entered as if no such death had occurred, provided the entry be made within two terms; and the effect will therefore be the same as if the death had occurred after final judgment, and before execution. In such case a scire facias must be brought by or against those who, in the capacity of executors, &c., represent the deceased party. Where the death occurs between interlocutory and final judgment, the action does not abate, but a scire facias is necessary to revive it. Where a judge has sealed a bill of exceptions and dies, a scire facias must be brought against his executors to certify it. If a woman obtain a judgment, and marry before execution, the husband and wife must sue out a scire facias to have execution. And if judgment is obtained against a woman, and she marries before execution, a scire facias must be brought against her and her husband before execution can be obtained. The object of the recognizance into which the bail to an action enter, is to secure to the plaintiff the payment of the damages and costs to which the defendant may become liable, or his surrender as a prisoner. If the plaintiff obtain a verdict, and the defendant fail to perform either of these conditions, the plaintiff may proceed by scire facias against the bail. To this the bail may plead that he has given time to the defendant without their concurrence or any other fact by which their liability is discharged. A scire facias is the only proceeding available for the purpose of repealing letters patent by which the king has made a grant injurious to some party, as where he has granted the same thing which he had already granted to another person; or a new market or fair is granted to the prejudice of an antient one, &c. The king may have a scire facias to repeal his own grant, and any subject who is injured by it may petition the king to use his name for its repeal. Scire facias lies to recover the money from a sheriff who has levied under a fieri facias and retains the proceeds. (2 Wms. Saund., 71; Tidd's *Practice;* Archbold's *Practice.*)

SCIRRHUS. [Cancer.]

SCISSURELLA. [Turbinaceа.]

SCITAMI'NACEÆ. [Zingiberaceæ.]

SCIU'RIDÆ. [Squirrels.]

SCLAVONIC, SCLAVONIANS. [Slavonic.]

SCLERANTHA'CEÆ, a small natural order of plants placed by Lindley in the curvembryose group of incomplete Exogens. They are small herbs with opposite leaves without stipules, having axillary sessile flowers, which are hermaphrodite. The calyx is 4-5 toothed, with an urceolate tube; stamens 1-10; ovary simple, superior, 1-seeded; styles 2 or 1; fruit a membranous utricle, which is surrounded by the hardened calyx; seeds pendulous; embryo cylindrical, lying curved round farinaceous albumen. They are mostly natives of barren fields in Europe, Asia, and North America. The plants of this order are nearly related to Chenopodiaceæ, but from these they differ in the indurated tube of the calyx, from the orifice of which the stamens proceed, and also in the number of the stamens, which often exceeds that of the divisions of the calyx. The Scleranthus perennis was formerly used in medicine. The Polish or German cochineal is obtained from the roots of this plant.

SCLERO'TICA. [Eye.]

SCLERO'TICUM. [Ergot.]

SCO'LIA (from σκολιός, crooked) were short drinking-songs, which were invented and cultivated by the antient Greeks. The origin of the name 'crooked songs' has been explained by the antients themselves in a variety of ways, of which we shall mention only two. Some supposed that these songs were called scolia because they were not sung by the guests in succession, and in the order in which they lay on their couches, but irregularly, and without any definite order: others thought that the name referred to peculiarities in their metrical forms; or, which is the most probable of all, to certain liberties which the singer might take in delivering his song. The first of these two opinions, though not a probable account of the origin of the name scolion, yet contains the true account of the manner in which scolia were sung. Artemon (*Ap. Athen.*, xv., p. 694) and Plutarch (*Sympos.*, p. 615) distinguish three kinds of scolia, viz. those which were sung in a chorus by a whole company, those which were sung by all the guests in succession, and those which were only sung by persons well skilled in the thing, who, when they ceased, called upon another member of the company to go on. But the name scolion seems, in the first two of these cases, to be applied improperly, as they must rather be considered as a kind of prelude to the real scolia, which is in fact implied in the description given by Plutarch (*l. c.*). These drinking songs were generally accompanied by the lyre, which was handed by the last singer to his successor: in some cases however, when persons were unable to play the lyre, a laurel or myrtle branch was handed to them. Scolia were first sung and composed by the Greeks of the Æolian race, and especially in Lesbos; but the custom was thence transferred into Attica, where it subsequently became a universal practice to sing scolia at repasts. The contents of these short songs, which, in the specimens still extant, seldom exceed four lines, varied according to time and circumstances; but it was a rule that only beautiful scolia should be sung, that is, such as contained some useful maxim or some ethical idea. (Artemon, *l. c.*) The metres in which scolia were written are of a lively and animated character, and, on the whole, resemble those used by the lyric poets of the Æolian school. Terpander is said to have been the first who wrote scolia, and he was followed by Alcæus, Sappho, Anacreon, Praxilla, Simonides, Pindar, and many others. A collection of Greek scolia still extant has been made by C. D. Ilgen, in his Σκολιά, *i.e.* 'Carmina convivialia Græcorum, metris suis restituta et animadversionibus illustrata,' Jena, 1798. The number of scolia in this collection is fifty, but they are not all real scolia.

(Compare Müller, *Hist. of Greek Lit.*, i., p. 188, &c.; Bode, *Geschichte der Hellenischen Dichtkunst*, vol. ii., part 2, p. 456, &c.)

SCO'LIADÆ, a family of Fossorial Hymenopterous Insects, distinguished by the following characters combined: antennæ thick in the females, shorter than the head and thorax; femora bent near the apex, and compressed; legs short and stout, and densely clothed with spiny hairs. The thorax is often short, and produced on each side.

The family *Scoliadæ* is thus subdivided by Latreille:—

I. Palpi always very short. Ligula with three linear divisions. Abdomen of the male terminated by three spines. Stigma replaced by a small cell. *Scolia.*

II. Maxillary palpi generally elongated. Ligula broad and expanded at the apex; a recurved spine at the apex of the abdomen in the males. Stigma distinct.

A. Second joint of the antennæ exposed; two complete cubital cells, or sometimes three, in which case the central cell is small and petiolated.

a. Without incomplete cubital cell closed by the posterior border of the wing. Radial cell either wanting or open in the females. *Tiphia*, Fab., and *Meria*, Illiger.

b. With an incomplete cubital cell closed by the posterior margin of the wing. *Tengyra*, Latr.

B. Second joint of the antennæ enclosed in the basal joint. Cubital cells four in number, of which the last is completed by the posterior margin of the wing in the males; none of them petiolated. *Myzine*, Latr.

SCOLOPA'CIDÆ. The place assigned to this family by modern systematists will be found in the article GRALLATORES.

The genus *Scolopax* of Linnæus consisted of the following species:—*Guarauna, Madagascariensis, Arquata, Phæopus, fusca, Rusticola, Gallinago, Gallinula, Fedoa, Glottis, Calidris, Totanus, Limosa, Capensis, Lapponica, Ægocephala, alba,* and *candida.* (*Syst. Nat.*, ed. xii.)

According to Cuvier, this genus comprehends the following subgenera:—*Scolopax, Ibis, Numenius, Rhynchæa, Limosa, Calidris* (Cuv. *Tringa*, Temm.), *Arenaria** (Bechst., *Calidris*, Vig.), *Pelidna, Falcinellus, Machetes, Eurynorhynchus, Phalaropus, Strepsilas, Totanus, Lobipes,* and HIMANTOPUS. (*Règne Animal*, ed. 1829.)

Mr. Vigors traces out the distinction between the family *Scolopacidæ* and the *Ardeïdæ* in the weakness and elevation of the hinder toe, and the slenderness and flexibility of the bill. The latter character is, he observes, more particularly conspicuous in the typical species which make use of the flexible bill in penetrating the mud and soft spungy marshes whence they extract the worms, insects, smaller mollusks, and animalcules that chiefly constitute their food. The family is, in his opinion, united to the *Ardeïdæ* by means of *Numenius*, Briss., which approaches *Ibis* most closely in its bill. By means also of the immediate connection of *Ibis* with the genera *Eurypyga* and *Aramus*, the *Scolopucidæ* preserve their affinity to those groups, with which, indeed, their appearance has generally associated them. This, he remarks, may be inferred from the generic or specific name originally conferred upon each of these groups, the former genus being formed of the *Scolopax helias* of Pallas, or the *Caurale Snipe* of Latham's 'Synopsis,' and the latter of the *Ardea Scolopacea* of Linnæus. 'We cannot,' says Mr. Vigors in continuation, 'have a more accurate guide through the affinities of this extensive family than M. Temminck, whose opportunities of observing the habits and characters of the birds of the present order have been so extensive, and whose abilities have been so fully exerted, as to leave little room for further observation on the subject, as far at least as regards the European species. Following his views, with some slight modification, we may remark, that from *Numenius* we pass on to *Totanus*, Briss., the bill of which, comparatively robust at the point, holds a middle situation between the strong bill of that genus and the entirely flexible bill of *Limosa*, Briss. The genus *Recurvirostra* of Linnæus appears to come naturally among these groups, and to be intermediate between *Totanus* and *Limosa;* with the former of these it is connected by the structure of the foot, the *Totanus semipalmatus* of M. Temminck almost immediately meeting it; while with some species of the latter it is equally associated by the turned-up bill. The latter genus, *Limosa*, unites itself to the true *Scolopax*, Auct., by the flexible nature of its bill, a character which prevails through the remaining groups of the family. *Scolopax* leads to *Tringa*, Linn., through the medium of *Rhynchæa*, Cuv., which approaches the whole of the latter genus by its shorter bill, and agrees in particular with some species of it which have that member feebly curved, by the slight curvature observable at the extremity of its own. Among the groups which originally composed the *Tringa* of Linnæus, the *Phalaropus* of M. Brisson may be distinguished, which, by its lobated feet and habits of swimming, stands at the extremity of the present groups, and leads the way to the succeeding family of *Rallidæ*. The present family is united at its extremes, and the circular succession of affinities between its various groups is preserved, by means of some species of *Tringa*, whose curved bills lead back to *Numenius*, from which we started. The *Tringa platyrhyncha* of M. Temminck, the same as the *Numenius pygmæus* of the *Index Ornithologicus*, completes the circle.' (*On the Natural Affinities that Connect the Orders and Families of Birds*, in *Linn. Trans.*, vol xiv.)

Mr. Swainson makes the *Scolopacidæ* consist of the following genera and subgenera:—*Eurypygia*, Ill.; *Scolopax*, Linn. (with the subgenera *Rhynchæa, Scolopax, Limosa, Phalaropus,* and *Tringa*); *Himantopus* (with the subgenera *Recurvirostra, Himantopus, Totanus, Machetes,* and *Falcinellus*); *Strepsilas*, Ill.; and *Numenius*, Briss. (*Classification of Birds*, vol. ii.)

The Prince of Canino arranges the following genera under the family *Scolopacidæ:—Numenius*, Lath.; *Eurynorhynchus*, Nils.; *Tringa* (Bonap., *Calidris*, Cuv.); *Pelidna*, Cuv.; *Calidris*, Ill.; *Falcinellus*, Cuv.; *Machetes*, Cuv.; *Actitis*, Boié, not Ill.; *Actiturus*, Bonap.; *Totanus*, Bechst.; *Catoptrophorus*, Bonap.; *Glottis*, Nils.; *Terekia*, Bonap.; *Limosa*, Briss.

Under the second subfamily, *Scolopacinæ*, the Prince comprises the following genera:—*Macroramphus*, Leach; *Gallinago*, Steph.; *Rusticola*, Vieill.; *Scolopax*, Bonap. (*Birds of Europe and North America.*)

Mr. G. R. Gray divides the *Scolopacidæ* into the following subfamilies and genera:—

I. *Numeninæ.—Numenius*, Ray; *Limosa*, Briss.; *Terekia*, Bonap.; *Erolia*, Vieill.; *Ibidorhyncha*, Vig.

II. *Totaninæ.—Totanus*, Ray; *Glottis*, Nils.; *Guinetta*, Briss.; *Actiturus*, Bonap.; *Catoptrophorus*, Bonap.

III. *Recurvirostrinæ.—Recurvirostra*, Linn.; *Cladorhynchus*, Gray; *Himantopus*, Briss.

IV. *Tringinæ.—Hemipalama*, Bonap.; *Heteropoda*, Bonap.; *Tringa*, Linn.; *Machetes*, Cuv.; *Pelidna*, Cuv.; ? (Cocorli, Cuv.); *Eurynorhynchus*, Nils.; *Ereunetes*, Ill.; *Calidris*, Ill.

V. *Scolopacinæ.—Macroramphus*, Leach; *Rhynchæa*, Cuv.; *Scolopax*, Linn.; *Rusticola*, Vieill.; *Scolopax*, Linn.; *Rusticola*, Vieill.; *Homoptilura*, Gray; *Telmatias*, Boié; *Gallinago*, Ray.

VI. *Strepsilinæ.—Strepsilas*, Ill.

VII. *Phalaropodinæ.—Steganopus*, Vieill.; *Phalaropus*, Briss.; *Lobipes*, Cuv.

Of these genera, *Eurynorhynchus* had been previously used in ornithology, and *Heteropoda* had been preoccupied for a division of mollusks. [GASTEROPODA, vol. xi., p. 92.]

We now proceed to lay before our readers some of the forms of this extensive group, and shall endeavour to illustrate such of the others as require especial notice under their proper titles.

Scolopax.

Generic Character.—Bill long, straight, compressed, soft, the point enlarged; the two mandibles furrowed for half their length; point of the upper mandible longer than the lower the enlarged end forming a blunt hook; *arête* elevated at the base, projecting. Nostrils lateral, basal, slit longitudinally near the borders of the mandible, and covered by a membrane. Feet moderate, slender, naked space above the knee very small; three toes before entirely divided, the external and middle toe united; a hind toe. Wings moderate, 1st quill rather shorter than, or of the same length as, the 2nd, which is the longest. (Temm.)

---

* Used in botany.

M. Temminck divides the genus into three sections.

Section 1.

Tibia feathered to the knee.

Example, *Scolopax Rusticola.*

Description.—Male.—Upper parts varied with ruddy, yellowish, and ash, and marked by great black spots; lower parts yellowish-red, with brown zigzags; quills striped with red and black on their external barbs; tail-feathers terminated above with grey and below with white. Feet livid. Length about 13 inches.

Female.—Rather stouter and larger, but her colours are less vivid, and the wing-coverts have many white spots.

Accidental Varieties.—Yellowish-white or yellowish-red, with the spots of the plumage of a pale tint: the plumage often irregularly sprinkled with white spots: sometimes the wings and tail are pure white; more rarely the whole of the plumage is perfect white.

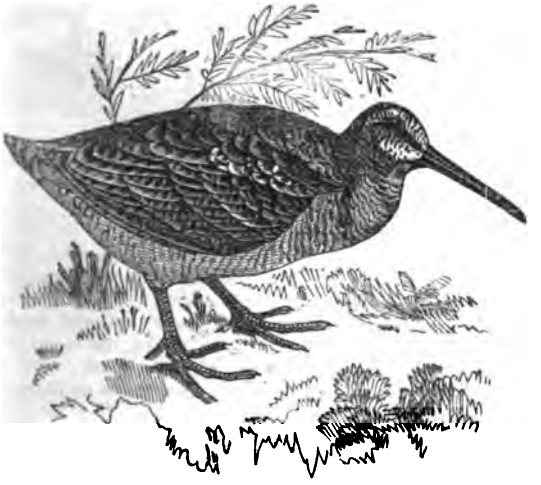
M. Temminck, who enumerates these varieties, adds as a variety, according to climate or the places inhabited by the bird, *Scolopax Rusticola parva*, which is smaller than ordinary individuals, and has all the colours of the plumage of a deeper tint, a greater number of black spots and dots on the upper parts, the lower parts clouded with ash, and the feet lead-coloured.

In the fourth part of his *Manuel* however, lately published (1840), he states that these *little Woodcocks* are, according to his observations, the young of late hatches, or of pairs whose nest has been robbed of their first deposit; these, he says, do not commence their migration till many weeks after the masses of woodcocks, which quit the northern countries early in October, when the late hatches are not yet strong enough to undertake the passage.

M. Temminck adds, that the most sure way of distinguishing the sexes had been recently communicated to him by M. Verster de Wulverhorst. The *males* have the external edge of the barbs of the first quill covered with brown spots upon a yellowish-white ground; the *females* have a spotless white edging throughout the length of those barbs.

This is the *Bécasse* of the French; *Beccaccia* of the Italians; *Waldschnepfe* of the Germans; *Holt Sneppe* of the Danes; *Morkulla* of the Swedes; *Blom-Rokke, Rutte*, and *Krogquist* of the Norwegians; *Cyffylog* of the antient British; and *Woodcock* of the modern British.

It is most probably the σκολόπαξ (*Scolopax*) of Aristotle.



Scolopax Rusticola.

Geographical Distribution.—Very wide. The species is found in Western Lapland beyond the Arctic Circle, in Finland, Russia, Siberia, rarely in Germany, and more rarely in France. A few have been known to breed in Switzerland. It is noted by the Prince of Canino as very common in Italy, and has been found all the year through at Madeira. Barbary possesses it, and at Athens it is by no means uncommon. They have been seen abundantly in Smyrna, and have been found in Aleppo and Egypt. It has been noticed in Cashmere and at Japan; in which last locality it is subject to the same varieties as with us.

Food, Habits, &c.—Worms, small snails or slugs, and (according to Temminck) small beetles form the food of the Woodcock; but earthworms appear to be its favourite nourishment. For these it bores with its long and sensitive bill with unerring certainty. The Woodcock breeds occasionally, not to say frequently, in this country, in Scotland especially. The nest is placed on the ground in a dry warm spot among herbage, and is loosely fabricated of dead leaves, of the common fern principally, and unlined. The eggs three or four in number, are pale yellowish-white, blotched, and spotted at the larger end with ash-grey, and two shades of reddish-yellow brown, according to Yarrell; of a dirty-yellow sprinkled with small spots of pale brown, according to Temminck. When surprised, the old birds have been known to carry off their young in their bills and claws.

We need hardly add that the bird, served with its trail in, is a delicious dish.

II. Section.

Lower part of the tibia denuded of feathers.

Snipe.

III. Section.

External and middle toe united by a very small membrane.

Macroramphus, Leach.

Example, *Macroramphus griseus, Scolopax grisea*, Auct., *Brown Snipe* of Pennant.

Strepsilas, Ill.

Generic Character.—Bill moderate, hard at the point, strong, straight, of an elongated conical shape, slightly curved upwards; *arête* flattened; point straight, truncated. Nostrils basal, lateral, long, half closed by a membrane, pierced through and through. Feet moderate; not much nakedness above the knee; three toes before and one behind; the three anterior toes united at the base by a very short membrane; the posterior toe articulated upon the tarsus. *Wings* acuminate; the first quill the longest. (Temm.

Example, *Strepsilas collaris.*

Description.—Very old Male.—Front, space between the bill and the eye, a large collar on the nape, a part of the back, a longitudinal band and another transversal one upon the wing, upper coverts of the tail, middle of the breast, as well as the other lower parts, all of pure white; deep-black takes the shape of a narrow frontal band, which, passing before the eyes, is dilated below, where on one side it is directed on the lower jaw, and on the other dilating itself anew on the sides of the neck, it surrounds the throat, and forms a wide plastron in front of the neck and on the sides of the breast; top of the head reddish-white, striped longitudinally with black; upper part of the back, scapulars, and coverts of the wing bright chesnut red, sprinkled irregularly with large black spots; a large brown band on the rump; lateral quill of the tail pure white; bill and iris black; feet orange-yellow. Length 8 inches and 2 or 3 lines.

Female.—Differs only in having the shades less pure and the black less deep.

In this state of plumage the bird is *Tringa Interpres* of Gmelin; *Morinella collaris*, Meyer; *Turnstone* or *Sea Dotterel* of Edwards.

Young of the Year.—No trace of black nor of red chesnut. Head and nape of ashy-brown striped with deep-brown; white spots on the sides of the head and neck; throat and front of the neck whitish; feathers of the sides of the breast deep brown, terminated with whitish; the other lower parts and the back pure white; upper part of the back, scapulars, and coverts of the wings deep brown; all the feathers surrounded by a wide yellowish border; transverse band of the rump deep brown bordered with ruddy; feet yellowish-red. The black and white more regularly defined, in proportion as the bird advances in age.

In this plumage the bird is *Tringa Morinella*, Linn.; *Tringa Interpres Morinella*, Gmel.; *Arenaria cinerea*, Briss.; *The Turnstone* of Pennant.

Young at the age of a Year.—The large plastron, or collar on the front of the neck and on the sides of the breast, is marked out with black feathers, terminated by a narrow whitish border; summit of the head and nape brown, spotted with blackish-brown; back, scapulars, and coverts of the wings black, all the feathers surrounded by a ruddy border; a great black spot on the lateral tail-feather; the rest as in the adults. (Temm.)

This is the *Voltapietre* of Savi; *Steinwälzer* of Brehm; and *Huttan y môr* of the antient British.

Geographical Distribution.—Very wide. Nova Zembla. Greenland, Winter Island, Felix Harbour, the coast between Victoria Harbour and Fury Point—about the middle and end of June. Shores of Hudson's Bay and of the Arctic Sea up to the seventy-fifth parallel, where it breeds in June, quitting in September, halting in October on the shores of the Delaware, and proceeding farther south on the setting in of cold weather. The United States.* The straits of Magellan. Cape of Good Hope. Japan, Sunda, the Molucca Islands, and New Guinea. New Holland. In Europe, from Russia southward to Italy. Norway. Madeira. In this country it is found on the coasts from August to May, when it returns northward to breed. Stationary in Zetland, according to Dr. Fleming, who concludes that it breeds there.

Food, Habits, &c.—The *Turnstone*, as its name implies, procures its food—small crustaceans, molluscous animals, &c.—by turning over the stones on the shore which shelter its prey with its strong bill. Mr. Hewitson found its nest on the coast of Norway placed against a ledge of rock, and consisting of nothing more than the dropping leaves of the juniper bush, under a creeping branch of which the eggs, four in number, of an olive-green colour, spotted, and streaked with ash-blue and two shades of reddish-brown, were concealed and sheltered.

Strepsilas collaris.

Totanus.

Generic Character.—Bill moderate, straight, sometimes slightly recurved, firm, rounded, the upper mandible grooved and with its tip curving over the lower mandible. Nostrils lateral, basal, linear, longitudinally cleft in the furrow of the mandible. Legs long, slender, naked above the knee. Toes three before, united at the base by a small membrane, and one behind, which is short. Wings moderate.

Such is the character of those *Scolopacidæ* which are termed by the English *Redshanks*, *Greenshanks*, &c., and by the French *Chevaliers*.

Example, *Totanus stagnatilis*.

Description.—Male and Female in perfect Winter Plumage.—Bill very weak, long, and awl-shaped; on the external barbs of the caudal feathers are two zigzagged bands, disposed longitudinally; feet very long, greenish. Eyebrows, face, throat, middle of the back, front of the neck and breast, as well as the other lower parts, of pure white; nape striped longitudinally with brown and white; top of the head, upper part of the back, scapulars, and great coverts of the wings clear ash bordered with whitish; smaller coverts and bend of the wing blackish ash; sides of the neck and breast whitish with small brown spots; tail white striped diagonally with brown bands, except on the two external feathers, which have a longitudinal zigzag band; bill ashy-black; feet olive-green; iris brown. Length about nine inches.

Young before the First Moult.—Different from the adults and young in winter, in having the feathers of the upper part of the back, scapulars, and coverts of the wings blackish-brown, all surrounded by a large yellowish border; the largest feathers which extend upon the quills have small diagonal rays of very deep brown; on the face and sides of the head are some very small brown points; extremity of the quills whitish; feet greenish-ash.

In this state the bird is *Scolopax Totanus*, Linn.; *Le petit Chevalier aux pieds verts* of Cuvier; *La Barge grise* of Buffon.

Summer or Nuptial Plumage.—White from the upper part of the bill to the eye; throat, front of the breast, belly, and abdomen pure white; space between the eye and the bill, temples, sides and front of the neck, sides of the breast, and lower coverts of the tail equally pure white, but on each feather a small longitudinal black spot; top of the head and nape striped longitudinally with black on a greyish white ground; top of the back, scapulars, and great coverts of ash tinged with reddish, each feather varied with transverse black bands, the largest of which is towards the end; the black bands are diagonal on the longest scapulars; the two quills of the middle of the tail are ash, striped diagonally; the others striped on the external barbs in longitudinal zigzags; feet greenish; bill black.

In this plumage it is *Totanus stagnatilis* of Leisler, and *Albastrella cenerina* of the *Stor. degl. Ucc.*

Geographical Distribution.—North of Europe, on the borders of rivers, migrates along the eastern provinces of Europe to the Mediterranean, but never along the maritime coasts of the ocean. (Temm.) M. Temminck adds, in his fourth part, that the winter plumage of the individuals of the isles of Sunda, Timor, and New Guinea is rather paler than in those killed in Europe; in the young there is no difference; in their nuptial plumage they are never received from those islands. M. Temminck states also that the species inhabits the eastern parts of Europe. It had never been sent to him from Japan.

Totanus stagnatilis.

Machetes.

Generic Character.—Bill straight, rather slender, with a smooth and dilated tip. Nostrils basal, lateral, linear, situated in the commencement of the groove. Wings long and sharp-pointed; first and second quills equal, and longest. Legs long, slender, and naked high above the tarsal joint. Three anterior toes, one posterior, which is short; outer toe connected to the middle toe by a membrane as far as the first joint.

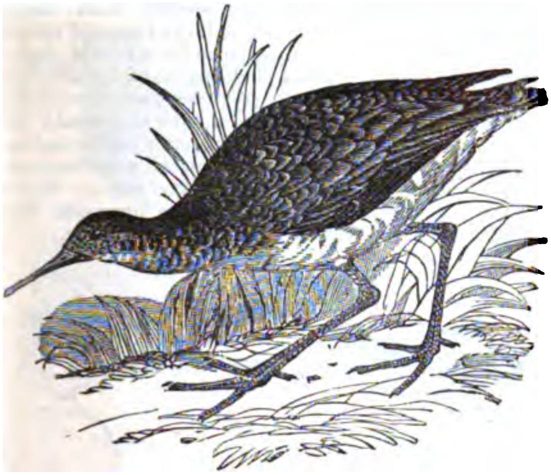
Example, *Machetes pugnax*.

Description.—Tail rounded, the two middle feathers striped; the three lateral feathers always uniform in colour. The hues of the plumage so variable, that it is almost impossible to find two individuals which perfectly resemble each other.

Plumage of Autumn and Winter.—Male.—Face covered with feathers; occiput and neck clothed with short plumage; throat, front of the neck, belly, and the other lower parts pure white; breast reddish, with brown spots; plumage of the upper parts most frequently brown, sprinkled with black spots, and bordered with reddish; the longest wing-coverts and the middle tail-feathers striped with brown, black, and red; bill brownish; feet yellowish, tinged with greenish brown or reddish; iris brown. Length nearly twelve inches.

Female.—A third smaller, her plumage more ashy, and the front of the neck rarely of a pure white; bill black; feet of a deeper hue.

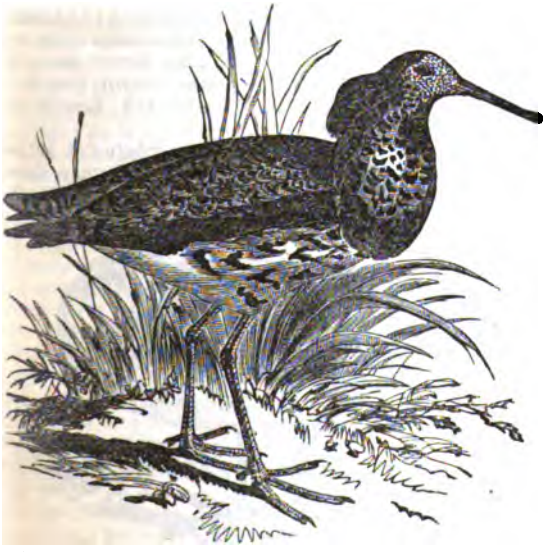
The male in this state is the *Tringa variegata* of Brunnich.



Male Ruff in Winter Plumage.

Summer or Nuptial Plumage.—Male.—Face naked, covered with tubercles or fleshy warts. The occiput is adorned with long feathers; a large ruff, composed of beautiful feathers, adorns the throat; these feathers and those of the occiput contrast ordinarily with the colours spread over the plumage of the body, which is most frequently variegated with red, ash-colour, black, brown, white, and yellowish: the feathers of the ruff and occiput vary infinitely; bill yellowish orange; warts yellow or reddish. Feathers of the ruff more or less long according to the age of the bird.

In this state the male is the *Tringa pugnax* of Linnæus.



Male Ruff in his Summer dress.

The Young of the Year much resemble the females in winter plumage, but the tints of the front of the neck and breast are dead reddish-ash. The feathers of the head, back, scapulars, and great coverts of the wings are blackish brown, with wide red and yellowish borders; the lesser coverts of the wings are bordered with reddish white; throat, belly, and abdomen pure white; bill black; feet greenish.

In this state the bird is *Tringa littorea* of Linnæus; *Le Chevalier varié* of Buffon; *Shore Sandpiper* and *Greenwich Sandpiper* of Latham.

The adult female and the young after the autumnal moult are the *Tringa equestris*, *Equestrian Sandpiper* of Latham; *Le Chevalier commun* of Buffon; and *Le Chevalier ordinaire* of Gérard. (Temm.)

This species is *Le Combattant* and *Paon de Mer* of the French; *Salsarola* and *Uccello muto* of the Italians; *Bruushane* of the Danes; *Brushane* of the Swedes; *Streitschnepfe* and *Rampfhähnlein* of the Germans; *Ruff* (male) *Reeve* (female), of the modern British; and *Yr Ymladdgar* of the antient British.

Geographical Distribution.—Iceland, Lapland, Scandinavia, Denmark, Siberia, Russia, France, Provence, Switzerland, Italy, Malta, Tunis, Trebizond, and the neighbourhood of the Caucasus. In Ireland the Ruff appears occasionally in spring and autumn. (Thompson.) In England it arrives in spring, about April, and departs in autumn.

Food, Habits, &c.—The food of the Ruff consists of worms and such insects as it can pick up in moist and marshy places; in the spring it is rarely found on the shores of the sea. Colonel Montagu has given the best account known to us of the habits of the Ruff, and of the mode of taking it and fattening it for the table:—

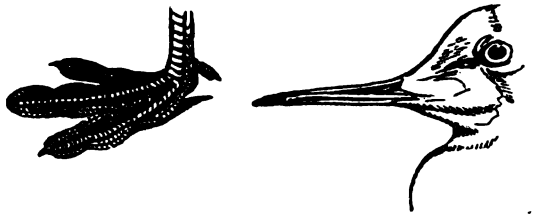
'The trade of catching ruffs,' says that distinguished ornithologist, 'is confined to very few persons, and at present scarcely repays their trouble and expense of nets. These people live in obscure places, on the verge of the fens, and are found out with difficulty; for few if any birds are ever bought but by those who make a trade of fattening them for the table; and they sedulously conceal the abode of the fowlers; so much so, that by no art could we obtain from any of them where they resided; and in order to deceive us, after evading our entreaties, they gave us instructions that led us in quite a contrary direction. The reason of all this was obvious; for after much labour and search, in the most obscure places (for neither the innkeepers nor other inhabitants of the towns could give any information, and many did not know such a bird was peculiar to their fens), we found out a very civil and intelligent fowler, who resided close to Spalding, at Fengate, by name William Burton (we feel pleasure in recording his name, not only from his obliging nature, but for the use of others in similar pursuits) and strange to say, that although this man had constantly sold ruffs to Mr. Towns, a noted feeder, hereafter more particularly noticed, as also to another feeder at Cowbit, by the name of Weeks, neither of those persons could be induced to inform us even of the name of this fowler. The reason however was evident, and justly remarked by Burton, for he obtained no more than ten shillings per dozen, whereas Weeks demanded thirty shillings for the like number he had the same day bought of Burton. The season was far advanced, and we were obliged to buy some at that price of Weeks, for Burton could not then catch us as many as were required. At this time we were shown into a room where there were about seven dozen males and a dozen females, and of the former there were not two alike. This intrusion to choose our birds drove them from their stands, and, compelling some to trespass upon the premises of others, produced many battles. By this feeder we learned that two guineas a dozen was now the price for fattened ruffs; and he never remembered the price under thirty shillings, when fit for table. Mr. Towns, the noted feeder at Spalding, assured us his family had been a hundred years in the trade, and boasted that they had served George II. and many noble families in the kingdom. He undertook, at the desire of the late marquis of Townsend, when that nobleman was lord-lieutenant of Ireland, to take some ruffs to that country, and actually set off with twenty-seven dozen from Lincolnshire; left seven dozen at the duke of Devonshire's, at Chatsworth, continued his route across the kingdom to Holyhead, and delivered seventeen dozen alive in Dublin, having lost only three dozen in so long a journey, confined and greatly crowded as they were in baskets, which were carried upon two horses. Nothing can more strongly evince the hardy constitution of these birds than the performance of such a journey, so soon after capture, and necessarily fed with a food wholly new to them. Yet a certain degree of care and attention is requisite to preserve, and more especially to fatten them; for out of the seventeen dozen delivered at the castle of Dublin, not more than two dozen were served up to table, doubtless entirely owing to a want of knowledge or attention of the feeder under whose care they had been placed. The manner of taking these birds is somewhat different in the two seasons; in the spring the ruffs *hill*, as it is termed, that is, they assemble upon a rising spot of ground, contiguous to where the reeves propose to deposit their eggs; there they take their stand, at a small distance from each other, and contend for the females,—the nature of polygamous birds. This hill, or place of resort for love and battle, is sought for by the fowler, who, from habit, discovers it by the birds having trodden the turf somewhat bare, though not in a circle, as usually described. When a hill has been discovered, the fowler repairs to the spot before the break of day, spreads his net, places his decoy birds, and takes his stand at the distance of about 140 yards, or more, according to the shyness of the birds. The net is what is termed a single clap-net, about seventeen feet in length, and six wide, with a pole at each end; this, by means of uprights fixed in the ground, and each furnished with a pulley, is easily pulled over the birds within reach, and rarely fails taking all within its grasp; but in order to give the pull the greatest velocity, the net is (if circumstances will permit) placed so as to fold over with the wind; however there are some fowlers who prefer pulling it against the wind for plovers. As the ruffs feed chiefly by night, they repair to their frequented hill at the dawn of day, nearly all at the same time, and the fowler makes his first pull according to circumstances, takes out his birds, and prepares for the stragglers who traverse the fens and have no adopted hill; these are caught singly, being enticed by the stuffed birds. Burton, who was before mentioned, never used anything but stuffed skins, executed in a very rude manner; but some fowlers keep the first ruffs they catch for decoy birds; these have a string of about two feet long tied above the knee, and fastened down to the ground. The stuffed skins are sometimes so managed as to be moveable by means of a long string, so that a jerk represents a jump (a motion very common among ruffs, who at the sight of a wanderer flying by will leap and flirt a yard off the ground); by that means inducing those on wing to come and alight by him. The stuffed birds are prepared by filling the skin with a whisp of straw tied together, the legs having been first cut off, and the skin afterwards sewed along the breast and belly, but with no great attention to cover the straw beneath; into this straw a stick is thrust, to fix it into the ground, and a peg is also thrust through the top of the head, and down the neck into the stuffing or straw body, and the wings are closed by the same process. Rough as this preparation is, and as unlike a living bird as skin and feathers can be made it answers all the purpose. When the reeves begin to lay, both these and the ruffs are least shy, and so easily caught, that a fowler assured us he could with certainty take every bird on the fen in the season. The females continue this boldness, and their temerity increases as they become broody; on the contrary, we found the males at that time could not be approached within the distance of musket-shot. We were astonished to observe the property that these fowlers have acquired of distinguishing so small an object as a ruff at such an immense distance, which, amongst a number of tufts or tumps, could not by us be distinguished from one of those inequalities; but their eyes had been in long practice of looking for the one object. The autumnal catching is usually about Michaelmas, at which time few old males are taken, from which an opinion has been formed that they migrate before the females and young. It is however more probable that the few which are left after the spring fowling, like other polygamous birds, keep in parties separate from the female and her brood till the return of spring. That some old ruffs are occasionally taken in the autumnal fowling, we have the assertion of experienced fowlers, but we must admit that others declare none are taken at this season. It must however be recollected that in the autumn the characteristic long feathers have been discharged, and consequently young and old males have equally their plain dress; but the person who assured us that old male birds were sometimes taken at that season, declared it was easy to distinguish them from the young of that summer.'

The males arrive in England several days before the females. According to Col. Montagu, the reeves begin laying their eggs the first or second week in May, and he found their nests with young as early as the 3rd of June. By that time the males ceased to *hill*. The nest was usually placed upon a tump in the most swampy places, surrounded by coarse grass, of which it was also formed. The same author describes the eggs as four in number, nearly similar in colour to those of the snipe and redshank, both of which breed in the same wet places, and make similar nests. The eggs of the ruff are however, he observes, superior in size to those of the snipe; and are known from those of the redshank by the ground being of a greenish hue instead of rufous-white; but individuals assimilate so nearly to each other as not to be distinguished, especially as the dusky and brown spots and blotches are similar.

The food offered to the ruffs in captivity, and they will go greedily to it and fight for it immediately after their capture, is bread and milk or boiled wheat.

Phalaropus.

Generic Character.—Bill long, slender, weak, straight, depressed at its base, the two mandibles furrowed up to the point; extremity of the upper mandible curved over the lower one, obtuse; point of the lower mandible awl-shaped. Nostrils basal, lateral, oval, prominent, surrounded with a membrane. Feet moderate, slender, tarsi compressed; three toes before and one behind; the anterior toes united up to the first joint, the rest of them furnished with festooned or lobated membranes dentilated on the edges; hind toe without a membrane, articulated on the inner side. Wings moderate, first and second quills longest. (Temm.)



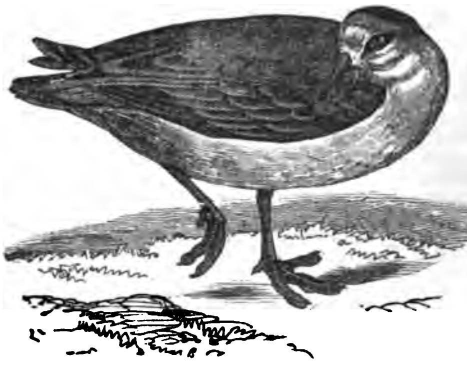
Bill and Foot of Red-necked Phalarope (Phalaropus hyperboreus).

Example, *Phalaropus platyrhynchus*.

Description.—Bill wide, depressed, flattened at the base; tail long, very much rounded.

Male and Female in Winter Plumage.—Top of the head, occiput, and nape, pure ash-colour; a large spot of ashy-black on the orifice of the ears, two bands of the same colour take their origin towards the eyes, and pass upon the occiput, where they form a single band, which descends the whole length of the nape; lateral parts of the breast, back, scapulars, and rump, very pure bluish ash; blackish occupies the centre of all these feathers, and is directed along the shafts; the longest of the scapulars terminated with white; a transversal white band on the wing; tail-feathers brown, bordered with ash-colour; front, sides of the neck, middle of the breast, and all the other lower parts, pure white; bill yellowish-red at its base, brown towards the point; iris reddish-yellow; feet greenish ash. Length above eight inches.

In this state the bird is *Phalaropus lobatus* of Latham; *Tringa lobata* of Linnæus; *Phalarope à festons dentelés* of Buffon; *Le Phalarope gris* of Cuvier; and *Grey Coot footed Tringa* of Edwards.

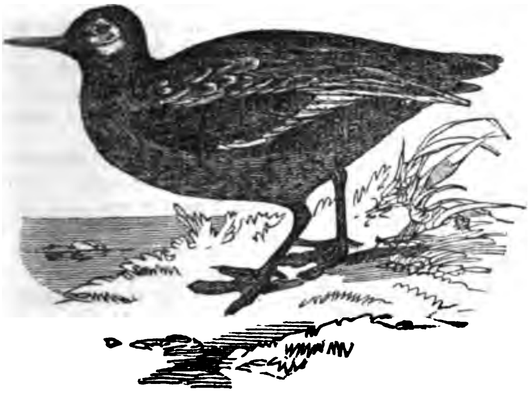


Phalaropus Platyrhynchus in Winter Plumage.

Young before the Moult.—A blackish spot of a horse-shoe shape on the occiput, and a band of that colour passing upon the eyes; nape, back, scapulars, upper coverts, and quill-feathers of the tail, ashy-brown; feathers of the back, scapulars, and middle tail-feathers, with wide yellowish borders; rump white, varied with brown; secondaries and quills edged with white, the coverts bordered and terminated with yellowish-white; a transverse white band upon the wing; front, throat, sides and front of the neck, breast and other lower parts, of greenish-yellow; bill ashy-brown.

In this state it is the *Grey Phalarope* of Latham.

Summer or Nuptial Plumage.—Old Male and Female.—Head, nape, back, scapulars, and upper coverts of the tail, blackish-brown; all the feathers of these parts are surrounded by a wide red-orange border; a yellowish band passes above the eyes; wing-coverts blackish, terminated with white, a transverse white band on the wing; rump white, spotted with black; front of the neck, breast, belly, abdomen, and lower tail-coverts, brick-red.



Phalaropus Platyrhynchus in Summer Plumage.

In this plumage it is *Tringa Fulicaria* of Brunnich; *Phalaropus rufus* of Bechstein; *Tringa hyperborea* of Linnæus; *Le Phalarope rouge* of Buffon and Cuvier; *Phalarope roussâtre* of Brisson, *Red Coot-footed Tringa* of Edwards.

M. Temminck adds that individuals in summer plumage which have not attained the age of two or three years have the belly more or less variegated with white feathers.

In his lately published fourth part he describes the female in summer plumage as having the forehead, the top of the head, and the occiput of a full spotless black; the band on the cheeks wider than in the male, and of pure white; black predominates on the plumage of the back, the red borders of the feathers being narrower than in the male; the lower parts are less red, and less mingled with white feathers. This plumage the female keeps longer than the male, which moults some time after the female, and loses his summer dress before she does.

This bird is the *Grey Phalarope* of the modern British; and *Pibydd llwyd llydandroed* of the antient British.

Geographical Distribution.—Within the Arctic Circle; the eastern parts of the North of Europe; abundant in Siberia, on the shores of great lakes and rivers; migratory on the great lakes of Asia and on the Caspian Sea; numerous in America; migratory, but at uncertain intervals, throughout most of the countries of Europe; rare in Switzerland, on the lake of Geneva; with us it is a winter visitor. It appears to be spread generally from the northern towards the intertropical regions.

Food, Habits, &c.—Insects or crustaceans principally, which live on the surface of the water, form the principal food of the *Grey Phalarope*, and it rarely seeks for its nourishment on the banks or on land. M. Temminck refers to Major Sabine's memoir 'On the Birds of Greenland,' where that acute observer relates that on the 10th of June, and at the 68th degree of latitude (where the species breeds), a number of these birds were seen swimming at sea in the middle of icebergs, and at a distance of four thousand miles from land; and M. Temminck observes that he cannot see why this bird, with such habits and such a form as it has, should be associated with the *Snipes* and *Chevaliers*.

Mr. Gould (*Birds of Europe*) remarks that 'the places which it not uncommonly chooses for its residence during its sojourn with us are such as would possess for it, according to our ideas, but little attraction; thus, for instance, it will often continue for weeks together, if unmolested, about a farm-yard pond or mere puddle, manifesting a familiar and unsuspecting disposition, and allowing itself to be approached with freedom; it does not however appear to confine itself much longer to one spot, but after remaining at a certain place from one to three or four weeks, suddenly departs, if on the approach of spring towards the north, and in autumn towards the south; every European country, in fact, appears to be equally visited, although at uncertain and often long intervals. Like the other species, it is an admirable swimmer, taking its food on the surface of the water with the utmost agility and address; indeed it appears to seek its nourishment there alone, and may be watched while assiduously engaged in this occupation, displaying a thousand graceful attitudes and manœuvres.'

The eggs are greenish-ash, spotted and dotted with black.

Numenius.

Generic Character.—Bill long, slender, curved, compressed, hard at the point, and subobtuse; upper mandible exceeding the lower, rounded towards the end, canaliculated for three-fourths of its length. *Nostrils* lateral, linear, pierced in the canaliculation. Face feathered, space between the eye and the bill covered with feathers. Feet slender, naked above the knee; three toes before and one behind, which last is articulated on the tarsus and touches the ground, the anterior toes united up to the first joint by a membrane. Wings moderate; first quill longest.

Example, *Numenius arquatus.*

Description.—Male.—The whole plumage bright ash-colour, with longitudinal brown spots on the head and breast, some of the feathers of those parts clouded with red; belly white, with longitudinal spots; feathers of the back and scapulars black in the middle and bordered with red; tail whitish ash, striped with brown bands disposed transversely; upper mandible blackish-brown; the lower mandible flesh-colour; iris brown; feet deep ash. Length two feet and upwards.

Female, with the tints more ash-coloured; the red which borders the feathers of the back and scapulars less pure.

Young of the Year.—Bill short, scarcely four inches long, and nearly straight; it curves in proportion as the bird grows; in old individuals it measures not unfrequently upwards of six inches.

Varieties.—The species varies more or less in the number of less large spots and stripes on the breast, and in a slight degree of greater length of the bill. These are the only differences between individuals from the great Asiatic Archipelago and those of the other parts of the antient Continent.

M. Temminck, who gives these definitions, observes that it must be borne in mind that, independent of this variety, there is found in the same latitudes a different species of Curlew (*Numenius nasicus*, Temm.), which is larger than *Numenius arquatus*, and has the bill more slender, remarkably long, and but little curved in proportion to its length. The plumage is whitish, marked with numerous black spots; the belly white; the bill brown. This species inhabits Borneo and Sumatra.

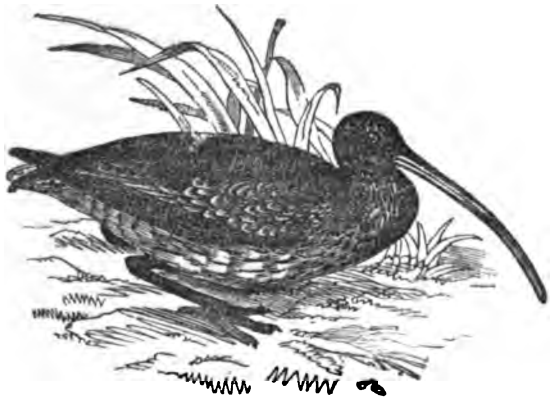
Numenius Arquatus is the *Courlis* of the French; *Ciarlotto, Ciarlotto Spadone*, and *Chiurle Maggiore* of the Italians; *Heel-spove* of the Danes; *Der Grosse Krumschnäblichte Schnepfe* and *Keilhacke* of the Germans; *Curlew* of the modern British; and *Gylfinhr* of the antient British.

Geographical Distribution.—Very wide in the Old World, (the American species is different). 'Equally diffused from the sultry portion of the torrid zone to the frozen countries of the north: the islands of the Pacific Ocean, particularly New Holland, are not devoid of its presence, and we also possess examples from China, Nepaul, &c.' (Gould, *Birds of Europe.*) Very common in Asia; the individuals sent from Pondicherry differ hardly at all from those of Europe. Extends to Japan, where it is absolutely the same. (Temminck, *Manuel.*) Dr. Andrew Smith brought individuals from South Africa.

Food, Habits, &c.—The food of this well known and wary bird, which in Scotland is called the *Whaup*, consists of earth-worms, slugs, small testaceans, and insects.

The nest, which consists of a few dry leaves, &c. carelessly put together, is placed among rushes or long grass and heath; Temminck says, often in the downs which border the sea. The egg, which is large (2 inches 7 lines long, 1 inch 11 lines broad), is olive-green, blotched, and spotted with darker green and deep brown. It breeds in these islands. The young run almost as soon as they are out of the shell, but do not fly for a long time. The clear whistle of the bird is usually uttered on the wing, but Mr. Hewitson saw a curlew perch on the top of a pine in Norway, during summer, and in that situation it uttered its cry.

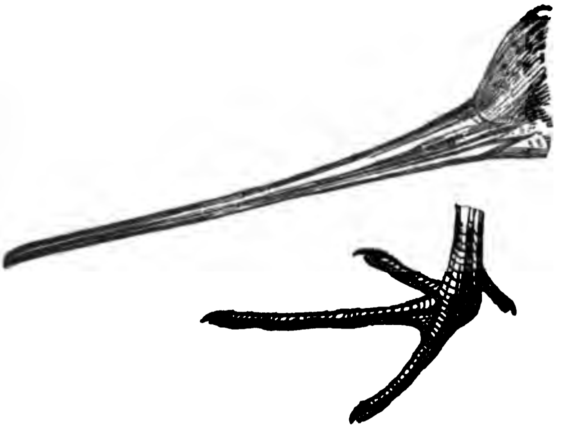
The bird, at certain seasons, is not bad eating, and it formerly enjoyed a considerable reputation in that way. At the *Intronazation* of George Nevell, archbishop of York (reign of Edward IV.), one hundred were served, and they stand next to the woodcocks, of which there were four hundred. In the Northumberland *Houshold* book, *Kyrlewes* are charged at the same price as *Fesauntes* and *Bytters* (bitterns), viz. 12*d*., whilst Woodcocks are charged at 1*d*. or 1½*d*, and Partridges at 2*d*. In the expenses of Sir John Nevile of Chete, Knight, on the marriage of his daughter Elizabeth Nevile (17th Henry VIII.) is the following: 'Item, Curlews, 3 of a dish;' and 18 curlews are charged at 24*s*., whilst 40 partridges are only charged 6*s*. 8*d*. Among the charges of the same Knight at Lammas Assizes (20th Hen. VIII.), we find 20 curlews at 26*s*. 8*d*., and 32 'Curlew Knaves' at 32*s*.



Numenius Arquatus.

Limosa.

Generic Character.—Bill very long, more or less curved upwards, soft and flexible throughout its length, depressed, and flattened towards the point; the two mandibles furrowed throughout their length, the point flat, dilated, and obtuse. Nostrils lateral, longitudinally slit in the furrow, pierced through and through. Feet long, slender; a great naked space above the knee; three toes before and one behind; middle toe united to the external one by a membrane which extends up to the first joint; the posterior toe articulated upon the tarsus. Wings moderate; first quill longest. (Temm.)



Head and Foot of Limosa melanura.

All known species of the *Godwits* undergo a double moult, which changes, nearly entirely, the colour of the plumage. The females are always larger than the males, and lay very large eggs in proportion to their size; and their periodical moult takes place later than that of the males, indeed after they have assumed their new dress. (Temm.)

Example, *Limosa melanura*.

Description.—Bill straight; tail uniform black, with a base of pure white; claw of the middle toe long and dentilated; a white beauty-spot (miroir) on the wings.

Old Males and Females in Winter Plumage.—All the upper parts uniform brown-ash, only varied by the deeper brown of the shafts; throat, front of the neck, breast, and sides bright grey; rump blackish; belly, abdomen, upper part of the quills, and base of the caudal feathers, pure white; on all the tail-feathers a great space of deep black, those of the middle terminated with white; bill orange at its base, and black at the point; feet blackish-brown. Length upwards of 15 inches. The colours of the female are less bright.

In this state the bird is *Limosa melanura* of Leisler; *Scolopax Limosa* of Linnæus; *Totanus Limosa* of Bechstein; *La Barge ou Barge Commune* of Buffon; *Jadreka Snipe* of Latham.

Young before their first Moult.—Band of the upper mandible to the eye, throat, base of the caudal feathers, upper part of the quills, belly, and abdomen pure white; feathers of the upper part of the head brown, bordered with bright red; neck and breast bright ashy-red; feathers of the back and scapulars blackish, surrounded by a red band; coverts of the wings ash, bordered and terminated by a great space of reddish-black; extremities of the tail-feathers bordered with white; point of the bill brown.

In this plumage the bird is *Totanus rufus* of Bechstein.

Nuptial Plumage.—Male.—Band of the upper mandible to the eye whitish-red; space between the eye and the bill brown; feathers of the top of the head black, bordered with bright red; throat and neck bright red, striped transversely with fine black zigzagged bands; upper part of the back and scapulars deep black; all these feathers terminated with a band of bright red and bordered by spots of that colour; coverts of the wings ash; lower part of the back and tail deep black; middle of the belly, abdomen, base of the tail-feathers, and upper part of the quills pure white; base of the bill bright orange; feet black.

The colours of the *females* are less bright and the black spots are less numerous in her plumage. (Temm.) Mr. Gould says they frequently surpass the male in brilliant colouring.

In this state the bird is *Scolopax Belgica*, and *Scolopax Ægocephala* of Gmelin; *Totanus Ægocephalus* of Bechstein; *La grande Barge Rousse* of Buffon; *Red Godwit* of Latham; and *Dunkelfussiger Wasserlaufer* of Meyer.

Rhosing is the antient British name for the Godwits.

Geographical Distribution.—Northwards as far as Iceland. Rare along the Rhine on its double passage, which is directed more towards the shores of the sea than along the rivers. Europe; Germany, Holland, and Switzerland. Japan and the Isles of Sunda. (Temminck.) Italy, Spain, North Africa, Trebizond, Erzeroom, and the neighbourhood of the Caucasus. Mr. Gould states that it inhabits the whole of the European continent, and that examples are found in most collections from Africa and India. With us they are most frequently seen in spring and autumn. They breed mostly in high northern latitudes, but occasionally in England. In Ireland the species is but seldom seen.

Food, Habits, &c.—The food consists of insects and their larvæ, worms, &c. The nest is formed of dry grass and herbage, and the four eggs are light olive brown, blotched and spotted with darker brown.

Godwits were formerly considered most delicious eating (*The Devil is an Ass*, iii. 3; Sir Thomas Browne and others); but though they are now sometimes fattened with bread and milk, like Ruffs, they are not held in half the estimation that Ruffs are.

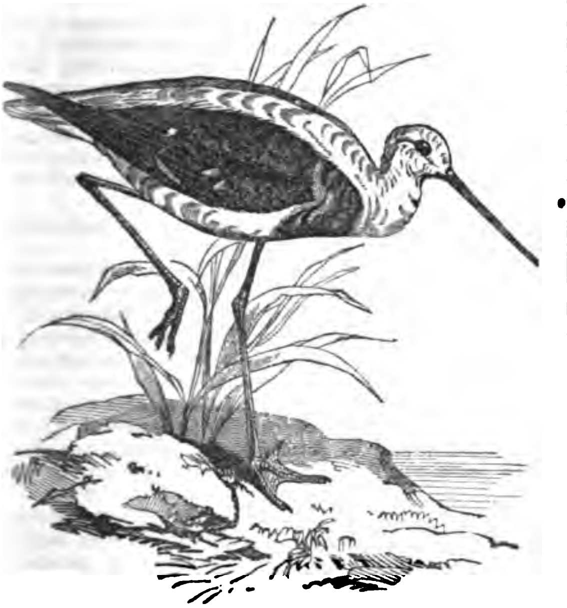
Cladorhynchus. (G. R. Gray.)

This genus, which closely approximates *Himantopus*, was first characterised by the Chevalier B. Dubus, under the name of *Leptorhynchus*. Mr. Gould published a description and part figure of the species here noticed, in his *Synopsis of the Birds of Australia*, as *Himantopus palmatus*. *Leptorhynchus* had been pre-occupied in ornithology; and therefore, as Mr. Gould observes, Mr. G. R. Gray's name must stand.

Example, *Cladorhynchus pectoralis; Leptorhynchus pectoralis*, Dubus.

Description.—Body white; breast crossed by a broad band of chesnut, bordered anteriorly with black; wings and centre of the abdomen black; bill black; legs reddish-yellow. In a specimen presumed to be the female, the band on the chest was greyish-brown instead of chesnut, and there was no appearance of the black mark on the centre of the abdomen; and in another the pectoral band was apparently disappearing, from which Mr. Gould infers that this mark only exists in the breeding season.

Localities.—Southern and Western Australia. Rottnest Island.



Cladorhynchus pectoralis.

Reduced from Mr. Gould's figure of the natural size, in his magnificent work on *The Birds of Australia*, now in the course of publication.

The *Sandpipers* will be more particularly noticed under the titles TOTANINÆ and TRINGINÆ.

SCOLOPENDRA, according to Latreille, a genus of the order *Myriapoda*, and belonging to a section of that order termed *Chilopoda*. In the classification of Dr. Leach the Myriapoda are raised to the rank of a class; and Latreille's section *Chilopoda* is regarded as an order, to which the name *Syngnatha* is applied. The species of the genus *Scolopendra*, as now restricted, are distinguished from others of the section of which they form a part, by their possessing at least twenty-one pairs of legs, and there are more segments apparent on the upper surface of the body than on the under; the antennæ are composed of seventeen joints; the eyes are distinct, and are four in number on each side. These insects inhabit the southern parts of Europe, and all the tropical portions of the globe; their mandibles (which, strictly speaking, it would appear are formed by the second pair of legs) are terminated by a sharp hook, which is pierced for the transmission of a venomous fluid. The *Scolopendræ* have the body long, slender, and depressed, and protected by coriaceous plates: they run very fast, and shun the light, living for the most part under logs of wood and the loose bark of decayed trees. Their venomous properties cause them to be much dreaded in the hot climates which they inhabit. [SYNGNATHA.]

SCO'MBRIDÆ, a family of fishes of the section *Acanthopterygii*, of which the common mackerel may be regarded as a type: the tunny, sword-fish, dory, and boar fish also belong to this group, which contains a multitude of species and many genera. The body is generally covered with small scales; the tail is usually very powerful and deeply cleft: in most of the species the pectoral fins are long, narrow, and pointed; the dorsal fins are two in number, the foremost of them being composed of bony rays; the hinder dorsal is chiefly supported by soft rays, and is often divided into numerous small false fins. They are provided with numerous cæca, and these are often united in clusters. In the genus *Scomber*, as now restricted, the body is covered with small smooth scales; the dorsal fins are widely separated; the hinder part of the second dorsal, as well as of the anal fin, is divided into numerous small spurious fins or finlets, which extend along the hinder part of the body, above and beneath, almost to the tail; the sides of the tail are carinated, and the body is elongated and tapering at both extremities. To this genus belongs the common mackerel (*Scomber Scomber* of Linnæus, or *Scomber vulgaris* according to some authors), a fish too well known to require to be described here. 'This fish,' Mr. Yarrell observes, 'it is probable inhabits almost the whole of the European seas; and the law of nature which obliges it and many others to visit the shallower waters of the shores at a particular season, appears to be one of those wise and bountiful provisions of the Creator by which not only is the species perpetuated with the greatest certainty, but a large portion of the parent animals are thus brought within the reach of man, who, but for the action of this law, would be deprived of many of those species most valuable to him as food.' It may be further observed, says the same author, that there is scarcely a month throughout the year in which the fishes of some one or more species are not brought within the reach of man by the operation of this law. 'On the coast of Ireland the mackerel is taken from the county of Kerry on the west, along the southern shore, eastward to Cork and Waterford; from thence northward to Antrim, and north-west to Londonderry and Donegal. Dr. MacCulloch says it visits some of the lochs of the Western Islands, but is not considered very abundant. On the Cornish coast, this fish in some seasons occurs as early as the month of March, and appears to be pursuing a course from west to east. They are plentiful on the Devonshire coast, and swarm in West Bay about June. On the Hampshire and Sussex coast, particularly the latter, they arrive as early as March, and sometimes even in February; and the earlier in the year the fishermen go to look for them, the farther from the shore do they seek for and find them. Duhamel says the mackerel are caught earlier at Dunkirk than at Dieppe or Havre: up our own eastern coast however the fishing is later. The fishermen of Lowestoffe and Yarmouth gain their great harvest from the mackerel in May and June. Mr. Neill says they occur in the Forth at the end of summer; and Mr. Lowe, in his "Fauna Orcadensis," states that they do not make their appearance there till the last week in July or the first week in August.'

'The most common way of fishing for mackerel, and the way in which the greatest numbers are taken, is by drift-nets. The drift-net is twenty feet deep, by one hundred and twenty feet long; well corked at the top, but without lead at the bottom. They are made of small fine twine, which is tanned of a reddish-brown colour, to preserve it from the action of the sea-water; and it is thereby rendered much more durable.'

SCONE or **SCOON**, a village in Perthshire, on the left or east bank of the Tay, a little above Perth, which is on the west or right bank. It was famous in the middle ages as the residence and place of coronation of the Scottish kings. The celebrated stone which for so long a time formed the seat of the Scottish kings at their coronation, was transferred hither from Dunstaffnage by Kenneth II., when he united the territories of the Picts and the Scots under his sceptre, in the ninth century. [PICTS, vol. xviii., p. 149.]

This stone remained at Scone until the invasion of Scotland by Edward I., who carried it to Westminster (A.D. 1296), where it still remains. [EDWARD I., p. 286.] The Scottish princes were however still crowned at Scone until the union of the two crowns. In the twelfth century an abbey of the regular canons of St. Augustine was founded at Scone. This abbey continued till the Reformation, when, as well as the palace, which had been the residence of the kings, it was demolished by a mob from Perth and Dundee.

The modern village of Scone is neatly and regularly built, with a population of about 1500. That of the whole parish, in 1831, was 2268, of whom about 40 men were employed in fishing on the Tay, and about the same number in stone-quarries.

SCOPAS, a celebrated sculptor, born in the island of Paros. Pliny (*Hist. Nat.*, xxxiv. 8) makes Scopas contemporary with Ageladas, Polycletus, Myron, and other distinguished artists who were living in the eighty-seventh Olympiad; but from various circumstances, it seems probable that he did not flourish till a somewhat later period. Like many artists of antiquity, he united the two professions of sculpture and architecture; and the temple of Minerva Alea, at Tegea in Arcadia, was constructed under his direction. (Pausanias, viii. 45.)

The date of the destruction of the temple which the new edifice was intended to replace, and the period at which another work on which Scopas was employed was completed, materially assist in establishing the age of this artist. Pausanias says the older temple referred to was burned during the archonship, in Athens, of Diophantus, in the second year of the ninety-sixth Olympiad (about 388 B.C.); and Pliny (xxxvi. 5) tells us that Scopas was one of the sculptors employed on the tomb erected in honour of Mausolus, king of Caria, by Artemisia, his queen, who died (before the work was completed) in the hundred and seventh Olympiad, or about 350 B.C. Scopas, it is true, may have been living at the same time with some of the later artists mentioned by Pliny, but a calculation of the above dates will sufficiently prove almost the impossibility of his practising as a contemporary artist with the great sculptors preceding and forming the Phidian age and school, and likewise exercising his art at a date so distant from their time as three hundred and fifty years before our æra. He lived, most probably, between 400 and 300 years B.C.

Pliny furnishes a copious list of works by this artist. Among those which he says were particularly worthy of admiration was a series of figures representing Neptune, Thetis, Achilles, Nereids mounted on dolphins, and attended by Tritons and other marine monsters. All these 'were from the hand of Scopas,' and Pliny adds, 'it was a splendid work (*præclarum opus*), sufficient for the fame of his whole life. It was preserved in the temple of Cneius Domitius, in the Circus Flaminius at Rome. The same writer also mentions two statues of Venus, one of Pothos, or Desire, one of Apollo, and a much admired Vesta in a sitting attitude; also a colossal sitting figure of Mars, and a Bacchus at Cnidus.

Pliny tells us there was a doubt in his time whether some statues representing the dying children of Niobe (' *Niobæ liberos morientes*') in the temple of Apollo Sosianus at Rome, were by Scopas or Praxiteles. The well known group or series of figures representing this subject, now preserved in the gallery of the grand-duke of Tuscany at Florence, is generally believed to be the work alluded to by Pliny. Whether it be an original production of either of these great masters, or, as some critics have supposed, only copied from their work, it must ever be classed among the finest specimens of art, and as a noble monument of the genius of its author. This group has been described in a former article. [NIOBE.]

Scopas was employed upon the tomb of Mausolus, and had for his associates and rivals (*æmulos eadem ætate*) Bryaxis, Timotheus, and Leochares. This work, considered by the antients one of the seven wonders of the world, was of a square form, having four faces, Each of the above-named artists completed one side. The eastern was given to Scopas; the northern to Bryaxis; the southern to Timotheus; and Leochares decorated the western façade. Pliny in mentioning this uses the terms *cœlavere* and *cœlavit*, from which it may be inferred that all their performances were in *rilievo*. The whole mass, measuring twenty-five cubits in height, was surmounted by a quadriga, or four-horsed chariot in marble. This was the work of one Pythis; of whom nothing further is known than his having been thus employed on this celebrated monument.

Pausanias, in his description of Greece, speaks of various performances of Scopas (both in bronze and marble), existing in the cities which he visited. In the temple of Venus at Megara were statues of Ἔρως, Ἵμερος, and Πόθος (Love, Passion, and Desire). (Paus., i. 43.) There was also a statue of Hercules by him at Sicyon (ii. 10); and at Gortys in Arcadia were two statues, one of Æsculapius, *imberbis* (or beardless), and the other of Hygeia (viii. 28). Two works by Scopas are celebrated by epigrams in the Greek Anthology: one of them refers to a much admired statue of Mercury; another pays a high compliment to the skill displayed by the sculptor in a figure of a Bacchante represented in a state of inebriety. The latter work was executed in Parian marble.

Strabo (lib. xiii., 604) mentions a statue by Scopas, of Apollo, in rather a remarkable character,—that of a *killer of rats*. It was in the temple of the god surnamed Smintheus, at Chrysa or Chryse in the Troad. The figure was represented in the act of pressing or crushing a rat with his foot.

From the terms in which Pausanias speaks of the temple before alluded to, which Scopas built to Minerva Alea at Tegea, his merit as an architect must have been little if at all inferior to that which he displayed in the sister art. Pausanias says it far exceeded, both in the quality of its decoration and its dimensions, all the other temples in Peloponnesus. He describes it as being of the Ionic order on the outside; but within it was decorated with Doric columns having over them others of the Corinthian order. In the pediment in front was represented the hunting of the Caledonian boar, with Atalanta, Meleager, Theseus, and numerous other figures. The other pediment exhibited the contest of Telephus and Achilles. Pausanias does not state distinctly that these works were by Scopas, but it may fairly be inferred that they either were executed by him or at least were produced under his superintendence.

Before closing this short notice of Scopas it may be right to mention that the difficulty of reconciling the dates given by Pliny has led the learned antiquary Sillig (*Catal. Artificum*, p. 415) to suppose there may have been two artists of the name; one a native of Paros, and the other of Elis. But the reasons adduced do not however appear sufficient to warrant such a conclusion.

SCOPAS, or SCOPINAS, an artist or mechanist, of unknown date, mentioned by Vitruvius.

SCO'POLI, GIOVANNI ANTONIO, was born at Cavalese in the Tyrol, on June 13, 1723. After pursuing his preliminary studies at Trent, he went to Innspruck, and took the degree of doctor in medicine at that university in 1743. He early displayed a great fondness for natural history, and was in a great measure self-taught, since there was not then at Innspruck any professor capable of directing his studies in that department. Botany especially attracted his attention, and he formed a plan, which however he never executed, for publishing the Flora of his native country.

A journey which he made to Vienna led to his obtaining an appointment as a physician at Idria. Here he published a Flora of Carniola, and his proximity to the quicksilver-mines gave him many opportunities for cultivating mineralogy. The results of these studies appeared in various memoirs, among which was a valuable essay on the diseases to which the miners are liable. The talent and indefatigable diligence which he displayed, excited the envy and opposition of many of the officers in the mines, but his appointment as professor of mineralogy at Idria relieved him from all the disquietudes to which he had before been subjected. On the removal of Jacquin to Vienna, Scopoli succeeded to the chair of mineralogy at Schemnitz; and in 1777 he was appointed professor of natural history at Pavia, where he died on May 8, 1788.

Scopoli was well acquainted with all branches of natural history, though especially distinguished as a botanist. He was much respected by Jacquin and Linnæus, the latter of whom named a plant in honour of him, and a genus Scopolia is still distinguished by botanists.

There is a notice of his life in the *Dictionnaire des Sciences Médicales, Biographie Médicale*, tome vii., article 'Scopoli.'

His principal works are, 'Flora Carniolica,' Vienna, 1760, 8vo., and Leipzig, 1772, 8vo.; 'Entomologia Carniolica,' Vienna, 1763; 'Tentamina Physico-chemico-medica,' Venice, 1761, 8vo., Jena, 1771, 8vo., which contains his paper on the diseases of the workers in the quicksilver-mines; 'Deliciæ Floræ et Faunæ Insubriæ,' &c., Pavia, 1786-88, three parts, folio.

SCOPS. [STRIGIDÆ.]

SCOPUS. [HERONS, vol. xii., p. 166.]

SCORE, in Music, is a collection of all the vocal and instrumental parts of a composition, arranged on staves, one above the other, and bar for bar, presenting at once, to the eye of a skilful musician, the effect of the whole band as the composition proceeds.

SCORPIO, a genus of the class Arachnida, order Pulmonaria, and section Pedipalpi. The animals of this genus (commonly called scorpions) are distinguished from other groups of spiders by their having the abdomen articulated and terminated by a curved spur at the extremity; the palpi are very large, and the terminal segment assumes the form of the lobster's claw, being in like manner provided with pincers; the stigmata are eight in number, and situated along the inferior and lateral part of the abdomen; on the under side of the thorax are two comb-like appendages; the number of the eyes varies from eight to twelve in different species, and some subgenera have been established upon this character. Those to which the term *Scorpio* is used in its most restricted sense have only six eyes; those *Scorpions* which have eight eyes constitute the subgenus *Bathus;* and those which have twelve eyes, *Androctonus*.

'These Arachnides,' says Latreille, 'inhabit the hot countries of both hemispheres, live on the ground, conceal themselves under stones and other bodies, most commonly in ruins, dark and cool places, and even in houses. They run with considerable swiftness, curving the tail over the back—this they can turn in every direction, and use for the purposes of attack and defence. With their forceps they seize various insects, on which they feed after having pierced them with their sting. They are particularly fond of the eggs of spiders and insects.

The wound occasioned by the species found in the southern parts of Europe (*Scorpio Europæus*), is not usually dangerous; but according to the experiments of Dr. Maccary, made upon himself, the sting of some other and larger species produces serious and alarming symptoms, and the older the animal the more active seems to be the poison. The remedy employed is the volatile alkali, used externally and internally.

The young scorpions are produced at various intervals, and are carried by the parent for several days upon her back, during which time she never leaves her retreat.

SCO'RPIUS, or SCORPIO (the Scorpion), a constellation of the zodiac, lying between Libra and Sagittarius, and bounded north and south by Ophiuchus and Lupus. It contains one star of the first magnitude, which, with Spica Virginis, and Arcturus, forms a conspicuous triangle. As noticed in LIBRA, this constellation was formerly two signs of the Greek zodiac, the claws occupying the place of Libra. The story is that the chelæ or claws of the Scorpion were drawn back by Roman astronomers, and the constellation Libra added in honour of Julius Cæsar, at whose death a new star was said to have appeared in that part of the heavens. This story is alluded to, not very distinctly, by Virgil; Hyginus is totally silent about it, merely saying that his countrymen call one part of this constellation Libra, Manilius uses both Libra and Chelæ. Ptolemy does not mention Libra in his catalogue, though he does elsewhere. Dupuis contends, from its presence in the most antient Indian and Persian zodiacs, that it is in reality as antient as the rest: and indeed it is not unlikely that the Greeks may have derived their zodiac from some nation in which the term for scales was confounded with that for claws, either by a synonyme in the language itself, or by mistranslation on their part.

The following are the principal stars:—

Character. Not in Bayer ( )	No. in Catalogue of		Magnitude.	Character. Not in Bayer ( )	No. in Catalogue of		Magnitude.
	Flamsteed. (Piazzi.)	Astron. Society.			Flamsteed. (Piazzi.)	Astron. Society.	
b	1	1800	6	λ	35	2007	3
A	2	1806	5		(10)	1854	6
	3	1812	7		(19)	1726	6½
	4	1815	6	(u)	(23)	1969	5¼
ρ	5	1816	4		(28)	1861	7
π	6	1818	3		(28)	1972	6½
δ	7	1823	3	(d)	(31)	1864	5¼
β	8	1836	2	(p)	(36)	1866	6
ω¹	9	1837	5		(39)	1868	7
ω²	10	1838	5		(72)	1878	7
	11	1841	6		(76)	1990	6
c¹	12	1849	6		(93)	1890	7
c²	13	1850	6		(118)	1769	7
ν	14	1851	4		(137)	2010	5
ψ*	15	1852	5	θ	(138)	2012	5
	16	1853	6		(159)	1908	6½
χ†	17	1857	6	κ	(174)	2027	3
(n)	18	1860	7	μ¹	(189)	1919	3½
(o)	19	1871	6	(f¹)	(191)	1808	6
σ	20	1872	5	(f²)	(192)	1810	6
α	21	1885	1	μ²	(193)	1921	4
(i)	22	1888	5½	ι¹	(210)	2037	4½
τ	23	1900	4		(214)	1924	6½
(m)	24	1907	5¼		(236)	1937	6½
	25	1911	6		(237)	1829	6
ε	26	1915	3	ρ	(255)	1943	6
	28	1954	6	(m)	(265)	1840	6
	29	1965	6	(k)	(268)	1947	5
	30	1968	6		(273)	1949	7
	31‡	1971	6½		(280)	1848	6
	33	1991	7	η	(302)	1960	4
υ	34	2002	4				

* Commonly called χ, from a mistake of Flamsteed's.
† Usually without a letter (see above).
‡ The same star as 38 Opiuchi.

The mythological story of the scorpion, according to Hyginus, is that it was an animal to which the earth gave birth expressly for the purpose of destroying the hunter Orion, who had boasted that he was the master of all the animals on its surface: it is sufficient to point out, in proof of the singular inconsistency of the classical mythic constellations, that the story in ORION of that worthy's death is also told by Hyginus.

SCOT, from *sceat*, an Anglo-Saxon word originally signifying 'a part' or 'portion.' It appears also, at least in composition, to have meant any sum paid; thus, sawl-sceat, soul-scot, or soul-shot, was the name for the ecclesiastical due payable at the open grave for the benefit of the soul of the deceased. Previous to the Reform Act, 2 W. IV., c. 45, in many boroughs the payment of scot and lot constituted a qualification as a voter for a member of parliament of the borough. Those who possessed such qualification at the time of passing the Act have, under certain conditions, their rights still reserved to them.

The qualification consists in the payment of the rates which are allotted to each person as the proportion to be contributed by him. The criterion adopted for the purpose of ascertaining the scot and lot voters of a borough, is the poor-rate of the respective parishes comprised in it.

(Rogers *On Elections*.)

SCOT, REGINALD, this learned and extraordinary man was born early in the sixteenth century, in which he was the most distinguished opposer of the then almost universal belief—*witchcraft*. He was the son of an English gentleman of family, and educated at Oxford. (Wood, *Athen. Oxon.*, vol. i.) He took no degree there; but returning to Smeeth in Kent, devoted himself to study, and more particularly to the perusal of old and obscure authors; occupying his hours of relaxation in gardening. The fruits of this learned leisure were, 'A perfect platform of a Hop-garden,' and 'The Discoverie of Witchcraft,' 1584. In both of these we see the mixture of sagacity and absurdity, extensive learning and puerile paradoxes, and ostentatious quoting of Greek and Latin authors, so common to writers of that period, when the writing a book, being an event in a man's life, he seized upon that opportunity to thrust in all he knew. The following is the title of the latter work:—'Discoverie of Witchcraft, proving the common opinion of witches contracting with devils, spirits, familiars, and their power to kill, torture, and consume the bodies of men, women, and children, or other creatures, by diseases or otherwise, their flying in the air, &c., to be but imaginary, erroneous conceptions, and novelties. Wherein also the practices of witchmongers, conjurors, enchanters, soothsayers, also the delusions of astrology, alchemy, legerdemaine, and many other things are opened that have long lain hidden, though very necessary to be known for the undeceiving of judges, justices, and juries, and for the preservation of poor people;' and its boldness and humanity would alone entitle it to consideration. A striking passage in the preface is to this effect: this work is composed, that, 'first, the glory of God be not so abridged and abased as to be thrust into the hand or lips of a lewd old woman, whereby the work of the Creator should be attributed to the creature; secondly, that the religion of the Gospel may be seen to stand without such peevish trumpery; thirdly, that favour and Christian compassion be used towards these poor souls, rather than rigour and extremity.' Such a work, with such a purpose, and such a common-sense straightforwardness mingled with its humanity, could not fail of drawing down on the author's head every possible ridicule, obloquy, and confutation. To assert that the devil had no power whatever of controlling the course of nature, and that old women were not assiduous and vicarious instruments of his power, was little better than atheism! And when Scot laughed at the difficult tricks of legerdemaine, and explained how they were performed, we cannot wonder at his book being burnt by the common hangman, and at 'refuters' appearing on all sides. He was abused by Meric Casaubon, Glanvil (author of the 'Scepsis Scientifica'), and finally, King James himself, who wrote his 'Demonologie,' as he informs us, 'chiefly against the damnable opinions of Wierus and Scot; the latter of whom is not ashamed in public print to deny there can be such a thing as witchcraft.'

Scot's boldness could not at once succeed, when opposed by a reigning king and the statute law of the land. When human reason was so blinded by superstition that it was a common practice to throw a woman, suspected, into a pond, and if she escaped drowning she was burnt as a witch; it is not to be expected that common-sense could gain many converts; and yet, from its having had three editions, and being translated into French and German, it would appear to have met with great success. It is now extremely rare: as an evidence of the peculiar phases which the human mind historically exhibits, this work, as well as the superstition which it combats, merits attention. This 'solid and learned person,' as Hallam calls him, 'for such he was beyond almost all the English of that age,' died in 1599, and was buried with his ancestors in the church at Smeeth.

SCOTER, a name for one of the *Surf Ducks*, *Oidemia nigra*, Flem., *Black Duck*, or *Black Diver*. The characters of *Oidemia* are given in the article FULIGULINÆ, vol. xi., p. 7.

SCOTIA, NOVA. [NOVA SCOTIA.]

SCOTISTS. [DUNS SCOTUS.]

SCOTLAND. [GREAT BRITAIN.]

SCOTLAND. It is now admitted on all hands that we first hear of the Scots as a people inhabiting Ireland, which island they appear in the fifth century to have divided with the Hiberni or Hiberniones, the previous inhabitants, over whom however they gradually acquired so decided a superiority as to be enabled to give their name to the country, which exclusively was called Scotia from the fifth down to the tenth or eleventh century.

In the beginning of the sixth century—about the year 503, according to the common calculation—a colony of Scots from the north of Ireland emigrated to North Britain, and effected a settlement in the district now constituting the county of Argyle, to which they gave the name of Dalriada (it is said, from their leader Riada, Reada, or Reuda). Mr. Skene, in his late work entitled 'The Highlanders of Scotland, their Origin, History, and Antiquities,' 2 vols., Edin., 1837, has shown that the Dalriadic kingdom never extended beyond the branch of the sea called the Linne Loch on the north, and that its eastern boundary, called by the old writers *Drumalban*, and sometimes *Dorsum Britanniae*, was 'that chain of hills which runs from Benauler, on the north-west corner of Perthshire, to the head of Loch Long, and which to this day separates the county of Argyle from the district of Atholl and the counties of Perth and Dumbarton.' Dalriada however included both the peninsula of Cantyre and the islands of Jura and Islay.

Within these bounds the Dalriadic Scots—the 'Scoti qui Britanniam incolunt,' as they are called by Bede, writing in the early part of the eighth century—remained confined for more than three hundred years, during which the rest of the island to the north of the friths of Forth and Clyde is stated by all the oldest authorities to have formed the kingdom of the Picts, which nation however, although governed by one king, appears to have been divided into two populations, the Northern or Highland Picts, and the Lowland or Southern Picts—the Septentrionales and Australes Picti of Bede. It is remarkable that Ammianus Marcellinus describes the Picti of the latter part of the fourth century as 'in duas gentes divisi, Dicaledonas et Vecturiones.' The panegyrist Eumenius also, in his oration addressed to the emperor Constantine in 310, speaks of the 'Caledonum aliorumque Pictorum silvas et paludes.' These passages would lead to the conclusion that the Caledonians were a Pictish people,—that they were in fact merely the Northern Picts. And this is the opinion now almost universally received.

The question however still remains whether these two divisions of the Picts were the same race or two different races,—whether they spoke the same or two different languages. But the weight of evidence appears to be decidedly in favour of their identity. They seem to have lived, as we have seen, under one government. They are both designated by the common name of Picts. The antient names of places throughout the district inhabited by the Southern Picts are equally Celtic with those in the district inhabited by the Northern Picts. And in the Welsh Triads, which there is good reason to believe are as old as the sixth century, the Picts in general are uniformly designated the *Gwyddyl Ffichti*, that is, the Gaelic or Celtic Picts. Bede, it may be added, although, as we have seen, he was well acquainted with the distinction between the Northern and the Southern Picts, yet, in enumerating at the beginning of his History the different languages in which the gospel was taught in Britain, speaks of only one lingua Pictorum.

The history of the kingdom of Dalriada has been preserved in considerable detail by the Irish annalists; and from their account it appears that from nearly the commencement, in 731, of the reign of the Pictish king Angus MacFergus, who was a Southern Pict, and had forced his way to the throne in opposition to a competitor supported by the Northern Picts, the latter were in the habit of entering into confederacies with the Dalriads against their fellow-subjects of the Lowlands; so that from this date repeated wars took place between the Pictish kings and the Dalriadic Scots acting in union with the Northern Picts collected around the standard of some rival claimant of the crown. In 736 Angus appears to have effected a conquest of the whole, or at least of the greater part, of Dalriada, and there is reason to believe that a line of Pictish princes, of whom the first was one of his sons, reigned in that territory from this date till the year 819, when, by the assistance of the Northern Picts and of the Irish, the Dalriadic family recovered their ancestral dominions. (Skene, i., 50, 54.) Meanwhile we find a contest also going on, with various fortune, between the two divisions of the Picts about the succession to their crown, which appears to have been to a certain extent elective, and was acquired sometimes by a Northern, sometimes by a Southern Pict, till a great victory obtained by Constantine MacFergus, a descendant of Angus, in 789, established the superiority of the Southern Picts, and, being followed by a long reign of thirty years, enabled Constantine to introduce the principle of succession by descent, and to make the monarchy hereditary in his family. His death however coincides with the year 819, in which the Scots appear to have recovered Dalriada.

Constantine was succeeded by his brother Angus (or Ungust) II., the founder of St. Andrew's; he, in 833, by Drust, a son of Constantine; he, in 836, by Uven, or Uen, a son of Angus II., who was killed by the Danes in 839. The death of Uen probably broke the power of the Southern Picts; for although two additional Pictish kings are given in the antient lists, no other events are mentioned till in the year 843 we find the whole of North Britain united under the sceptre of Kenneth MacAlpin, originally king of the Scots of Dalriada, but thenceforth styled king of the Picts.

The authorities for this historical deduction, which, for the most part, exhibit a very remarkable concurrence with one another, are principally the following:—the Latin Life of St. Columba, by his disciple Adomnan, written in the seventh century; Bede, who finished his History in 731; Nennius, who appears to have written about 858; Tighernac, the Irish annalist, who wrote about 1088, and evidently drew his information from earlier records; the antient Erse poem commonly called the Gaelic or Albanic Duan, composed before 1093; the 'Chronicon Regum Pictorum,' published by Innes (*Critical Essay on the Inhabitants of Scotland*, 2 vols. 8vo., London, 1729) from a manuscript of the fourteenth century, which however is believed to have been transcribed in this part from another much older; the catalogue of Pictish kings published by Innes from the register of St. Andrew's, written in 1251; the catalogue in Fordun, who wrote about 1385; the succession as given by Winton, whose Chronicle was written about 1410; and another list from the year 577, published by Lynch (*Cambrensis Eversus*, fol. 1662), from an antient Irish translation of Nennius. It is quite evident that no one of these five catalogues of the Pictish kings has been transcribed from any of the others. They may be found collected in the appendix to the first volume of Pinkerton's 'Enquiry into the History of Scotland preceding the Reign of Malcolm III.,' 2 vols. 8vo., 1789, 1794, or 1814.

Among all these authorities however no one gives any details of the revolution which thus appears to have placed a new and foreign dynasty on the Pictish throne, and to have for the first time united the whole of North Britain into one monarchy. And what is still more perplexing, the writers of several contemporary accounts that mention the Picts, such as King Alfred, in his translations of and additions to Bede and Orosius—Asser, in his life of Alfred—and the earliest Welsh chroniclers, do not appear to have been aware of any change whatever having at this time taken place in the government or condition of that people.

In the obscurity in which the matter is thus left, modern speculation has resorted to a variety of hypotheses. It has been conjectured that Kenneth MacAlpin never was king of the Dalriads at all; that he was most probably not a Scot, but a Pict; or that, if he was really the Dalriadic king, he was at the same time related, by some unrecorded marriage or other, to the Pictish royal family, and succeeded to that throne by the now established rule of inheritance; or that what has been called a conquest of the Picts by the Scots was in fact merely a union of the two nations and kingdoms; or, in fine, that what actually took place was not a conquest of the Picts by the Scots, but a conquest of the Scots by the Picts.

Nevertheless the antient accounts, though they have preserved no details, all either imply or expressly affirm that the Picts were conquered by Kenneth, king of the Scots. The 'Chronicon Pictorum' has 'Pictis..quos..Kinadius delevit.' The Register of St. Andrew's tells us that Kenneth reigned sixteen years over the Scots after he had destroyed the Picts (destructis Pictis); adding, that with wonderful cunning he led the Scots out of Argyle (Argadia) into the territory of the Picts. To the same effect are the accounts of Henry of Huntingdon and Giraldus Cambrensis in the twelfth century, in which, for the first time, we find a few details, which are amplified by Fordun and Winton and their successors.

And on the whole perhaps this view is attended with fewer difficulties, and accords better with ascertained facts of a subsequent date, than any other which it has been proposed to substitute. We must hesitate indeed as to the degree of faith to be given to the part of the story which makes the Picts to have been entirely swept away, and a Scottish population planted in their state throughout the whole extent of Kenneth's new kingdom. Such a total extermination of the Picts must have been as impracticable as would have been the supply of their places by a tribe which had hitherto occupied only the single district of Argyle. Besides, there is reason to suppose that in the contest which terminated in his acquisition of the Pictish crown, Kenneth MacAlpin must have had the Northern Picts for his friends and allies, in which case their destruction certainly would not have been one of the consequences of his success. Kenneth too and his immediate successors called themselves, or at least are called by both the Irish and Welsh annalists, sometimes kings of the Scots and the Picts, sometimes kings of the Picts merely; and the Picts continue to be spoken of as existing in North Britain for nearly two centuries after the date assigned to the Scottish conquest.

At the same time, it is by no means improbable nor inconsistent with the usages of those times, as evidenced by various well authenticated transactions, that the subjugation of the Southern Picts on this occasion should have been attended with a considerable change in both the proprietorship and occupation of the soil throughout the conquered country; that the chiefs should generally have been dispossessed of their lands; that the people of all ranks should have been partly put to death, partly driven from their habitations, partly reduced to slavery; and that the followers of the conqueror should in great numbers have abandoned their antient seats and settled in the new territory.

Throughout the tenth century, North Britain, ruled as one kingdom by the successors of Kenneth MacAlpin, appears to have been generally known by the name of Albania, undoubtedly the same with Albion, or Albin, which is the most antient name attributed to the island, and that by which the Gael of Scotland distinguish it to this day. [GAEL.] About the middle of this century however we find the name of Scotland beginning to be applied to North Britain; and from the commencement of the eleventh century the people of that country are commonly designated the Scots simply, and not the Scots of Britain, or of Albania, by way of distinction from the main body of the nation, which was till now considered as settled in Ireland. By this time the decay of the Irish Scots combined with the rising power and importance of their kindred in Britain to transfer to the latter and to their country the superior celebrity which the former had previously enjoyed.

The Scotland proper of this date comprised, as has been observed, only that part of the island to the north of the Forth and Clyde. But the south of modern Scotland, in whole or in part, was also occasionally comprised under the same name. It may be divided into three districts: 1, the eastern portion, called Lodonia, or Laodonia, a Teutonic term, signifying the march or border land; 2, the kingdom of Strathclyde, in the north-west; and 3, the district of Galloway, in the south-west. Lodonia, comprehending the Lothians and the other counties to the south of them, formed, from the middle of the fifth century, a part of the Anglo-Saxon kingdom of Bernicia, and the people appear to have been mainly Angles from that date; but the result of the battle of Dunnechtan (Dunnichen in Angus), fought in 685, between the Pictish king Brude, or Bridei, and the Northumbrian king Egfrid, was to transfer it to the dominion of the Picts The claim of the English king to this territory however was occasionally renewed in after-times, till it was at last formally surrendered by Edgar to the Scottish king Kenneth IV. in 971. In 1005 it appears to have been overrun by the earl of the Northumbrians; but in 1020 it was again formally ceded to Malcolm II. (Allen's *Vindication of the Antient Independence of Scotland*, 8vo., Lon., 1833.) Strathclyde, comprehending, besides Lanark, Renfrew, and the northern half of Ayrshire, certainly at least the town and rock of Dunbarton, then called Alcluyd, which was its capital, and, as some suppose, a surrounding district of considerable extent to the north of the Clyde, was a Cymric or Welsh kingdom, and remained independent of the Scottish crown till the defeat of its last king Dunwallon by Kenneth III., at the battle of Vacornar in 973. The history of Galloway, which comprised the modern counties of Kirkcudbright and Wigton, together with the southern portion of Ayrshire, is very obscure; but it is spoken of as having been a Pictish country so early as the sixth century (by Jocelin, in his *Life of St. Mungo*), and the English historians notice the Picts of Galloway as appearing in the Scottish array at the battle of the Standard, fought in 1138. About the same period the government of the district was in the hands of a powerful Irish family of the name of Macdonall, of whom all that is known is that the first of the line was named Fergus. (Ritson's *Annals of the Caledonians*, &c., ii. 245.) These lords of Galloway, although practically independent down to this or even a somewhat later date, appear to have generally acknowledged themselves feudatories of either the Scottish or the English crown, most commonly of the former, to which they were eventually reduced under complete subjection. We may observe also that the district of Cumbria, lying within what is now called England, was made over to Malcolm I. king of the Scots, by the Saxon king Edmond I. in 946, and being held as an English fief, constituted an appanage of the Scottish crown from that date down to the year 1072.

The most valuable sources of the history of Scotland during the tenth, eleventh, and twelfth centuries, besides the Albanic Duan, the Pictish Chronicle, and the Register of St. Andrew's, already mentioned, the Saxon Chronicle, and the Melrose and a few other native chronicles, are the Irish Annals of Innisfallen, Buellan, and Ulster (published in O'Connor's 'Rerum Hibernicarum Scriptores Veteres'), the Welsh Triads, and the Annals of Caradoc of Nant-Garvan (published in the 'Welsh Archæology,' 3 vols. 8vo., 1801), and the Norse Sagas. By comparing these Irish, Welsh, and Norse accounts, which are found in general to agree with and support one another in the most satisfactory manner, Mr. Skene has in his late work thrown much new light upon the course of events during this period.

It appears that the Orkney and Western Islands having been taken possession of by the Norwegians in the end of the ninth century, Sigurd, the earl or king of the former, and Thorstein the Red, who, although for the present kept out by an insurrection of the natives, claimed the sovereignty of the latter, leaguing together, had made a descent upon the mainland of Scotland in the year 894, and quickly overrunning the greater part of the districts of Caithness, Sutherland, Ross, and Moray, had established there a Norwegian principality, which was given to Thorstein, and was held by him with the title of king of the half of Scotland, till he was defeated and slain, and his followers expelled, by the Scots in the year 900. Caithness however appears to have been reconquered by Thorfinn, earl of Orkney, about the middle of the tenth century. In 986 a confederacy of the chieftains of the north of Scotland, headed by Finlay, the Maormor or great chief of Moray, made an attempt to drive the Norwegians from this possession; but they were defeated by the forces of Earl Sigurd, a successor of Thorfinn, who, pursuing his success, speedily succeeded in reducing to his authority not only the whole of the territory that had formerly been held by Thorstein the Red, but in addition the antient Scottish kingdom of Argyll (or Dala, as it is often called, that is, 'the territory,' as if pre-eminently, the term being the same that enters into the composition of the name Dal-Riada). Sigurd retained these acquisitions for some years; but a general rising of the northern Maormors at length succeeded in once more clearing the whole of Scotland of the Norwegians in the year 993. The able and fortunate leader in this national liberation was Malcolm, Maormor of Moray, the nephew of Finlay mentioned above; and he turns out to be the person who a few years after, by the defeat and death of Kenneth V. (called Macduff or Grim), acquired possession of the throne of his native country under the title of Malcolm II. 'In what his title to the crown consisted, or what was the nature of the claim which he made to it,' says Mr. Skene, 'it is impossible now to determine; but certain it is that he was supported in his attempt by the whole of the inhabitants of the northern parts of Scotland; and in order to obtain the countenance of a people so singularly tenacious of their antient customs, he must have possessed a stronger claim than what mere power or influence could give him, more especially as his descendants for many generations afterwards constantly asserted their right to the throne of Scotland, and as invariably received the assistance of the Celtic portion of its inhabitants. In all probability the Highlanders were attempting to oppose the hereditary succession in the family of Kenneth MacAlpin, and to introduce the more antient Pictish law.' Soon after his accession, Malcolm, having effected a reconcilement with his old enemy Earl Sigurd, gave him his daughter in marriage, and, after a reign of twenty-six years, died in 1029. On his death the Scottish faction succeeded in raising to the throne another Malcolm, the son of Kenneth Macduff, whom the late king had defeated and slain. This Malcolm MacKenneth, immediately after his accession, proceeded to take his measures for dispossessing Sigurd's son and successor Thorfinn of the district of Caithness, with which he had been invested by his maternal grandfather; and a long war followed between the Scottish king and the Norwegian earl, which terminated, in 1034, in the defeat and death of the former; events which were forthwith followed by the complete subjugation of Scotland by Thorfinn, as far south as to the Frith of Tay. The greatest inconsistency and confusion has been introduced into the narrative given by Fordun and his successors of this portion of Scottish history, by their substitution of only one Malcolm for these two kings of that name, who were not only of different families, but of altogether opposite politics and conduct. Hence, among other things, some of the Scottish authorities make Malcolm II. to have been slain in battle, others to have died in his bed. (Pinkerton, *Enquiry*, ii. 192.) The Irish Annalists agree with the Norse Sagas in the above account.

The Norwegian kingdom thus founded in the north of Scotland by Thorfinn lasted for thirty years. It comprehended the whole of Scotland to the north of the Tay, with the exception only of the mountain districts of Argyle and Athol. Nor did the establishment of the Norwegian dominion in these parts imply merely a change of masters to the inhabitants. It was, to a great extent, a change of the population itself. 'Earl Thorfinn,' says the Norse Saga, 'drove the scattered remnants of the Scottish army before him, and subjugated the whole country in his progress, even as far as the district of Fife.' The natives, after their submission, rose, upon a portion of the invading army being withdrawn; but when Thorfinn re-assembled his forces, 'the Scots,' continues the account, 'did not attempt to defend themselves, but fled immediately to the woods and deserts. Then Earl Thorfinn, when he had driven the fugitives away, declared that he would burn and lay waste the whole country, in revenge for their treachery. His men then spread over the whole conquered country, and burned every hamlet and farm, so that not a cot remained. Every man that they found they slew, but the old men and women fled to the deserts and woods, and filled the country with lamentation. Some were driven before the Norwegians and made slaves.' This passage affords a curious and valuable illustration of the nature and manner of these antient Norse subjugations.

On the death of Malcolm MacKenneth, the part of the country that remained unsubdued appears to have acknowledged as his successor Duncan, the son of his daughter Bethoc, whose father, Crinan, commonly designated Abbot of Dunkeld, is considered by Mr. Skene to have been one of the maormors or chiefs of the Northern Picts. If that was the case, the elevation of Duncan to the throne may be regarded as an arrangement recommended by its accordance with both the Pictish and the Scottish principles of succession,—the elective and the hereditary,—and as such peculiarly suitable in the present circumstances of the country. After six years of an undisturbed reign, Duncan, in 1040, during a temporary absence of Thorfinn, putting himself at the head of an army, marched upon the dominions of that prince, and is said to have made his way as far north as the district of Moray without encountering any resistance. And even at this point he was, according to Mr Skene's theory, opposed not by the Norwegians, but by the Gaelic inhabitants, who, it seems, 'preferred remaining under the Norwegian yoke, rather than submit to a chief of their own race whose title to the throne they could not admit.' These Celts were commanded by Macbeth, the Maormor of Moray, who, attacking Duncan near Elgin, defeated and slew him, and then, overrunning the whole of the country that had hitherto acknowledged the sway of Duncan, assumed the title of king of Scotland. It is most probable that Macbeth, in the whole of this affair, acted as the ally of Thorfinn, who naturally repaid the assistance he had rendered in overthrowing Duncan, by supporting him in his seizure of the vacant throne. Macbeth was probably the near relation and representative of the late Malcolm II. (who, it may be recollected, had been also Maormor of Moray), and as such he would be the hereditary friend of Thorfinn and the Norwegians, as well as, in the estimation of his own clan, and perhaps of the Anti-Scottish population generally, the true heir to the crown.

But the next quarter of a century produced a series of revolutions, which again changed the condition of things in every part of Scotland. Macbeth in the south, and his friend Thorfinn in the north, reigned undisturbed till the year 1045, when the adherents of the Scottish family rose against the former, under the conduct of Duncan's father, Crinan; but this attempt was soon crushed, by the defeat of Crinan in a great battle, in which he himself fell, with, as the Irish annalist expresses it, 'nine times twenty heroes' more of his party. His success secured Macbeth nine years more of tranquillity; but in 1054 he was again attacked by a Saxon force, under the command of Siward, earl of Northumberland, which had been obtained from Edward the Conqueror by Duncan's eldest son Malcolm, who, after his father's death, had taken refuge at the English court; and the result of this invasion was the complete expulsion of Macbeth from the country to the south of the friths of Forth and Clyde, and the establishment of Malcolm (surnamed Canmore, or Great Head) as king of that part of Scotland. The authority of Malcolm continued to be confined to the Lothians till 1058, when an expedition of Thorfinn, aided by the son of the king of Norway, against the English king, while it failed in its object, drew down the vengeance of Edward upon the Norwegian earl and his ally Macbeth, whom a second Saxon invasion drove as far north as Lumphanan in Aberdeenshire, where he was overtaken and slain in battle. His regal title was assumed by Lulach, whom one account makes to have been the son of his cousin Gilcomgain; another, the grandson of a brother of his queen Gruoch, the daughter of Bodhe; but he too was defeated and slain, after a nominal reign of three or four months, at Essie in Angus; and Malcolm was left undisputed master of as much of his father's kingdom as remained unconquered by Thorfinn. That Norwegian however held his own till his death, in 1064, and even then the people of the north refused to submit to Malcolm, but set up a king of their own, Donald MacMalcolm, who is styled, like Malcolm II. and Macbeth, Maormor of Moray, and was probably of the same family with them. It cost the able and persevering Malcolm Canmore many years of continued warfare before he succeeded in putting down this opposition to his authority; but at last, in 1085, we find the Saxon Chronicle recording the slaughter both of Donald Mac Malcolm, who is styled king of Alban, and of his ally, Maolsnechtan, the Maormor of Moray, the son of the late king Lulach,—events which seem to have put an end to the contest, and to have brought the whole of Scotland under subjection to Malcolm, unless it might be that Caithness still remained in the hands of the Norwegians.

The reign of Malcolm Canmore terminated in 1093, and his death immediately gave rise to a new conflict between two opposite principles of succession to the throne,—the population of the Lowlands, now to a great extent Saxon, supporting the claim of Duncan, whom the Scottish historians call the natural son of the late king, but who is, with more probability, represented as his legitimate son by the Sagas,—the Celtic tribes of the north asserting the right of Malcolm's brother, Donald Bane, in conformity with what is called the system of tanistry, which, brought by the Dalriads from their former country, Ireland, had probably till now regulated the succession in the Scotic royal family, both in their first seat and since they had succeeded to the Pictish crown. From this date the elective system, which seems to have been the original constitution of the Pictish monarchy, and is perhaps to be derived from the appointment of Galgacus as general leader of the Caledonians, in the year 84, may be regarded as extinct. But the peculiar modification of the hereditary principle to be found in the system of tanistry was perhaps naturally still less able to maintain itself against the more perfect recognition of that principle, than the elective system had been to maintain itself against tanistry; for the chief cause which would be always at work under the elective system to introduce the hereditary principle, namely, the wish of the reigning king to perpetuate the crown in his own family, would operate almost as powerfully against tanistry as against the elective system itself, while the former wanted altogether that strength of another kind which belonged to the latter. Tanistry however had one recommendation in common with the elective system, which gave it some advantage in an unadvanced state of society:—the successor it provided to the throne was always a full-grown man, able to perform in his own person all the functions of royalty. It had the advantage also, when it was brought into competition with the more perfect form of the hereditary principle on the present occasion, that it had been for some time the established system,—that it was the old law of the country, to which the habits, feelings, and prejudices of the mass of the antient population were attached or reconciled; whereas the rival system was not only an innovation, but peculiarly distasteful as an importation from another country, and as supported and attempted to be forced upon the Scots by the foreign race which had intruded itself and so many more of its customs into the land only within the last few years. But both these advantages were of a nature to have their value and importance diminished by time and the progress and consolidation of society. Meanwhile the contest as begun between Donald Bane and Duncan, arrayed, as we have observed, Saxon against Celtic Scotland, and such continued to be the character of the struggle between the two principles of succession so long as it subsisted. The population however of by far the greater part of the country was already of a very mixed description. Without reverting to the questions of in how far even the purest part of the present Celtic population was to be considered the representative either of the antient Picts and Caledonians or of the Dalriadic Scots, it is probable that the course of events during the preceding century must have made at least the whole of the eastern half of the country, from the Pentland Frith to the Tay, more Norwegian than Celtic, and the last reign may be presumed to have almost equally Saxonised whatever of Southern Scotland had remained Celtic up to the accession of Malcolm Canmore. The English education of that king at the court of the Confessor, his marriage with Margaret, the sister of Edgar Atheling, and the Norman conquest of England, which happened in the early part of his reign, all co-operated to make himself and his court more Saxon than Celtic, and to induce great numbers of the English Saxons to flock to Scotland and settle there in his time. In fact, as has been remarked, 'the Norman conquest of England, in nearly the same degree that it made Saxon England Norman, made Celtic Scotland Saxon.' (*Pict. Hist. of Eng.*, i. 537.) It is to be remembered however that, as already pointed out, the population of the eastern coast of Scotland to the south of the Forth,—of the part of the country antiently called Lodonia, or the Lothians,—had been mainly if not exclusively Saxon for some ages before this date. To what extent, if at all, the two Teutonic races that had thus before the close of the eleventh century acquired possession of the whole of that side of the kingdom, were now, or became at a later date, mixed with one another, need not here be considered. For the present, circumstances tended rather to divide the Northmen and Saxons, and to oppose them to one another, than to unite them. The Norwegians, as we have seen, had taken part with the Northern Celts in all the internal contentions of Scotland ever since the commencement of the reign of Malcolm II., in 1004. Their whole race had been the hereditary enemies of the English Saxons for some centuries. They themselves, the Scottish Northmen, had had a special quarrel of their own with the English ever since the expedition of Earl Siward in 1054. It is probable, in fact, that they considered themselves as the natural allies rather of William the Conqueror and his French Normans, than of the previous Saxon rulers of South Britain, or of the Saxon interest in Scotland, which supported the descendants of Malcolm Canmore. Add to all this that Donald Bane, as having passed his life among the Celts of the Hebrides, was for that reason personally acceptable to the people of the north, and had probably always been looked upon by them as the representative of the old national interest, in opposition to the foreign habits and predilections of his elder brother.

In entering upon his contest with Duncan, Donald Bane was powerfully assisted by Magnus Barefoot, king of Norway, to whom Malcolm Canmore, in the last year of his reign, had been forced to cede the Western Islands, and who now probably arranged with Donald that if he was successful in his attempt upon the throne, he should confirm that grant. This alliance enabled Donald in the first instance to carry everything before him, and the establishment of his authority is said to have been immediately followed by the expulsion of all the Saxons who had settled in the Lowlands of Scotland during the late reign. But after a few months, Duncan came against him with a numerous army from England, permission to raise which he had probably obtained from William Rufus by consenting to hold the Scottish crown as the vassal of the Norman king; and Donald was obliged to give way before the invader. It appears however that even Duncan was not able to protect the Saxon settlers who had thus returned with him; he found it necessary to drive them all once more out of the country, even as had been done by Donald Bane; a concession to the popular cry however by which he gained nothing, for as soon as his Scottish subjects found him thus naked of foreign protection, they rose and put him to death, and replaced his uncle on the throne. But two years afterwards, another English army, conducted by Edgar Atheling, again overpowered Donald, and set the crown on the head of Edgar, a brother of Duncan. That result finally decided the contest between the two principles of succession, and also the struggle for supremacy between Celtic and Saxon Scotland. Edgar, whose accession took place in 1097, was succeeded, after a reign of ten years, by his brother Alexander I., and he by his brother David I., whose reign extended to the year 1153. In the reign of Alexander, the Highlanders of the district of Moray rose under Ladman, a son of Donald Bane; but that vigorous king instantly took such measures as not only crushed the revolt, but rid him for ever of his unfortunate rival. On the death of David however, and the accession of his grandson Malcolm, surnamed the Maiden, a child only in his eleventh year, the two systems of succession again came into collision; and an attempt was made by the Highlanders to maintain, in opposition to the feudal heir, the claim of William, styled the Boy of Egramont, who was a grandson of Malcolm Canmore's eldest son Duncan; but although this new pretender and his descendants repeatedly renewed their efforts, not only while Malcolm occupied the throne, but throughout the long reign of his brother and successor William the Lion, and even in the early part of that of William's son, Alexander II., they were always discomfited. The last of Duncan's descendants, or pretended descendants, Gilliescop MacScolane, was put to death, with all his sons, by Alexander II., in 1222; and from that date no further attempt was made to dispute the rights of the reigning family.

It was not however till fully two centuries later that the rule of the king of the Scots was completely established over the whole of Scotland. 'On the accession of Edgar,' says Mr. Skene, 'those districts which had formed part of Thorfinn's kingdom appear to have remained in the possession of the native chiefs, who had regained them on the fall of that kingdom; but the rest of the country, consisting of the territories on the north of the friths of Forth and Clyde, which the Scots had wrested from the Southern Picts, and which had fallen to the royal house founded by Duncan, in addition to the whole of the country south of the friths, became the absolute property of the king; and here we find the Saxon population and Saxon institutions principally established. In imitation of the Anglo-Saxon kingdom, this part of the country was divided into earldoms, which were bestowed upon members of the royal family; Saxon thanes were introduced over the whole country; sheriffs and sheriffdoms everywhere established; and thus during the reigns of Edgar and Alexander I. the whole of Scotland, with the exception of what had formed the kingdom of Thornfin, exhibited the exact counterpart of Saxon England, with its earls, thanes, and sheriffs; while the rest of the country remained in the possession of the Gaelic Maormors, who yielded so far to Saxon influence as to assume the Saxon title of earl.' From the reign of Alexander's successor David I. we are to date the introduction of Norman institutions into Scotland. Of the great Highland chiefs, the earls of Moray continued to be the most formidable till the year 1161, when that antient line, which, always in league with the Norwegians, had either asserted its own claims to the throne, or been the chief support of some other pretender, ever since the death of Malcolm II. in 1029, was at length stripped of its power and its possessions by Malcolm the Maiden, and the title it had enjoyed transferred to the earls of Mar. Upon their ruins the earls of Ross rose into eminence, and for some time acquired the ascendancy in the Highlands; but from the cession of the Hebrides by the Norwegians in the year 1266, the most powerful family of the north came to be that of the Macdonalds, the Celtic chiefs of these islands, who styled themselves Lords of the Isles, and having been accustomed to acknowledge only a nominal subjection to the Norwegian king, were little disposed to yield more submission to the king of Scotland, and indeed affected to carry themselves in almost all respects as independent sovereigns. But the strength of the Macdonalds, which had been broken by the defeat of Donald, Lord of the Isles, at the battle of Harlan, fought in 1411, during the regency of the duke of Albany, was destroyed by the effective measures taken to curb the Highland chiefs by James I. on his return from England a few years after. From this epoch may be dated the complete reduction of Celtic Scotland under the sceptre of the Saxon king of the Lowlands. The lordship of the Isles was finally extinguished by the forfeiture of the last lord in 1493.

The further details and revolutions of the history of Scotland will be found under the names of the more eminent kings. The succession of the kings from the epoch of the Scottish conquest is as follows:—

A.D.
843. Kenneth MacAlpin, styled Kenneth II.
859. Donald III., brother of Kenneth.
863. Constantine II., son of Kenneth.
882. Hugh, brother of Constantine.
882. Grig, called Gregory the Great, one of the northern chiefs, with Eocha or Eth, a grandson, by a daughter, of Kenneth MacAlpin.
893. Donald IV., son of Constantine II.
904. Constantine III., son of Hugh.
944. Malcolm I., son of Donald IV.
953. Indulf, son of Constantine III.
961. Duff, son of Malcolm I.
965. Culen, son of Indulf.
970. Kenneth III., son of Malcolm I.
994. Constantine IV., son of Culen.
994. Kenneth IV., surnamed Grim, son of Duff.
1004. Malcolm II., Maormor of Moray.
1029. Malcolm III., son of Kenneth IV.
1033. Duncan, grandson, by a daughter, of Malcolm III.
1040. Macbeth, Maormor of Moray.
1058. Malcolm IV. (commonly called III.), surnamed Canmore, son of Duncan.
1093. Donald Bane, brother of Malcolm Canmore.
1093. Duncan, son of Malcolm Canmore.
1095. Donald Bane restored.
1097. Edgar, son of Malcolm Canmore.
1107. Alexander I., brother of Edgar.
1124. David I., brother of Alexander I.
1153. Malcolm V. (commonly called IV.), surnamed the Maiden, grandson of David I.
1165. William, surnamed the Lion, brother of Malcolm.
1214. Alexander II., son of William.
1249. Alexander III., son of Alexander II.
1286. Margaret, called the Maiden of Norway, granddaughter, by a daughter, of Alexander III.
1290. Interregnum.
1292 John Baliol, great-grandson, by a daughter and granddaughter, of David, earl of Huntingdon, younger brother of William the Lion.
1296. Interregnum.
1306. Robert Bruce, great-great-grandson, by a younger daughter, of David, earl of Huntingdon.
1329. David II., son of Robert Bruce.
1332. Edward Baliol, son of John Baliol.
1341. David II. restored.
1370. Robert Stuart, surnamed Blear-eye, grandson, by a daughter, of Robert Bruce.
1390. Robert III., called John Fernyear, son of Robert II.
1406. James I., son of Robert III.
1437. James II, surnamed With the Fiery Face, son of James I.
1460. James III., son of James II.
1488. James IV., son of James III.
1513. James V., son of James IV.
1542. Mary, daughter of James V.
1567. James VI., son of Mary, who succeeded to the crown of England in 1603.

To the publications of Innes, Pinkerton, Ritson, Skene, and others, referred to above, on the earliest period of Scottish history, may be added, as among the most important and valuable of the numerous modern works on that subject, Gordon's 'Itinerarium Septentrionale,' fol., Lon., 1726; Horsley's 'Britannia Romana,' fol., Lon., 1732; Roy's 'Military Antiquities of the Romans in Great Britain,' 2 vols. fol., Lon., 1793; and Chalmers's 'Caledonia,' 3 vols. 4to., Lon., 1807-24. See also the list of works at the end of the article PICTS. The most important of the original sources of information for this period have been already indicated.

The principal of the old native historians are Fordun, Major, Boece, Lesly, and Buchanan, who wrote in Latin between the middle of the fourteenth and the end of the sixteenth century; and Lindsay of Pitscottie, Monipennie, and Knox, who wrote in their native dialect in the sixteenth century; all of whom may be regarded as to a certain extent original or contemporary authorities. To these may be added the poetical or rhyming chronicles of Wyntown, Barbour, and Blind Harry, which belong to the fourteenth and fifteenth centuries, and, amid much legendary matter, contain some facts not elsewhere to be found. To the early part of the seventeenth century belongs Dempster's 'Menologium Sanctorum Scotorum,' afterwards republished under the title of 'Historia Ecclesiastica Scotorum.' This is a sort of literary history of Scotland. The principal histories of ecclesiastical affairs are Archbishop Spotswood's 'History of the Church of Scotland, from A.D. 203 to 1625,' fol., Lon., 1655; Calderwood's 'True History of the Church of Scotland, from the beginning of the Reformation unto the end of the reign of James VI.,' fol., 1678; Wodrow's 'History of the Sufferings of the Church of Scotland from the Restoration to the Revolution,' 2 vols. fol., Edin., 1721-2; and Keith's 'Catalogue of Scottish Bishops,' 4to., Edin., 1755. There are also the curious diaries of Birrel, Bannatyne, Sir James Melvil, the Rev. James Melvil, Spalding, and others, written in the Scotch of the sixteenth and seventeenth centuries.

The best modern works on the later periods of Scottish history are Dalrymple's 'Annals from 1057 to 1371,' 2 vols. 4to., 1776, 1779; Pinkerton's 'History from the Accession of the House of Stuart to that of Mary,' 2 vols. 4to., 1797; Robertson's 'History during the Reigns of Queen Mary and of King James VI. till his Succession to the Crown of England,' 2 vols. 4to., Lon., 1758; Laing's 'History from the Union of the Crowns to the Union of the Kingdoms,' 4 vols. 8vo., Lon., 1804; and Tytler's 'History from the Accession of Alexander II. to the Union of the Crowns,' now in course of publication.

SCOTLAND, UNION WITH. The attempts made to subjugate Scotland by the first and second Edwards, in the end of the thirteenth and the early part of the fourteenth century, having proved unsuccessful, the notion of an incorporation of the two kingdoms can scarcely be said to have entered into the schemes or contemplations of practical English statesmanship, except on one or two occasions for a moment, till the course of events united the two crowns about 300 years later. It does not appear that such a consequence was much thought of at the time as likely to flow from the marriage of Henry VII.'s daughter Margaret with James IV. of Scotland in 1503. That marriage had been proposed by the Scottish king, and merely as the surest way of putting an end to the wars between the two countries that had been constantly breaking out and all that Bacon, writing in the time of James I., ventures to say, is, 'that the joy of the city (of London) thereupon showed, by ringing of bells and bonfires, and such other incense of the people, was more than could be expected, in a case of so great and fresh enmity between the nations, especially in London, which was far enough off from feeling any of the former calamities of the wars; and therefore might be truly attributed to a secret instinct and inspiring, which many times runneth not only in the hearts of princes, but in the pulse and veins of people, touching the happiness thereby to ensue in time to come.' Perhaps Henry himself however saw deeper into the future: during the treaty, which was almost three years under consideration, 'it is reported,' Bacon tells us, 'that the king remitted the matter to his council; and that some of the table, in the freedom of counsellors, the king being present, did put the case, that if God should take the king's two sons without issue, that then the kingdom of England would fall to the king of Scotland, which might prejudice the monarchy of England. Whereunto the king himself replied, that if that should be, Scotland would be but an accession to England, and not England to Scotland, for that the greater would draw the less, and that it was a safer union for England than that of France. This passed as an oracle, and silenced those that moved the question.' (*History of King Henry VII.*) And it is probable enough that this remark of the sagacious king, working its way into the national mind, may have had considerable effect in reconciling old prejudices to the succession of the Scottish king when it actually took place exactly a century after.

At any rate we may assume it as quite certain that nothing but such a previous union of the crowns would have made the legislative union of the two countries possible. An attempt made by Henry VIII., after the death of James V. in 1542, to bring them under one sceptre by means of a marriage between James's infant daughter and successor Mary and his son Edward, was soon abandoned. Fortunately, from the rule of succession being in all points the same in both kingdoms, the union of the crowns, which took place in the person of James I., was not an arrangement which a change of circumstances might afterwards break up, but placed the two countries under the same king for all time coming.

As soon as James found himself seated on the English throne, he addressed himself with great earnestness to the bringing about of a legislative union between his two kingdoms. [GREAT BRITAIN.] This project formed the burthen of the very long and characteristic speech with which he opened his first parliament, 19th March, 1604. Having mentioned the confirmation of the union of the houses of York and Lancaster in him by his 'descent lineally out of the loins of Henry VII.,' he went on to observe that the union of these two princely houses was nothing comparable to the union of the two antient and famous kingdoms which were brought together in his person; and then he went on at great length to argue and enforce the advantages of the connection thus established, and to insinuate the expediency of making it still closer. 'What God hath conjoined, then,' he said, 'let no man separate. I am the husband, and all the island is my lawful wife; I am the head, and it is my body; I am the shepherd, and it is my flock. I hope therefore no man will be so unreasonable as to think, that I, that am a Christian king under the Gospel, should be a polygamist and husband to two wives; that I, being the head, should have a divided and monstrous body; or that I, being the shepherd to so fair a flock (whose fold hath no wall to hedge it but the four seas), should have my flock parted in two. . . . . And as God hath made Scotland (the one-half of this isle) to enjoy my birth, and the first and most imperfect half of my life, and you here to enjoy the perfect and last half thereof; so cannot I think that any would be so injurious to me, no, not in their thoughts and wishes, as to cut asunder the one half of me from the other.' But although James concluded this part of his address by expressing his conviction that in their hearts and minds his hearers all applauded his discourse, we are informed by the historians of the time that neither his logic nor his rhetoric was received with the approbation he expected; and we know that his efforts to bring about the union wholly failed. On the 14th of April the lord chancellor moved in the Lords that some proposition might be made to the lower house for a conference about this affair; and, the motion being agreed to, a conference took place accordingly that afternoon. Two days after, the Commons sent a message to the Lords expressing their feeling that the matter ought to be proceeded in with great caution and deliberation, and objecting to have any more conferences till every man of their house had considered of and delivered his opinion about it. On the 21st a draft of a plan for the union, devised by the king himself, was read to the Lords by the Lord Cecil; and another conference took place between the two houses on the 30th, which resulted in a bill being brought in and passed appointing certain English commissioners to treat with others to be named by the parliament of Scotland concerning such union. (Stat. 1 Jac. I., c. 2.) James's proposals are preserved, and are printed in the 'Parliamentary History,' together with a letter from his majesty to the Commons, rating them roundly for the slight regard in which they appeared to hold his scheme. The affair had been debated for several days together in that house; and notes of the arguments on both sides are entered on the journals; but the prevailing opinion of the members may be gathered from the way in which they took up the publication of a book or tract in favour of the union by Dr. Thornborough, the bishop of Bristol, which, on the 30th of May, we find them complaining of to the Lords as a breach of privilege, and for which the bishop in the end was obliged very formally to confess himself in the wrong, and to beg forgiveness. His declaration of error was recorded in the journals of the Commons, and the book was suppressed. Meanwhile little or nothing was done by the commissioners: they 'no sooner met,' says the Parliamentary History, 'than they found the matter impracticable; for the Scotch, though we had taken their king, absolutely refused to be governed by any of our laws.' But the aversion to the measure at this time was probably very nearly as strong among the English as the Scotch. The business was resumed in the next session (1605-6), when several more conferences were held, and another act explanatory of that of the last session was passed (Stat. 3 Jac. I., c. 3), but with no further result. James however again took up the subject in the speech which he delivered at the commencement of a new session, 18th November, 1606, and which he professed to be to a great extent extempore: in introducing this part of his address in particular, he said that 'the goodness of the matter must supply his want of premeditation; for that which he should say must proceed out of some inspiration, because he had so small a time of respiration to consider it; but that gold did not need to be gilded, nor precious stones any ornament.' He then proceeded, first 'to answer all objections that by men of humorous or malicious minds were opposed against this union;' and to point out the advantages of the measure and the mode of carrying it into effect. In consequence of this warm recommendation, the business occupied parliament throughout nearly the whole of that session; but although an instrument of union, drawn up by the commissioners, was laid before both houses, and many more conferences and debates took place, all that was done was to pass an act 'For the utter abolition of all memory of hostility and the dependences thereof between England and Scotland, and for the repressing of occasions of discord and disorders in time to come.' (Stat. 4 Jac. I., c. 1.) The principal discussion arose on the naturalization of Scotsmen, both those born since and those born before the king's accession,—the post-nati and ante-nati, as they were styled,—in favour of which concession Bacon, then solicitor-general, exerted himself with particular zeal. The objections that were advanced were various, but, as Rapin observes, 'the most prevailing argument, though it was not publicly insisted upon, was the jealousy of the English, which baffled all Bacon's rhetoric.' On the 31st of March, 1607, James sent for both houses to Whitehall, and took them to task for their dilatoriness in an harangue which occupies sixteen closely printed columns of the Parliamentary History; and on the 2nd of May, on their reassembling after the Easter holidays, he addressed them once more on the subject at considerable length. But neither of these elaborate orations of his majesty appears to have made much impression. Two years after however the decision of the judges in the Exchequer chamber in Calvin's case determined that Scotsmen born after the king's accession to the English crown, were entitled to purchase and inherit lands in England. (*State Trials*, ii. 559-696.)

The first actual union of England and Scotland was ef-

Google

fected in the time of the Commonwealth. In 1652 the Long Parliament, after Monk's subjugation of Scotland, sent down Sir Harry Vane, St. John, and other commissioners to obtain from the Scottish shires and boroughs their consent to a union with England; upon which, as Ludlow tells us, 'eighteen of one and thirty counties, and twenty-four of sixty-six cities and boroughs, consented to send their deputies to the parliament of England, most of the rest excusing themselves for want of money to defray the expenses of their representatives.' (*Memoirs*, i. 401.) A bill was afterwards brought in for incorporating the two countries into one free commonwealth; but it appears that it had not been carried through its last stage when the parliament was dissolved by Cromwell on the 20th of April, 1653. Five representatives for Scotland and six for Ireland sat among the 144 persons who met on the summons of Cromwell and the Council of Officers, 5th July, 1653, and formed what is known by the name of Barebones' Parliament. The affair of the union afterwards received its completion from Cromwell, who, in an act or decree issued on his own authority as Lord Protector, 12th April, 1654, entitled 'Scotland made one Commonwealth with England,' declared Scotland and its dependencies to be incorporated with England, and provided that thirty members from Scotland should sit in every future Parliament. It had in the preceding December been declared in the Instrument of Government by which Lambert and the Council of Officers, after the dismissal of Barebones' Parliament, made over the supreme authority to Cromwell, that the three kingdoms of England, Scotland, and Ireland should be united into one commonwealth and government, and that England should be represented in parliament by 400 members, Scotland by 30, and Ireland by the same number. Accordingly the representatives from Scotland, and also from Ireland, sat both in the parliament which met 3rd September, 1654, and in the immediately succeeding one which met 17th September, 1656. It should seem however that the force of the Protector's edict came in course of time to be disputed or doubted; for immediately after the assembling of the last-mentioned parliament we find bills brought in for uniting Ireland and Scotland into one commonwealth with England. (Burton's *Diary*, i. 6 and 12-18.) And several debates afterwards took place on the validity of the ordinance of April, 1654, and the necessity of the proposed measures; which however were not completed when the parliament was dissolved by Cromwell, 4th Feb., 1658. (Burton, i. 346, 353, and ii. 57.) The Scotch and Irish members also took their seats in Richard Cromwell's parliament, which assembled 27th January, 1659; and, although the question of their right to sit gave occasion to long debates (Burton, iv. 112-193), a vote in their favour was at last carried by a considerable majority. It is to be observed, that the style of the united Commonwealth, which may thus be said to have subsisted from July, 1653, to the meeting of the Convention Parliament (which restored the king) in April, 1660, was the Commonwealth, not of Great Britain and Ireland, but of England, Scotland, and Ireland, and of the dominions and territories thereunto belonging.

The project of a union with Scotland was renewed in the reign of Charles II., and in 1670, the subject having been particularly recommended to parliament in the speech from the throne, an Act was passed authorising his majesty to appoint commissioners to treat for that purpose with others to be appointed in the same manner by authority of the Scottish parliament. (Stat. 22 Car. II., c. 9.) The Scottish parliament passed a corresponding Act, and the commissioners on both sides were named and met; but according to the writer of the account of this reign, in Kennet's 'Complete History,' 'after many conferences, and seeming resolutions of agreement in the main things, they broke off in mutual jealousies and a general dissatisfaction.' He adds, 'I have heard [that] one of the Scots commissioners themselves confessed it was their own fault in being over wise and nice in the smaller terms of accommodation.' According to a modern writer, the Scottish commissioners, 'instructed by the insignificant share which their country acquired in the government during the usurpation, refused, on a subsequent treaty, to accede to a union unless the Scottish estates were preserved entire, and, instead of a proportional representation, the two parliaments were incorporated into one.' (Laing's *History of Scotland*, iv. 58.)

The scheme of a union between the two countries was again agitated in the beginning of the reign of king William, who, in his letter to the Scottish convention, dated 7th March, 1689, stated that he had been glad to find so many of the nobility and gentry of Scotland, when in London, so much inclined to the proposal, and declared his resolution to use his utmost endeavours in advancing everything that might conduce to the effectuating the same. The convention, in compliance with this representation, nominated commissioners to treat upon the subject, and William, in opening the first session of his second parliament, 21st March, 1690, expressed his desire that commissioners might also be nominated in England, 'to see if such terms could be agreed on as might be for the benefit of both nations,' so as to be ready to be presented to parliament in some future session. But it does not appear that anything was done in consequence. In his last message to the House of Commons, 28th February, 1702 (five days before his death), his majesty again in very earnest terms recommended the union to the consideration of parliament, as that than which nothing could more contribute to the present and future security and happiness of both countries.

In pursuance of this recommendation, immediately after the accession of Anne a bill was brought into the House of Commons for empowering her majesty to appoint commissioners to treat with others from Scotland for a union between the two kingdoms, which, although warmly opposed, was in the end carried through both houses by great majorities. (Stat. 1 Ann., c. 8.) A similar Act having been passed by the parliament of Scotland, commissioners were appointed for both kingdoms, who met for the first time at the Cockpit, 22nd October, 1702. But after having agreed 'that the two kingdoms should be inseparably united into one monarchy under her majesty, her heirs and successors, and under the same limitations, according to the Acts of Settlement,' such difficulties arose out of a proposition of the Scotch commissioners for preserving the exclusive rights and privileges of the Darien Company, that no further progress could be made; and the parliament which met in Scotland the next year annulled the commission.

The subject however was again taken up by the English parliament in the session which began on the 29th of October, 1704; and an act was passed (Stat. 3 and 4 Ann., c. 6) 'For the effectual securing the kingdom of England from the apparent dangers that may arise from several acts lately passed in the parliament of Scotland,' which again authorised her majesty to nominate commissioners to treat of the union as soon as the Scottish parliament should pass an act for the same purpose. Meanwhile, till the succession of the crown of that kingdom should be settled in the same way as that of the crown of England, natives of Scotland were declared to be aliens, and the importation of cattle, sheep, and coal from that country was prohibited. The consequence was, that in the next session of the Scottish parliament, which began 28th June, 1705, the act required was passed, though not without strong opposition, a protest of the Duke of Athol against it being adhered to by 25 peers, 35 barons (or representatives of shires), and 18 members for boroughs. On this the late English act was immediately repealed (by stat. 4 and 5 Ann., c. 15). The Scottish commissioners, 31 in number, having been appointed by the queen on the 27th of February, 1706, and the English, also 31, on the 10th of April, met for the first time in the Cockpit at Whitehall on the 16th of that month. Their deliberations were continued till the 22nd of July, when the articles were signed and sealed, and on the next day they were presented to the queen at St. James's. They were still however kept a profound secret from the public. The Scottish parliament was opened, for the last time, on the 3rd of October, by the Duke of Queensberry as high commissioner; and the discussion on the proposed union was commenced on the 12th. The articles were warmly opposed in debate; many petitions were presented against the measure; and the violence of the Edinburgh populace became so threatening, that it was at length deemed expedient that the parliament should carry on its deliberations under the protection of a military force; but on the 4th of November the first article was approved of by a majority of 33 votes; and in the end all the other articles were carried, without being subjected to any alteration of consequence. The last, the 25th, was agreed to on the 14th of January, 1707; and on the 16th the Act of ratification was carried by a majority of 110 against 69. According to the 'Memoirs' of George Lockhart, Esq., of Cornwall, a sum of 20,540*l.* was distributed from the English treasury among the members, lords and commoners together, to secure their votes. On the 25th of March the parliament was prorogued, or adjourned, by Queensberry to the 22nd of April; but it never met again.

Meanwhile the English parliament had met on the 3rd of December; and on the 28th of January the queen came to the House of Lords, and intimated, in a speech from the throne, the ratification of the treaty by the parliament of Scotland. The discussion of the articles was commenced in the Commons, in a committee of the whole house, on the 4th of February; and, after little opposition or debate, the report of the committee, approving of them, without any amendment, was received on the 8th. The subject appears to have undergone somewhat more discussion in the Lords; but in that house too all the articles were approved of by great majorities. In a division which took place, on the 15th of February, on the 22nd article, the numbers are noted to have been, contents 71, not contents 22. The articles were then formed into a bill, which her majesty came down to the House of Lords and gave her assent to on the 6th of March.

The articles of union, as embodied in this act (stat. 6 Ann., c. 11, or 5 and 6 Ann., c. 8, in the common printed editions) are twenty-five in number. The 1st declares the two kingdoms of England and Scotland to be for ever united into one kingdom by the name of Great Britain, from 1st May, 1707. The 2nd fixes the succession, in default of issue of her majesty, in the Princess Sophia and the heirs of her body being Protestants. [George I.] By the 3rd the United Kingdom is appointed to be represented in one and the same parliament, to be styled the Parliament of Great Britain. The 4th gives to all subjects of the United Kingdom full freedom and intercourse of trade and navigation to all places in the said kingdom and the plantations, and a communication of all other rights, privileges, and advantages belonging to the subjects of either kingdom. The next 13 articles relate severally to shipping, regulations of trade, excise, salt duties, &c., the land tax, stamp duties, duties on windows, duties on coals, the malt duty, the proportion of other duties to be charged on Scotland, further provisions on proportion of charges and application of revenue, the assimilation of the Scottish coin in standard and value to that of England, and the introduction of the English weights and measures into Scotland. The 18th article provides that all laws in use in Scotland, not repealed by the treaty, shall remain of the same force as before, but alterable by the parliament of Great Britain, with this difference, 'that the laws which concern public right, policy, and civil government may be made the same throughout the whole United Kingdom; but that no alteration be made in laws which concern private right, except for evident utility of the subjects within Scotland.' The 19th article enacts the continuance of the courts of session and justiciary, the admiralty jurisdictions, and other courts of Scotland; provides for the establishment of a court of exchequer there; and authorises the crown to continue a Scottish privy council. The 20th article reserves to the owners all heritable offices and jurisdictions. The 21st guarantees the rights and privileges of the royal burghs. The 22nd regulates the representation of the Scotch peerage by sixteen lords of parliament, and of the shires and burghs by forty-five members of the House of Commons. The 23rd settles the privileges of the sixteen representative peers; and the 24th relates to the rank and precedency of the Lyon King of Arms, the great seal, the privy seal, and the preservation of the regalia and public records of Scotland, which it is declared shall continue to be kept in Scotland in all time coming. The 25th, finally, enacts that all laws of either kingdom, contrary to or inconsistent with the terms of these articles, shall cease and become void. The statute also embodies and ratifies an act passed at the same time with the articles, by the Scottish parliament, establishing and confirming the Protestant religion, the Westminster Confession of Faith, and the Scottish church and its Presbyterian church government and discipline by kirk sessions, presbyteries, provincial synods, and general assemblies, as the only government of the church within the kingdom of Scotland, and providing that the universities and colleges of St. Andrew's, Glasgow, Aberdeen, and Edinburgh shall in like manner continue for ever, and that no person shall be admitted to bear office in any of them without subscribing the said Confession, as the confession of their faith; a similar act for the security of the church of England passed in the present session by the English parliament; and another act passed by the Scottish parliament for settling the election of the sixteen peers and the forty-five members for Scotland.

SCOTO'PHILUS. [Owls.]

SCOTORNIS. [Night Jars, vol. xvi., p. 228.]

SCOTT, DANIEL. [Stephens, H.]

SCOTT, SIR MICHAEL, was born in Scotland, in the early part of the thirteenth century. If he really was, as has been assumed, Scott of Balweary, he succeeded in right of his mother, who was the daughter and heiress of Sir Richard Balweary of that ilk (as it is phrased), to that estate, which is in the parish of Kirkaldy, in Fifeshire, and is now, we believe, the property of ——— Fergusson, Esq., of Raith. An antient tower in ruins still exists on it, or did exist not many years ago.

The literary reputation both of Sir Michael Scott and of his contemporary Thomas Learmont (the Rhymer) may be taken as affording a presumption, which other circumstances go to corroborate, that Scotland in the thirteenth century was by no means in the benighted state commonly supposed. In fact there is reason to believe that during the peaceful and prosperous reign of Alexander III., which terminated in 1286, the dawn of civilization in the northern part of our island made a nearer approach to the more advanced light of arts and letters in England than was generally maintained in the subsequent progress of the two countries. Scott however probably studied at some foreign university, either Oxford or Paris. He is said to have gone to France in early life, and to have spent some years in that country; after which he proceeded to the court of the emperor Frederic II., who, possessed of remarkable literary acquirements himself, was then the great patron of learned men. If he did not however remain in Germany after the death of Frederic, which took place in 1250, he must have been still only in early manhood when he left that country —most probably at least under thirty,—since, as we shall find, he was employed in public duties scarcely suited to a person in very advanced age forty years after this date. If he passed some years, as is asserted, at the court of Frederic, he could not well have been much more than twenty when he first presented himself to or was sent for by the Emperor. Dempster indeed states that he was but a young man when he was writing books at the request of Frederic, 'cujus rogatu hic etiam juvenis multa opera scribere est agressus.' Yet Dempster was not aware that he was Scott of Balweary· he tells us indeed that his name *Scotus* was not that of his family, but of his nation. Is it possible that the Michael Scott of Balweary, whom we find living in Scotland, and actively engaged in the public service, in 1290, may be mistakenly assumed to have been the learned person of that name who resided at the court of Frederic II.?

They tell us, too, that upon leaving Germany, Scott came to England, where he was received into great favour by Edward I. But Edward did not become king of England till 1272, twenty-two years after the death of the learned Scotsman's German patron. Some account of what Michael was about during this long interval is therefore a desideratum.

From England he is said to have returned to his native country, though when is not precisely noted. For the rest, all that is known is that a Michael Scott of Balweary, who is spoken of by Hector Boece as the famous scholar of that name, was one of the two ambassadors (Sir Michael de Wemyss, another Fife baron, was the other) sent to Norway by the estates of Scotland, in 1290, to bring home the infant heiress of the throne (Margaret, called the Maiden of Norway, daughter of the Norwegian king Eric).

The common account is, that Sir Michael Scott died in Scotland in the following year, 1291. Dempster says, 'Vixit usque in ultimam senectutem, et attigit annum MCCXCI., quo obiisse certum.' But Sir Robert Sibbald, in his 'History of Fife and Kinross,'—after telling us that, 'in testimony of this honourable commission and embassy' in which the two 'equites Fifani illustres, et summae prudentiae apud suos illis temporibus habiti,' as Buchanan describes them, were employed, 'there is still preserved in the house of Wemyss a silver basin of an antique fashion, which David [Michael?] de Wemyss got from the king of Norway at that time'—adds: 'And there is an indenture betwixt Sir Michael Wemyss de eodem miles, and Sir Michael Scott of Balweary, miles, in praesentia Joannis Balioli regis, apud Monasterium de Lundoris, anno 1294

(Edit. of 1802, p. 326.) We suspect there is no evidence for the death of Sir Michael Scott in 1291, at all to be compared with this evidence of the existence of a person of the same name and designation three years later. But in another place (p. 316) Sibbald asserts that the same Scott who was sent to Norway in 1290, went on a second embassy to that country to demand the cession of the Orcades, in the fifth year of Robert I., that is to say, in the year 1310. If this statement be correct, it is in the highest degree improbable that Michael Scott the ambassador could have been the person of the same name who figured as a distinguished literary character at the court of Frederic II. more than sixty years before. It is more likely that the one was the son of the other.

The real or supposed literary works of Sir Michael Scott are the following:—

1, 'A History of Animals,' in Latin; according to some authorities, a translation from the Arabic of Avicenna. But of this we know nothing. Dr. George Mackenzie, Scott's most elaborate biographer, says that the work exists 'in fol. editionis neque tempore neque loco expressis.' Dempster mentions 'Abbreviationes Avicennæ' in one book, and also 'De Animalibus ad Cæsarem' (*i.e.* Frederic), in one book.

2, 'Aristotelis Opera, Latine versa, partim e Graeco, partim Arabico, per viros lectos et in utriusque linguæ prolatione peritos, jussu Imperatoris Frederici II,' fol., Venet., 1496. The common accounts make Scott to have been the sole author of this translation; but it proclaims itself, as we see, to be the work of several hands. Possibly Scott may have contributed the translation of the Natural History, and may have done it from the Arabic, which may be all the foundation for the assignment to him of the version of Avicenna. Warton, speaking of the new translations of Aristotle from the original Greek into Latin, made about the twelfth century, says, 'I believe the translators understood very little Greek. Our countryman, Michael Scotus, was one of the first of them, who was assisted by Andrew, a Jew. Michael was astrologer to Frederic, emperor of Germany, and appears to have executed his translations at Toledo in Spain, about the year 1220. These new versions were perhaps little more than corrections from those of the early Arabians, made under the inspection of the learned Spanish Saracens.' (*Note to Dissert. on Introd. of Learning into England*, in *Hist. of English Poetry*.)

3, 'De Procreatione, et Hominis Phisionomia, Opus.' There is a copy of the first edition of this tract in the King's Library at the British Museum, printed, without the name of the place, in 1477; and in the general library of the museum are other editions, with the title slightly varied, printed in 1480 and 1487; and some, both in 4to. and 12mo., without date, and possibly still older. It is also the same work which was printed, with the title of 'De Secretis Naturæ,' at Strasburg in 1607, and at Frankfort in 1615, in 16mo., and with the works of Albertus Magnus, at Amsterdam, in 1655, 1660, &c., in 12mo. Bayle had an Italian translation of it, an octavo pamphlet of seven leaves, printed at Venice in 1533, with the title 'Physionomia, laqual compilo Maestro Michael Scotto, à prieghi di Federico Romano Imperatore, huomo di gran scienza; e è cosa molte notabile, e da tener secreta, pero che l'è di grande efficacia, e comprende cose secrete della natura, bastanti ad ogni astrologo; e è diviso in tre parti.'

4, 'Mensa Philosophica, seu Enchiridion, in quo de quæstionibus mensalibus, et variis ac jucundis hominum congressibus, agitur,' Franc., 12mo., 1602; 8vo., 1608; Lips., 24mo., 1603. There is an English translation of this treatise (which Tiedemann, in his 'Esprit de la Philosophie Speculative,' says contains some curious things), entitled 'The Philosopher's Banquet,' done into English by W. B., 3rd edit., enlarged, 12mo., London, 1633.

5, 'Quæstio Curiosa de Natura Solis et Lunæ.' This is a chemical treatise upon the transmutation of gold and silver, and is printed in the 5th vol. of the 'Theatrum Chimicum,' 8vo., Strassburg, 1622.

6, 'Eximii atque excellentissimi physicorum motuum cursusque syderii investigatoris, Mich. Scotti, super autor. Sphærar., cum quæstionibus diligenter emendatis, incipit expositio perfecta, illustrissimi Imperatoris D. D. Frederici precibus.' This is a commentary upon the celebrated treatise of Sacrobosco 'De Sphæra,' but is a mere compilation, and is believed to be falsely attributed to Scott. Dempster, after his fashion, enumerates a long list of additional titles, which it is quite unnecessary to transcribe.

But Michael Scott's chief reputation after his death, if not in his lifetime, was as a great magician. 'De quo,' says Dempster, writing in the beginning of the seventeenth century, 'innumerabiles etiam nunc hodie aniles fabulæ circumferuntur, nec ullum apud nostrates clarius nomen.' Even to this day he is traditionally remembered in that character in his own country; and various legends of his wondrous performances are still told, and half believed, among the peasantry, some of which may be found collected in the notes to Sir Walter Scott's 'Lay of the Last Minstrel,' in which poem the opening of the wizard's grave in the abbey of Melrose, and the taking from the dead man's cold hand of his 'book of might,' make so striking an incident. Dempster says, 'Ut puto, in Scotia libri ipsius dicebantur me puero extare, sed sine horrore quodam non posse attingi, ob malorum dæmonum præstigias, quæ illis apertis fiebant. But in earlier times the fame of his magic skill was spread over Europe. Dante has introduced him in his 'Inferno'—

'Quell' altro, che ne' fianchi è così poco,
Michele Scotto fu, che veramente
Delle magiche frode seppe il giuoco.'
(Canto xx., v. 117.)

and he is also mentioned by Boccaccio and other early Italian writers. He is severely arraigned by John Picus (Mirandula), in his work against astrology; and is defended from such charges, as well as Picus himself, in Naudé's 'Apologie pour les grands personnages faussement accusés de Magie.'

The Scottish tradition, as we have seen, is, that Michael Scott was buried in his own country, at Melrose. Another account however makes him to have died, and his remains to have been interred, in the abbey of Ulme or Holme Cultram, in Cumberland; and here also, it is pretended, his magic books were preserved. Satchells, in his rhyming 'History of the Right Honourable Name of Scott,' affirms that he got his account of the origin of that name out of an extract from one of Michael Scott's works which a person showed him at Burgh-under-Bowness, in Cumberland, in the year 1629. His informant told him, he says, that the book from which the passage was taken was never yet read through, and never would be; young scholars had only picked out something from the contents, but none dared to read the body of the work. And he adds,

'He carried me along the castle then,
And showed his written book hanging on an iron pin
His writing pen did seem to me to be
Of hardened metal, like steel, or accumie;
The volume of it did seem so large to me
As the Book of Martyrs and Turk's Historie.
Then in the church he let me see
A stone where Mr. Michael Scott did lie;' &c. &c.

This has been taken for a piece of poetic invention in Satchells; but we may observe that Camden, in his 'Britannia,' tells us that the magic books of Michael Scott were in his time still said to be preserved at Ulme, though they were then mouldering to dust. It is probable from this that they had been in the habit of showing at that place some antient volumes which they called Scott's magic writings. Camden adds, 'He was a monk of this place about the year 1290, and applied himself so closely to the mathematics and other abstruse parts of learning, that he was generally looked on as a conjuror; and a vain credulous humour has handed down I know not what miracles done by him.'

The present representative of the antient family of the Scotts of Balweary is said to be Sir William Scott of Ancrum (in Roxburghshire), Bart. (Douglas's *Baronage of Scotland*, ed. 1798, pp. 302 *et seq.*)

(The two chief authorities for the biography of Michael Scott are Dempster, 'Historia Ecclesiastica Scotorum,' which is full of lies; and Dr. Mackenzie's 'Lives of the Scottish Writers,' a compilation of the beginning of the last century, abounding also in apocryphal matter, and destitute of anything like critical spirit. Mackenzie's notice extends to eighteen folio pages, but of these thirteen are occupied with an account of the writings of Aristotle, translated from the 'Œuvres Diverses' of the Père Rapin, and above four more with equally irrelevant matter. There is a short article on Scott in Bayle; and one of more detail, to which we have been indebted for several facts respecting his writings, in the 'Biographie Universelle.')

SCOTT, WALTER, was born in Edinburgh, on the 15th of August, 1771. He died at Abbotsford, on the 21st of September, 1832. The sixty-one years of his life were filled by the incessant labours of a strong and restless mind, which in the latter half of its career fixed upon its own efforts no small share of public attention, during one of the most exciting periods of European history. How much of the European fame of Scott has been a consequence of genuine poetical power, and likely to endure; how much of it has been the result of accidental circumstances, and sure to die away, it is yet too early to decide. The contemporaries of a man of genius are no more able to estimate his intellectual stature and proportions aright, than the man who stands close under the wall of Westminster Abbey would be to decide upon its architectural merits. All that can yet be done is to allow facts to speak for themselves, and to recommend a sincere opinion to a candid acceptation.

Scott's first appearance in print was in the year 1796, when, as he himself playfully says, he was 'prevailed on by the request of friends to indulge his own vanity by publishing the translations of Bürger's "Leonora" and the "Wild Huntsman" in a thin quarto.' This event is of no further importance than as it marks the termination of his probationary career—his course of hard study, with vague aspirations after some mode of turning it to account. The simple act of printing a couple of translations from no very eminent poet, had with him, as an equally unimportant act has with many others, decided his fate. The die was cast: from that moment he was an author for life.

The history of his early boyhood is the tale of a naturally strong constitution struggling with disease. He had attained his twenty-second month, and could already walk tolerably well for a child of his age, when the girl who took care of him was awakened one morning by his screams, and on examination found his right leg powerless and cold as marble. Medical aid was vain; he was lame for life; and during upwards of two years, the previously healthy boy continued a pining child. In his fifth year, his parents thought him sufficiently recovered to trust him first to the charge of his grandfather at Sandy Knowe on the Tweed, and afterwards to that of a maiden aunt, who carried him to Bath. The boy had attained his eighth year before he was deemed strong enough to be sent to the high school of Edinburgh. While attending this seminary, and during the first winter of his attendance at college (1784), he enjoyed tolerably good health, and was able, notwithstanding his lameness, to join in most of the sports of his class-fellows. Towards the close of the year 1784 he had a violent attack of sickness, for the only distinct account of which we are indebted to himself:—'My indisposition arose in part at least from my having broken a blood-vessel; and motion and speech were for a long time pronounced positively dangerous. For several weeks I was confined strictly to my bed, during which time I was not allowed to speak above a whisper, to eat more than a spoonful or two of boiled rice, or to have more covering than a counterpane.' In May, 1786, he was sufficiently recovered to commence his apprenticeship as writer to the signet, at that time the usual commencement of the education of Scotch barristers; and his subsequent life was little troubled with indisposition.

These juvenile sicknesses had a powerful influence upon the development of his mental powers. The aunt to whose care he was entrusted when a mere boy, possessed an immense store of legendary tales, which were frequently put in requisition for the amusement of the invalid. During the confinement of his second attack he was allowed to devour the contents of a circulating library, founded, it is believed, by Allan Ramsay, rich in 'the romances of chivalry and the ponderous folios of Cyrus and Cassandra, down to the most approved works of modern times.' Scott has declared, 'I believe I read almost all the romances, old plays, and epic poetry in that formidable collection.' The child's love of stories was thus ripened into an ill-regulated fondness for books; the practice of reading, to which he was drawn by inability to do anything else, created a craving for that pleasure, and the constant succession of new books rendered unnecessary the exercise of attention required to extract a new pleasure on reperusal. His mind was accustomed to find pleasure in yielding passively to a succession of new images. Those ideas remained impressed on his memory which most roused his emotions; and he contracted unconsciously the habit of grouping them in conformity to that law of association which links events following or seeming to arise out of each other in the progress of an adventure. His mind even at that early age was developing the talents of the story-teller, and, as in the cases of Göthe and Richardson, the precocious command of language, giving voice and form to the stories which his imagination constructed, showed itself in the pleasure he found in inventing and telling tales for the amusement of his companions.

The society around him was favourable to the nourishment of such tendencies. His father was a strict disciplinarian, a precision in religion, and a legal formalist. He exacted from his children a strict observance of the outward forms of religion, and spared no trouble to imbue their minds with a knowledge of the doctrines of the national church. He strove to make the actions of his domestic circle as strictly conformable to rules as his causes in the Court of Session. The strong hand of discipline like this only serves to make children more intent upon the stolen enjoyment of their favourite amusements. Walter read with more avidity what his father scorned as trifling reading, and hung on the lips of every one who could gratify him with legendary tales. He was surrounded too by characters calculated to leave a deep impression on the mind of a bookish boy. The Lowlands of Scotland had by that time settled down into the same regulated habits of steady industry that still characterize them; but many old-world characters belonging to a less tranquil period were still surviving. George Constable, of Wallace Craigie, near Dundee, who sat for his picture in the 'Antiquary;' Mrs. Anne Murray Keith, the Mrs. Bethune Babel of the 'Chronicles of the Canongate;' Mrs. Margaret Swinton, who figures in the introduction to 'My Aunt Margaret's Mirror;' Alexander Stewart, of Invernahyle, a Highland gentleman, who had been 'out in the forty-five,' by their appearance and conversation carried the boy's imagination back to a state of society which had ceased to exist, and formed a connecting link between the real world in which he lived and the imaginary world which he found in his romances. He had opportunities too of observing closely the manners and feelings of the lower classes of society in the agricultural districts of the south of Scotland. His grandfather, being a farmer, lived on a footing of more familiar intercourse with his domestics than was even then customary in towns, and in his house Scott learned the pass-word to the confidence of that class. As he grew in years and in strength, he was encouraged by his family, probably with a view to confirm his health, to take long rambles on foot and on horseback through the border and highland counties where his father had relations or clients.

The impressions thus derived might have faded even from a retentive memory in the busy period of confirmed manhood; but a direction had been given to his awakening intellect, which led him to brood over and cherish them. On one of his visits to a paternal uncle, who resided in the environs of Kelso, he became acquainted with the collections of the bishop of Dromore. 'In early youth,' he says, in the 'Essay on Imitations of the Antient Ballad,' prefixed to the third volume of the 'Minstrelsy of the Scottish Border,' 'I had been an eager student of ballad poetry, and the tree is still in my recollection, beneath which I lay and first entered upon the enchanting perusal of Percy's 'Reliques of Antient Poetry,' although it has long perished in the general blight which affected the whole race of oriental platanus to which it belonged.' The perusal of this work led him on to the kindred publications of Herd and Evans. Herd's book was an attempt to do for Scottish what the bishop had accomplished for English traditional song. In Evans's work some poems of modern date were intermingled with the old ballads, and among others 'Cumner Hall' by Mickle, adverted to in the notes which Scott appended to 'Kenilworth,' in Cadell's collective edition of his novels. The hot controversy which arose between Percy and Ritson led the amateurs of old ballad poetry to plunge more deeply than they contemplated into philological and antiquarian discussions. The effects of this upon Scott may be conjectured from the subjects of one essay composed as a class exercise during his attendance on the moral philosophy lectures of Dugald Stewart in 1790, and three which he read in the years 1792-3 in the Speculative Society. They are, 'On the Manners and Customs of the Northern Nations of Europe,' 'On the Origin of the Feudal System,' 'On the Origin of the Scandinavian Mythology,' and 'On the Authenticity of "Ossian's Poems."' The topics which at that time engrossed the attention of his young contemporaries (among whom were the future founders of the 'Edinburgh Review') were practical, economical, and political discussions. Scott however held on his own way: his favourite themes were the old world, the bent of his mind was historical.

Like most young men addicted to literary pursuits, he had at an early age tried his hand at rhyme. His ballad studies kept alive the inclination. Burns, whom he saw at the house of Professor Ferguson in 1786-7, seems to have made a lasting impression upon him, both by his writings and his personal appearance. For ten years however his rhyming propensities remained in abeyance, till they were re-awakened by the popularity earned by the ballads of Monk Lewis. Scott's attention had been directed to German literature by a very superficial essay on 'The German Theatre,' read by Henry Mackenzie at a meeting of the Royal Society of Edinburgh in 1788. Scott and several of his companions formed a class, soon after the publication of that paper, for the purpose of studying the German language; but these studies were followed up in a rather desultory manner till the year 1793 or 1794, when Miss Aiken (Mrs. Barbauld) directed his attention to the works of Bürger. He had some difficulty in procuring them; and had already met the young lion of the day, Lewis, and been stimulated, by his conviction of his own superiority in general information, to attempt an appeal to the public, when an edition of Bürger, which a friend had procured for him from Hamburg, came into his hands. The consequence was the publication of 'William and Helen,' in 1796, which has been already alluded to.

It is necessary that we advert to Scott's more active pursuits before closing this retrospect of his probationary years. He was apprenticed to his father in May, 1786. He never however acted regularly as clerk. His absences on jaunts to the Highlands and the border counties were long and frequent; and a gentleman who was in Mr. Scott's office during the period of Walter's nominal apprenticeship, assured us that his time while there was mostly spent in playing chess. In 1791, having finally resolved to adopt the profession of advocate, he recommenced his attendance upon the college classes, interrupted by his illness, and joined the Speculative Society. In 1791 he petitioned and was admitted by the Faculty of Advocates to his first trials; in 1792 he passed the rest, and was called to the bar. As a member of the Speculative Society and the faculty, he took an active part in the private business of both bodies. In the civil court, he has told us, his employment did not exceed one opportunity of appearing as the prototype of Peter Publio. But in the Court of Justiciary he made several appearances, in all of which he distinguished himself by diligent preparation. His conduct at this period was marked by an anxious desire to force himself into professional employment, and by that energy which promised success, could he but succeed in making a beginning.

We have now brought the subject of our narrative to the commencement of that literary career which he prosecuted with unabated perseverance till his death. The story of his literary life naturally divides itself into three epochs: that during which he was achieving his poetical fame, extending from the publication of his translation of Bürger in 1796 to the publication of 'Waverley' in 1814; the period of the celebrity of his novels, during which they followed each other in brilliant and rapid succession from the publication of 'Waverley' till the bankruptcy of Constable in 1826; the period of his Herculean struggle to re-adjust his affairs, shattered by the convulsion of 1826, till he sunk over-tasked into a premature grave in 1832. It is in every case difficult, perhaps inexpedient, to separate the part from the man: in the case of Scott it is impossible. We proceed therefore briefly, as our limits command, to trace, for each of the three periods we have enumerated, an outline of his actual life and circumstances, and of the literary works produced under their influence.

Unaware of the extent to which he had become involved in the literary career, he continued for some time his professional efforts. He was engaged as counsel for the defendants in several of the prosecutions for riots, seditious practices, and other offences arising out of the political ferment of the day. It has been imagined that the active part which his political zeal induced him to take in organising and disciplining the volunteer corps of horse formed in Edinburgh, contributed to mar his professional prospects. It certainly distracted his attention from legal studies, but it accelerated rather than retarded his promotion. In December, 1799, he was appointed sheriff of Selkirkshire; in 1806 he was appointed one of the principal clerks of the Court of Session The duties of these offices, even when discharged by the same individual, left a large proportion of his time at his own disposal. The first mentioned ensured to him a small competency; the other was ultimately a lucrative appointment, although the arrangement he made with his predecessor in office prevented his deriving the full emolument from it till 1812. In addition to these sources of income he succeeded to a small landed property on the death of an uncle in 1797, and received a moderate fortune with Miss Carpenter, whom he married towards the close of the same year. He was thus placed above absolute dependence upon the literary exertions to which his inclination and leisure invited him. At the same time his relish for the elegant luxuries of life and the ambition to mingle on a feeling of equality with the families of the aristocracy, upon some of whom, as well as upon the honest farmers above alluded to, he had a claim of relationship—an ambition strengthened by this fondness for the legends of chivalry operating on an imaginative disposition, rendered further additions to his fortune not indifferent to him. It is questionable whether even this stimulus could have nerved him to perseverance in the dry drudgery of the law, but his active and energetic disposition courted labour so long as it did not impose any restraint upon the rambling desultory habits of thought acquired during the days of incessant reading of his sickly boyhood.

Even before he formed his final resolution to use literature 'as a staff,—not as a crutch,' he followed up the appeal made to the public by the printing of 'William and Helen.' In 1799 he published a translation of Göthe's 'Götz of Berlichingen.' He composed and circulated among his friends the ballads of 'Glenfinlas' and 'The Eve of St. John.' In 1799 he received a visit from Mr. (now Sir John) Stoddart, who repeated to him many then unpublished poems of his friends Wordsworth, Coleridge, and Southey, and inspired him with a relish for their peculiar beauties. An intimacy which Scott formed with Mr. Heber, on the occasion of that gentleman's residence in Edinburgh during the winter of 1799-1800, confirmed his antiquarian tastes and extended his acquaintance with old English literature: he advanced from the school of the old ballad into that of the Elizabethan drama. The bustling patronage of Lewis had made Scott's name familiar to many persons of literary tastes in England, and his acquaintance with the literati of Edinburgh became more extensive and intimate. About the beginning of the present century he paid several visits to Teviotdale, a district even less visited at that period than the Highlands, and in the course of these excursions not only added considerably to his stores of traditionary song, but, what was of more consequence, learned to know that stalwart race whom he afterwards portrayed with such graphic power in 'Guy Mannering.'

We have now reached the period of his life at which he took his final plunge into literary occupation and avowedly commenced author by profession. His first publication in this capacity was his 'Border Minstrelsy,' a work which afforded him an opportunity of exercising his talent in various departments and showing the magnitude of his store of heterogeneous and not very well assorted knowledge. In his introductions he showed his talents as an essayest; in his notes, his research and critical acumen as an antiquarian; in the imitations of the old ballad, his taste and talent for poetical composition. 'The Border Minstrelsy' is indeed little more than the accumulated materials out of which he hewed the best of his later works—a chaos through which the fragmentary lights of creative imagination were everywhere sparkling. The book is scarcely less interesting when viewed as the commencement of his connection with those commercial speculations in literature which ultimately broke down and crushed him, than as his first serious effort in the character of an author. Mr. James Ballantyne was, at the time of the publication of the 'Border Minstrelsy,' the editor of a provincial newspaper in Kelso. To him Scott offered the printing of his book. The offer, after some hesitation, was accepted, a new fount of types, superior to anything previously seen in Scotland, was procured, and under the direction of the principal workman on Mr. Ballantyne's establishment, who had been some time in the employment of Bensley, a specimen of typography was produced, which at once established the reputation of what was for a time rather affectedly called the 'border press.' Not long after Mr. Ballantyne removed to Edinburgh, and commenced printer on a large scale, in partnership, as has been proved by subsequent disclosures, with Scott. To this part of Scott's history we shall have occasion to return hereafter.

Scott commenced his career as the most popular poet of his day, in 1805, with the publication of 'The Lay of the Last Minstrel.' This poem was followed in 1808 by 'Marmion;' in 1809, by 'The Lady of the Lake;' in 1811, by 'Don Roderick;' in 1813, by 'Rokeby;' in 1814, by 'The Lord of the Isles.' To these may be added 'The Bridal of Triermain' and 'Harold the Dauntless,' published anonymously, the former in 1814, the latter in 1816. These poems took the literary world by surprise; they were unlike anything that had preceded them. There was an easy flow in their frequently slovenly versification, a condensed energy of thought, which even the total neglect of the *limæ labor* could not entirely conceal or obliterate; a pithy shrewdness in the occasional remarks upon life and manners; enough of the wild recondite spirit which the author had caught from Coleridge to lend a zest to his composition; enough of the leaven of common-place to render it intelligible to the mass of readers; and an entirely new class of heroes and adventures. Much of the popularity which attached to Scott's poems was owing to the novelty of their subjects, and much to his compliance with the taste of the times; but his strong native sense, the stores of out-of-the-way knowledge upon which he could draw, and the easy flow of his versification and imagery, rendered them also works of real intrinsic merit. As the first gloss of novelty wore off, the voice of criticism was more distinctly heard. Lord Byron's more exaggerated tone of sentiment and greater power of condensed rythmical declamation made a deeper impression upon the public mind, and caused Scott's works to appear comparatively feeble by the force of contrast. The imitators too, who had caught the outward form of Scott's versification, and found plenty of heroes in old *fabliaux* and romances, had for a time surfeited the public with his peculiar style of poetical composition. With a prudent caution, said to be characteristic of his nation, he prepared to exchange a field of literary exertion in which he found himself in danger of losing his popularity, and after the failure of two anonymous trials ('The Bridal of Triermain,' and 'Harold the Dauntless'), never attempted to re-enter it.

Some time previous to his abdication of the laurel, the success of Miss Edgeworth's 'Pictures of Irish Life,' and his consciousness of an extensive acquaintance with the manners and customs of Scotland, more especially of the olden time, had stimulated him to attempt a portraiture of them in a prose imaginative narrative. The task was prosecuted for some time, but in consequence of the unfavourable opinion of a friend, laid aside. In 1814 however he resolved to make the attempt, and 'Waverley' was published anonymously. This book, published without any parade of announcement, and without the attraction of an author's name, made its way noiselessly and rapidly to a high place in public estimation. In the course of four years it was followed in rapid succession by 'Guy Mannering,' 'The Antiquary,' 'The Black Dwarf,' 'Old Mortality,' 'Rob Roy,' and 'The Heart of Mid Lothian,' all bearing the indisputable impress of the same parent mind. The circumstance of Scott's having published a poem in the same year in which 'Waverley' appeared, and his engagement in other literary undertakings being known, combined, with the common prejudice that a poet cannot excel as a prose writer, to avert from him for a time the suspicion of the authorship of the 'Waverley' novels. The taciturnity of the few entrusted with the secret defeated all attempts to obtain direct evidence as to who was the author. From the first however suspicion pointed strongly towards Scott, and so many circumstances tended to strengthen it, that the disclosures from Constable's and Ballantyne's books, and his own confession, scarcely increased the moral conviction which had long prevailed, that he was the 'great Unknown.'

The light half-playfully worn veil of mystery served however, no doubt, to excite the public curiosity and to add a factitious interest to the 'Waverley' novels at the time of their publication. But their own merits were doubtless the main cause of their success. As narratives they have little merit: the plot is uniformly inartificial and unskilfully wrought up; the ostensible heroes and heroines, insipid or unnatural. It is in the admirable Scotch characters, in the ease and truth of their actions and conversation, that the charm of these novels consists. There is a power and depth in the characters themselves; they had been originally conceived with the intense love of a strong mind; they had remained stored up in its memory for years, mellowing in tone and growing more distinct in form, and were at last, accidentally we may almost say, poured out with a felicity and strength of expression of which the author was himself scarcely aware that he was capable. This new vein of popular applause was worked as sedulously as the former, and, like it, worked out. The novels which from 1818 to 1826 followed those we have enumerated in rapid succession, are not, like them, the outpouring of long-treasured thoughts; they bear marks of reading for the purpose of finding materials to fill up a previously sketched outline. They are of different degrees of merit, but all are inferior in depth of tone and weight of metal to the works of the first four years. Individual characters and incidents in some of them may be equal, but not one of them can bear comparison when considered as a whole.

Scott's novels and poems however occupied by no means the whole of his time during the thirty years of his busy life, of which they were the luxuriant produce. He contributed to the 'Edinburgh Review' at its commencement, and when differences of political opinion induced him to break off from that publication, he took a warm interest in the establishment of the 'Quarterly.' His trade connections with the Ballantynes, and through them with Constable and other publishers, led him to project many publications, and to take an active part in them as editor or contributor. To these we owe the 'Life of Dryden' (1808), of Swift (1814), the biographical and critical prefaces to Ballantyne's collection of the English novelists, and his annotations to such books as Sadler's 'Correspondence.' His biographical and critical writings are characterised by masculine good sense, vigour, and a happy play of humour, rather than by subtle analysis or a just and delicate taste.

From 1796 till 1826 Scott's life was busy and happy, and seemingly prosperous. By the patronage of friends he was rendered independent; by his own exertions he was raised to affluence. His notoriety as an author gave him an extensive circle of acquaintance. His manly and sensible character commanded respect, his *bonhommie* and talent for increasing the hilarity of the social hour conciliated the love of all who knew him. The continuance of apparent success increased his confidence in his own resources to a degree bordering on presumption. The ambition of his life was to enact the part of one of those feudal lords who were the favourite objects upon which his imagination dwelt. To this was owing the purchase and building of Abbotsford, the strewing of it with 'auld nick-nackets,' and the extensive scale on which he exercised his hospitality. He endeavoured to revive old times in his mansion on the Tweed. The last few years of his prosperity were spent in a gorgeous dream. The open-air day-light masquerade of the reception of George IV. in Edinburgh, in which Sir Walter Scott was a prominent actor, was the most gorgeous scene of what we can scarcely look upon in any other light than that of an opium dream. But the worm was gnawing at the root of his magnificence. Constable, Ballantyne, and Scott were all men of sense and talent, but the spirit of enterprise was stronger in them than that of accurate mercantile calculation. From the beginning their undertakings had been on a larger scale than their capital warranted; and as difficulties thickened around them their confident spirits looked for relief to bolder and more extensive speculations. This could not go on for ever: the commercial crisis of 1825-26 precipitated, but did not cause the catastrophe.

When what is called in Scotland 'a state of the affairs' of Constable and Co. and Ballantyne and Co. was made up subsequently to the bankruptcy of the two companies, it appeared that Sir Walter Scott was indebted to Constable's creditors, as a partner of Ballantyne and Co., for nearly 72,000*l.*; and that the total amount of the debts of Ballantyne and Co. was about 110,000*l.*, for the whole of which Sir Walter was liable as a partner. About half of the 72,000*l.* due to Constable and Co. being included in the debts of Ballantyne and Co., Scott's actual liabilities were somewhere about 147,000*l.* The presumptuous rashness with which, in order to indulge himself in the theatrical pleasure of enacting the part of one of the favourite heroes of his imagination, he incurred this immense load of debt, cannot be palliated. From 1823, if not from an earlier period, novels were contracted for and paid in bills, before even the subjects or names of the future publications were fixed. This was not a mere speculation upon popularity: it was a wanton setting of health, mental and corporeal, and of life itself, upon the hazard. But to the honour of Scott, he did not flinch from the terrible responsibility he had so presumptuously incurred. 'Gentlemen,' he said to the creditors, 'Time and I against any two. Let me take this good ally into my company, and I believe I shall be able to pay you every farthing.' He surrendered the whole of his property; executed a trust-deed in favour of certain gentlemen, who were to receive the funds realised by his labours, and pay off his debts with interest by instalments; sold his house and furniture, and retired to lodgings, and resumed his literary labours with dogged resolution. 'It is very hard,' he said, in his deep thoughtful voice, to a friend who expressed his sympathy, 'thus to lose all the labours of a lifetime, and be made a poor man at last, when I ought to have been otherwise. But if God grant me life and strength for a few years longer, I have no doubt that I shall redeem it all.'

Scott's works, published during the six years which elapsed between his bankruptcy and his death, which occurred on the 21st of September, 1832, possess a painful interest. They want the energy and buoyancy of his earlier writings; they bear the impress of the lassitude of a spirit engaged in a hopeless task. Some of them, like the 'History of Napoleon,' are works which lay out of his line; some of them, like the 'Letters on Demonology and Witchcraft,' are of a class to which humbler pens alone ought to be tasked; some of them, like the gossiping notes to his collected works, are concessions to the impertinent curiosity of the public, to which it is painful to see a great man stooping. Neither Walter Scott nor any other really great author ought to be his own Boswell. Making allowance for every drawback however, the old fire glows in his ashes. Nor was his self-immolation altogether in vain. There can be little doubt that the disease which proved fatal to him was superinduced by excess of mental toil, but the purpose for which he sacrificed himself was attained. His debts, materially diminished before his death have since been entirely liquidated by the profits of the edition of his collected works. The certainty of this event, the consciousness that he had not shrunk from the responsibilities he had incurred, the feeling that he had deserved and retained the love and respect which waited upon him in more prosperous days, was his consolation in the dark hours of his closing life. The political party to which he was devoted was overthrown, and the institutions he venerated were in his opinion about to be swept away; his wealth had melted from his grasp, toil was the lot and prospect of his old age, the friends of his youth were dying out one by one; but the consciousness of honourable and manly endurance, and the devoted love of his children, smoothed his passage to the grave. He sought, but too late, health in a foreign climate. The worn-out frame craved to be at home and at rest. He murmured, 'now he knew he was at Abbotsford,' when his friend Mr. Laidlow welcomed him on his return, and for a few days enjoyed the mansion he had reared with so much love and pride. His strong frame struggled hard with the disease, but exhausted nature gave way at last, and he expired after fourteen days of total insensibility

We observed at the commencement of this sketch that it is yet too early to attempt a dispassionate estimate of Scott and his writings. Making allowance for increased facilities of communication, and more generally diffused education, the fervour of popular enthusiasm with which his works were received was not greater than was experienced by the publications of Richardson. Time alone can decide how much of his writings will survive, and what place they will permanently occupy in the estimation of the literary world. Of this however there can be no doubt, that in Scott a strong and healthy intellect was engrafted on a powerful will, that he had a natural and easy play of humour, with no inconsiderable portion of poetical imagination, and a large share of that power of apprehending and portraying character which is the great charm of Fielding. Great part of his life he indulged in a dream world of his own: but when rudely awakened by adversity, he submitted to the consequences with heroic submission. He was a great and a good man

Walter Scott was the fourth of ten children, of whom only Thomas, a younger brother, left any descendants. His own children were, the present Sir Walter, Mrs. Lockhart and Miss Anne Scott (both of whom survived their father, but are since dead), and Mr. Charles Scott.

(Lockhart's *Life of Scott; Notes and Prefaces by Sir Walter to the edition of his Collected Works; Publications by the Trustees of the Messrs. Ballantyne; MS. Communications.*)

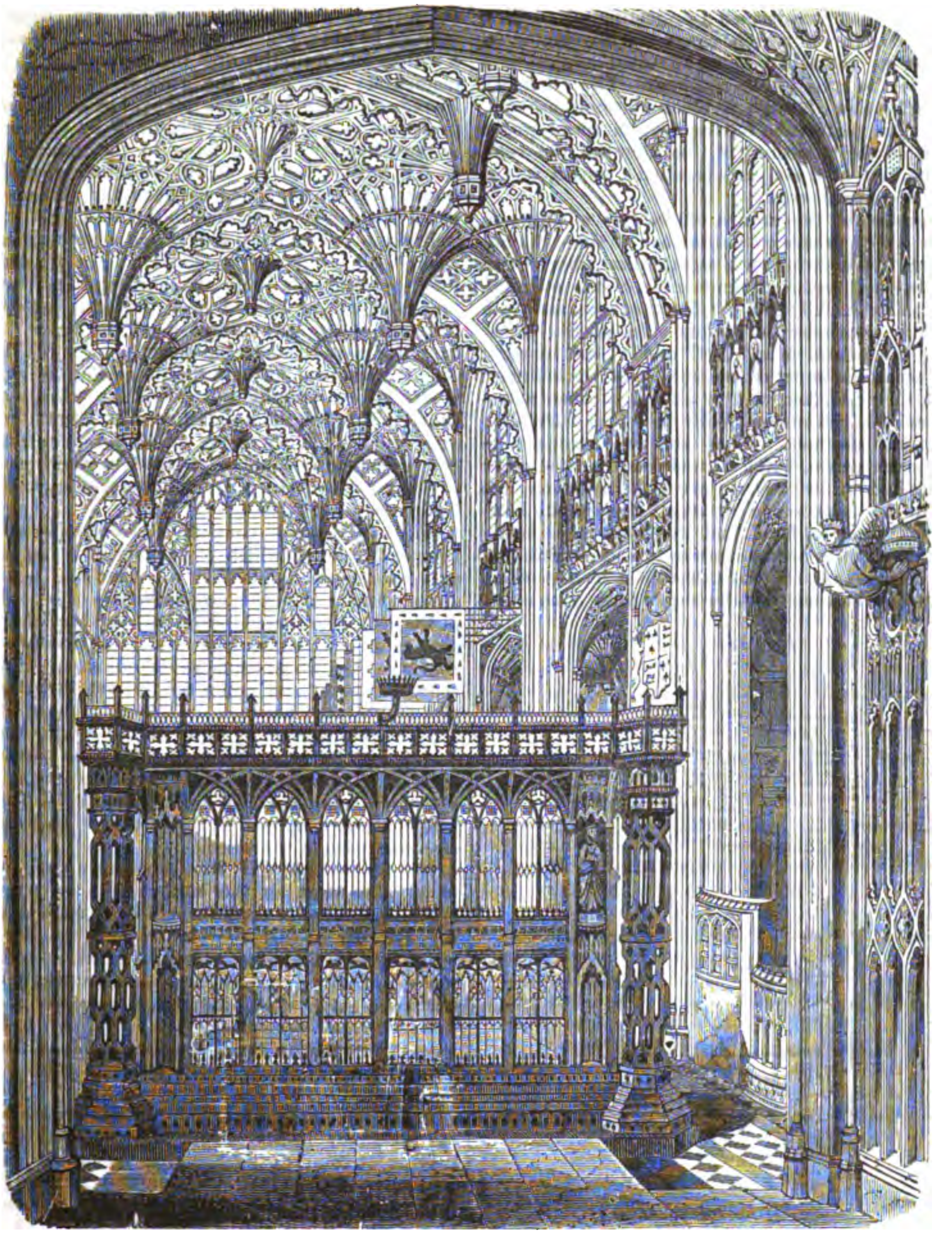
SCOTUS. [DUNS SCOTUS.]

SCREEN, in Architecture, a term probably connected with the Latin *Scrinium* and the German *Schrein*, signifies a partition dividing off some portion of an interior or room from the rest of its plan, without similarly contracting or shutting up the space over head, a screen being a partition carried up only to a certain height, so as to admit a view beyond it. Screens are exceedingly beautiful internal features in the Gothic or pointed style, in which they were employed for a variety of purposes, not in churches alone, but in halls and other buildings. Great diversity was also displayed in them as regards both design and material; for we meet with them sometimes solid or nearly so, at others almost entirely of open-work; of stone or of timber, and occasionally composed of both; but agreeing in one respect, namely, in being more or less elaborately decorated.

In our English cathedrals the choir is separated from the nave by the *organ screen*, which differs from others in being a double screen, so as to form the gallery for the organ above, and to admit of stairs leading up to it, in the space between two partitions. Though some prefer the continental mode, we are of opinion that the apparent extent of the vista is rather increased than not, by its being partially interrupted below, while the prospective is continued, and perhaps a view of a noble east window is caught in the remote distance.

The *altar screen* serves as a back wall to the choir, separating that division of the church from the presbytery or Lady-chapel behind it. It was therefore usually solid for the whole height to which it was carried up. That erected by Bishop Fox in Winchester cathedral is a splendid stone screen decorated with several tiers of canopied niches; and strikingly similar to it in design is the one by Abbot Whetehamstede at St. Alban's. Though not so designated, the stalls, &c. form lateral screens enclosing the lower part of the choir from the side aisles. Chartres cathedral contains a no less remarkable than fine example of such screen continued round the apsis of the choir, showing itself as a wall carried up to some height above the stalls, and divided into large compartments filled with sculpture. The fronts of chantries, small chapels, &c. in churches, may also be described as screens, the greater part of which is pierced or open-work and tracery. The examples of this class are so numerous, that to particularise any of them would be almost superfluous; nevertheless we may here mention that enclosing the monumental chapel of Prince Arthur, son of Henry VIII., in Worcester cathedral. The tomb of Henry VII., in his chapel at Westminster, is a very gorgeous piece of screen-work, executed entirely in metal, and forming an insulated shrine on a very large scale. Westminster Abbey itself contains many fine studies of screens in its chapels and chantries. Of timber screens separating the chancel and altar end from the body of the building, many specimens are to be met with in country churches, and not a few of them are worthy of being studied for the beauty of their design. In some instances, the lower part, or actual screen itself, is little more than a plain wooden partition surmounted by a range of open-work panels or arches. Of such screens there is a peculiar kind distinguished by the term of *rood-lofts* or *roodloft screens*, the top of them forming a kind of small overhanging gallery supported on corbets and brackets, and on which were placed the 'Holy Rood,' or large crucifix with a figure of the Saviour, and other images.

Screens of a different character, and for a different purpose from any of those above mentioned, were employed in the halls of domestic and collegiate buildings, for the purpose of cutting off a passage leading to the butteries and offices. Such screens were almost invariably of oak or other wood, and the space over them and the passage behind served as a music gallery. Open-work was very rarely if ever introduced into them, but they had generally two open arches, or sometimes square-headed doorways. Several specimens of this class of screens may be seen in Nash's 'Mansions of England in the Olden Times,' some of them, as that in the Hall at Audley-end, profusely adorned with



The Great Brass Screen which encloses the Altar Tomb of Henry VII. and his Queen in his Chapel at Westminster.

carved panelling and other sculpture; and the one just mentioned is further remarkable for the centre compartment being carried up higher than the rest, though not quite to the ceiling. Other instances occur where the screen is carried up two stories, so as to form either a passage on the chamber floor, or a closed gallery with glazed or latticed apertures. Of this kind are those in the halls at Knowle and at Hatfield. Of still more unusual character is the one at Wroxton Abbey, Oxfordshire, for there the screen, which has a series of small windows in it, is confined to the upper part of the hall, and is supported on an open colonnade below.

Screen is also employed to signify a colonnade or wall architecturally decorated, enclosing a court-yard in front of a building, as that for instance of the Admiralty, London, or the one which was erected before Carlton House, and which consisted of a single range of coupled Ionic columns placed on a lofty stylobate. Screens of this kind are sometimes had recourse to in order to connect the advancing parts of a plan together, and prevent a façade being cut up into gaps. It is by this means that the buildings forming the river front of Somerset House have been connected together into one continuous façade by screens assuming the appearance of open Corinthian loggios above spacious bridge-like arches. Eminently picturesque in themselves, these features serve greatly to relieve all the rest, and to prevent the monotony that would otherwise take place in so extended a front.

Of screens or low walls carried up midway between columns whose shafts are attached to them, there are frequent instances in Egyptian architecture, and they belong to the characteristic peculiarities of that style. [Egyptian Architecture, p. 314, 315.] Somewhat similar screens might occasionally be adopted with propriety and good effect, in the Grecian style also, either *behind* columns or *between* insulated square pillars. This has in fact been done behind the second range of columns in the recessed part of the portico of the Museum at Berlin, where a screen of the kind encloses the lower part of the staircase, while the ceiling, &c. are seen over it; whereby not only is the view continued, but light is obtained for the staircase, without windows. [Portico.] The article just referred to affords another instance of an inner screen within a portico, viz. that shown in *Fig.* 9; a valuable idea, susceptible of many variations and combinations, all of them more or less picturesque; for instance columns behind the screen, caryatides upon it, colossal *hermæ* forming pilasters on its surface, &c. In the interior of buildings again, let their style be what it may, architectural screens might be employed so as greatly to enhance effect, and at the same time to add very materially to convenience.

SCREW. This mechanical power generally consists of two parts, one of which is a solid cylinder of wood or metal, on whose convex surface is formed a projecting rib or fillet, frequently called a thread, which passes spirally round in such a manner as constantly to make equal angles with lines parallel to the axis of the cylinder. The other is a cylindrical perforation through a block of some material, the surface of the perforation having on it a spiral groove corresponding to the projecting rib or fillet on the solid cylinder. The first of these parts is called a convex screw, and the other a concave screw.

A just conception of the nature of the line of direction taken by the rib or groove on the surface of the cylinder, may be obtained by drawing on a rectangular paper, whose breadth AB is equal to the circumference of the cylinder, any number of lines AB, CD, EF, &c., equidistant from each other, and perpendicular to the sides of the paper. Then joining the points A and D, C and F, &c. by right lines, and bending the paper on the surface of the cylinder, the lines AD, CF, EH, &c., will, by uniting at their extremities, become the continuous *helix* or spiral curve-line which the thread assumes. When the two parts are in action, the convex screw, being turned round in the other by a power applied at its surface, moves at the same time rectilinearly in the direction of its axis: occasionally however the convex screw is fixed, and then the other being turned about, it acquires at the same time a like rectilinear motion. In either case, the path described by a point on any thread during the time that the screw turns once on its axis, on being developed, becomes equal to AD or CF; and in the same time a point on the axis moves through a space equal to BD or DF.

Fig. 1.

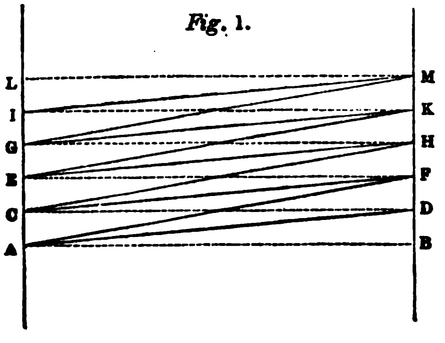
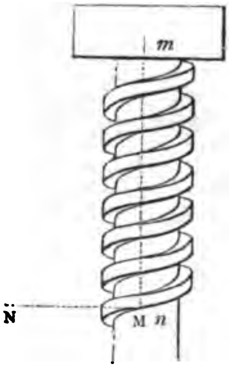


Fig. 2.



As a mechanical power, the screw possesses the properties of an inclined plane; for W representing a weight or pressure at one end of a convex screw, whose threads are thereby made to move in the grooves of the concave screw, let that weight be supposed to act in a direction parallel to the axis, and to be uniformly diffused among all the projecting threads which are at one time in the grooves; also let p be the part of the weight which presses in the direction mM on an elementary portion Mn of the side of a groove in the concave screw. Then Mn may be considered as a small inclined plane, making with mM an angle equal to ADB: and if q be a force which applied at M in the direction NM, touching a circle whose plane passes through the screw perpendicularly to the axis, would prevent the convex screw from turning round; the pressure on Mn and the counteracting force will be in the same circumstances as the weight of any body on an inclined plane and a sustaining power which acts in a direction parallel to the base of a plane, and, by the resolution of forces, the ratio between the pressure and the force will be as the base of the plane is to its height; that is, as AB to BD. Now an equal force q will be in equilibrio with the pressure p on every other elementary portion of the grooves in the concave screw; therefore, there being as many forces $= q$ as there are pressures $= p$, the whole weight W on the screw will be to the whole sustaining force, in the case of equilibrium, as AB to BD; that is, as the circumference of the convex screw is to the distance between the threads when measured in a direction parallel to the axis.

But the screw, when applied as a mechanical power, is never used in its simple state; a lever or wheel is always fixed perpendicularly to the axis, and the moving or sustaining power is applied near the outer extremity of the lever, or at the circumference of the wheel. In this last case, the ratio between the moving-power and the resistance is as the distance between the threads of the screw is to the length of that circumference; and the velocity of a point on the axis is to that of a point on the circumference in the same ratio. The friction of a screw is however very great, and is frequently equal to, at least, the weight supported, for it will prevent that weight from descending when the moving-power is taken away.

An *endless* screw consists of two or more spiral fillets or threads on a rod which is capable of being turned on its axis by a power applied to the handle of a winch, or to a string passing over the circumference of a pulley attached to the rod. The threads work between teeth on the circumference of a wheel, so that while the revolution of the rod continues, the wheel turns on its own axis. If the radius of the winch or of the pulley on the screw-rod be 6 inches, and the distance between the threads of the screw be $\frac{1}{10}$ inch, a power represented by unity at the circumference of the pulley will be in equilibrio, omitting the effects of friction, with a resistance expressed by $6 \times 10 \times 2\pi$, that is, by 376·99 (π being the half circumference of a circle whose radius is unity) applied at the threads of the screw or at the circumference of the wheel.

If the lines AF, CH, &c. were drawn on paper, and that paper were bent on the surface of a convex or concave cylinder, one spiral thread would be formed by the union of AF, EK, &c. at their extremities, and another by the like union of CH, GM, &c.: this is called a double-threaded screw, and it is evident that its mechanical power depends upon the ratio of AB to BF, while that of the single-threaded screw depends on the ratio of AB to BD; that is, with apparently an equal distance between the threads on both screws, the power of the latter is double that of the former.

From the high ratio which the resistance bears to the moving-power in the screw, the use of this machine for moving or compressing bodies is very great; it is also extensively employed in the construction of philosophical instruments for measuring small angles or distances. [MICROMETER.]

The ingenious screw-machine which was invented by Mr. Hunter, and is described in the 'Phil. Trans.' vol. 17, consists of one convex screw which works in the interior of another convex screw. The latter works in a concave screw which is fixed; and the former is capable of moving in a rectilinear direction only, being prevented from turning on its axis with the rotation of the exterior screw. Also the number of threads in an inch on the convex surface of this last is less by one than the number in an inch on the convex surface of the other: suppose the first number to be 10 and the other to be 11; then one revolution of the exterior screw would cause the whole machine to move forward through a space equal to $\frac{1}{10}$ inch, but in the same time the interior screw is carried backward through $\frac{1}{11}$ inch. Therefore the forward motion of this last is equal to $\frac{1}{10} - \frac{1}{11}$, or $\frac{1}{110}$ inch; and to produce an equal effect in a simple screw, the latter should have 110 threads in an inch.

Mr. Barlow of Woolwich mentions a compound machine of this kind in which the exterior screw had 100 threads in an inch, and the interior screw 101 threads; therefore one turn of the machine caused the latter to move through the very minute extent of $\frac{1}{10100}$ inch, and this space was further subdivided into hundredths by means of a micrometer head applied to the exterior screw.

The endless screw is a component part of graduating machines, counting machines, &c.; it is also employed in conjunction with a wheel and axle to raise heavy weights.

SCREW. The preceding article having explained the principle of the screw, it remains only to notice some of the contrivances used for making screws; which we shall commence by an account of the manufacture of those commonly used by carpenters for fastening pieces of wood, or of wood and metal together. These are, in this country, usually called *wood-screws*, and in Scotland *screw-nails*.

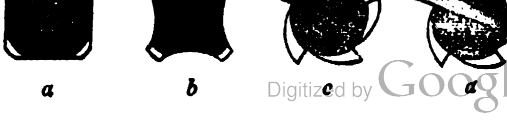
The blanks for wood-screws were formerly forged by the workmen who make nails, they being in fact very nearly the same as countersunk clout-nails, with the exception of their ends not being pointed. Some manufacturers make their blanks of round rolled iron, cut into the required lengths, and pinched when red-hot between a pair of dies in the chaps of a vice, while the heads are formed with a hammer, or the stamp of a fly-press. But it appears to be the best plan, at least for screws not exceeding about a quarter of an inch in diameter, to form the blanks of iron-wire, cut by a machine, and having the heads struck up in a die without the application of heat. After forming the head, the next process is filing or turning the necks and heads in a lathe; after which the nick, or groove to receive the end of the screw-driver, is cut with a circular saw. In the infancy of screw-making the thread was formed with a file, but this process has long been superseded by the use of dies and cutters, which are applied in various ways. The cutting of the worm is sometimes performed in a lathe, the blank being fixed in a chuck, and projected during its revolution between a pair of stationary cutters; the longitudinal motion of the blank, and consequently the size or inclination of the thread, being determined by a regulating or pattern screw attached to the mandril, which must therefore be changed for every different degree of fineness; while the shape of the thread or worm depends on the form and position of the cutters. Small screws are frequently wormed by a similar apparatus turned by a winch-handle attached to the mandril; and sometimes by means of a steel tap-plate. This method of forming the worm is that described in Hebert's 'Engineers' and Mechanics' Encyclopædia;' but another plan, originally introduced by Mr. Nettlefold, of Holborn, is now very commonly adopted. In this case the worm is formed by means of a pair of stationary cutting dies; between which the blank is projected by an apparatus which gives it an alternating rotatory motion. The dies themselves regulate the size of the thread, without the use of a pattern screw, and they must therefore be changed for every variety of screw. The peculiar motion of the blank resembles that of a bolt wormed by hand, as hereafter described.

The manufacture of wood-screws has been greatly improved by the exertions of the gentleman just alluded to, whose patent screws are far superior, in every respect, to those of the ordinary make; while, by the extensive application of machinery, they are produced at a price little exceeding that of the common imperfect article. Much attention is paid to the perfection of the worm in these screws. It is cut deeper than usual, and the thread is made nearly flat on the upper side, while the under side is considerably inclined; so that while the screw enters the wood more easily than those of the usual make, it offers much greater resistance to any force tending to tear it out. A very common defect in wood-screws is having the worm terminate in a rough thin shell, which frequently becomes bruised, and tears away the wood in such a manner as to leave very little hold for the screw. This defect is best remedied by making the point of the screw smooth and conical. The best wood-screws are made to taper slightly from the head downwards; and a further improvement, which we believe has been recently introduced by Mr. Nettlefold, consists in making the worm shallower towards the head than at the point, by which the screws are rendered less liable to be twisted in two at the upper part of the worm, when turned into hard wood with great force, as when a brace is used instead of the common screw-driver.

Several attempts have been made, and some appear to have been tolerably successful, to produce screws by *casting*. In the ordinary method of casting in sand, the chief obstacle in the way of casting screws consists in the difficulty of removing the pattern from the mould. Mr. Maullin, a manufacturer who obtained a patent in 1800 for a method of overcoming this difficulty, accomplished his object by an apparatus for *screwing* the patterns (of which a great number might be used together) out of the mould, so as to leave the impression of the thread uninjured. The details of this contrivance are given in the thirteenth volume of the 'Repertory of Arts.'

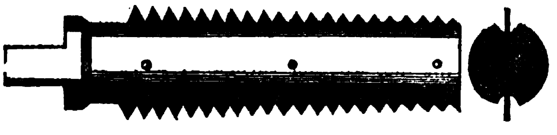
Screw-bolts and other screws for working in metal are manufactured in a similar manner to wood-screws, when the number required is sufficient to justify the expense of adjusting the machinery. When this is not the case, they are, if small, often cut by hand, without the aid of a lathe. The die, or instrument for cutting an external or male screw, resembles a common nut, but is usually divided into two parts, which are fitted, when in use, into an iron stock or die-frame, with long handles. Notches are cut in the die, across the direction of the threads, in order to produce cutting angles, and to afford room for the escape of the portions of metal removed in cutting the worm. The die, which is formed of steel, and well tempered, is inserted in the die-stock, with its two halves a little distance apart, but capable of being brought together by regulating screws fixed in the die-stock. The bolt or pin to be made into a screw is formed to the required size by turning or otherwise, and then made fast in a vice, while its end, which should be slightly tapered for the purpose, is placed in the die. The operator then proceeds to turn the die-stock so as to worm the die on to the bolt; not by a continuous motion in one direction, but by a series of turns backwards and forwards. When the die has proceeded as far on the bolt as the worm is required to extend, it is taken off, screwed up a little closer, and again applied in the same manner; and the process is repeated, closing the die a little after each operation, until the worm is cut to the required depth. The continuous motion of the die is impracticable, on account of the great resistance it has to overcome, as the worm is not formed merely by cutting away, but partly by compressing the metal, and squeezing it up into the thread. In working a similar apparatus by machinery, the dies are sometimes made in four pieces, the die-frame is stationary, and the bolt or screw-pin itself revolves. In this case the rotation is continuous, but in other respects the operation resembles that described. In the 'Mechanics' Magazine,' vol. xxv., p. 376, is published a description, with cuts, of a curious kind of die and die-stock invented by Mr. Tracey, in which the two halves of the die may be so varied in their relative position in the stock, that the same die will cut either a right-hand or left-hand screw, either single or double threaded. In cutting large screws, especially with a square thread, a steel cutter is sometimes used with the die, whether turned by hand or fixed in a lathe; and some instruments for cutting male screws in wood consist of a sharp steel cutter, fixed in a block, having a female screw; the wooden die, or rather nut, being used merely to regulate the motion of the cutter. Very small metal screws are cut by a steel tap-plate, wormed and notched in a similar manner to the dies above described, but having several holes varying slightly in size, the worm being formed progressively by using at each operation a smaller hole than at the preceding one.

Female or interior screws are commonly cut by means of a steel tap, which, in its most usual form, is simply a screw of which great part of the worm is removed by filing two, three, or four flat faces along its whole length, the angles left by this operation forming a series of obtuse cutters. The tap should be made somewhat conical, that it may enter the hole readily, and cut the worm by degrees. In some cases two taps are used, the first only of which is tapered. The head of the tap is squared, to fit into the middle of a long handle, by which it can be turned with considerable purchase; and it is worked to and fro, in a similar manner to the die for an external screw, the nut being held stationary. The taps for cutting screws in wood are commonly fluted on the sides, to make them cut the more readily, and to afford more room for the escape of the cuttings. The tap invented by Mr. Jones, and described in the forty-eighth volume of the 'Transactions' of the Society of Arts, answers the purpose of a tapering tap for commencing the screw, and a cylindrical one for completing it, the lower part being tapered, while the upper is left cylindrical. Mr. Jones recommended the fluting or notching of the tap in the form represented in section at *c* in the annexed figure,



a form evidently more adapted for cutting than either *a* or *b*, which are the more usual forms. As much unnecessary friction is caused by having many teeth in the tap of the full size, it is recommended to file down a portion of them, in some cases as many as two-thirds, so as to leave the fully projecting (and therefore cutting) teeth at greater intervals than are occasioned by the flutes or notches. In large taps of this kind a steel cutter may be inserted, as shown in the section *d*, at the commencement of the cylindrical portion of the tap; the cutter being made to project a little, so that the tap follows it without difficulty. Such cutters are not used in taps of less than an inch and a quarter diameter.

An ingenious kind of tap for cutting screws in wood is described in the French 'Manuel du Tourneur,' and in Gill's 'Technological Repository,' vol. xi., p. 42. That described and represented by Gill is for cutting a square-threaded screw, and consists of a hollow screw of steel, having a hole drilled obliquely from the front end of the thread to the hole in the centre of the tap. The edges of this oblique hole, being made sharp, cut their way through the wood when the tap is turned round, while the hole itself forms a channel by which the cuttings escape into the cavity in the centre. For cutting internal screws in wood, where great accuracy is not required, the tap invented by Mr. Siebe, and described in the forty-first volume of the 'Transactions' of the Society of Arts, is very convenient, as the same instrument will serve for cutting either right-hand or left-hand screws, according to the direction in which it is turned. This tap is represented in the following cut, and may be formed by turning a wooden screw of the size required, then cutting a longitudinal slit along its centre, and inserting a plate of steel of the length and breadth of the screw. While held in this position, the edges of the plate are filed into notches corresponding with the worm, after which it is removed while the wooden thread is turned away, leaving the wood in the form of a plain smooth cylinder. The steel plate is then re-inserted, and the whole securely riveted together. As shown in the cut, which gives a side and an end view of the tap, though the wooden part is cylindrical, the steel plate tapers towards the end that enters the hole, in order that, by the first teeth projecting but little, the instrument may cut gradually. A groove is cut on each side of the tap, where the plate is inserted, to afford room for the escape of the cuttings; and the upper end of the cylinder is made flat or square for the purpose of fitting the lever by which it is turned. Such a tap may be formed without the aid of a worm on the wooden stock, by simply dividing and notching the plate so that the teeth on one side are opposite to the notches on the other. When a double or treble-threaded screw is to be cut with this tap, notches must be made at the commencement of each thread with a hand tool, to make the tap commence cutting in the right place. Similar taps, with only two cutting edges, are proposed by Mr. Siebe for cutting screws in metal.



The large iron screws used in vices, presses, waggon-jacks, &c., are stated by Gill (*Technological Repository*, vol. vi., p. 289) to be formed by means of dies, turned with immense power by very long levers; the thread being made without cutting, by indenting and squeezing up the metal. The very best scrap-iron is required for the screws formed in this manner, on account of the twisting force to which they are subjected. The female screws are formed by winding a thin rod of iron into the worm of the male screw, so as to form it into a spiral thread, and then brazing it into a cylindrical case of wrought-iron; the nut being finished by grinding it with the screw, with the addition of sand and water.

In the ordinary method of cutting screws in a lathe, the size of the worm, or the distance between the threads, is regulated by a pattern screw, and cannot be varied from it. An ingenious machine is used in the Woolwich dock-yard for cutting a great variety of different screws from one pattern, of which a detailed description, with engravings, is given in the volume on Manufactures, in the 'Encyclopædia Metropolitana.' In this machine the bolt or cylinder upon which a screw is to be cut is placed in a lathe, while the die or cutter is fixed in a kind of sliding frame drawn forward by means of two regulating screws lying parallel with the bolt. These screws are turned by two small cogged-wheels working into a third fixed on the axis of the lathe; and by varying the relative sizes of these wheels, the pitch or inclination of the screw may be altered at pleasure. Thus, if the three wheels are exactly alike, the bolt and the regulating screw will revolve with equal velocity, and the thread produced will be of the same size as that of the pattern or regulating screw. If the wheels attached to the screws are smaller than that on the axis of the bolt, they will revolve more rapidly, and the thread produced will be wider than the pattern; and if the wheel on the mandril be the smallest of the set, the screws will revolve slower than the bolt, and a closer thread will be produced. By using many different sets of wheels, any variety may be produced. When a double thread is required, the screw or bolt must be turned half round after the first thread is cut, without moving the regulating screws; or for a treble thread, turned one-third round. The same machine is used for cutting female screws; the cutter or tap being fixed in the lathe, and the nut in the moving frame or slide-rest. In another screw-cutting machine used at the same establishment, the slide-rest is urged forward by a constant regular force, without the use of pattern screws; by which means the inconvenience of changing the cogged-wheels, and the risk of inaccuracy from the imperfection of the regulating screws, are avoided.

In making screws for mathematical or astronomical instruments, where the greatest accuracy is essentially necessary, it is especially desirable to avoid the risk of error arising from irregularities in the pattern screw, or in any part of the machinery used; and the plan communicated by Mr. Walsh to the Society of Arts, and published in the forty-second volume of their 'Transactions,' appears well adapted to attain this object. He proposes first to make a short cylinder of soft steel, twice the diameter of the intended screw. This cylinder is to be cut in the ordinary way with a double-threaded screw, and then hardened. The short screw thus produced is placed in the lathe, and a similar cylinder, but of the same diameter as the intended screw, is fixed in a frame and pressed against the first, until, by revolving in contact with it, it has received a perfect impression of the thread; which will be, owing to the different diameters of the two cylinders, a *single* thread; and *left-handed*, supposing the first cylinder to be cut with a right-handed screw. During the process the relative position of the cylinders should be occasionally reversed, by which any tendency to error will be counteracted. When completed, the small cylinder is to be hardened, and then pressed against the intended screw, which is placed in the lathe, and to which it imparts its thread in the same way that it received it from the first steel cylinder; making it however a *right-handed* screw. The position of the steel cylinder should, as before, be frequently reversed; and it should be shifted but one thread at a time, until the whole length of the screw is impressed with the thread. The worm may be deepened with a pointed tool, but should be finished by repeated and varied revolutions in contact with the pattern. By the intervention of another steel cylinder, a left-hand screw may be produced from a right-hand one, or *vice versâ*.

SCREW OF ARCHIMEDES. The inventor of the machine so called is quite unknown, but both Diodorus Siculus and Athenæus ascribe the origin of it to the philosopher of Syracuse. The former relates (*Bibl. Hist.*, lib. i., c. 34) that irrigation was facilitated in Egypt by a certain machine invented by Archimedes of Syracuse, and called Cochlias (κοχλίας) from its form; and the latter states (*Deipnosophistæ*, lib. v., p. 206, Casaub.) that Archimedes invented it for the purpose of removing the water from the hold of the great ship which was built by King Hiero of Syracuse. Vitruvius (*De Architectura*, lib. x., c. 11) describes the machine under the name of cochlea. He says that it consisted of four or eight laths bent spirally and fixed at one edge against the axle, so as to form as many winding channels about it: and that the whole was covered by a cylindrical case, formed of planks, nailed over the exterior edges of the laths. The lower extremity was immersed in the water, which, rising along the channels by the revolution of the machine on its axis, was discharged at the upper extremity. Vitruvius adds that it was turned by men walking on its outer circumference, probably on the conical surface of a bevelled wheel fixed to the axle.

By the account which Vitruvius has given of its disposition, the spiral laths were placed nearly at an angle of 45° with the axle, and the latter was inclined to the horizon in an angle of 36° 52′. The cause of the ascent of the water, and the limits of the inclination of the axle to the horizon, are stated in HYDRAULICS.

The machine has been occasionally, in modern times, employed to draw water from docks, basins, &c.; and it might be used to raise globular bodies, as cannon balls, from one level to a higher, as from the hold of a ship to the top of a wharf. A similar machine, having the spiral detached from and revolving within the cylinder which is about it, has been much used on the Continent. It is said to raise more water than the usual screw, but it cannot be elevated at a greater angle with the horizon than 30°, and its action is more easily impeded by the sand or gravel which is frequently mixed with the water.

The Archimedean screw has been recently applied to the purposes of navigation, and a yacht bearing the name of Archimedes has been furnished with one in the *dead wood* under its counter, and between the keel and stern-post. This screw, which consists of a helix making but one revolution about a horizontal axle passing longitudinally through the ship, is put in motion by a steam-engine; and it is stated that its power of moving the vessel is equal to that of the common paddle-wheel. An attempt has been made to improve upon the machine by causing the helix to consist of two parts, each equal to half a revolution, which are placed at a small distance from one another on the same axle: by this disposition it is supposed that the escape of the water, after it has been acted on by the screw to propel the vessel, will be facilitated. Captain Carpenter has also obtained a patent for the application of four losenge-shaped plates as propellers: these, which act on the same principle as the screw, are placed obliquely, in pairs, on two horizontal axles fixed in directions parallel to and on opposite sides of the keel, in order by their revolutions to give motion to the vessel to which they are attached. The action of the backwater is supposed to be entirely removed by this contrivance; and it is said that, in the event of an accident happening to the rudder, the action of one pair or both may be employed to give a power of steering the vessel.

SCREW-JACK, a portable machine for raising great weights by the agency of a screw. Portable jacks, which are sometimes worked by a rack and pinion instead of a screw, are used for raising heavy carriages when they have fallen owing to the breaking of an axle or the coming off of a wheel; the head of the jack being placed under the axle, or the framing the carriage, and then raised by turning the screw with a lever. The apparatus recently introduced under the name of the 'Universal Screw-Jack' is a great improvement on the common machine, as it allows lateral as well as vertical motion. In it the nut in which the vertical screw works is fixed in a carriage or sliding frame resting on the framework that forms the base of the machine, and capable of being moved upon it by means of an horizontal screw turned by a ratchet lever. This kind of jack is particularly useful on railways, where it affords a simple means of lifting a carriage or engine that may have run off the rails, and then moving it laterally until the wheels are in their proper position over the rails.

SCREW-PRESS, a machine for communicating pressure by means of a screw or screws. The screw offers great facilities for the application of power, as the force applied may be almost infinitely multiplied by increasing the length of the lever by which it is turned, and diminishing the distance between the threads. It is also very convenient in cases where a continued pressure is required; because, in ordinary cases, the friction of the screw is too great to allow it to run back on the removal of the power by which it is turned. In machines where the duration of the pressure is not required, and it is desirable to obtain momentum during the descent of the screw, as in a printing or stamping press, this property is not an advantage, and may be in great measure overcome by using a very wide or open thread.

In the common screw-press the articles to be subjected to compression are laid upon a stationary *bed*, or horizontal piece, forming the base of a strong frame, in the upper cross-bar or *head* of which a nut is firmly secured. The screw works up and down in this nut, and to its lower end is attached the *follower*, or moving piece which presses on the upper surface of the substance operated upon. The connection between the screw and this piece is such that the follower rises and falls, but does not turn round with the point of the screw; and the steady motion of the follower is provided for by making it fit closely to the side-pieces or cheeks of the press, which therefore act as guides. At the lower end of the screw there is usually a massive globular head, pierced with two holes at right-angles with each other, which receive the end of a long iron lever, by which the screw is turned. The screws of presses were formerly made of wood, and they are so still for some purposes not requiring great power; but as it is necessary to make the thread of considerable size in order to obtain strength, such screws are not adapted for giving great pressure. An iron screw, besides having less friction, may have its thread less than one-third the size of a wooden screw of equal strength, thereby increasing threefold the effect of the power employed in turning it. The use of iron instead of wood for the frame of the press is also a very great improvement, as even the hardest wood has been found insufficient to bear, for a length of time, the immense strains to which it is exposed in a powerful press.

The great space required for turning a long lever is a serious inconvenience in some cases, and has led to the contrivance of several methods for turning the screw with great power by a more compact apparatus. In a press invented and patented by Mr. Dunn, of Pentonville, the screw is turned by means of a short bent lever, resembling the handle of a printing-press, acting upon a ratchet-wheel fixed on the lower part of the screw; arrangements being added to enable the lever to rise and fall with the screw, and to unscrew the press by means of a second set of ratchet teeth on the wheel. In another ingenious modification of the common screw-press, invented by Mr. Pouchée, type-founder, of Holborn, a large cogged-wheel is fixed horizontally on the screw, just below the common head for receiving the end of the lever. A small pinion, having a square axis to receive a lever handle, is fixed on the platten or follower of the press, and works into the large cogged-wheel. This press is worked in the ordinary way until the screw is turned as far as the lever will conveniently move it. The bar is then removed, and the handle of the pinion put on, and by turning it the screw may be further depressed. If the pinion be turned by a lever of the same length as that used for the screw, the power of the press will be increased by this arrangement in proportion to the difference between the diameters of the large wheel and the pinion. Representations of this machine, and of that previously described, are given in Hebert's 'Engineers' and Mechanics' Encyclopædia,' art. 'Press.' In the same work, under the title 'Hot-pressing,' is given a plan of a screw-press for performing that operation, in which the plates do not, as in those of the usual construction, need to be removed for heating; they being kept at the necessary temperature by hot air introduced into four hollow columns, which serve the purpose of cheeks to the press.

While the diminution of the size of the thread affords the means of increasing the power of a screw-press, by reducing the distance traversed by the point of the screw during each revolution, it is attended by the serious disadvantage of diminishing its strength. This difficulty may be avoided by the use of a double or differential screw, the principle of which is explained in the article SCREW (p. 108, col. 1). This beautiful contrivance may be applied in different ways, but the description of one will suffice. The press may be made of the usual form, excepting that the lower end of the screw is cut, for a short distance, with a finer or closer thread than the upper part. This smaller screw is received into a nut or barrel resting on the presser or follower, and capable of turning on it when not held by a key. The head for receiving the lever by which the screw is turned is in this case placed above the head or top beam of the press, because its usual place is occupied by the moveable nut or barrel at the lower part of the screw. When in use the nut is, during the former part of the operation, keyed fast to the screw, so that it turns with it, and the action is exactly the same as that of the common press. When the screw has been turned as far as it will go in this way, the key that connected the nut with the screw is removed, and the nut is keyed fast to the presser. The screw being again turned, the lower thread enters the nut, so that the presser, instead of being moved at each revolution of the screw a distance equal to the width of the threads, is depressed only through a space equal to the difference between the width of the upper and lower threads of the screw; the effect being precisely the same as if it were moved by a very fine screw, with a thread only equal in width to such difference. By making the two parts of the screw very nearly alike in fineness, the distance traversed by the platten may be diminished, and the pressure increased almost to infinity.

Screw-presses are occasionally made with more than one screw. In one arrangement of this kind the screws are stationary, and the nuts, which are fitted into the follower of the press, are turned by means of toothed circles or cogged wheels driven by an endless screw laid horizontally on one side of the follower, and terminating at each end in a winch-handle. Mr. Brindley's press, patented in 1837, resembles the common press, except in having several screws instead of one, by which the patentee states that the pressure will be more evenly distributed. Though a greater or less number of screws may be used, four are recommended, each having a cogged wheel working into another fixed on a plain central shaft, which is moved by a winch and bevil gear.

It is unnecessary here to enter into the details of the various kinds of screw-press used for different purposes in the useful arts and manufactures. The common PRINTING-PRESS, which is a modification of the screw-press, is described in that article, in vol. xix., p. 18.

SCRIBES. In the article MOSES (p. 441) this word has been used as a translation of the Hebrew word שֹׁטְרִים, which in the authorized version is translated 'officers.' The word which is translated 'scribe' in the English Bible is סֹפֵר, or in the Chaldee סָפַר, meaning 'a writer.' It was applied to an officer of the king, or, as we should say, a 'secretary of state' (2 *Sam.*, viii. 17; xx. 25; 2 *Kings*, xxii. 3); also to a 'secretary-at-war,' who had the enrolment of the soldiers under his care. (*Jerem.*, lii. 25.) It was also used to signify men learned in the Jewish Scriptures. (*Ezra*, vii. 6, 11.) The last was the meaning which the word came to have in the later ages of the Jewish state, or rather, as the Jews regarded all learning as contained in a knowledge of their sacred books, the word *scribe* was used to designate all men of learning. In this sense we find it in the Apocrypha and the New Testament, as the translation of the words *γραμματεὺς, νομικὸς, νομοδιδάσκαλος*, for the *lawyers* (as our version generally translates the last two words) were evidently the same persons as the Scribes. Their office was to explain the law. They had seats in the Sanhedrim, and were generally Levites. In the time of Christ they appear to have been for the most part Pharisees.

(Winer's *Biblisches Realwörterbuch*, art. 'Schriftgelehrte.')

SCRIBO'NIUS LARGUS DESIGNATIA'NUS, an antient Latin physician, who lived at Rome in the reigns of Tiberius and Claudius, the latter of whom he accompanied in his campaign in Britain. He is the author of a work in Latin, 'De Compositionibus Medicamentorum;' but little is known of the events of his life, and even the language in which he wrote has been disputed. As the Latin of this work is somewhat barbarous, and as Galen, who never mentions any Latin writer, quotes the author, it was thought that it had been written originally in Greek, and translated afterwards into Latin. Physicians however have in general cared little for purity of language, and it may easily have happened that in the Silver age of Latin literature a practitioner may have written in a barbarous style. Besides, the diction itself proves that the work was originally composed in Latin (Bernhold, *Praefat. ad ed. Scribon. Larg.*, p. 17); and again, there is no author whom Galen has copied worse than he has Scribonius, probably because he did not understand Latin sufficiently well. (Cagnati, *Observ. Var.*, 8vo., Romae, 1587, lib. iii., c. 14, p. 222.) Although, says Sprengel (*Hist. de la Méd.*), in one place, Scribonius will not admit of any separation between the different branches of his art, at least he does not prove that he himself was ever able to unite the theory of medicine to the practice. He spared no pains in collecting together all the preparations mentioned in different authors (cap. 1, p. 35, ed. Bernhold), without paying the least attention to the difference of the diseases for which they were prescribed. He copied Nicander almost literally, and adopted from other authors a number of superstitious remedies. He believed, for example, that he had found a certain preservative against the bite of serpents in the plant which he called *ὀξυτρίφυλλον* (Allehira), and which ought to be gathered with the left hand before sunrise (cap. 42, p. 91). He also recommended many preparations against *sighing;* which shows how much he was attached to empiricism (cap. 19, p. 51). Amongst other antidotes he much esteemed the *Hiera* of Antonius Pacchius (cap. 23), and a composition of Zopyrus of Gordium, which, according to the custom of the times, that physician prepared every year with much ceremony. The work of Scribonius is chiefly valuable for the information it contains relating to the Materia Medica of the antients. It was first published by J. Ruellius, at the end of his edition of Celsus, Paris, 1529, fol. This edition was printed in October, 1528, which therefore gives it a few months' priority over that published at Basle, 1529, 8vo., ap. And. Cratandrum, which is sometimes said to be the *editio princeps*. The best edition, according to Choulant ('Handb. der Bücherkunde für die Aeltere Med.,' 8vo., Leipzig, 1828), is that by Rhodius. Patav., 1655, 4to.; the last (which is less complete than the preceding) is Bernhold's, Argent., 1786, 8vo. A future editor may profit by three dissertations by C. G. Kühn, Lips., 4to., 1825-6, entitled 'In Scribonium Largum Animadversionum Ottonis Sperlingii Specimen.'

SCRIPTURE (*γραφή, scriptura*). This word means simply a *writing*, but it has long been used to designate the sacred books of the Old and New Testament. It is thus repeatedly used in the New Testament in reference to the Old Testament, and in one passage Peter applies it to the *Epistles* of Paul, and very probably he meant to include under the word some of the other books of the New Testament which were then written. (2 *Peter*, iii. 16.) The different forms in which this word occurs in the New Testament are 'the Scripture,' 'the Scriptures,' 'the Holy Scriptures,' 'inspired Scripture.' (2 *Tim.*, iii. 16; compare Smith's *Scrip. Test. to the Messiah*, chap. ii., note A.) The term *a Scripture* is also used for a passage in the Scriptures. (APOCRYPHA; BIBLE; CANON; and the titles of the different books of the Bible.)

SCRO'FULA, or SCRO'PHULA, the technical name for the disease that is popularly called 'the King's Evil:' the origin of the latter term will be explained presently; that of the former is very obscure and uncertain. We find the word *scrofula*, or rather *scrofulæ* in the plural, employed for the first time to signify the present disease, or one supposed analogous to it in cattle, by Vegetius (*De Re Veterin.*, lib. iii., cap. 23, ed. Schneider). It is generally admitted to be derived from the Latin *scrofa*, or *scropha*, 'a sow,' although the reason of the derivation is by no means clear. The same analogy, whatever it may have been, influenced also the Greek and Arabic writers in naming the disease, as the former call it *χοιρὰς*, or *χοιράδες*; and the latter *khanásir* (Avicenna, tom. i., p. 154; l. 36, p. 194; l. 30, vol. ii., p. 73, l. 12, ed. Rom., 1593, fol.; Albucasis, *De Chirurg.*, lib. i., cap. 22, p. 50, ed. Oxon., 1778, 4to.), both of which words are intimately connected with *swine*. The origin of the name, according to Paulus Aegineta (lib. iv., cap. 33), is either *ἀπὸ τῶν χοιράδων πετρῶν, ἢ ἀπὸ τῶν συῶν ὅτι πολυτόκον ζῶον, ἢ ὅτι τοιουτώδεις οἱ χοῖροι τραχήλους ἔχουσι*; according to Joannes Actuarius (*De Dignot. Morb.*, lib. ii., cap. 37) it is *τῷ τε τοῖς χοίροις τὸ τοιοῦτον πάθος συμβαίνειν, ὡς φασὶ, καὶ τῷ πολυγόνους δοκεῖν*; according to Avicenna (lib. iv., fen. 3, tract 2, cap. 9, tom. ii., p. 123, ed. Venet., 1564, fol.) it is 'propterea quod multa accidunt porcis propter gulositatem eorum, aut propterea quod figuræ earum secundum plurimum assimilantur porcis.' Dr. Forbes, in his 'Select Medical Bibliography' (*Cyclop. of Pract. Med.*, vol. iv.), 'hazards the following conjecture, as at least not more improbable than some that have been proposed, viz. that the smooth, rounded, conglomerated swellings of the submaxillary glands (to which the term was at first restricted), suggested the name, from their fanciful resemblance to a litter of young pigs lying huddled together, or even from the form of a single swelling bearing some resemblance in its rounded outline to the animal. 'This notion,' says he, 'may seem to derive greater plausibility from the fact that the Greeks actually gave the same name of *a young pig* (*χοιρὰς*) to small rocks just rising above the surface of the sea, from their fancied resemblance to the back of a pig when swimming; and it may not be altogether irrelevant to add, that the swelling produced by a blow upon the face or head is vulgarly termed *a mouse*.' The classical Latin term for the disease is 'struma' (Celsus, *De Medic.*, lib. v., cap. 28, § 7; Pliny, *Hist. Nat.*, lib. viii., cap. 77), or 'strumæ' in the plural (Celsus, lib. i., cap. 9; Pliny, lib. xxii., cap 16), which is also a word of which no satisfactory derivation has been given, as probably few persons will agree with Dr. Good in deriving it from *στρῶμα*, 'congestion,' or 'coacervation,' as of straw in a litter, feathers in a bed, or tumours in the body.'

The vulgar English name applied to it, viz. 'the King's Evil,' commemorates the virtues of the *royal touch*, to which, from the time of Edward the Confessor till the reign of Queen Anne, multitudes of persons afflicted with scrofula were subjected. A similar custom prevailed in France; and miraculous powers for the cure of scrofula were likewise claimed for different Romish saints, for the heads of certain noble families, for the seventh son, and for many consecrated springs. The *royal touch* requires some further notice, for though it is generally considered to be only a subject for ridicule, and is therefore disbelieved without inquiry, yet, if any one will take the trouble fairly to examine the evidence on which it rests, he will probably agree with Bishop Bull (*Serm.* 5, p. 133, ed. Oxford, 1827), that 'it is unquestionable that divers persons desperately labouring under it have been cured by the mere touch' [apparently] 'of the royal hand, assisted with the prayers of the priests of our church attending, unless the faith of all our antient writers, and the consentient report of hundreds of most credible persons in our own age attesting the same, be to be questioned.' That the kings of England for several centuries actually exercised their touch for the cure of scrofulous complaints, is proved by abundant historical authority; and scarcely any of our old historians, who wrote during a period of at least five hundred years, have omitted taking notice of this strange and unaccountable fact. We have not room here to give the evidence fully, and must refer those who wish to inquire more deeply into the subject to 'A Free and Impartial Inquiry into the Antiquity and Efficacy of Touching for the King's Evil,' 1722, by William Beckett, an eminent surgeon; 'Charisma, sive Donum Sanationis: seu Explicatio totius Quaestionis de Mirabilium Sanitatum Gratiâ, in quâ praecipuè agitur de solenni et sacrâ cui Reges Angliae, ritè inaugurati, divinitus medicati sunt,' &c. &c., 1597, by William Tooker, afterwards dean of Lichfield; 'Charisma Basilicon, or the Royal Gift of Healing Strumaes, &c.,' 8vo., Lond., 1684, by J. Browne; 'Several Chirurgical Treatises,' Lond., 1676, fol., and 1719, 8vo. 2 vols., by Richard Wiseman, principal surgeon in the army of Charles I., and serjeant-surgeon to Charles II., whom Haller (*Biblioth. Medic. Pract.*, tom. iv., p. 399) calls 'insignis certe et peritissimus chirurgus.' The question is examined at some length by Bishop Douglas, in his 'Criterion; or, Miracles Examined,' &c. &c., p. 191, ed. 1754, who, while he denies the alleged miraculous powers, fully admits the reality of the cures. See also Colquhoun's 'Isis Revelata: an Inquiry into the Origin, Progress, and Present State of Animal Magnetism,' Edin., 1836, 2 vols. 8vo., who also allows (vol. i., p. 87) 'the sanative efficacy of the process,' but connects it with the phenomena of animal magnetism. Among the most curious parts of the subject, it may be mentioned that the old Jacobites considered that this power did not descend to Mary, William, or Anne, as they did not possess a full hereditary title, or, in other words, did not reign by divine right. The kings of the house of Brunswick have, we believe, never put this power to the proof; and the office for the ceremony, which appears in our Liturgy as late as 1719, has been silently omitted. The exiled princes of the house of Stuart were supposed to have inherited this virtue. Carte, in the well-known note to the first volume of his 'History of England,' mentions the case of one Christopher Lovel, who, in 1716, went to Avignon, where the court was then held, and received a temporary cure; and when Prince Charles Edward was at Holyrood House, in October, 1745, he, although only claiming to be prince of Wales and regent, touched a female child for the king's evil, who in twenty-one days is said to have been perfectly cured. (*Hist. of the Rebellion*, in Constable's 'Miscellany.')

The complaint was well known to the antients. It is slightly mentioned by Hippocrates (*Coac. Prænot.*, tom. i., p. 321, ed. Kühn; *De Gland.*, p. 496; *Aphor.*, sect. 3, tom. iii., p. 725); Celsus gives a fuller account (*De Medic.*, lib. v., cap. 28, sect. 7); and it is described at some length by Galen (*De Meth. Med.*, lib. xiv., cap. 11, tom. x., p. 982, ed. Kühn); Paulus Aegineta (*De Re Med.*, lib. iv., cap. 33, and lib. vi., cap. 35); Haly Abbas (*Lib. Pract.*, lib. iii., cap. 33, et lib. ix., cap. 11, ed. Lugd., 4to., 1523); Avicenna (*loco cit.*), Albucasis (*loco cit.*), Leonidas (apud Aëtii, *Tetrab.*, iv., serm. 3, cap. 5, p. 741, ed. H. Steph.), &c.

Scrofula is defined by Dr. Good (*Study of Med.*) to be, 'indolent glandular tumours, frequently in the neck; suppurating slowly and imperfectly, and healing with difficulty; upper lip thickened; skin smooth, countenance usually florid:' which agrees almost exactly with the definition given by Cullen in his 'Nosology.' Its appearance is in general well known, but it has been sometimes mistaken, and a number of other ailments confounded under this title. It appears first as a tumor not confined in its earliest stages to any one part of the body; which tumor almost universally suffers no change of colour for some time, and is perfectly free from pain and inflammation; it is also commonly moveable, though not always. Its progress to an inflammatory state is slow, and it is very gradually that it shows more and more pain, heat, redness, and swelling. Its progress afterwards to suppuration is as slow; and even after a fluctuation is perceived in the tumor, it is generally a long time before it breaks and forms an ulcer. The tumor differs particularly from a phlegmon, as it is very rarely pointed; sometimes it is so, but it never opens at the apex, but always at one or more lateral apertures, which are generally small at first. From these apertures flows a little purulent matter, but not in proportion to the size of the tumor; it is not so consistent as pus, but of a curdy nature, and whiter than purulent matter in general. This is discharged soon after the ulcer opens, mixed with a quantity of transparent gelatinous serum. The ulcer thus formed heals very slowly; its edges are seldom regularly circular or oval, and they are free from tumor and callus; by all which marks scrophulous ulcers may be easily distinguished. A soft, brittle, unorganised matter, resembling curd, or new cheese, is found mixed with the contents of scrofulous abscesses, or deposited in rounded masses of different degrees of firmness, varying in bulk from the size of a millet seed to that of a hen's egg. To the rounded masses of this substance, the name of *tubercles* has been assigned, and the substance itself is called *tuberculous*, or tubercular matter; and the presence of this matter is regarded by Dr. Cumin (*Cyclop. of Pract. Med.*, art. 'Scrofula') to be the most certain evidence of the existence of the disease.

Scrofula, though not a contagious disease, is unquestionably hereditary; and hence very generally dependent upon a peculiar diathesis. Yet, like many other hereditary diseases, it is also occasionally generated as a primary affection, without any hereditary taint that can be discovered. When it occurs as a primary or ingenerated affection, it is by no means always limited to any particular temperament or habit of body. But where scrofula appears hereditary, and especially where it does not show itself very early, it is often accompanied with a peculiar constitution. 'The character of a scrofulous child,' says Sir Astley Cooper, 'is as follows:—You will find the skin thin, if you pinch it, which is quite different from the skin of children who are not scrofulous; in them the skin is solid and dense, and the fibres strong; but in scrofulous the skin is thin, and the vessels may be seen meandering under it; and it is on this account that persons with this disease frequently have a rosy colour, arising from the thinness of the skin, which allows the vessels to be seen under it. The hair is also light coloured. If you observe, in a family of five or six children, one among them who has a delicate thin skin, with light hair and complexion, you will find that if they are all exposed to the same causes, they will escape from any scrofulous affection, with the exception of the one stamped by nature, and that this, during its growth, will be affected by the disease. The hair is also extremely fine, the eyelashes long, the pupils dilated, and the fingers are what is called clubbed, similar to the fingers in phthisical persons, *i.e.* they are extremely long and thin, but at the extremities are broad and flat. The upper lip is of considerable thickness, and this is a mark of debility.'

In considering the causes of a disease so deeply rooted in the constitution as scrofula is universally acknowledged to be, it is necessary to direct our attention to circumstances very remote in the history of those who are its subjects. The foundation of a scrofulous habit is frequently laid during the fœtal state, by the transmission of that peculiar organization of the frame from parents who themselves possess it. Scrofula is also observed to originate in the healthy offspring of healthy parents, under certain circumstances, the principal of which are habitual exposure to cold and damp, privation of free air and light, and want of healthful exercise. A moist, cold, and variable climate, like those of Great Britain and Holland, is particularly favourable to the development of scrofula; in proof of which it is sufficient to adduce the great prevalence of the malady in both of those countries. A very cold or a hot climate, on the other hand, serves rather to protect us against scrofula; the former, dry and bracing, invites to exercise, and promotes, digestion, and thus strengthens the system; while the latter favours the excretions, particularly that of the skin, and preserves the body from those sudden changes of temperature which in our island so often lay the foundations of scrofulous affections. Among the causes which appear to give rise to scrofula in children, are the practises of rearing them by the hand and suckling them too long; two extremes, both of which often lead to the same result, — the imperfect nourishment of the child. Another cause of this disease is confinement in ill-ventilated apartments; for the deficiency of pure atmospheric air cannot be long endured, especially during youth, without the most injurious consequences. Acute diseases, especially those accompanied with cutaneous eruptions, as small-pox, measles, and scarlet-fever, are often observed to have the effect of producing the development of scrofula; and the more tedious the convalescence, the more frequently do symptoms of this disease ensue.

We proceed now to pass briefly in review the various parts and organs of the human body in which scrofula most commonly appears, and to point out the modifications of this disease induced by the different properties and textures of the parts affected. The first which presents itself is the common integument; for the three species of 'porrigo,' named 'favosa,' 'larvalis,' and 'furfurans,' together with 'eczema impetiginodes' and 'rubrum' in their chronic forms, are now frequently considered as strumous diseases. One variety of 'lupus,' or 'noli me tangere,' is decidedly a scrofulous affection; namely, that which commences with small, red, button-like prominences, which usually remain indolent for some time, and then form eroding ulcers, with pale, shining, spongy granulations, and encrusted margins. But the absorbent glands, especially those of the neck and mesentery, are the parts of the body which have long been regarded as the peculiar seats of scrofula, and the disease, when it attacks the latter organ, is of sufficient importance to require a separate notice under the head of TABES MESENTERICA. The enlargement and induration of these glands are still considered as affording more unequivocal evidence in the living body of the presence of that disease than any other circumstance except the discharge of tuberculous matter. A lymphatic gland, when first affected with scrofula, is soft and fleshy, and its size is increased; the texture, as proved by inspection, then becomes firmer, and the colour paler than in health: as the disease proceeds, portions of the gland are observed to have altogether lost their flesh-colour, and acquired a degree of semi-transparency, and a texture approaching to that of cartilage; at length a deposition of soft white or yellowish curd-like substance is found to have taken place, and the true scrofulous tubercle is now manifest. The size to which strumous glandular tumours attain is in some instances enormous. The lower jaw and upper part of the neck are occasionally seen hung round with such voluminous swellings as completely to deform the countenance; and in the case of a strumous middle-aged man, both groins have been seen occupied by vast glandular tumours, the larger of which equalled in size the half of a child's head at birth. The sublingual and submaxillary glands are often the seat of scrofula, the parotid more rarely; occasionally the tongue is attacked; and the mucous membranes are frequently affected with this disease. Those of the eye and lachrymal passages are peculiarly liable to it; which affection has been already described in the article OPHTHALMIA. The lungs have long been known to be particularly liable to scrofulous deposits; and so rare is it to find tubercle in any other situation without also finding it in the lungs, that Louis states he never met with an instance in all his numerous dissections excepting once, in the case of a man who had died of fever When this organ is attacked, the disease assumes the name of PHTHISIS, to which article the reader is referred The synovial membranes of joints are undoubtedly much more liable to disease in scrofulous subjects than others. Inflammation is more readily excited, and effusion of fluid into their cavities is more easily induced. The mamma and testicle are frequently attacked; the heart has been found affected, but rarely. The frequent occurrence of scrofula within the central organs of the nervous system has been satisfactorily ascertained. The chronic enlargement of the thyreoid gland is sometimes considered as scrofulous; but this opinion is probably incorrect.

The treatment of scrofula naturally divides itself into the *preventive* and the *curative;* the former of which is the more generally successful, and obviously the more important. As some children are born with tubercles, or the germs of them already formed, and as all are liable to become scrofulous under the influence of various conditions detrimental to the general health, the following advise is given by Dr. Cumin (*Cyclop. of Pract. Med.*) respecting the mode of rearing a child in whom circumstances justify the opinion of a tendency to the disease:—'When the child of a scrofulous father is born, the infant, unless the mother is free from all traces of the disease, ought to be consigned to a wet-nurse of sound and robust constitution, having an abundant supply of milk. This alone ought, for some months, to be sufficient for the nourishment of the child; but after a time, should it appear delicate, a little isinglass jelly may be allowed in addition, or liquid yolk of egg, or beef-tea, together with some preparation of wheaten meal or flour, or pure starch. Daily immersion in cold water, and gentle friction of the whole body, will be found of great utility. The child ought to be warmly clothed, to be carried about in the open air as much as possible, and the apartment in which it sleeps ought to be kept at a steady moderate temperature, and perfectly well ventilated. All rooms occupied as nurseries for children ought to be spacious and lofty, never situated in a sunk floor nor in an attic, and, if possible, considerably above the level of the ground.' To all individuals in whom a scrofulous diathesis is manifest, or even probable, and whose circumstances enable them to remove to a mild climate, and to localities judiciously selected, such change affords one of the best chances of preventing or checking the disease. The facts of scrofula being so prevalent in cold damp countries, noted for extremely variable temperature, like this kingdom, and of its comparative rarity in and total absence from some other parts of the world, prove sufficiently that climate is of all the exciting causes of scrofula the most powerful one.

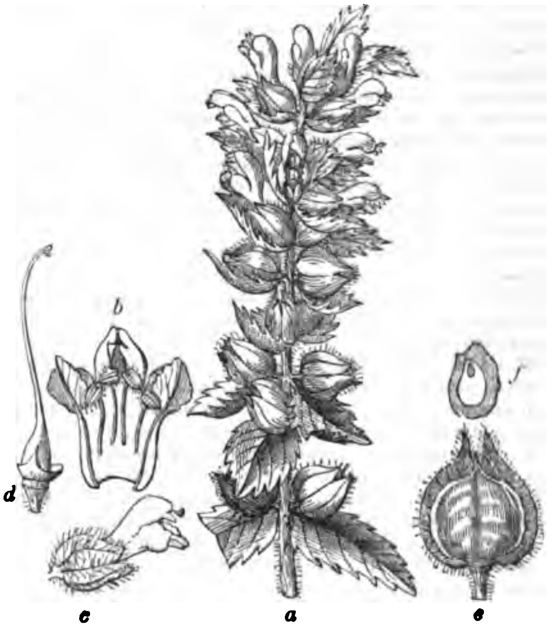
The *curative* treatment of scrofula may be divided into *constitutional* and *local* applications. With repect to the former, it would be impossible here to notice all the numerous remedies that have been recommended for the cure of this disease; we must be content with pointing out those that are most generally esteemed. Of all the remedies employed in the treatment of scrofula, perhaps none have enjoyed a greater reputation than mercurials; but it is only from their purgative and alterative effects that they prove beneficial, and not when they produce that powerful influence on the frame which so rarely fails to ensue from their free exhibition. Tonics are amongst the most valuable remedies; of these, cinchona is perhaps the most efficacious, and from the concentrated form in which it can now be exhibited (viz. the disulphate of quina), the most generally available. Other vegetable tonics and bitters have been administered with advantage in scrofula, such as calumba, gentian, and hop. Of the metallic tonics used in scrofula, iron is that which has been found the most beneficial; and the best forms of exhibiting it are the Vinum Ferri, the Tinctura Ferri Sesquichloridi, and the Ferri Sesquioxidum, in powder. Iodine, as prescribed by Lugol, is at present in considerable repute. It is successfully employed both internally and locally, in each of which modes it increases the action of the absorbents; and in the latter it likewise often induces suppuration of strumous tumours, and thus hastens their removal. The use of baths in the treatment of strumous affections is of great value, the kind of bath to be made choice of being determined by the existing state of the patient. Sudden immersion in cold water, and especially sea-water, has long been an approved remedy in scrofula; but when the strength of the patient is so reduced that no kindly glow follows, and when there is decided feverishness, the cold plunge-bath is not admissible. In most cases the warm-water bath, and still more that of vapour, will be found highly soothing and restorative.

With respect to the *local* treatment, indolent scrofulous tumours, when the health is little reduced, may be dispersed or made to suppurate by continued pressure, or by blistering, which can be employed when the situation of the swelling will not admit of pressure. In the treatment of scrofulous ulcers, Mr. Russell considers that, under the ordinary circumstances of the complaint, the simplest and mildest dressings answer best. Cold spring-water is a favourite application with many practitioners; and preparations of lead are, upon the whole, very convenient and useful applications, provided the solutions be used in a state of sufficient dilution to prevent irritation. Formerly, the extirpation of scrofulous tumours was advised, but this method is now considered as being for the most part injudicious and unnecessary, with the exception of diseased joints and a few other parts which frequently require being amputated for the sake of saving the patient's life. Caustics have been employed for the same purposes, instead of the knife; but as they effect the object in view less certainly, more painfully and tediously, and cause extensive ulcers, they are disused by all the best surgeons of the present day. Some authors advise making issues, and keeping them open, in order to prevent any ill effects from the healing of the scrofulous ulcers. Issues may perhaps be unnecessary for any purpose of this kind; but they are eminently useful as a part of the local treatment of scrofulous joints and abscesses. When all hope of recovering a diseased portion of the body is at an end, the question immediately presents itself whether such part ought not to be removed by an operation. In considering the propriety of amputation, it is necessary to determine how far the continuance of the affections brings the patient's life into hazard, and whether he has still sufficient strength left to undergo the operation. When another important joint, or a vital organ, as the lungs or bowels, is already the seat of incurable disease, such operation is nugatory, and in such cases unquestionably it should not be performed. Great caution however is required in making our final decision; for every practitioner of experience has seen instances where the symptoms of visceral disease appeared almost to preclude hope, and yet have yielded on the removal of the local irritation, and a cure has been the happy result. (Cooper's *Surg. Dict.*; *Cyclop. of Pract. Med.*, &c.)

SCROPHULARIA'CEÆ, a natural order of plants belonging to the dicarpous group of monopetalous Exogens. The plants of this order are herbaceous or shrubby, with round and knotless or square and nodose stems. Leaves alternate, undivided or lobed, sometimes collateral; the floral ones sometimes double and placed near each other. The inflorescence is variable, usually spicate, racemose or paniculate, seldom solitary. The calyx is 5-parted, seldom 4-parted; the sepals often unequal, the upper one being largest, the two lowest smaller, the lateral ones smallest; corolla 4-5 parted, tube short or long, limb flat or erect, nearly equally divided or labiate, imbricate in æstivation; stamens 2-4, didynamous, rarely equal, alternate with the lobes of the corolla, the fifth stamen and sometimes the three upper ones abortive; anthers 2-celled or sometimes growing together 1-celled, opening longitudinally; ovary superior, 2-celled, many-seeded; style simple; stigma mostly simple, entire, emarginate or bifid, often flattened, occasionally double at the points of the divisions of the style; fruit capsular, seldom berried, bi-carpellary, 2-celled, sometimes with 2 entire or bifid valves, sometimes with 4 entire ones, sometimes opening by pores or lids, dissepiment parallel or opposite to the valves, finally loose in the centre, or altogether; placentæ adhering to the dissepiment; seeds indefinite, albuminous.

Scrophulariaceæ are nearly allied to Solanaceæ, and in some instances it is difficult to say to which of these two orders plants may belong. Bentham separates these orders by a purely artificial distinction, considering as Solanaceæ such genera as have a plaited corolla and 5 stamina, and as Scrophulariaceæ all those in which either the fifth stamen is wanting or the æstivation of the corolla is imbricated. Of the orders with irregular flowers, those which may be mistaken for Scrophulariaceæ are Gesneraceæ and Orobanchaceæ, which are distinguished by their unilocular ovarium with parietal placentæ; and the Bignoniaceæ, Cyrtandraceæ, and Pedaliaceæ, which have seeds without albumen, and the two latter have a unilocular or spuriously 2-4-locular fruit. Lentibulaceæ are closely allied to this order, but are distinguished by their unilocular fruit, free central placentæ, and minute embryo.

The Scrophulariaceæ, are very widely diffused over the surface of the earth, being found in the whole range of climate between the coldest point at which vegetation occurs at the poles, and the hottest parts of the tropics. In the torrid zone of both worlds they are very abundant, and form a 26th part of the flowering plants of Europe and a 36th of those of North America. In New Holland and New Zealand they are common, and the barren shores of Tierra del Fuego produce several species. Scrophulariaceæ are in general suspicious plants. Several of them are active poisons, and though all do not possess deleterious properties, they are all more or less acrid. Some are esculent, but they require great caution in their preparation as food: heat or vinegar appears to lessen or destroy their injurious principles, and these agents should be employed in preparing them for use. Amongst those which are edible are the *Mimulus lutea* and *guttatus*, the former being eaten as a pot-herb in Peru, and the latter as a salad. *Achimenes cochinchinensis*, when pickled, is much esteemed, in the country where it grows, as an article of diet. Many of the species of this order are used in medicine: the *Digitalis purpurea*, or purple foxglove, has a powerful influence on the system and is a valuable remedy in many diseases. [DIGITALIS PURPUREA.] *Gratiola officinalis*, the hedge hyssop, is also an active medicine, and so efficacious was it once esteemed that it received the name of *Gratia Dei*. It is bitter, and acts as a purgative and emetic, and is indebted for these properties to a peculiar principle called *gratioline*. Scrophularia, the genus which is the type of the order, derives its name from the resemblance of the tumid roots of some of the species to scrophulous swellings of the neck, to which they were applied upon the absurd supposition that nature thus pointed out the remedies for diseases. *S. nodosa* has a bitter taste, and a decoction of its leaves is used for curing the scab in swine. *S. aquatica* is called by the French *herbe du siége*, from the circumstance of the garrison of Rochelle, during the celebrated siege by Cardinal Richelieu in 1628, having supported themselves by partaking of its root.



Rhinanthus hirsuta.

a, cutting, showing leaves and inflorescence; *b*, corolla opened, showing didynamous stamens; *c*, personate corolla, and calyx; *d*, pistil; *e*, fruit; *f*, seed with embryo lying in the albumen.

SCRUPLE (*scrupulum*, diminutive of *scrupus*, a term for a sort of pebble, probably used in counting) is now used only as the third part of a dram, or the 24th part of an ounce, in the apothecaries' division of the troy pound. It was used originally as the 24th part of the Roman uncia; afterwards as the sixtieth part of an hour, or what is now called the minute. The sixtieth part of a minute was called scrupulum secundum, the sixtieth part of a scrupulum secundum was scrupulum tertium, &c., whence our terms second, third, &c. applied to the sexagesimal divisions of the minute. It is worth noting that the antient form of the word is also scripulum and scriptulum, which might suggest a different derivation of the word as a weight or measure. It may be worth while to add that the scrupulum is described by lexicographers as a small pebble, such as found its way between the sandal and the foot, whence the use of the word to denote a difficulty or objection.

SCUDE'RI, GEORGE DE, was born about 1601, at Hâvre in Normandie, of which place his father was governor (lieutenant de roi). Young Scudéri was brought up by his father to the profession of arms, but he quitted it about 1630 for that of a dramatist, in which he had at first little success, and was very poor; but both his reputation and circumstances gradually improved, and he was regarded by many as equal to P. Corneille, with whom he was on terms of intimacy, till the unusual success of 'The Cid' threw Scudéri into the shade, and caused a feeling of envy, to which he gave vent in 'Observations sur le Cid,' Paris, 1637: these Observations were published anonymously, but the author soon became known, and Corneille replied in a bitter epigram, in which he described his late friend as a 'solemn fool.' Scudéri however was favoured by Cardinal Richelieu, who was also offended to find that Corneille had obtained a degree of patronage from the public which rendered the great poet independent of the great minister. In 1641 or 1642 Scudéri was appointed governor of Notre Dame de la Garde, a small fort situated on a rock near Marseille, where he went to reside, but soon returned to Paris, and it was humorously said of him in 1656, that he had 'shut up the fort, returned to Paris by the coach, and for fifteen years had carried the key in his pocket.' In 1650 he was elected a member of the Académie Française. He died at Paris, May 14, 1667.

In the period from 1631 to 1644, Scudéri produced sixteen plays under the following titles:—'L'Amour Tyrannique,' 'Armenius,' 'Orante,' 'Lygdamon,' 'Le Vassal Généreux,' 'Le Trompeur Puni,' 'La Mort de César,' 'L'Amant Libéral,' 'Didon,' 'Eudoxe,' 'Andromire,' 'Axiane,' 'Le Fils Supposé,' 'Le Prince Deguisé,' 'L'Illustre Bassa,' and 'La Comédie des Comédiens.' He also wrote 'Poesies Diverses,' Paris, 1649, 4to., and 'Alaric, ou Rome Vaincue,' Paris, 1654, folio, an heroic poem, which he undertook at the request of Christina, queen of Sweden. He also wrote a few other works, but they are not worth mentioning.

Scudéri is one of those who have left 'a lasting tomb.' His name is familiar to us from the reputation which he once had, but both his plays and poems are deservedly neglected, or are only looked into from a motive of curiosity. He was a man of excessive vanity, and in the prefaces to some of his plays boasts of his own merits in terms which indicate the most perfect self-satisfaction, which, taken in connection with the patronage of Richelieu, may partly account for the fame which he had in his day, the mass of mankind, little capable of judging for themselves, for the most part allowing a man to take that station which he assumes, rather than placing him in that to which his merits entitle him.

SCUDE'RI, MADELE'NE DE, the sister of George de Scudéri, was born in 1607. She is the authoress of several voluminous romances which had an extraordinary reputation:—'Ibraham, ou l'Illustre Bassa,' Paris, 1641, 4 vols. 8vo.; 'Artamène, ou le Grand Cyrus,' Paris, 1650, 10 vols. 8vo.; 'Clélie, Histoire Romaine,' Paris, 1656, 10 vols. 8vo.; 'Almahide, ou l'Esclave Reine,' Paris, 1660, 8 vols. 8vo. 'L'Illustre Bassa,' 'Cyrus,' and some of the first volumes of 'Clélie,' were published under the name of George de Scudéri, but after the authoress became known her other works were published anonymously. Besides these grand romances, Mademoiselle de Scudéri wrote—'Celinte,' 1661, 8vo.; 'Femmes Illustres, ou Harangues Heroïques,' 1665, 12mo.; 'Mathide d'Aguilar,' 1669, 8vo.; 'La Promenade de Versailles,' 1669, 8vo.; 'Discours de la Gloire,' 1671, 12mo., which obtained the prize of eloquence given by the Académie Française; 'Conversations sur divers Sujets,' 1684, 2 vols. 12mo.; 'Conversations Nouvelles,' 1684, 2 vols. 12mo.; 'Conversations Morales,' 1686, 2 vols. 12mo.; 'Nouvelles Conversations de la Morale,' 1688, 2 vols. 12mo.; 'Entretiens de Morale,' 1692, 2 vols. 12mo.; 'Nouvelles Fables en Vers,' 1685, 12mo.; besides a great number of 'Vers de Sociéte,' addressed to her contemporaries.

Mademoiselle de Scudéri was a sort of queen of the Parisian Blue-Stockings, the 'Précieuses Ridicules' of the seventeenth century, and she enjoyed this 'high and palmy state' of honour till her death, which did not occur till June 2, 1701, when she was in her 94th year The praises bestowed upon her were not confined to the fashionable society of the Hôtel de Rambouillet, of which she was the acknowledged dictator, but eulogiums in no measured terms were bestowed upon her by Huet, the learned bishop of Avranches, by Mascaron, bishop of Tulle, by the cardinal De Bouillon, and many others. Christina of Sweden honoured her with her correspondence, and gave her a pension. She had a pension also from Cardinal Mazarin, which, at the request of Madame de Maintenon, was continued and augmented by Louis XIV.

Mademoiselle de Scudéri seems to have been indebted for her pre-eminence of honour partly to the tact with which all her works were adapted to the usages of the society in which she moved, many of the frequenters of the Hôtel de Rambouillet being recognised in the heroes and heroines of her romances, and partly to a factitious brilliancy of conversation which consisted of ridiculous puerilities and a play of imagination in the worst taste, all founded upon those conventionalisms of politeness and gallantry which were current among the fashionable society of that age. Love was the inexhaustible theme of all these romances and conversations; the heroes of antiquity are transformed into French petit-maîtres, and the heathen mythology supplied its store of imagery and allusion to decorate the fashionable manners and personages of the age of Louis XIV. It must be added however that Mademoiselle de Scudéri appears to have been a woman of very amiable disposition, was greatly esteemed by her female associates, and had several professed admirers among the gentlemen, though she was very ugly.

(*Biographie Universelle;* Moreri, *Grand Dictionnaire Historique.*)

SCUDO. [MONEY.]

SCULPTURE, in its strict sense, is the art of carving or cutting any material into a proposed form or shape. In its more general acceptation it is the art of representing objects by *form;* and is thus applied to carving, modelling (or the plastic art), casting, whether in metal or other materials, and to gem-engraving. Sculpture is practised in various ways; namely, in forming entire or insulated figures, as statues or groups, called, in technical language, 'the round;' or in representing objects more or less raised without their being entirely detached from a background. This latter is termed 'relief,' and the degrees of relief are defined by modern writers and artists by the expressions *alto-rilievo,* when the object is so salient as to be nearly 'round;' *basso-rilievo,* when it is slightly raised from the background; and *mezzo-rilievo,* when a medium is preserved between the extremely high and the very flat 'relief. There is another variety of this manner of working 'basso-rilievo,' which is only or chiefly found in Egyptian sculpture; the outline is sunk into the plane or ground, and the parts are then formed and rounded on the principle of basso-rilievo. By this mode of working there is usually no projection beyond the profile or face of the original ground; to gain effect therefore in this kind of *relieved intaglio,* the Egyptian artists frequently painted the sculpture.

It is not necessary to enter into a discussion of the various opinions respecting the comparative antiquity of the arts of painting and sculpture. Pliny's story (*Hist. Nat.*, XXXV. 12) of the daughter of Dibutades having traced the outline of her lover's profile on the shadow cast on the wall, and of this outline being afterwards filled in with clay by her father, would give the priority to drawing; and it seems obvious that drawing an outline must be antecedent to modelling, or cutting in *relief;* but a little consideration will suffice to establish the probability that *insulated* objects and figures were made in the very earliest times. So many materials offered themselves upon which the imitative faculty could be exercised, that there can be little doubt that rude attempts at forming clay, or any other plastic substance, into a defined shape, were amongst the first exercises of human ingenuity; and the easy task of thus repeating or copying the real form of an object, compared with that of representing by lines (and on a flat surface) its partial and perspective appearance, is quite sufficient to lead to the inference that this was the earliest mode of imitation. The antients appear to have availed themselves of every known material that was capable of being employed in sculpture. Pliny, Pausanias, and other writers supply some curious information on this subject, for, in describing works of art, they usually mention the materials in which they were executed.

For modelling, clay, wax, and stucco, or plaster, appear to have been universally adopted; and works of great antiquity, formed of these substances, are still preserved. The clay model was usually baked, by which it acquired a hardness scarcely inferior to stone. Moulds were also made of clay, and being subjected to the above process, were safely used as forms into which softer substances could be pressed, and thus objects were multiplied without difficulty. The almost countless number of figures, bassi-rilievi, lamps, tiles, architectural ornaments, vases, domestic utensils, stamps, &c., which are found of this material (called *terra-cotta*, baked earth), proves the extent of its employment in the earlier ages of art. The objects usually composed of terra-cotta are of small dimensions, but there are instances of its being used for works of considerable size. In the Museo Borbonico at Naples are two statues, of Jupiter and Juno, above six feet high, and two others, one of an actor and the other an actress, above four feet high. They were found at Pompeii. The larger figures are inferior in their forms to the others, but whether the faults of proportion arise from the shrinking or contraction of the clay in baking, or were errors in the original modelling, it is not easy to determine. The specimens of *terra-cotta* preserved in England are for the most part of small size; but there are some very beautiful objects, both for execution and subject, in the Townley collection of the British Museum. It appears highly probable that the antients always, or almost always, painted their *terra-cotta* works. In many instances the colour still remains, and the draperies of figures, and portions of architectural ornament, often exhibit well preserved designs of border patterns. The employment of wax for modelling and casting can be traced to a very remote period. The Romans also employed it for making statues, or perhaps only busts. It was a custom in some families to preserve portraits of their ancestors. They were kept in an apartment in their palaces especially appropriated to this pious purpose, from which they were only removed on particular occasions, such as on the death of a member of the family, when it was considered a mark of distinction to carry before the body of the deceased the representations, or *icones*, of his more eminent predecessors. Pliny alludes to these figures of wax (xxxv., 2). On occasions of ceremony, and at particular festivals, they often were dressed in real drapery. A great proportion of the ornamental work in the buildings of Pompeii is of *stucco* or plaster. On the outer walls of a small temple or chapel in the court of the temple of Isis there were, some few years ago, two stucco bassi-rilievi of considerable size and of good design, but which, by exposure to the atmosphere, and other injuries wantonly inflicted by travellers, are now nearly if not entirely destroyed. Few collections of antiquities are without specimens of figures and ornaments modelled in this material. Some in the British Museum are examples of great delicacy and sharpness of execution. Many of them are painted; red is the prevailing colour.

The list of materials used for *carved* works comprises every substance, hard or soft, that could by possibility be employed for the purpose, including porphyry, basalt, granite, marble, alabaster, ivory, bone, and wood of all kinds. The three first-named were used chiefly by the Egyptians, who seem, in all their monuments of art, to have worked with the view of securing the durability of their productions, employing, whenever they could do so, and especially for works of importance, materials likely to resist the action of the atmosphere. When the introduction of some of the superstitions of Egypt into Rome led to the adoption of the Egyptian style of sculpture, it became the fashion to execute works of art in the above materials; but this did not occur till the reign of Hadrian, before and after which time they are seldom met with.

The variety of marbles known and used by the antients is almost infinite. (Pliny, *Hist. Nat.*, xxxvi. 7.) Those preferred for their superior texture, colour, or applicability to sculpture, were, first, the Parian, which was found in the island of Paros. It is called also Marpessian, from the mountain from which it was brought; and sometimes Lygdinum or Lychneum, perhaps from its bright sparkling appearance. In the second rank was the Pentelic marble, which was procured from Mount Pentelicus, in the neighbourhood of Athens. It was highly esteemed by the sculptors of antiquity. Its colour, like that of the Parian marble, is white; but it usually has a cold bluish tone, arising from the grey, and sometimes greenish, streaks that run through it; while the general hue of the marble of Paros is warm and creamy. The Italians often call the Pentelic marble *marmo salino*, from the salt-like appearance of its grain or crystals. The marble of Mount Hymettus in Attica was also much esteemed; it resembled in colour the Pentelic. After the conquest of Greece by the Romans, this marble was imported in great quantities into Italy. Lucius Crassus introduced it most extensively in the decoration of a palace which he built on the Palatine; an instance of unusual luxury, which was much reflected upon at the time. The marble of Thasos seems to have been much used, especially for architectural purposes. It was employed for covering and encasing edifices, and for lining reservoirs and fish-ponds. The Italian marble was procured from Luna, in the range of mountains near which are the modern towns of Massa and Carrara. These quarries seem to have been unknown till about the time of Julius Cæsar, when they were extensively worked. The grain of the Carrara marble is finer than that of the Greek marbles above mentioned. Its colour is usually a rich white, and it bears a close resemblance to fine lump sugar. It is seldom found quite pure; veins and spots of black, grey, and red and yellow (oxides of iron) occur in it. The produce of the different excavations varies in colour and quality, and large crystals are sometimes met with which resist the chisel. The marble of the antient Luna, where remains of the former working may still be seen, is considered to be finer in grain and more compact in texture than the ordinary Carrara marble. The Romans worked quarries in Africa which produced limestone and white marble with veins of pale grey. The quarries in Greece are no longer worked, and the chief, or it may be said, the only supply of statuary marble is at present from Italy. These were the principal white marbles which were employed by the sculptors of antiquity, and in which some of the finest remains of art are executed.

Among the varieties of wood in which objects were carved, we find oak, cedar, cypress, sycamore, pine, fig, box, and ebony. Cedar was thought to be very durable, and on that account was used, Pliny says, for images of the gods; the same author especially distinguishes cypress, cedar, ebony, and box, for their capability of resisting the injuries of time. (Plin., *Hist. Nat.*, xvi., 40.) Pausanias saw several statues of wood during his travels in Greece, and the following instances will serve to show that this apparently humble material was employed for representing the most elevated personages in the antient mythology. The statue of Apollo Archegetes was composed of ebony, as was the statue of Diana Limnitis. At Lacedæmon the statue of Venus was of cedar. A statue of Apollo made of box adorned the treasury of the Sicyonians in the Altis. In the temple of Castor and Pollux at Argos were their statues, those of their children, and of their mothers, all made of ebony. All these works in wood have perished, notwithstanding Pliny's observation, 'Materiae ipsae aeternitas' (*Hist. Nat.*, xiii. 5). A few however of smaller dimensions have been found in tombs. They are chiefly figures of Egyptian idols; and the wood of which they are made seems to be sycamore. Gold, silver, iron, tin, copper, lead (and their compounds), wax, and plaster were all used for the purpose of *casting*. [BRONZE; FOUNDING.] A mixture of gold and silver, in the proportion of one to five, formed a composition termed *Electrum*. According to Homer, Helen presented to the temple of Minerva at Lindus, in Rhodes, a cup made of electrum, of the exact form and size of one of her own breasts. A mixture of copper and tin, with sometimes, but not always, small portions of other metals, formed what the Greeks called *Chalcos* (χάλκος); the Romans, *Æs;* and modern artists (from the Italians), *Bronze*.

There was a statue of Augustus of *amber;* and at the celebration of funeral ceremonies, as those in honour of Sulla, statues were sometimes made of *gum* and *aromatics*, as well as of other materials of the most combustible nature, as, for instance, of *hay*. Among the strange conceits of artists there is mention of a statue of the goddess of Love made of *loadstone*, which attracted a Mars of *iron*.

The union, or rather, combination of different marbles in the same work was called *polylithic* sculpture. When painting or colouring was resorted to, it was termed *polychromic* sculpture. These mixtures, which modern taste disapproves, were resorted to by the most celebrated artists of antiquity, and during the most flourishing period of sculpture and architecture in Greece. The various architectural members of their temples were picked out in red and blue; and the backgrounds, and frequently parts also of the sculpture itself, especially of rilievi, were coloured, to give further effect to the design. There can be no doubt that the peculiar circumstances of the climate must materially affect the appearance of this kind of decoration. What in the dull atmosphere of northern countries would, at the best of times, appear either dingy or tawdry, might easily be imagined to have a very different effect when seen clearly defined and relieved against a cloudless blue sky, and by the bright glare of a southern sun. The combination, under such favourable circumstances, of white marble, of which the temples were usually constructed, with simple though brilliant colours to indicate the mouldings or smaller members of the architecture and sculpture, sparkling with gold ornaments, certainly offers to the fancy a spectacle of surpassing splendour. It is not quite so easy to reconcile with *our* notions of propriety or good taste the mixture of materials for sculpture *within* buildings, where space, and sometimes light, if the temple were not open in the roof, would be wanting to dissipate the heaviness of effect which it is conceived such works would have. The introduction of foreign substances, either metal, precious stones, paste or glass, for eyes in statues and busts (of which examples occur in works even of the best period of art), is a species of barbarism that is quite unaccountable, and which the most zealous admiration of the genius of the Greeks cannot qualify or excuse. Such instances may however be considered exceptions to the rule of pure taste and simple feeling which is exhibited in the greater number of works by the sculptors of Greece; and modern experience will probably afford the best solution of what would otherwise seem an anomaly, by suggesting that the artists, even of those times, were occasionally dictated to, and their own better taste overruled by the caprice of their employers. It seems difficult to account otherwise for the strange circumstance of the lips as well as the eyes being inlaid. There is more than one example of this among the fine bronzes preserved at Naples.

Inscriptions were sometimes inserted into bronze statues; the letters being of a different metal from the figure. Cicero (*In Verr.*, Orat. iv.) speaks of an Apollo inscribed with the name of Myron. In the collection at Paris is a statue of a youth in bronze, on the left foot of which are the remains of two Greek words, ΑΘΑΝΑΙΑ . ΔΕΚΑΤΑΝ, in silver letters.

There was a very peculiar combination, rather referred to than described by antient authors, by which shades or tints of colour were produced. Plutarch (*Symp.*, lib. v.) says that the sculptor Silanion made a statue of Jocasta, the wife of Laius, king of Thebes, in which she was represented dying. To increase the intensity of the expression of the countenance, the artist, by an ingenious mixture of the metals of which the statue was composed, had produced a pallid appearance. This, he says, was effected by the addition of silver. Callistratus admires a bronze statue of Cupid by Praxiteles, for its elegant position, for the arrangement of the hair, its smile, the fire in its eyes, and, he adds, there was in its countenance a vivid blush. He observes the same thing, and with equal admiration and astonishment, of a statue by Lysippus. After describing the work generally, he says, the cheeks were coloured like the rose, and those who saw it were struck with surprise at seeing the bronze imitate the appearance of nature. The same remarkable effect is noticed in a bronze statue of Bacchus of Praxiteles. To these may be added a statue of Athamas at Delphi, mentioned by Pliny. He was represented sitting after the murder of his son Learchus, whom he had precipitated from a rock. This work, he says, was not entirely of iron; for the artist Aristonidas, wishing to express the effect of confusion and remorse in the countenance of the king, used a mixture of iron and bronze, which should imitate in some measure the blush of shame. (Plin., *Hist. Nat.*, xxxiv. 14.) Other notices might be quoted of this practice of the antients. The writers who refer to these effects describe them as the result of study and intention on the part of the artists, and do not allow us to suppose that the mere accident of oxidation and decomposition produced them. The art seems to be quite distinct from that called *toreutic;* the latter being the union of distinct materials, easily removeable, while the former is described as effecting an amalgamation which produced shades or tints. The few writers who speak of it are certainly general in their observations, and give no technical details of the manner of effecting these combinations; but this hardly justifies the entire rejection of their testimony as to what they saw. It is most probable that they coloured the statues after they were cast, as Pliny says was done in Egypt (xxxiii. 9). The different compartments and objects in the shield of Achilles (*Iliad*, xviii.) are described as exhibiting different colours. This however, whether the passage be Homeric and genuine, or interpolated at a later though antient period, may have been a specimen of *toreutic* art. That the antient sculptors increased, or imagined they increased, the effect of their productions in marble by adding colour, not only tradition but existing monuments testify. It is therefore not only possible but highly probable that they had some process with which we are unacquainted, by which they were able to produce some similar effects in their metal works.

Writers on art have usually been desirous to show that it had its origin in and was derived from some one particular nation; that its principles were by degrees acquired by the various peoples with whom that nation had communication, and its practice carried into distant countries by the accidental intercourse of commerce, war, and colonization. There is no reason for believing this to be the case. There can be no doubt that the intercourse of nations materially affected the style and manner of already existing art; or that where it was not known, its practice may have been thus taught; but experience has proved, by the discovery of examples of imitative art in remote countries that cannot by any apparent possibility have had any communication, that such intercourse is not absolutely necessary for its existence; its invention having been an unaided effort of original feeling, and the exercise of the natural faculty of imitation.

Sculpture, as it was practised by the most antient nations, must be viewed in a very different light from that in which we consider its employment in more modern times. With a comparatively uncivilized and unlettered people sculpture and typical art were the only means of representing ideas, and it had its origin almost in the wants of man. With later nations (even of a remote antiquity) art became in a degree a refinement; and then the various changes and improvements were adopted that now occasion the difficulty in distinguishing between original and engrafted styles.

The few notices that are scattered over the writings of the antients are quite inconclusive as to a common origin of art; although certain received opinions upon the subject are occasionally met with. The very late date of the oldest of these writers, compared with the undoubted antiquity of the arts of design, accounts sufficiently for the difficulties they laboured under in collecting any trustworthy evidence on such points, and for the fables, exaggerations, and contradictions that abound in their statements. The adventures and works attributed to Dædalus, for instance, are a proof of the limited knowledge that existed of the first artist whose name occurs in the annals of Greek sculpture. The inventions and improvements in various useful arts due to a series of artists, and for which a single life would be insufficient, are nevertheless all ascribed to this one individual, who, after all, bore a name that in all probability was merely a general appellation given in early times to any skilful workman or artificer. In the same manner we find the introduction into Italy of the plastic art (simple modelling) attributed by Pliny to a refugee from Corinth at so late a date as about 600 B.C. The arrival in Etruria of Demaratus may have introduced changes or improvements in the fabric and decoration of vases. The names of the artists who are said to have accompanied him, Eucheir and Eugrammus, sound like epithets indicative of skill, rather than simple names of persons. Some writers speak of images having fallen from heaven. These several instances are referred to in order to show that even where tradition had supplied scattered and undefined notices of works of art of a remote date, they had become so subject to change and misrepresentation as succeeding generations received and in their turn again recorded them, that it would be vain to place any dependence upon them for a history of the origin of art. The inquiry into the precise time, the country, the circumstances when the first efforts in sculpture were made, must therefore be attended with almost insuperable difficulties. Not so the establishment, at a later period, of epochs marked by changes in style, and what artists call treatment.

The desire to perpetuate the memory of extraordinary events, of remarkable persons, or of their actions; to honour heroes and benefactors even during their lives, and to hand down to future ages the fame of their exploits, has been universal, and has rendered the arts by which such an end could be attained objects of universal interest. The first works applied to this purpose were no doubt marked by the greatest simplicity. The oldest and most authentic histories speak of monuments erected to mark the scene of any remarkable incident; and although, at the early periods referred to, these monuments were only composed of rude blocks, or mere heaps of stones, still to such a simple commencement may doubtless, in a great measure, be traced the origin of sculpture. Jacob set up a heap of stones at Bethel to mark the spot where he had had his dream or vision. (*Gen.*, xxviii. 18.) A similar simple memorial of a pillar and a heap of stones commemorated the covenant entered into between Jacob and Laban. (*Gen.*, xxxi. 44.) A similar monument was built over the grave of Rachel. (*Gen.*, xxxv. 20.) Joshua also set up a great stone under an oak, 'to be a witness.' (*Josh.*, xxiv. 27.) As late as the time of Pausanias, about A.D. 170, certain of the Grecian divinities were worshipped under the form of rude blocks or mere columns, or stones set upright (Paus., vii. 22); and even in the present day the custom exists in some countries of setting up a heap of stones to mark the spot where any extraordinary accident, such for example as a death from violence, has occurred. These are frequent in Italy, where the passer-by usually adds another stone to the heap, at the same time repeating a prayer for the repose of the soul of the deceased.

It has been said that the history of sculpture is almost the history of idolatry. Religious feeling doubtless had its share in forwarding the progress of the arts; for man, even in his rudest state, always has a belief that good and evil emanate from some superior power; and, unable to comprehend a divine essence or spirit, has by degrees been led to offer his addresses to some visible object as its representative. But it seems probable that the first images or statues were of men rather than of gods; and thus that human idols preceded those of divinities. This supposition is strengthened by the fact that the heavenly bodies were the earliest objects of worship among the heathen nations; and the symbols that were afterwards dedicated to them were most likely merely pillars of a conical or pyramidal form, and not imitations of the human figure; and when such works are referred to and called 'graven images' by Moses, it has ingeniously been supposed to be in allusion to the signs or hieroglyphics inscribed or cut on them. The sun was worshipped at Emesa under the form of a black conical stone with marks to represent the sun. (Herodian, v. 6; Gibbon, vol. i., c. vi.)

Traditional accounts of wonderful feats in arms, the real or fabled history of a conqueror, or a lawgiver, or the founder of a nation, led in all probability to the first attempts at making a portrait figure or image, which a rude and uninformed people, always attracted by the marvellous, associating with it actions of supernatural prowess, would soon learn to contemplate with feelings both of admiration and of awe.

Extraordinary respect would lead to the payment of extraordinary honours; and the elevation of heroes into divinities would be attended with little difficulty when time had obscured the real existence of the personages and weakened the remembrance of their actions. The imagination would easily be worked upon while the eye contemplated these first rude attempts at form; and thus men would be elevated into gods.

The oldest idols of Egypt, no less than the monstrous images of the Buddhists and Chinese, were probably, in the natural progress of superstition, the fruits of a similar origin. The general forms once admitted and consecrated, as symbolical of divine attributes, were afterwards, in some instances, preserved from innovation by the influence of the hierarchical institutions; and thus was a barrier raised which for a long period was fatal to the progress of imitative art. We are accustomed to look to the East as the nursery in which art and science had their origin; and it is probable that much in the Egyptian and even in the Grecian religious systems was derived from this source. In the representations of the deities of the Hindus, the human form is frequently combined with the brute,—the union of intelligence and force; and, as we know was the case with the Egyptians, the Hindu artists seem to have been subjected to some limitations and to a prescribed type. In all statues and rilievi that remain, many of which must have been executed at distant periods, there is the same prevailing character of form, expression, and attributes; while out of the immediate pale of their mythological or sacred system they appear to have been less restricted; and some of the sculptures at Ellora and Elephanta exhibit a feeling for composition, and a power of expressing character, which make it surprising that their sculpture never attained higher excellence. The caves that contain the most interesting of these remains are of great extent. They are divided into compartments, or aisles, by ranges of massive columns, closely resembling the heavy proportions found in Egyptian buildings. They are decorated with sculpture relating to various personages of their mythology or to religious mysteries. These are for the most part of a prescribed form and character; but among the deviations from strictly sacred subjects are some of considerable interest owing to the greater knowledge of art displayed in them.

In turning to the inspired writings, we find allusion made to imitative art in the earliest period of history. The Israelites, after the Exodus, are warned against the superstitions and corruptions that had by degrees crept in and deformed their primitive simple forms of worship, and are exhorted to return to a pure devotion, as for instance in the book of Joshua (xxiv. 2, 14, 15, 23).

Rachel, when she left her father's house with Jacob and Leah, carried away 'the images;' and Laban pursued them in order to recover objects upon which he seems to have set a high value. This, we believe, is the earliest notice in the holy writings of the existence of such things, and even here we have no particulars by which any idea can be formed of what they were like or of what materials they were made. That they were small is evident from the circumstance of Rachel being able to carry them away unobserved, as well as from the facility with which they were concealed when Laban 'searched all the tent, and found them not.'

No remains of Hebrew sculpture are known; but as early as the time of Moses they had attained to a considerable proficiency in some of the most difficult processes of art. The setting up of the molten calf, and the making of the brazen serpent, are evidence of this. The earliest recorded names of sculptors are in the Old Testament; Bezaleel the son of Uri, of the tribe of Judah, and Aholiab the son of Ahisamach, of the tribe of Dan. (*Exod.*, xxvi.) They were the artists appointed to make the ornaments of the Tabernacle, and their date is therefore about fifteen hundred years before the Christian æra.

The most careful examination of the site and ruins of antient Babylon fails to discover any remains which illustrate the state of the arts in that celebrated city. The Bible and Herodotus are the only antient records that can safely be trusted to on this subject, and these supply only scanty information upon such minute points as are necessary to make us acquainted with the early practice and subsequent progress of design. Of other antient writers upon Babylon, Diodorus Siculus is the most valuable for detail; but he is not entitled to equal credit with Herodotus, for never having visited Babylon in person, he follows, in this part of his history, the account of Ctesias [CTESIAS], who does not appear to have been a critical writer. Herodotus visited Babylon while it was in a state of tolerable preservation. He speaks (i. 79, &c.) of the 'hundred gates in the walls, all of bronze,' and of the temple of 'Jupiter Belus, which has brazen gates.' In describing this Babylonian temple, he says, 'there is a large golden statue of the god seated, and by it a golden table, and the step of the chair and the chair are of gold.' He alludes also to another statue of solid gold, twelve cubits high, which he says he did not see, but he repeats what was told him by the Chaldæans. Darius, the son of Hystaspes, had designs upon this statue, but he did not remove it. His son Xerxes seized it, and slew the priest who attempted to resist its removal. Diodorus (ii. 9, &c.) describes the riches which adorned the palaces and gardens of Semiramis, consisting of statues of Belus, Ninus, and of Semiramis herself—of sculptures in relief, and painted, representing various animals—of works in gold, in silver, and in bronze, many of which were of large dimensions. Admitting there is much exaggeration in the account of Ctesias, who seems to have attributed all the works spoken of to the time of the most antient Semiramis, there can still be no doubt that the arts of design had at least been practised to a great extent during the antient Assyrian monarchy. Perfection can only be attained by slow degrees, and by successive efforts, and such works as are alluded to by Diodorus, though they are distinguished by the names of the earlier and greatest sovereigns, may more probably be attributed to a later date. There are some curious and interesting particulars respecting the customs of the Babylonians, in dressing up and parading the images of the gods, at a later period of their history, in the complaint of Baruch (chap. vi., 4, 8): 'Now shall ye see in Babylon gods of silver, and of gold, and of wood, borne upon shoulders, which cause the nations to fear;' 'they themselves are gilded, and laid over with gold;' 'covered with purple raiment,' &c., &c. Baruch wrote about B.C. 607.

From the peculiar position held by the Phœnicians, and their character for enterprise and ingenuity, it is much to be regretted that we possess no specimens of their design. The coins of Carthage, a colony of Phœnicia, are of too late a date and of too insignificant a character to throw any light upon the condition of sculpture among the parent people; and we can therefore only estimate their proficiency in all ingenious pursuits from the encomiums so generally passed upon them by antient writers. While the neighbouring people were in a state of primitive simplicity or of profound ignorance, the Phœnicians seem, by a native industry and disposition to exertion, to have made themselves celebrated for their arts and manufactures. Their country was the great mart and magazine of the known world. The prophet Ezekiel apostrophises Tyre as a 'merchant of the people for many isles.'—'The ships of Tarshish,' he says, 'did sing of thee in thy market; and thou wast replenished and made very glorious in the midst of the seas.' Homer (*Iliad*, xxiii. 743) calls them 'the *Sidonians*, the skilful workers or artificers' (Σιδόνες πολυδαίδαλοι), when he speaks of them as having made an elaborately worked silver cup. Solomon sent to Hiram, king of Tyre, for workmen to build and decorate his magnificent temple; and the king sent him a 'cunning' man, skilful to work in gold, silver, brass, iron, stone, and timber. (2 *Chron.* ii. 13; and 1 *Kings*, vii.) The building of Solomon's temple took place about one thousand years before the Christian æra.

With the exception of the Hindus, our remarks have thus far been confined to those nations among whom sculpture is known to have been practised, but of whose art no monuments remain. We are now about to enter upon a more interesting field of inquiry. Sculpture had in its first stage (when, as we believe, each people who employed it originated it for themselves) fulfilled its purpose as a sign or a record. Afterwards it acquired an increased dignity from being used to represent objects claiming admiration or respect; and it was in this stage probably that valuable materials were first used for sculpture. The progress was easy to employing it for decoration, and the Babylonians and Hebrews made great use of it for this purpose. But as yet no practical knowledge has been gained with respect to its progress as an art of design; of the changes from primitive rudeness to defined form and character; nor of the innovations or varieties in feeling or practice occasioned by the intercourse of hitherto strange and unknown nations.

The style of sculpture and the condition of the art at different periods among the Persians, the Egyptians, the Etrurians, the Greeks, and the Romans, can fortunately be illustrated by reference to existing remains. Each of these people had their peculiar manner, which has given a character of *school* to their productions. In all of them the practice of art was more or less influenced by the priests, and by local and popular religious opinions; and it will be interesting to trace how far these influences affected the progress of sculpture, by restraining, as they did in some instances, its advancement towards perfection even as an imitative art; or in urging it forward, as among the Greeks, till it reached its highest excellence, by the union of subject, form, and expression, as a means of gratifying sense, exciting feeling, and elevating sentiment.

Sculpture was practised in Persia with very limited success. Various circumstances conspired to retard its progress. The Persians disapproved of statues for religious purposes; that is, as objects to which worship should be offered. Not believing, as the Greeks did, that the gods had the human form, they admitted no representation of the deity, and allowed fire and water to be the only symbols or emblems of the divine power. It is said that Xerxes destroyed the temples of Greece at the instigation of the Magi, who exclaimed against the impiety of those who presumed to enclose within walls the gods to whom all things are open and free, and whose appropriate temple is the whole universe. Wherever they appeared as conquerors, the effects of this opinion were exhibited; and in Egypt, as well as in Greece, they gave full indulgence to the iconoclastic fury. It is not easy to determine the date of such sculptures as appear on Persian buildings. Those which decorate the structures at Persepolis represent religious processions chiefly, and sometimes combats both of men and beasts. In none of them is there any approach to a representation of the naked human figure. Their figures, enveloped in long heavy draperies, are deficient in grace, variety of action, and character. At a later period of their history some innovations seem to have been permitted, but these were not of sufficient importance to raise their art to any degree of excellence. The low measure of their attainments in this respect, and the general want of taste in art, are strikingly exhibited in the gold coins called *Darics*, which display as much poverty of design as meanness and clumsiness of execution. It has been thought that Persian art received some additions or modifications after the return of Cambyses from Egypt, when he probably was accompanied by some of the artists of that comparatively cultivated nation. There is however nothing in any of the monuments that remain which is evidence of this influence. In the treatment of the termination of the hair in small round shell-like knobs, and in the parallelism and uniformity of the long draperies, there is a strong resemblance between the styles of the Persian and early Greek and Etruscan monuments. If this is anything more than a general characteristic of primitive art, it only proves that the Persians were at one period not far inferior to their neighbours, but failed to make that progress in design and execution which eventually led to the perfection of art in Greece and Asia Minor. Pleased with display and empty parade, the Persians, as a nation, were never eminent for high intellectual acquirements or refined taste. From these remarks it appears that the Persians contributed little or nothing to the advancement of art; and indeed they hardly deserve to be mentioned in connection with the great schools of design. Still, as few collections are without specimens of their productions, it might not be right to omit all allusion to them. Their works are curious as examples of art, but they cannot justly be considered as a link in the chain of its history.

In Egypt, on the other hand, distinct as is the quality of its art from that of Greece, sculpture was practised on a scale and for purposes that give it an irresistible claim to our interest. From all we read in antient authors, and from all that modern research has brought to light (and we are receiving, almost daily, fresh accessions to our knowledge), the Egyptians were learned, intelligent, industrious, and wealthy. Neighbouring nations considered Egypt as the centre and the source of all knowledge; and 'the wisdom of the Egyptians' passed into a proverb. Of the power and the ingenuity of the Egyptians, even in the most archaic times, some idea may be formed from the magnitude and character of their remaining monuments of architecture and sculpture, some of which, of a finished style of art, are considered to be not only of a much earlier date than any known works of other countries, but older than any historical record that we possess. The date of the foundation of Thebes, the capital of Upper Egypt, and of Memphis, the capital of Lower Egypt, is undetermined; but it must be of a very high antiquity. At Karnak (a portion of Thebes lying on the Arabian side of the Nile) there are remains of sculpture which bear the name (Osirtasen) of a monarch supposed to have been contemporary with Joseph; and many of the ruins are attributed by archæologists to a date long antecedent to that king. These monuments are mentioned merely in proof of the great antiquity of sculpture among the Egyptians, and as affording the opportunity of comparing the peculiarities of the style of art at that early time with that of works of later date.

Winckelman, Millin, and Fea have thought it possible to distinguish different periods, or epochs, in the history of Egyptian sculpture; but they have not agreed in their classification. This is not to be wondered at, when the general resemblance of style that pervades all Egyptian design is considered. In the course of ages, and especially under some of the more ambitious and enlightened of their kings, a grander style of form and greater variety of composition were indulged in. Still, the very slight variations that were made (for, considering the space of time over which the history of Egypt, as a flourishing nation, extends, they may truly be called slight) render any attempt at a satisfactory classification, or reduction of changes to chronological periods, almost hopeless. In the arrangements of the above antiquaries, much more importance is allowed to the influence exercised on the arts by Cambyses than is reconcilable with authority. He endeavoured to abolish many of the customs and even to interfere with the religion of the Egyptians; but that he occasioned any change in their style of art is not hinted at by Herodotus or any other antient writer. It must also be remembered that those innovations which the conquests of Cambyses enabled him to introduce were of no great duration, for his successor Darius permitted the Egyptians to return to their own habits and usages; and it is remarkable, and confirmatory of this view that the Egyptians were but little affected by the residence of the Persians in their country, that Plato (*Laws*, ii.), speaking of the strong attachment which the Egyptians had for all their most antient customs, observes that no change had taken place for ages. Plato lived about one hundred and twenty years after Cambyses, so that his testimony on this point is valuable. The only division of epochs of art in Egypt which is not open to dispute is, first, that of an original and preserved standard which, with slight variations and modifications, existed from the earliest date of art in the country down to the time of the arrival of the Macedonian Greeks in Egypt, that is, till about 330 B.C. The Greek dominion in Egypt constitutes the second period; and the style of art may perhaps not inappropriately be called Greco-Egyptian, as it certainly was influenced by the taste introduced by that people. The next and last period may be termed the pseudo-Egyptian, or imitative period; and dates from the time of Hadrian, or about A.D. 130, when the Romans adopted many of the superstitions of the Egyptians, and added some of their divinities to their own extensive mythological calendar. This love of novelty, or subserviency to the caprices of their emperor, filled the cities and villas of Italy with statues of Isis, Osiris, and other personages and objects of Egyptian worship. No advantage however was gained by Egyptian art in consequence of the springing up of this fashion in Rome. The great endeavour was rather to give all design an Egyptian character, than to elevate the character of Egyptian art by the introduction of a superior taste either in form or composition. The most favourable specimen of the mixed style is the fine statue of the Egyptian Antinous, as it is called; but, founded on caprice and false principles, the Roman or pseudo-Egyptian manner soon fell into disuse, and has never been resumed. It will be remarked that in all the changes of circumstances to which we have referred, and by which the political condition of Egypt was materially affected, no sufficient alterations occurred to destroy the peculiar and distinctive character of Egyptian art, which exists in all its force, whether the works be of the most remote archaic period and of the whole range of time to Alexander the Great, of the time of the Ptolemies, or even the still more modern period of Hadrian.

It is indeed matter of surprise that a nation so celebrated as the Egyptians for superior intelligence, and of such long experience in the practice of the arts, should have made so little progress in them; and the phenomenon would be quite inexplicable if we were not acquainted with the nature of their institutions, and the check which was thus opposed to their advancement beyond a certain limit. The common speculations that have been offered with the view of accounting for the acknowledged inferiority of the Egyptians to the Greeks are altogether unsatisfactory, even if the facts upon which they are founded could be admitted. Some have supposed the absence of grace and the stiff uniformity of action in Egyptian design to be owing to the want of beauty in the natives of Egypt. Others have imagined that the artist's want of knowledge of anatomy, and there being no public games in which they could study the human figure, are sufficient to account for this inferiority; attributing to physical causes alone that which was effected by very different influences. The art of sculpture especially seems to have been employed exclusively for religious purposes. The priests, an hereditary body, systematically enforced the preservation of antient usages, and confirmed their hold upon the respect, obedience, and veneration of the people by not suffering any innovation upon old established forms. The whole population was divided into castes, and a calling or profession was exercised from generation to generation. The sons were all obliged to follow the steps of a father. The order of these castes is variously stated by different writers. The sacerdotal of course ranked first. According to Synesius, the profession of an artist was not exercised by common or illiterate persons, lest they should attempt anything contrary to the laws and regulations regarding the figures of the gods; and Plato, in his second book of Laws, says, 'they never suffered any painters or statuaries to innovate anything in their art, or to invent any new subjects or any new habits. Hence the art remains the same; the rules of it the same.' Here then we see the real cause of the duration through a series of years of one unchanged style of art. The origin of the form preserved through so many ages is declared by its extreme simplicity. The earliest attempt at representing the human figure would be marked by the absence of action; and this is the characteristic of all Egyptian statues. The figure is upright, or kneeling, or sitting. The legs are close together, and the arms are attached to the body. This then became the established type; and though some slight movement was occasionally allowed, as in advancing one foot before the other, it hardly can be said to relieve the so improved figure from the stiffness of the more primitive standard. That there was a capability in the artists for mechanical excellence is amply proved by the more elegant forms that sometimes are met with even in Egyptian statues, but more especially in those works where they could without impropriety indulge their fancy. The heads of divine personages occasionally beam with majesty and grace; and in the examples in the British Museum of Egyptian monuments, whether in the head of the so-called Young Memnon, or in the Prudhoe Lions and other representations of animals, or in some of the compositions portraying scenes of active life, the student will perceive that some other cause than want of feeling or skill must have operated to prevent the sculptor of Egypt from arriving at the same eminence in art that was attained by the artists of Greece. The stiff and limited action of Egyptian statues has already been noticed. To this must be added, that the figures of men are usually naked, excepting that a sort of apron is folded across the loins; while those of women are represented dressed in a long and simple garment fitted close to the body. This covering has no folds in it, and can only be distinguished from the figure by a slightly raised border at the neck and feet. The form of the breasts is sometimes indicated on the dress by their natural projection being circumscribed by an indented line. One of the most interesting specimens of Egyptian sculpture is now in this country. It is generally known as the head of the Young Memnon, though it has no claim to that title, which was given it from a mistake made by Norden, the traveller, who visited Egypt in 1737. This bust is formed of a single block of fine-grained granite, containing two strata of colour, one portion being of a red, the other of a grey (or blue) cast. Though it possesses all the characteristics which so eminently distinguish Egyptian sculpture—the flat eyebrows, projecting eyeballs, the rounded nose, thick lips, and the ears placed high up, this head claims admiration for beauty of outline and the peculiar sweetness of its expression. It offers a remarkable exception to the general rule of Egyptian design; and shows, what has before been hinted at, that there was the power of representing beauty both of form and sentiment, if room had been allowed for its exercise. In working basso-rilievo (and pictures) the Egyptian artists decidedly ventured beyond the limitations to which they seem to have been confined in representing insulated figures. Almost all the temples and tombs that have been explored are richly decorated with sculptures in the peculiar style of rilievo to which allusion has been made in the introductory part of this article; and, although they do not materially differ in the general style and character of art, they are sufficiently varied in the mode of treatment to warrant this distinct notice of them. The most striking difference from the insulated figures consists in the superiority as well as extent of design and composition. This is particularly observable in the Theban remains, to which attention has been directed by Wilkinson, Rossellini, and others who have illustrated the history, arts, and customs of the antient Egyptians. Wilkinson, speaking of Luq'sor and Karnak, observes as to the decorations of the temple, 'The principal historical sculptures are on the exterior of the great hall. . . . . . The upper compartment represents the king attacking a fortified town situated on a rock which is surrounded by a wood, and lies in the immediate vicinity of the mountains.' In another compartment the king is again the hero, and is represented slaying the chief of the enemy with his sword, having first wounded him with his spear, and entangled him with his bowstring. The author observes here that the drawing of these figures is remarkably spirited. After other series or compartments, in which the Egyptian monarch is seen scattering death among his enemies, is a representation of his return, and the presentation, by him, of captives and spoils to the deities of Thebes.

All colossal works in Egypt are of basalt, porphyry, granite, or sandstone; though Herodotus (ii. 148) tells us that at Saïs and at Thebes there were statues, of large dimensions, of wood. We are not aware that any large statues have been found made of metal. The British Museum possesses three bronze figures which merit attention as they exceed the usual dimensions of such Egyptian works; being about three feet high, and gilt. The substance or thickness of the metal is not great, and the interior is filled up with stucco or plaster. The gilding, some of which is well preserved, both in surface and colour, seems to have been applied as a wash; the bronze having first been entirely covered with a coat of plaster about as thick as a card.

The clean execution and exceedingly fine surface observable in the sculptures of Egypt has attracted the attention of practical judges; and has led to the conviction that the Egyptians must have had great knowledge in the arts of hardening or tempering metal, to enable them to execute such highly finished works in the most obstinate and brittle materials. It is a remarkable fact that when the colossal head before alluded to as the Young Memnon was placed in the British Museum, and it was necessary to cut some holes in it for the insertion of iron cramps to unite some of the broken fragments, the hardness of the granite was so great that six or eight blows rendered the mason's tools (which were tempered more highly than usual) totally useless.

The facilities that are now afforded the student and public for examining authentic monuments of Egyptian art, in the extensive and valuable collection in the British Museum, render it unnecessary to dwell at greater length upon the peculiarities of that school of design. That their works are wanting in the grace, the flow of lines, and the beauty united with repose, that constitute the charm of the best Grecian sculpture, must at once be admitted; but the simplicity and clearness of intention in their more extensive compositions, and the sublime grandeur, repose, and dignity of their colossal statues, so appropriate to their mystic and religious purposes, will always ensure their being considered amongst the most interesting monuments of past ages.

Etruscan Sculpture.—The Etruscan is the next school of sculpture that claims attention. The history of this nation is involved in great obscurity. The appellations of Tuscan and Etruscan were foreign to them, and Etruria was a Roman term. The more antient name by which they were called was *Rasenæ* (Ῥασηναι). Their later history is chiefly known from their connection with other nations; for, as they either never cultivated a literature, or their writings have perished, there are no direct means of attaining information respecting them; the few inscriptions that are found on their monuments being even less intelligible than are now the hieroglyphics of Egypt. The discoveries that have been made, especially of late years, in the old towns of Etruria, not only of architectural remains, but of tombs and sepulchral chambers, containing vases, arms, armour, ornaments, and paintings, have partially rewarded the diligence and kept alive the zeal of scholars; but though these memorials are of the highest interest as evidence of the ingenuity and the wealth of the former inhabitants of the country, it must be admitted that they have thrown but little light on the main question of the origin of this remarkable people. Even in antient times it was disputed whether the Etrurians were Pelasgians from Greece, Lydians from Asia, or indigenous in Italy; and modern antiquaries have added to these speculations their conjectures as to a Phœnician, an Egyptian, and a Celtic origin. It will be sufficient to mention the names of Micali, Lanzi, Inghirami, Niebuhr, and Müller, among the modern writers on the history of the Etrurians. An examination of their sculpture, as founded on the numerous existing monuments, almost seems to connect them, in a greater or less degree, with the Greeks. Whether the Etrurians at any time possessed a mythology and style of design on which Greek 'myths' and forms were subsequently engrafted, or whether each nation retained principles originally common to both, is not important in this part of our inquiry. The supporters of the more remote antiquity and superior intelligence of the Etrurians have supposed it possible that this people, instead of being taught by them, were at one time the instructors of the Greeks, amongst whom, in consequence of their wars, internal divisions, and other disturbing causes, the arts were neglected, and probably suffered to fall to decay, while Etruria had enjoyed a state of comparative repose, favourable to the advancement of the arts. Among the great difficulties with which this part of the subject is embarrassed, is that of establishing with any certainty the dates of the settlement of Greeks in Etruria. It certainly is remarkable that the cinerary urns found in sepulchral chambers often have represented on them subjects whose meaning is unknown, and which seem to have no affinity at least with the *post-Homeric* Greek mythology; and so far the practice of art and a class of symbols seem to have existed in Etruria, either essentially its own, or, if ever shared with others, so antient that all record of it was lost, excepting as it appears on these older Etruscan monuments.

The history of the known Etruscan school of sculpture is therefore necessarily founded on the character of the majority of existing specimens; and in these the recurrence of similar subjects and personages, resemblance of costume, and the common form of many of the letters of the Etruscan and Greek alphabets, distinctly establish the fact of some communication between the two nations. Lanzi (*Notizie sulla Scultura degli Antichi*) divides the art of Etruria into epochs or periods, and considers the second to be that which was influenced by colonies from Greece; and it is this influence which is so observable in the monuments referred to.

In observing however that all or nearly all the specimens of Etrurian art that have reached our times indicate a connection or intercourse at some period between that country and the Greeks, it may be well to repeat a remark that has incidentally been made in a former part of this history,—to caution the student from too hastily attributing to different nations a common origin of design, from the mere similarity of certain forms and corresponding particulars of execution which may perchance be recognised or discovered in their primitive attempts at art. It must always be borne in mind that this appearance is often nothing more than the general characteristic of all art in its infancy; the same, or nearly so, in Greece, in India, in Etruria, as in all other countries. These mechanical resemblances teach little or nothing. The learned Lanzi has very justly taken the same view of the subject in his observations on similarity of style; and, in combating the conjecture that Etruscan art had been derived from Egypt, another distinguished Italian historian of sculpture, the Count Cicognara, says, 'The supposition that the Etrurians derived their arts and their design from Egypt is unfounded, since, as Lanzi intimates, the hardness or stiffness and straightness of the forms need not to come to us from the Nile: in the first attempts at art among all nations we see the same character; that style or manner being (or showing) not so much art as the absence or want of it.' (*Storia della Scultura*, vol. i.) Lanzi also observes, in speaking of the sculpture of this school (*Notizie sulla Scultura degli Antichi*), that a distinction must be made between works in the Etruscan style and works simply executed by Etrurian artists. The 'Etruscan style' was a peculiar manner of treating art. It was designated by the Latins 'Tuscanicus;' and all works executed in this manner were termed 'opera' or 'signa Tuscanica.' That this distinctive character of school existed, and was recognised as a peculiar feature in art, is confirmed by a passage in Quintilian, in which that writer is particularizing the style of some of the great sculptors of Greece, and showing the changes or progress that distinguished the earlier from the later masters. He says, 'Callon and Egesias made their statues hard' (a technical term meaning stiff and severe), 'and nearly approximating to the Tuscan figures. Calamis made his works less rigid.' (Quintil., *Orat.*, lib. xii., 10.) The peculiar characteristics of the Etruscan style,—the *signa Tuscanica*,—are an affectation or exaggeration in the general actions and attitudes, and meagreness of treatment in the details. In the heads, whether of male or female figures, the hair is usually stringy; or plaited, and falling in long tails or lengths. The hands are placed in the least natural position for the purpose on which they are employed, and the ends of the fingers are often turned up in the most unnatural and therefore ungraceful manner. The draperies are cast without any regard to masses or agreeable forms, and always appear as if they had been put on wet and starched, and had stiffened in drying; the edges are very much shown, and in the falling or perpendicular views appear in regular and corresponding zigzag lines. Many points of resemblance to the above works of the *signa Tuscanica* will be found in early Greek art, especially that of the Æginetan school. With these however this indication of primitive style passed away as the knowledge of art advanced, while the Etruscan manner was retained, and even imitated in many works of a much later period than the original Tuscan, and by artists belonging to schools of a more perfected taste. As a general remark, it may be observed that productions in the Etruscan style are very deficient in beauty. They neither exhibit the repose and simplicity which, notwithstanding its other deficiencies, give dignity to Egyptian, nor the fine forms and sentiment which ennoble Grecian sculpture; and whatever interest they excite is derived rather from the value that attaches to them in an archæological point of view, than from any merit that they possess as works of art.

It has been observed that some Etruscan works are found to differ from these in the style of their execution. This is particularly observable in the recumbent figures that have been discovered in the Volterran and other Etruscan tombs and hypogæa. Some of these are small, but many are of large size, and usually decorate the lid of the coffin, or sarcophagus, in which the ashes and sometimes the body of the deceased were deposited; closely resembling in this respect the style of monumental sculpture in Europe in the fifteenth and sixteenth centuries. In these figures there is a totally different character, both in form and expression, from the true Etruscan monuments. The heads frequently possess great beauty; there is often a strong character of nature in them, and it seems probable that they were intended to be portraits of those whose tombs they surmount. Many of them show marks of having been painted. The age of these works is undetermined. From the locality in which they have been found, and from the inscriptions which they bear, they would seem to belong to remote times of Etruscan dominion. In other respects, as in the general heaviness of the forms and clumsiness of drapery, they call to mind the style of art of a low Roman period; to which time, indeed, some antiquaries have at once assigned them. The question is not unattended with difficulty. There is every reason to believe that the antient tombs of Etruria had been invaded, and in many instances opened and plundered, long before they were rediscovered by our modern archæologists and collectors. It is also probable that many of them have been used as depositories of the dead by a people much more modern than their original constructors. Objects have been found in them of various ages, from which it would appear either that many of the tombs and sarcophagi are really of a later date than usually has been supposed, or that the antient burying-places have been used for the dead of a more modern race.

It is worthy of remark, as it may account in a great measure for the distinctive quality of Etruscan art, that Etruria, like Egypt, was ruled by a powerful hierarchy. Their chiefs, *Lucumones*, were priests as well as temporal rulers, and they may, like their Egyptian brethren, have exercised some influence in directing art, and in preserving from innovation the forms once consecrated by religion. It is at the same time probable that this influence was not so restrictive in Etruria as it was in Egypt; for the varieties that are found in works of art prove that the artists here took greater liberty than was permitted to those of Egypt. This appears to be the most reasonable way of accounting for the continuance of a distinctive style and limited progress of design among a people who were eminently clever (φιλοτεχναι) and ingenious. Considered in this point of view, Etruscan sculpture holds a position of great interest in the history of art. It is impossible not to recognise in it the connecting link between two systems, namely, the practice of art for hieratic or purely sacred purposes, and that more liberal and general development of it which, under the later and more refined Greeks, was directed to the illustration of the most poetical and sublime conceptions through the medium of the most beautiful forms. Of the great extent of their practice in sculpture a sufficient proo is afforded by the fact mentioned by historians that when after having sustained long and expensive wars against the Romans, the Etrurians were finally subdued by them, and became a Roman province (about 280 B.C.), two thousand statues were taken by the victors from Volsinii alone. (Plin., *Hist. Nat.*, xxxiv. 7.)

The Etrurians were famed for their skill in making vases, and different towns became celebrated for peculiarities o manufacture. (Plin., *Hist. Nat.*, xxxv. 45.) There is however reason for believing the greater number of painted *terra-cotta* vases, usually called Etruscan, from being first discovered in Etruria, to be Greek. Their subjects, their style of painting and design, evidently connect them with that people; and it has been observed, that though the Etrurians inscribed every other work of art with their own characters, there is scarcely an instance of a painted vase with any other than a Greek inscription. The Arezzo (Arretium) vases are of a fine clay of a red colour, but the figures are in relief: many of these are of a comparatively late period, and bear Latin inscriptions. (Inghirami.) The arrival in Etruria of Demaratus with artists from Corinth has been assigned as the date of the introduction of the art of making vases, and of other processes in the plastic art. It is, however, more probable that they only effected some changes in the style of design that already prevailed; for modern discoveries seem to establish the existence in Etruria of a manufacture of cinerary urns and vases long anterior to the appearance of the refugees from Corinth. (Lanzi, *l. c.*; Winckelman, *Storia della Scultura*; Mrs. H. Gray, *Tombs of Etruria*.)

The Gallery of Antiquities at Florence contains some extremely curious specimens of Etruscan sculpture, especially in some figures of large size in bronze. Some of these have inscriptions on them. The bronze she-wolf, preserved in the Capitol at Rome, is also a remarkable example of antient art in the Etruscan manner. The extensive discoveries that have been made in different parts of Tuscany of late years have likewise added greatly to our knowledge of the Etruscan art and customs, and have enriched the museums of Rome, Naples, Florence, and even England, with most interesting records of this remarkable people. The remains preserved in these and in private collections are well worthy of attention, but a detailed description of them belongs rather to the general history of the country and its antiquities.

The works in sculpture of the Etrurians are chiefly in *terra-cotta*, stone, and bronze; and the most antient tombs have supplied some exquisitely worked ornaments in gold, as well as larger pieces of armour of the same costly material.

Greek Sculpture.—In the preceding pages we have had rather to notice its existence than to trace the progress of sculpture; for, with very limited exceptions, its practice was under circumstances so little favourable for its improvement, that it is scarcely possible to connect it, in any way, with the refined pursuit which it afterwards became in the hands of the Greeks. In other countries it never advanced beyond certain limits; mere representations of objects were produced, seldom elevated by sentiment or feeling; and if, sometimes, the rudeness of first attempts at form was overcome, the art still remained in fetters. In Greece, on the other hand, sculpture soon rose superior to all those prejudices that would have restricted its advancement. With this gifted people it became something more than a merely mechanical pursuit. It was here that the conceptions of sublime and glowing fancies were embodied in the productions of what may truly be termed a race of poet-artists. Writers have endeavoured to account in various ways for this universally admitted superiority of the Greeks over every other nation among whom the fine arts have been practised, and usually have attributed their success to such physical causes as a fine climate, or the prevalence of beautiful forms, or to the public exercises so general in that country; or to the kind of government in those communities in which the arts were most successfully cultivated. Valuable as some of these conditions must be allowed to be towards the perfection of art, they are by no means sufficient to account for an excellence which, even amongst the Greeks, was both extremely partial with respect to locality and extent, and limited as to its duration. Nor were those particular states in which the arts of design most flourished, peculiarly favoured beyond others in the causes supposed to contribute to that excellence. The climate of Attica, it is admitted, was unequal; and though vegetation appeared in the greatest luxuriance in some spots, in others the soil was barren and naked. With regard to beauty, too, there is no reason to believe that the people who most excelled in the fine arts (namely, the Athenians) were distinguished beyond all other Grecians for this quality. Cicero, indeed, makes a very remarkable observation which would go far to prove that the contrary was the fact. He says, speaking of the crowd of young men whom he saw at Athens, how few there were who were really handsome. (*De Nat. Deor.*, lib. ii., c. 79.) And it is curious also that of all the women whose celebrity for beauty has reached us, not one appears to support in this respect the honour of Athens. Phryne was a native of Thebes, Glycera of Thespiæ, Aspasia was born at Miletus, and when Zeuxis, the painter, desired to procure the most beautiful models for his Venus, it is said he produced his masterpiece from the study of seven virgins of Crotona. It is not intended to deny the existence of beautiful forms amongst the Athenians, but simply to show that it is not to this exclusive possession that their success in the imitative arts can justly be attributed. The admiration of beauty amongst the Lacedæmonians is admitted (Ælian, *Var. Hist.*, xiv. 27; and *Athen.*, xii. 12); but the fine arts were not permitted to be practised in Sparta. In other parts of Greece also personal beauty conferred a title to distinction; the priests of the young Jupiter at Ægium in Achæa, those of the Ismenian Apollo, and the boys who walked in procession at the festivals in honour of Mercury at Tanagra, were youths to whom a prize of beauty had been awarded (Paus., vii. 24; ix. 10. 22); but no school of art arose out of this which at any period equalled, or attempted to equal, that of Athens. It is scarcely necessary to allude to the question of government. The arts flourished where the most different forms existed. Corinth held a secondary rank among the cities of art, while Athens and Sicyon were in the first. Indeed, if wealth, pomp, and luxury had been necessary, or alone favourable, for the success of art, it would have been exhibited among the splendid communities of Asia, and not been left to its comparatively tardy development in the small, scattered, and often disturbed states of Greece. It was not to any of these accidents, either singly or collectively, that the perfection of Greek sculpture was owing. It was the principle upon which, among that people, imitative art was founded (and upon which it was practised throughout all its stages), that led to its excellence. The whole secret of the superiority of the best schools of Greece was in their making nature, in her most perfect forms, their model,—the only means by which perfection in art can be attained. As soon as they acted upon this knowledge, their sculpture became almost as divine as their great exemplar.

Judging from their poetry, and from their art, whether in their sculpture or their painting, it would seem that the Greeks had an intuitive sympathy with beauty. The artists seem to have been careful never to lose sight of this principle, by expressing any passion or feeling under forms at variance with the simple laws of beauty. All extremes of expression are studiously avoided, and they appear to have chosen only those subjects for representation which allowed them to keep within these bounds. Pliny (*Hist. Nat.*, xxx. 37) mentions an artist who had an opprobrious nickname in consequence of painting low and common-place subjects; and the Thebans had a law which subjected artists to a fine if their works were inferior in beauty to the objects which they professed to imitate. (Ælian, *Var.*, iv. 4; Junius, *De Pict. Vet.*, ii. 4; Lessing, *Laocoon*, ii., p. 12.) This natural sensibility to the charm of beautiful forms was encouraged and assisted by the habits of the people. The gymnasia, or schools, in which young men were trained to take part in the public games, were frequented by all classes. Statesmen, philosophers, poets, and artists were in the habit of attending them, and were thus accustomed to see the human form in all its varieties, whether draped or naked, or in repose or in action; and while the sculptor was filling his mind with the beauty and capabilities of the human figure, the spectator was acquiring the knowledge that enabled him to become a competent judge of imitative art. The importance attached to distinction in these games rendered the education of the young men a subject of great care. Every means were resorted to in order to increase the elegance, the strength, the suppleness, and the active powers of the body; and the sculptor especially benefited by having constantly before him the finest forms that exact discipline and judicious training could produce. He was thus taught to seek the causes of the superiority of the victor in the race or the wrestling match; and by comparing or contrasting the different properties most generally found to exist in the conquerors in the various classes, to adopt those qualities in whatever characters he might be called upon to represent. The deep and spacious chest and broad shoulders of the brawny wrestler gave the type or distinguishing character of Hercules, and the class in which physical strength was to be exhibited: the clean legs, small well-knit joints, and light proportions of the victor in the foot-race, furnished the character of form of the messenger of the gods; while the union of strength and agility in the athlete, taught the sculptor how to make those combinations which eventually resulted in what is termed *ideal* beauty,—the statues of gods, demigods, and heroes. Having this access to the best models, and exercising his art under the eyes of critics who, from habit and observation, were as well acquainted as himself with his standard, it is not surprising that the sculptor of Greece acquired a facility and a power of representing every class of form unattained by any other people, and which have rendered the terms Greek and perfection, with reference to art, almost synonymous. The high purposes to which sculpture especially was applied, and the general interest that was felt in all works that were produced, accounts for the success with which the art was practised. The mind of the sculptor was enlarged while he reflected on the appropriation of his work and the great objects of his labours. His was not the ambition of present praise or profit. He felt, and truly felt, that his art, properly practised and rightly understood, was capable of producing great moral effects upon those who were to contemplate them; and consequently, in the best period of Greek art, the appeal was always made to the higher feelings rather than the mere senses. The artist did not produce his works to gratify a patron, but to improve a people; and whether they were destined to the temple, the grove, the portico, or the place in which the public games were celebrated; whether, like the Jupiter of Olympus, they were intended to excite religious impressions of the majesty of the gods; or, as in the *icones* (or portrait statues) in Altis, to stimulate the energy of the youths of Greece to gain distinction in the public games—the sculptor felt, and he acquired power as he was impressed with the ennobling idea, that he was contributing to a great end. This is the principle of the success of the arts in Greece; and in the presence or absence of this recognition of the public utility of art, may be discovered the causes of its comparative success or failure in other nations and in later times. The most extensive private patronage will fail to produce great results in this respect. Encouragement for public purposes, that is, to incite the public feeling to noble thoughts, or to stimulate to exertion by recording great deeds, are the only means by which an elevated quality of art can be attained. Anything short of this will do, at its utmost, no more than advance mechanical dexterity; often, as has been seen in modern times, and where there has been no want of genius in the artists, at the sacrifice of grandeur of design and good taste.

In Greece, as in other countries, the earliest attempts at imitative art were extremely rude. Pausanias, who travelled in Greece about A.D. 170, mentions that at Pharæ in Achæa thirty quadrangular blocks of stone were worshipped, or at least honoured, as the symbols or representations of certain divinities. At Thespiæ Juno was thus recognised, and at Sicyon Diana Patroa was represented by a column, and Jupiter Milichius by a pyramid. (Paus., vii. 22; ii. 9.) The antient statue, if it can be so called, of Venus of Paphos, with others that might be referred to, were mere columns or stones set upright. The next step in art was in the attempt to characterise these shapeless symbols by giving them a human form. The upper part was shaped into the likeness of a head, and, by degrees, arms and legs were marked out; but in these early imitations of the human figure the arms were doubtless represented closely attached to the sides, and the legs, though to a certain extent defined, were still connected or united in a common pillar as in the statues of the Egyptian school.

The history of Greek sculpture may be divided, generally, into four periods, each of which is illustrated by existing works bearing unequivocal marks of the progressive changes which attended the practice of the art from its rise to its decline. These greater divisions or periods might perhaps easily be subdivided into smaller parts; but, as the present object is to give only a general and comprehensive view of the history of Greek sculpture, it seems better to confine ourselves to a few great divisions. The student who desires a more extensive acquaintance with the subject will find ample information in the numerous valuable works that have recently appeared, as well as in the opportunities that now exist of examining the remains of Greek art of all ages which are preserved in the museums of this and other countries. The four principal sections into which antient Greek sculpture may be divided are—the Archaic, or most antient period; the Phidian; the Praxitelian, which includes the period of Lysippus; and fourthly, the age of its decline.

The First period embraces all the uncertain age, of which little is known but what can be gleaned from the traditions preserved in antient writers. It may be considered to extend to the commencement of that great change in the style of art which had its consummation in the school of which Phidias was the head. The Second division includes the period during which sculpture was practised in the grand or sublime style, and during which the scholars of Phidias executed their works on the principles which he taught and illustrated. The Third period is characterised by a more rich and flowing style of execution, as well as by the choice of softer and more delicate subjects than had usually been selected for representation. In this the beautiful was sought after, rather than the sublime. Praxiteles may be considered the first sculptor who introduced this more sensual, if it may be so called, style of art; and Lysippus contributed to advance it by the peculiar fulness, roundness, and harmonious general effect, by which it appears that his works were characterised. The Fourth and last period in this classification is that of the decline of sculpture; when, although the excellence of preceding schools was still admitted and often maintained, not only no advance was made, but artists were frequently led away by the love of novelty of design, or the desire to discover some new road to fame or profit, and neglected the means which ages of progressive improvement had shown to be the best and safest rules of practice. When this was the case, grandeur of style will be found to have given place to littleness, and the beauty and simplicity of general form and character were lost in individuality and minute detail.

The remains of Greek sculpture of the Archaic period are interesting to the antiquary, but they offer very few attractions to the lover of the beautiful. Rigid and stiff in action, and rude and inelegant in form, the statues and rilievi of the infancy of Greek sculpture have very little to distinguish them in these respects from the earlier attempts of other nations. The first step towards a change was in the attempt to give action; and this was soon attended by fresh peculiarities of shape or figure in the parts. In this stage it will be observed that there is great energy or violence in the general design, with a lumpy or knotty character of form. The general proportions of the figures are thick in comparison with the length of parts. The breasts and shoulders are wide or broad, while the hips are narrow. The thighs and calves of the legs are large and heavy for the knees and ankles, and the feet are long and clumsily shaped. The treatment of the head is peculiar in the sculpture of this early period. The eye is usually long and narrow; and is slightly raised at the outer extremity. The mouth is open, and, owing to a slight curve or elevation at the extremities, has the expression of smiling. On the most antient coins the hair is wiry, the lines being parallel and close together, in the apparent endeavour to give the effect of the whole by imitating every hair. This was more successfully attempted by executing the hair in masses; some very antient works exhibit examples of this, where the effect is partially produced by small knobs or lumps. At a more advanced period the hair is executed in a more minute and careful manner, and with a more precise arrangement, combining as it were the particular character of the earliest treatment with the more general effect attempted in the next stage of art. In this the hair is brought in nearly straight lines over the head, but it terminates in small round curls which are arranged with great regularity, and sometimes in two or three rows over the forehead, extending on each side to the temples and ears. Specimens of these modes of treatment occur in the early tetradrachms of Athens; in the heads of the figures in the statues found in the island of Ægina; and in the sculptures found at Selinunte in Sicily, as well as in other remains of small bronzes and early coins; and there are many examples of it preserved in the collection of antiquities in the British Museum. In male figures the beard, wherever it occurs, is wiry, and exhibits elaborate execution. There is a curious specimen of this in the head of a warrior in a group in the Selinuntine marbles above mentioned (and of which there are casts in the British Museum), as well as in the Æginetan marbles. The draperies in the sculpture of this early time are extremely thin, lying close to the figure (or to the ground, if in reliefs), excepting at the edges of the folds, which are sharp and angular; these are arranged with the greatest precision, opposite folds corresponding as nearly as possible with each other, with the edges shown, and terminating in a sort of regular zigzag series of lines. All these peculiarities are characteristic of the most antient, or, as we have called it, Archaic art: and whenever imitations of it have been made in later times, these features of action, form, and treatment of drapery have been observed. Sometimes portions only of the peculiarities above pointed out will be remarked in genuine antient works, but of a later age than that under consideration. The sculptures alluded to as Æginetan offer examples of this; the treatment of the heads being characteristic of an earlier age of the art than the rest of the figures. This is doubtless to be attributed to a feeling of veneration for the older forms and received traditions of certain personages, such as divinities and heroes; and in this respect obedience to prescription marks the Greek as it did the Egyptian and other schools: with the former however it lasted for a limited period only; with the latter it extended throughout their whole existence.

The first sculptors whose names are recorded are Dædalus, Smilis, and Endoeus. We have already adverted to the difficulties that are in the way of establishing a fixed date for the first of the above-named artists, and indeed of distinguishing how many persons were so called. The earliest person called Dædalus was descended, according to the antient traditions, from a royal stock, being grandson of Erectheus, king of Athens. He is said to be the first sculptor who ventured to separate the legs of his statues. He also was the inventor of the saw, the axe, lever, &c. It is impossible to say how much fable and exaggeration have been admitted into the accounts of this remarkable discoverer; and it is equally vain to attempt to distinguish the inventions of the earlier artificers who bore this name, from the improvements introduced at subsequent times by others so called. Dædalus was in all probability a general title, for some time, given to any distinguished mechanist or figure-maker, as figures of a certain style or character were denominated Dædala (Δαίδαλα). Pausanias (ix. 3, &c.) says 'the antients called wooden figures Dædala;' and he adds, that he thinks it likely that the artist was called after the works, rather than by his own name; thus making Dædalus a title or surname. The same author was shown some wooden statues attributed to Dædalus, which he admits were not beautiful, but he says there was in them a certain air of grandeur (ii. 4). Smilis was a native of Ægina, and the son of Euclides. He was said to be contemporary with Dædalus, and he made a statue of Juno at Samos. Endoeus was an Athenian, and a scholar of Dædalus, and, according to antient writers, executed various important works. Pausanias (vii. 5) speaks of a colossal statue in wood of Minerva Polias, which was preserved in his time in the temple of Erythræ in Ionia. It was a seated figure. Other statues by this artist are also mentioned, executed in stone and in ivory.

A mere list of the earlier Greek sculptors can throw little light upon the state of the art; more especially when the existence of many of those whose names are handed down to modern times may fairly be questioned, at least as to the dates assigned to them; and of their skill we certainly possess no authentic examples.

About 869 B.C., Phidon of Argos is said to have struck the first money in Greece, in the island of Ægina. Some extremely rude and simple coins of that island are extant; the device is a tortoise; and from the very primitive style of execution, they are thought not to be very remote from the period alluded to. It has been supposed that the employment of metal for sculpture took place soon after the striking of money under Phidon; and about this time we find mention made of statues of brass or bronze.

Among the sculptors recorded in the annals of art is Gitiades of Sparta, of whom there were works remaining at Lacedæmon at the time of Pausanias (lib. iii., 17). Gitiades exercised the profession of architecture as well as sculpture. Learchus also, a sculptor of Rhegium, is placed about this date. Pausanias mentions a bronze statue of Jupiter at Lacedæmon, which was said to be by Learchus, and he calls it the most antient statue in that material known to exist. There are some inconsistencies in the accounts of this artist, and scholars differ in the date which they assign to him. Much of the difficulty in classifying the artists of this time arises from the uncertainty that chronologers have felt in fixing the period at which Dipœnus and Scyllis flourished; but the date here given to Learchus must approximate nearly to the time at which he lived. The next names of importance that occur in the history of art are Telecles, Rhœcus, and Theodorus, to whom sculpture seems to have been indebted for various and great improvements. Their reputation for skill was so high, and their innovations in the practice of art so important, that they were even called inventors of some branches of it, which, however, it is obvious must have been known long before they appeared. Such, for instance, was the case with modelling, or the plastic art, which Pliny (*Hist. Nat.*, xxxv., c. 12), recording without examination all that he read, says was attributed to them; though he himself declares that this discovery was claimed by or given to Dibutades of Corinth. Rhœcus and Theodorus were born at Samos. (Paus., viii. 14.) There appear to have been two sculptors of the latter name; one the son of Rhœcus, the other of Telecles. Rhœcus, architect as well as statuary, is said by Herodotus (iii. 60) to have built the temple of Juno at Samos. He was also considered the author of a statue, of a female, which the Ephesians called Night. It was preserved in the temple of the Ephesian Diana. Pausanias (x. 38) says it appeared more antient than the statue of the Minerva of Amphissa, and was of ruder workmanship, or style of art. This writer tells us that he was unable to find any bronze work of Theodorus; but Pliny alludes to several by an artist of that name. The second, the son of Telecles, was considered the inventor of an art which was rarely exercised by the antients, that of casting figures in iron. According to Herodotus, Theodorus engraved the celebrated ring of Polycrates, tyrant of Samos. Antient story tells us that being warned that his course of prosperity might not always last, he consented to chequer his enjoyments by making some voluntary sacrifice. He threw into the sea this ring, which he valued most highly. In a few days after, a large fish was presented to the king, and, upon its being cut open, the ring was discovered in its belly. (Herod., iii. 41.) Theodorus is said to have made one of two magnificent vases which were presented by Crœsus, king of Lydia, to the temple at Delphi. It has been argued from this circumstance that Theodorus must have lived at a later date than that usually assigned to him. But it is not stated that the vase was made expressly for Crœsus. It is more probable that it was among the treasures of the king, and from its age, the reputation of its maker, and its intrinsic value, might have been thought worthy of dedication. One of the vases was of gold; the other of silver. The latter alone is considered of sufficient importance for the artist who made it to be recorded. The above sculptor is noticed by Pliny for a work of great delicacy and minuteness, a statue in brass of himself, holding in one hand a file, alluding probably to his profession; in the other a *quadriga*, so small that a fly might cover it with his wings. With respect to the dates of the above artists, Pliny says they lived long prior to the expulsion of the Bacchiadæ from Corinth, an event which occurred in the thirteenth Olympiad, about 659 B.C. It is conjectured, therefore, that Rhœcus, and the first and second Theodorus, lived between 800 and 700 years B.C.

The introduction of casting in metal forms an interesting epoch in the history of art, and it is to be regretted that our information with respect both to time and place, that is, the part of the country in which it was first practised by artists of Greece and Asia Minor, is so limited. The fact of Learchus of Rhegium being recorded as one of the earliest statuaries would lead to the inference that the art was known in Italy before it was adopted in Greece.

Some antiquaries place Dipœnus and Scyllis between 800 and 700 B.C., a date which Flaxman (*Lect.*, p. 75, 79) adopts in speaking of these sculptors. Others suppose they lived as late as 540 B.C. They have been called the first artists who employed marble for sculpture (Plin., *Hist. Nat.*, xxxvi. 4), but it is more likely that the expression upon which this opinion has been founded means that they were eminently distinguished for their skill (which may have been extraordinary at the time) in working in that beautiful material. They were employed by the Sicyonians to make for them certain statues of their gods; but we are told that having taken some offence, they quitted Sicyon, leaving their work unfinished. The country was soon after afflicted with famine; and, upon consulting the oracle, the Sicyonians were told that it would cease when the statues of the gods were completed. Dipœnus and Scyllis were persuaded to return, and they finished the statues: they were of Apollo, Diana, Hercules, and Minerva. Among their numerous scholars we find Learchus of Rhegium, which will account for the earlier date that is assigned them. They are also called the masters of Tectæus and Angelion, Dorycelidas, Dontas, Medon, and Theocles. (Paus., ii. 32; iii. 17, &c.) Dipœnus and Scyllis were considered the founders of the school of Corinth.

From the earlier time of which mention has been made, down to about 550 B.C., there probably was little change in the style of sculpture, although great improvement in execution or mechanical power doubtless extended the extensive practice which the growing admiration of art occasioned. In a country in which all the efforts of genius were justly appreciated, sculptors, who were called upon to represent the most exalted objects, were likely to exert themselves to the utmost to arrive at perfection; and the remains of art afford sufficient evidence that from the time alluded to, that is, between the sixth and seventh centuries before our æra, when the first difficulties had been surmounted, the advancement of sculpture was rapid and uninterrupted.

It is not necessary to give a mere list of names of the artists who are supposed to have lived to this time. So much that is uncertain is mixed up with the notices of them that are found in Pliny, Pausanias, and others who refer to them, that the inquiry into their personal history would rather impede than advance our present object.

Up to the period at which we are now arrived, sculpture seems to have been practised most generally and successfully in the Greek colonies of Asia; but the consequences of the revolt against Darius, the son of Hystaspes, were utterly destructive to their further progress. Many of the temples were burnt by the Persians, and the inhabitants were carried to distant places, or were reduced to a state of slavery. But as art fell in Asia, it acquired vigour in Europe, and the artists of Ægina, Sicyon, and Corinth diffused the principles of good taste and the knowledge of art throughout neighbouring countries; a feeling for a grand style of sculpture was soon exhibited wherever any opportunity occurred for the practice of the art.

It is interesting to be able to refer, in illustration of the character of the art at this time, to some undoubted remains of sculpture of a period certainly not very remote from that under consideration. These consist of eleven statues which decorated the western and five statues that stood in the eastern pediments of a temple in the island of Ægina, where they were discovered, in the year 1812, by some English and German travellers. The subject of both series is a battle, and the eleven figures of the western side seem to be the full number of the original composition. Minerva, fully armed, her helmet on, the ægis covering her breast, and her shield on her left arm, occupies the centre. This figure is of rather larger proportions than the combatants, and is raised on a plinth, and appears to be presiding over the battle. Immediately in front of the goddess, and extended at her feet, is a dying warrior; another appears advancing towards him, as if to protect or assist him, while a third, with uplifted arm, in which probably was a spear, seems to rush forward to prevent his approach. The rest of the figures are engaged in various ways, exhibiting great energy of action; the smaller ends of the pediment are filled up with the fallen and wounded. The figures of the eastern side are larger than those of the western pediment.

These sculptures offer many peculiarities. The general style is what has been termed Archaic, but there are varieties in detail, or in parts, which require comment. The statue of the goddess is more rude or antient in style than the figures in action. She is entirely draped down to the ancles; and the feet, raised on sandals, are both turned in profile, as if the figure were standing sideways. The drapery is stringy and arranged in the peculiar zigzag manner before described. The ægis is smooth, but the scales have been either painted or gilded, as remains of colour were found upon it. The edge of the ægis has a sort of border of snakes, and here, as well as in the helmet of this and the other figures, are indications of metal having been inserted by way of terminations or probably ornament. The costume of the various figures that are dressed is highly interesting. The forms of the cuirass, the greaves, and the helmets are evidently most correctly copied; and the greatest care is shown in the fastenings, which appear in most instances to have been made of metal. The dress of one figure, a kneeling archer, is apparently composed of leather. It fits closely and without any indication of folds throughout the figure from the throat to the ancles. His head-dress resembles the Phrygian cap.

In the execution of these sculptures considerable skill is indicated both in the treatment of the marble and in the expression thrown into the forms. Though the details are not always graceful, there is a grand division and breadth of parts; and in the articulations of the bones and the clean execution of the joints there is much to admire. The heads are uniformly Archaic—hard, and dry; with a simpering or smiling expression about the mouths, however opposed to this character may be the action or employment of the figures. The manner of treating the hair in small curls or knobs corresponds with the description before given of works of this period.

The subject represented by these sculptures is still a matter of inquiry; and the learned have not yet pronounced any satisfactory opinion upon it. The figure of Minerva may possibly only be intended for an image of the goddess, and not the goddess herself. The fact of its being represented of a larger proportion and in a different style from the combatants, favours in some respects this idea. These sculptures, called the marbles of Ægina, are in the collection of the king of Bavaria at Munich; there is a set of casts from them in the British Museum.

The Selinuntine marbles, so called from their having been found at Selinunte, on the site of the antient Selinus, in Sicily, are very curious examples of early art. They consist of fragments of marble alti-rilievi, and seem to have formed part of the decoration of two temples, of which traces still remain. There are some peculiarities about these sculptures which are characteristic of two different styles of art. Those which belonged to one (distinguished as the Eastern) temple, have many points of close resemblance to the style of the Archaic (Æginetan) school, while those of the western temple appear to have come either from a more barbarous hand, or to be of a much earlier date than the others. Without having the sculpture to refer to, it is difficult to explain in what these peculiarities consist, but a comparison of what remains of a head of Minerva, and that of a dying or wounded warrior, with some others of the collection, will suggest the inference we have ventured to draw. The head of the dying figure closely resembles (in character) that of the warriors in the marbles of Ægina; in the other figures there is a greater resemblance to the full overcharged forms described as characteristic of the very earliest art, and approaching indeed in some degree to the works of the Egyptians. At a later period than that to which these sculptures may be referred, the artists of Ægina were invited by the tyrants of Sicily to execute works in that country. It is highly probable therefore that in more remote times, and when art was still less known or practised there, foreign artists should have been employed in furnishing the decoration of the temples of newly founded cities. These artists would be the most esteemed of the time, and the rising school of Ægina would doubtless take a high rank amongst them. Joined with these, or probably working under them, the natives of the country might also have contributed their ruder efforts towards the same important object, and this would sufficiently account for the difference referred to with respect to the style and treatment of the various works.

From about 500 B.C. the succession of the great sculptors of Greece, and the changes that each master and his school effected in the style of art, can be traced with tolerable accuracy. Sicyon and Ægina were the most celebrated schools of sculpture, and unrivalled for the high quality of their bronzes. After Callo, or Callon, a sculptor whose date is very uncertain, the Æginetan artists of the greatest celebrity seem to be Glaucias and Onatas. These artists were much employed by Gelon, the tyrant of Syracuse, and his successors. Onatas, the scholar of Tectæus and Angelion, enjoyed a high reputation, and, judging from the numerous works which Pausanias (lib. vi., viii., ix., x.) attributes to him, must have had very extensive employment. This writer speaks of a colossal statue in bronze of Apollo, which was at Pergamus, the work of this sculptor; likewise a statue of Ceres, which he made for the Phigalians. There were also several works of Onatas at Olympia. One was a colossal bronze figure of Hercules, placed there by the Thasians. For the people of Pheneos he executed a statue of Mercury, dedicated also at Olympia. In this work he had the assistance of Calliteles, who was his scholar, and probably his son. (Paus., v. 27.) Onatas and Calamis worked together on a chariot and accompaniments, which was dedicated at Olympia, after the death of Hiero, king of Syracuse; and in another great work described by Pausanias, we find Onatas associated with Calynthus, showing that it was not unusual, nor considered derogatory to either, to secure the talents of various artists in one work. According to the above-mentioned writer, Onatas was a painter as well as statuary. His performances spoken of in this branch of art were executed for the Platæans: one of his pictures, with a work by Polygnotus, was preserved in the temple of Minerva Aræa. (Paus., ix. 4, 5.) Sculpture was now rapidly approaching towards the perfection which it attained under Polycletus and Phidias; and an event occurred in the fifth century before the Christian æra, which tended to accelerate this progress. This was the disastrous termination of the expedition of Xerxes against Greece. The failure of this vast undertaking showed the Greeks their own strength, while it also exhibited to them the immense wealth of the invaders, and placed in their hands the means of effecting the most costly improvements and decoration. It was customary in Greece to dedicate a tenth of all spoils gained in battle to the service of the gods; and that proportion of what was obtained from the Persians was, as a matter of course, appropriated to that purpose. Its value was expended on the construction of magnificent temples, enriched with sculpture and painting, and ornamented with vases, tripods, shields suspended as trophies, and every variety of decoration. The Persians, in their invading march, had destroyed every temple that they met with; but after their retreat and disgrace, they were all restored with increased magnificence. The ample employment thus afforded for their talents, and the high purposes to which their works were destined, excited a noble spirit of emulation among the artists, whose minds seemed to expand with the greatness of the objects required of them.

The gradual improvement of style in art, from the Archaic period, and through the early Æginetan and Athenian schools, is traced by some of the antient writers. 'The works of Callon,' Quinctilian says (*Orat. Instit.*, xii. 10), 'with those of Hegesias, are hard, and approached what was distinguished as the Etruscan manner. Calamis was less rigid, and the style of Myron, who followed, was still more softened.' In Cicero we find a still more extended list, and a confirmation of the quality of improvement down to a contemporary, as in the above instance, of Phidias, the great master of sculpture. He says the statues of Canachus were more rigid and hard than was agreeable to the truth of nature. Those of Calamis were also hard, but still they were of a softer character than those of Canachus; nor were the works of Myron close enough to nature, though there could be no doubt that they were very beautiful; but the productions of Polycletus, he adds, were still more beautiful, and were truly perfect. (Cic., *De Clar. Orat.*, c. 18.)

The history of the progress of sculpture in Greece has now been carried through the earlier schools, into a period at which it may be considered to have reached its perfection, as far, at least, as regards the principles on which it was practised. The chief sculptors of this age were Hegias, Pythagoras, Ageladas, Myron, Polycletus, Phidias, Alcamenes, and others. Hegias, Egesias, or Hegesias, has been noticed among the sculptors of an improving class, but whose works still gave indication of belonging to the Archaic time.

Pliny distinguishes at least three statuaries of the name of Pythagoras, but although allusion is made in antient writers to artists so called of Samos, Rhegium, and Paros, it appears probable that there were only two of very high reputation. The most celebrated was a native of Rhegium, and the scholar of, or, more correctly speaking, of the school of Clearchus. (Paus., vi. 4.) He executed, among other works, several statues of conquerors in the public games, and he eminently contributed to advance the character of sculpture by his success in giving expression to his statues. Till his time this quality, so indispensable to excellence in art, seems to have been little thought of. A work by him is particularly alluded to for its excellence in this respect: it was a figure of a lame or limping man, in which the expression of anguish was so admirably portrayed, that the spectators were affected, and seemed to feel the pain he was suffering. Pythagoras is also noticed as being the first who represented veins in his statues, and as having bestowed greater care upon the treatment of the hair. From these curious and interesting particulars it is easy to see in what manner the dryness and almost prescriptive character of early art was giving way to the bolder as well as more refined treatment of the Phidian age. Pythagoras may be placed about 480 B.C. He had a scholar called Sostratus. (Pliny, *Hist. Nat.*, xxxiv. 8; Paus., vi., &c.)

Ageladas holds a distinguished rank among the sculptors of antiquity, not only from the quality and number of his works, but also from the circumstance of his having been the master of the three most eminent artists of the brightest period of sculpture, namely, Myron, Polycletus, and Phidias. He was a native of Argos. There is some reason to think that there were two sculptors of this name. Pausanias (iv., vi., vii., and x.) alludes to various statues by Ageladas. He seems chiefly to have worked in bronze.

Myron was a native of Eleutheræ, according to Pliny (*Hist. Nat.*, xxxiv. 8), or an Athenian, according to Pausanias (vi. 2, &c.). There is no artist of antiquity who is mentioned more frequently or more honourably than Myron, and it is scarcely possible to believe that such universal praise would have been accorded if his works had not fully deserved it. It is unfortunate that no known production from the hand of this distinguished artist has reached our times. The only work of which any judgment can be formed is of his famous statue of a Discobolus. Various copies of this figure are believed to exist. The best is in the Palazzo Massimi in Rome. The Discobolus, in marble, in the collection of sculpture in the British Museum, is also believed to be a copy from the same celebrated original. A mere list of the works of this sculptor is unnecessary in this place. A few however may be particularly distinguished, from the peculiar interest given to them by the testimony of antient writers. The Discobolus is especially mentioned and described by Pliny (xxxiv. 8), Lucian (*in Philopseude*), and Quinctilian (*Orat Instit.*, lib. ii.). This work was very remarkable, considering the date of the artist, for the energy of its action, and the earnest and appropriate expression which pervaded the whole figure. Quinctilian says, 'Quid tam distortum et elaboratum quam est ille Discobulus Myronis.' In this passage the word *distortum* must not be supposed to mean *distorted*, in its usual acceptation, but *varied, removed from the usual and common simple action* given to statues. Lucian refers to the peculiar direction given to one foot, and the effect of the sway or swing of the figure. This peculiarity is observable in the supposed copies of this statue. Another work referred to is a statue of Hercules; also a Satyr contemplating his pipes (*tibiæ*); a Minerva; statues of victors in the games, &c. Strabo (xiv. 637) speaks of three colossal statues at Samos by Myron, of Jupiter, Minerva, and Hercules. Cicero (*In Verr.*, iv. 3, 43) alludes to works by this artist. Pausanias also, in various places, describes his performances in terms of praise. Myron seems also to have had a great reputation for figures of animals, and one of his works of this class, a heifer or cow, is honoured by as many as thirty-six epigrams in the 'Anthologia' (iv.). A dog is mentioned by Pliny, and a calf is also much praised. Propertius alludes to a group of four oxen, which were represented round an altar. The peculiar characteristic of the sculpture of Myron seems to have been expression. Petronius, in spite of Pliny's assertion, leads us to believe that this was the great excellence of Myron; he says, 'Myron qui pene hominum animos ferarumque ære expresserat.' With respect to his style, it seems probable, from some remarks of Pliny, that his works still exhibited certain peculiarities of treatment that belonged to a ruder age, though he gives him the high praise of superiority, in some respects, to Polycletus. He says he introduced more variety into his figures, for this seems to be the true interpretation of the expression of the above writer. 'Primus Myron multiplicâsse varietatem videtur, numerosior in arte quàm Polycletus,' &c. (*Hist. Nat.*, xxxiv. 8.) The works of Myron were chiefly executed in bronze. He used that which was made at Delos, while his rival Polycletus preferred that of Ægina. Though chiefly celebrated for his productions in this material, he worked also in marble, and a statue is mentioned by him of Hecate, made of wood. (Paus., ii. 30.) Myron had a son called Lycius, also a distinguished sculptor.

Polycletus of Sicyon was one of those who eminently contributed to ennoble art, and to carry sculpture to perfection in what has been called the sublime style. In one respect he is said to have been superior to Phidias himself; inasmuch as he was considered to have carried to perfection the *Toreutic art*, which Phidias had only, as it were, commenced. He was the author of that perfect rule of proportion called, by way of distinction, the *Canon of art.* [POLYCLETUS.]

The name of Phidias completes, or rather crowns, this list of the great originators of the highest style of sculpture. [PHIDIAS.] The most splendid and the most perfect productions in the art were executed by him, and as long as the principles which he taught were retained, sculpture seems truly to have merited the epithet of sublime. Phidias was called the sculptor of gods; and the majesty of his Olympian Jupiter was declared, in the forcible language of an antient writer, to have added something to the beauty or sublimity of religion. That works of art are capable of exalting the mind, and rendering it susceptible of the most pure and elevated feelings, there can be no question, and this doubtless was the effect produced by the awful grandeur of this far-famed statue. Panegyric has almost been exhausted in recording the merits of this sculptor; but there is no reason to doubt the justness of the honour paid him. Many of his finest productions were in existence when, even comparatively, late writers were living, so that the accounts that have come down to us are not merely the repetitions of unsupported or unproved traditionary encomium. The statue of the Olympian Jupiter was existing till the year 475 of our æra. It was then destroyed by fire at Constantinople; whither it had been transported by the emperor Theodosius the First. Unfortunately no remains of the greater works of Phidias have reached our times; but we have abundant opportunity of judging of his excellence, from the sculptures which, under the title of the Elgin Marbles, form a part of our national collection of antiquities. There is no doubt that these are the productions of this great artist; many of them probably from his own hand, and all executed under his immediate direction. They formed part of the decoration of the Parthenon at Athens, of the building and enrichment of which Phidias had the entire direction. The architects Callicrates and Ictinus worked under him. These sculptures consist of the statues and groups which were placed in the pediments of the temple; of several metopes, in alto-rilievo; and of a considerable portion of the frieze of the cella, in basso-rilievo.

These celebrated marbles have been so frequently and so fully commented on, that it will only be necessary to notice them in this place in their relation to the general history of sculpture, and so far to point out their peculiar character and excellence. The quality for which they are particularly deserving of attention is their truth. The most perfect, the most appropriate, and the most graceful forms have been selected. All that is coarse or vulgar in common forms is omitted, and that only represented which unites the two essential qualities of beauty and truth. The result of this is that happy combination distinguished by the term *ideal beauty*. That no productions of imitative art prior to the time now under consideration possessed this, may be seen by examining the numerous monuments of more antient art remaining to this day: that the productions of the school of Phidias exhibit it in an eminent degree is sufficiently proved in the works above alluded to. The statues of the Ilissus or River God, the Theseus, the Neptune, and the draped groups, though mutilated, are still full of grandeur united with simplicity. When the figure is displayed naked, the nicest knowledge of the human form, its anatomy, and capabilities of action are exhibited. The draperies also are treated with the greatest skill, and with the most careful attention to effect. They are plentiful, and rich in their masses, and yet so judiciously arranged with respect to the figures, that they do not encumber them, nor prevent the movement and even form of the limbs from being seen. These works are admirable also as fine examples of composition. Although in the bassi-rilievi of the frieze a crowded and busy procession is represented, the utmost skill is displayed in avoiding any unseemly or unintelligible confusion. The perfect acquaintance which the best sculptors of this time had with the anatomy and character of animals is worthy of remark. The skill of Myron has already been alluded to. The horses in the Elgin Marbles are admitted by competent judges to be representations of the finest shape and of the best blood. The commonest observer is struck with their spirited and at the same time graceful action. In short these works may be studied with advantage for every quality that sculpture should possess; for truth, beauty, expression, and composition, united with the purest style and most masterly execution: and they may justly be considered the finest specimens of antient sculpture that are known to exist. [ELGIN MARBLES.]

It may be as well to offer in this stage of the history of the art some observations upon the combination or mixture of materials in sculpture. The custom of using a variety of materials for the different parts of statues, as marble, or stone, or wood for the heads, hands, and feet, and metal for the draperies and accessories, was very general throughout Greece and Asia Minor from a very early period; and although it militates against the received notions of a pure taste, the practice was in full force during what has always been considered the best period of art, namely, the age of Pericles and Phidias. Nor was this mixture of materials the only interference with the simplicity which some have supposed a principle and essential quality of Greek art. The hair of marble statues appears in some instances to have been gilt, and even colour was added to heighten effect. The background of works in rilievo was frequently painted blue, remains of which may still be traced on many antient works. (Kugler, *Polychromie*, &c.; Millingen; Müller.)

The occasional practice of introducing eyes of silver, glass, or paste, has already been alluded to in the introductory part of this essay, in speaking incidentally of Polychromic and Polylithic sculpture. The injurious effect of this introduction of gaudy and sparkling foreign substances upon the higher qualities of any work, such as its composition and expression, seems to be beyond dispute. It may be judged of in wax figures, and in some of the richly dressed and elaborately worked and ornamental images in Roman Catholic churches, and in Hindu temples. No arguments, even when supported by the authority of antient practice, can render such works otherwise than disagreeable as imitative art to any but vulgar minds. An artist of superior power might possibly so treat his work that its expression, the beauty and grandness of its forms, and the scale on which it is executed, might take such entire possession of the spectator as to make him overlook the incongruous mixture of materials; but it is inconceivable that, with their refined taste, extreme sensibility to beauty, and great knowledge of the essentials of art, the Greeks could ever have preferred works of this kind to those of more simple composition. The probability seems to be that the employment of ivory and gold was owing as much as anything to the desire to use the most costly materials, as all the important works so composed appear to have been executed under peculiar circumstances, either as great national contributions, votive offerings in honour of the gods, or as trophies. In the case of tenths of spoils, when vast riches had fallen into the hands of the Greeks, and were devoted to a particular purpose, it was essential to find employment for them in exclusive furtherance of that object; and as the architectural details of their temples were richly ornamented and painted, and even golden shields suspended over the architraves and friezes, it was natural to expend a liberal portion of enrichment on the statue of the presiding divinity. This opinion receives some support from the fact that the practice seems to have been almost if not entirely discontinued as the taste for art for general purposes increased. When we read of exquisite productions by Praxiteles in marble, or Lysippus in bronze, there is no mention of works executed at the same period in the richer materials.

Sculpture in gold and ivory has been called Chryselephantine, from the Greek words χρυσὸς, 'gold,' and ἐλέφας, 'ivory.' It was not first introduced at the time to which our history has reached, as Pausanias describes works so composed, of a much earlier date, existing in the Heræum, or temple of Juno, at Olympia, as well as in other places; but it was during this period that it was carried to its highest point of excellence. The two most celebrated works recorded in these costly materials are the masterpieces of Phidias. They were, the statues of the Minerva of the Parthenon, and that of the Olympian Jupiter in his temple at Elis. The exposed parts of the figures were made of ivory, and the drapery and accessorial enrichments of gold. Of the enormous value of this kind of work some idea may be formed from the accounts of the antients, that the figure of Minerva was twenty-six cubits high, and that the gold employed on it weighed forty talents. (Plin., *Hist. Nat.*, xxxvi. 5; Thucydides, ii. 13.) One writer says there were fifty talents of gold on it. (Diod. Sic., xii. 40.)

Chryselephantine sculpture seems to have been a branch of what the antients called *Toreutic*. The exact meaning of this term has not been satisfactorily explained. (See *Le Jupiter Olympien*, par Quatremère de Quincy, where several opinions are collected; also *Archäologie der Kunst*, by Müller; Millingen, *Antient Inedited Monuments*, &c.) It was probably used to describe sculpture in which metal, which was worked or chased, was combined with other materials. Pliny says Polycletus brought the art to perfection. (*Hist. Nat.*, xxxiv. 8.)

The antient writers do not furnish any particulars as to the mode of executing these colossal works in materials which sometimes, as in the case of ivory, could only have been supplied in comparatively small pieces. Pausanias (v. 15) tells us that an edifice called the workshop of Phidias, near to Altis, was pointed out to him. It was there, he says, that the sculptor worked each of the parts of the Olympian Jupiter. In addition to the original cost of these productions, there seems to have been great care necessary to preserve them. The Olympian Jupiter was surrounded by a groove or channel of black marble containing oil. The object of this was, first to supply the necessary quantity of moisture to preserve the ivory; and secondly, to secure the work from damp, as the Altis was situated on marshy ground. Means were also adopted at Athens for preventing injury to the ivory parts of the Minerva, from the too dry situation of the Acropolis. We are told that the statue of the Olympian Jupiter was out of repair very soon after its completion; and the fact of the Phædruntæ being established to take care of the work, is a proof of its liability to accident. Pausanias mentions a remarkable circumstance connected with the persons appointed to this duty. It had been entrusted to the descendants of Phidias, and he says that it was in the same family in his time.

The scholars and followers of Phidias were Agoracritus of Paros, Alcamenes of Athens, Colotes or Colotas, Pæonius, and others. The two first deserve notice for the celebrity of their names and works. Agoracritus was the favourite scholar; Alcamenes, judging from the accounts left of him, the most able artist. He was considered second only to his great master; and one author, alluding to the progress made in sculpture, even classes him with Phidias, saying, that what was wanting in Polycletus was to be found in the works of Phidias and Alcamenes. (Quinctilian, lib. xii., 10.)

The sculptures of Phigalia, consisting of a series of altirilievi, representing the battle of the Lapithæ and Centaurs, and of the Greeks and Amazons, are of this age. The temple of which they formed part of the interior decoration was built by Ictinus, the architect, under Phidias, of the Parthenon; and from the style which pervades them, there is every reason to think these compositions proceeded from the same source as the sculptured portions of that edifice. The inferiority of their execution may be easily accounted for by supposing the working out of the designs of the master to have been left to the scholars or inferior artists. These interesting remains have already been more particularly described. [PHIGALIAN MARBLES.] The original sculptures are preserved in the British Museum.

The influence of Phidias continued to be felt for some time. Art had gradually been relieved from the dryness and hardness of the Æginetan school, and Phidias produced out of it the grand character which marks his period; but it appears there was still remaining a severity, both in the forms and in the treatment, in the works of some of the artists of this school, which it was left for a sculptor of a succeeding age to remove. This change, which stamped the character of a new school of sculpture, was effected by Praxiteles.

When the restrictions which originally confined sculpture to religious purposes and prescribed forms had once been disregarded, and the art was applied to represent objects of general beauty and interest, it rapidly underwent changes; and the sculptors of the period which we are now considering, that is, at about 350 B.C., succeeded in introducing an entirely new quality of art. The grand, the sublime, and the severe, gave way to the soft, the flowing, and the graceful. At the head of these innovators was Praxiteles. He worked in bronze and in marble; but his most beautiful and admired performances were probably in the latter material, in the working of which he exhibited the greatest skill, and in which he is said to have introduced processes unknown to his predecessors. [PRAXITELES.] He is supposed to be the first sculptor who ventured to make a statue of Venus entirely naked. Millingen tells us that all statues of female divinities were antiently draped, 'and that Praxiteles was the first who represented Venus naked.' (Millingen, *Monuments*, x., p. 7.) Such an innovation was considered extremely indecorous; but it was excused in this instance, on account of the beauty of the performance. Subsequent artists, desiring to reconcile a mode of representation so favourable to the purposes of art, with the prejudices still existing in a degree in matters pertaining to religious personages, seem to have adopted a middle course, as is seen in the two statues of Venus called of Capua and of Melos. (*Museo Borbonico; Galérie du Louvre.*) In these the forms are left entirely naked down to the middle, from whence rich drapery falls to the ground, covering all the lower portion of the figures.

The next name of importance, as the leader of a new school, is that of Lysippus of Sicyon. The reputation of this artist is not inferior to that of any sculptor who preceded him. He appears to have worked exclusively in bronze; and, according to Pliny, executed as many as six hundred and ten works. A colossal statue at Tarentum by him is much distinguished. Lysippus was the favourite sculptor of Alexander the Great, and had the exclusive privilege of making statues of him. According to some, he executed a series of portraits of this prince, from his earlier years up to his maturer age. A long list of works by Lysippus is furnished by Pliny, Pausanias, and other writers. It will not be necessary to transcribe the catalogue, as a mere list of names will not illustrate the history of the art; but some remarks of the former of these authorities as to the peculiarities of the practice of Lysippus are valuable for the light they throw on the progress of sculpture. He is said to have paid great attention to the treatment of hair, and to have introduced an improvement in proportion, making the heads of his figures smaller than his predecessors had done. He doubtless observed that his figures gained in elegance and effect by taking this liberty; for a saying of his is recorded, 'They (the older sculptors) made men as they were; he represented them as they appeared to be.' This seems to be a paradox; but it is not so, and its meaning and the value of the principle are quite intelligible to artists. It shows that Lysippus considered that very minute detail and close mechanical copying should be made subservient to general effect. Pliny says, 'There is no Latin word to express *symmetria*, which Lysippus most carefully preserved.' The whole passage is curious, and proves that there was a quality about the style and practice of Lysippus which caused all he did to be highly valued. It is said that the emperor Nero commanded that a statue by Lysippus which was at Rome should be gilt; but it was found that its beauty was so impaired by it, that the gilding was removed; and Pliny adds, 'it was more valuable without it, notwithstanding the scratches and cuts which remained after this process.' Lysippus left several scholars, three of whom, his sons Daippus or Laippus, Bedas, and Euthycrates, are mentioned amongst the most eminent of his successors. The last is said to have imitated the firmness, or the austerer parts, of his father's practice, rather than his more elegant and pleasing qualities. 'Therefore,' says Pliny (*Hist. Nat.*, xxxiv. 8), 'he succeeded admirably in a statue of Hercules, at Delphi,' &c. There is a fine bronze statue of Hercules in the Townley Gallery in the British Museum, which has every indication of being of this school.

The perfection of sculpture seems to have been attained under Praxiteles and Lysippus. They were contemporary, and each effected in his way what was before wanting to its completion. It is believed that there are imitations of some of the works of Praxiteles in the various modern collections of sculpture. Among these are the Sleeping Fawn, at Munich; the Cupid of the Vatican, at Rome; statues of Venus, believed to be copies of the far-famed Venus of Cnidus; and the Apollo Sauroctonus, at Rome.

The death of Alexander the Great (324 B.C.) was followed by the dismemberment of his vast empire. The arts suffered in some measure by these divisions and contentions; but it is difficult to assent to Winckelman's opinion, that after the death of that prince there was nothing left except a class of mere imitators. Each of the artists above mentioned left numerous scholars, who still preserved the high character of sculpture by their own successful practice. Among the most distinguished of these sculptors are Cephisodotus and Eubulus, the sons of Praxiteles; Pamphilus, his scholar; the before-mentioned Daippus, Bedas, and Euthycrates, the sons, and Tisicrates, the scholar, of Lysippus; (the works of the latter are said to have been so excellent that they were often mistaken for those of Lysippus himself); Xenocrates, who also wrote a treatise on his art; Chares, the Lyndian, the author of the famous Colossus of Rhodes; Dameas, Eutychydes, and Phœnix. Hermocles of Rhodes is mentioned as having been employed by the earlier Seleucidæ. Isigonus, Pyromachus, and Stratonicus illustrated by their art the victories of Attalus and Eumenes over the Gauls; and the Ptolemies also for a time were protectors and patrons of artists. To the above names many others might be added, sufficient both in number and talent to warrant the belief that sculpture was not only still encouraged and practised on the best principles, but that there were artists living quite capable of aiding its progress by their own genius. The assertion therefore of Pliny (xxxiv. 8), that from the 120th to the 155th Olympiad the art was almost extinct, seems utterly groundless. To this or about this period antiquaries have attributed some of the most interesting remains of antient sculpture that have reached our times. Amongst these may be noticed the well-known statue of the Hermaphrodite, at Paris; the fine fragment called the Torso of the Belvedere, at Rome; the Hercules, called the Farnese, at Naples; and the statue called the Fighting Gladiator. To these some have added the group called the Toro Farnese, at Naples, representing Dirce, Zethus, and Amphion with the bull, and even the group of Laocoon and his sons.

The fatal blow to the existence of the arts in Greece was given by the success of the Roman arms. Lucius Mummius had been sent by the senate against the Achæans. He engaged the Greek army near Corinth, the principal city of the famous Achæan League, and completely defeated it. The city was immediately devoted to destruction, and sacked by the conquerors. The Romans carried away from this celebrated seat of the arts, as well as from the other cities of Greece which fell into their hands, the greater part of the fine productions both in painting and sculpture, which had been accumulated for centuries. These were forthwith transported as spoil to Rome, which became filled, for the first time, with the most splendid monuments of Grecian taste and genius. This event occurred in the 158th Olympiad, or 146 B.C. Athens, which may be considered as the great centre of art, and the favourite asylum of the most distinguished artists of Greece, had suffered a variety of fortune since the time of Pericles, when her glory may be said to have been at its zenith. Her political importance declined from about that period, but she still seems to have maintained a character as the abode of literature and of art long after her political influence was at an end. At length she was doomed to share, in full, the calamities and humiliations to which other Grecian cities had been subjected by the victories of the Romans. Having vainly endeavoured to impede the progress of the Roman army into Greece, Athens had to submit to what she might fairly consider a barbarian conqueror. In the year 86 B.C. she received as her master the haughty and unrelenting Sulla. The history of antient sculpture in Greece may be said to close at this time. After the establishment of the Roman empire, the Greeks no longer had either the higher inducements or the means to carry on the exercise of the arts in what may be considered their native country; and their professors were driven to seek employment and an asylum among their conquerors.

The greatest influx of Greek artists into Italy occurred when Augustus had obtained the sovereignty, though earlier than this period there had been some efforts made by individual Romans to introduce a taste for art among their countrymen. A slight general view of what had been effected in this respect, or rather, of the means used to effect this end, will not be out of place here, as introductory to the examination of what has been called Roman sculpture; but the art never appears to have been naturalized among the people, and, as will be seen, it was always rather an exotic in Rome, nursed and tended by its own natural cultivators, Greek sculptors, than a growth brought to any perfection by the people in whose stranger soil it had accidentally, and almost forcibly, been planted.

Roman Sculpture.—It is not easy to determine when the Romans began to pay attention to the arts of painting and sculpture. For a long period they were too much occupied in insuring their safety and strengthening and extending their state, to think of arts which they could then only have looked upon as unworthy of a warlike people. Their first public monuments were doubtless trophies. The trunk of a tree, stripped of its branches, and bearing the arms of the vanquished, proclaimed the achievement of the victor, and at the same time incited the young Roman to exertion in his country's cause. The sculpture mentioned as existing in Rome at a very early date was, there can be no doubt, of foreign growth, the production of their neighbours the Etrurians; and the celebrated she-wolf still existing in the Capitol, one of the most antient and interesting monuments, whether considered historically, or as an example of early bronze sculpture, may fairly be attributed to that people.

It is recorded that after the victories of Camillus and Mænius over the Latins, equestrian statues were erected in Rome in their honour. This was above 350 years before our æra, or about 400 years after the building of Rome. In the third century B.C. one of the Fabii devoted himself to the arts, and acquired, from his success, the surname of Pictor. Pliny (*Hist. Nat.*, xxxv. 4) says that he decorated with his paintings the temple of the goddess of Health at Rome, and that the pictures existed in his time. A bronze statue of Apollo, made out of spoils taken from the Samnites, is said to have been dedicated in the Capitol about this period. After the conquest of Syracuse by Marcellus, Rome became enriched with the spoils which fell into the hands of the victors. The reply of Marcellus, when he was accused of rapacity for stripping the conquered city of its works of art, is remarkable: he declared he had done it in order that the public edifices of Rome might be ornamented, and also to introduce among his countrymen a taste for the arts and elegance for which the Greeks were so distinguished. The power and greatness of Rome were now being extended in all directions; and, by some caprice of fancy, generated probably by the facilities that were offered for its gratification, it became a rage to collect specimens of sculpture. Where however temples were ransacked simply with the object of enriching the treasury of Rome, as was the case with works in the more costly materials, or to gratify the soldiers, or, as sometimes appears, to swell the triumph of a general, the finest works were little likely to induce a love for refinement among the Romans, or excite any admiration of such objects for their merits as works of art. Notwithstanding the opportunities thus offered for acquiring some knowledge of the beauties of art, from the mere habit of having the most exquisite examples of sculpture brought before them, it does not appear that any decided taste discovered itself till about 86 years B.C. Sulla, in his victorious march through Greece, destroyed several of the most magnificent temples and monuments of that country; but he also collected a great quantity of spoil, which he forwarded to Rome, and which consisted chiefly of the fine works which were preserved in the temples or adorned the public places. This enormous accumulation of such objects seems at length to have aroused in the Romans some feeling of admiration favourable to the existence, at least, of art in their own country. The fashion, or rather passion, to form collections at any price increased. Verres is handed down to posterity among the most zealous and at the same time the most lawless of dilettanti; but the character of the works he possessed, several of which are mentioned by Cicero in his celebrated orations against the rapacious prætor of Sicily, give him a claim to be considered fully capable of appreciating excellence in art. The means that he adopted for gratifying his taste merit the severest condemnation; but he probably preserved from neglect and destruction many of the most valuable monuments of sculpture.

In the last century before Christ various sculptors of distinguished name were resident in Rome, or were practising their art in other parts of Italy. Among these may particularly be mentioned Pasiteles, Arcesilas or Arcesilaus, the author of a group of boys with a lioness; Saurus and Batrachus, Strongylion, Olympiosthenes, and Evander. Arcesilaus was much employed by Lucullus. Strongylion is honourably mentioned for a fine statue of an Amazon, so beautifully formed in the legs that it was called Euenemos. He also made some statues of Muses; and Pausanias, who alludes to them, adds he was most skilful in his representations of animals. Olympiosthenes also executed three Muses. Pliny speaks in the highest terms of the merit of Pasiteles. He became a Roman citizen, and among his works is mentioned a statue of Jupiter, of ivory, which was placed in the temple (*æde*) of Metellus. It is to be regretted that a literary work of this artist, mentioned by Pliny, no longer exists. He says, 'Pasiteles wrote five volumes containing descriptions of the most remarkable works in the whole world.' Such a record from an artist of the character of Pasiteles would be a treasure.

Among other fine works in sculpture which are supposed to have been produced in the earlier part of this period, may particularly be mentioned the statue known as the Germanicus of the Louvre. It doubtless is intended for a figure of a Roman; but it seems to be agreed that it cannot be a portrait of the prince whose name it bears, but is of an earlier date. On the pedestal, immediately under the falling folds of the drapery, is a tortoise. As this animal was sacred to Mercury, the god of eloquence, Visconti conjectured that the statue might represent some distinguished Roman orator. A Greek inscription declares it to be the work of Cleomenes, the son of Cleomenes the Athenian; a name distinguished among those who illustrated Greece during the prosperous times of sculpture. The names of Apollonius of Athens, and of Glycon, also an Athenian (the sculptors, according to the inscriptions on the works, of the celebrated Torso and of the (Farnese) Hercules), do not occur in Pausanias; which has occasioned a doubt whether they had executed many works remaining in Greece in the time of that writer. They are thought to have lived in the century before our æra.

Julius Cæsar gratified his taste for the fine arts by collecting statues, gems, and similar objects. His patronage extended itself even to remote places, and he not only embellished Rome, but many cities of Gaul, Spain, Greece, and Asia Minor participated in the advantages of his good taste.

A great impulse was given to the encouragement of sculpture by Augustus. He caused all the finest works that could be procured to be collected, and he had them placed in the public places of Rome. He is also said to have removed the statues of illustrious men from the area of the Capitol to the Campus Martius. (Suet., *Calig.*, 34.) The example of Augustus was imitated by the wealthy Romans, and no expense was spared in adding new and admired productions to the different collections of statues and paintings. Among the most liberal of the patrons of this period, Agrippa stands pre-eminent, for the munificence with which he devoted his fortune to the embellishment of Rome. The Pantheon is a monument of the taste and princely liberality of a Roman citizen. Agrippa employed an Athenian sculptor, called Diogenes, to enrich this temple. Pliny particularly alludes to some Caryatides by him, as well as to some figures in the pediment or front (*fastigio*); but these Pliny (*Hist. Nat.*, xxxvi. 4) says produced less effect, owing to the height at which they were placed. It is recorded that Agrippa constructed some aqueducts, which he decorated with three hundred statues in bronze and marble. During the age of Augustus the names of many very distinguished artists occur. Among them, Vitruvius, the architect, Posidonius, a native of Ephesus, and the celebrated Dioscorides, the engraver of gems, may be particularly mentioned.

The good effect of the example of Augustus seems to have been long felt in Rome, though it does not appear that Tiberius contributed much to preserve or nourish a taste for art. A circumstance however is said to have occurred during this latter reign which shows that the Romans were alive to the value of fine public works. Tiberius admired a statue representing an athlete anointing his limbs, by Lysippus, which stood in the baths of Agrippa—a place, it seems, of public resort. Desiring to have exclusive possession of this work, he had it removed to his own palace; but the dissatisfaction of the people was so great, and their indignation at the emperor's depriving them of what they considered public property so violently expressed, that Tiberius, fearing a revolt, ordered the favourite statue to be replaced in its original situation.

Caligula had works of art brought to Rome from Greece, but it does not appear that he had any admiration of them as objects of beauty or as memorials of an enlightened people, but rather that he considered them as means of gratifying his personal vanity. He ordered the heads of the gods and of illustrious men to be struck off their statues, and his own to be substituted. This paltry ambition, which could be exercised at a cheap rate, accounts for the mutilation of many statues that have reached our times, and in which a totally different character will often be observed in the heads and other portions of the work. Caligula is recorded as the first emperor who was guilty of this species of sacrilege; but he appears to have been imitated by many of his successors. It is a curious fact that notwithstanding the efforts so unworthily made by Caligula to make himself known to posterity, portraits or busts of this emperor are extremely rare. Among the celebrated works which Caligula desired to have transported to Rome was the famous Olympian Jupiter of Phidias; but the idea was relinquished in consequence of the report of the architects that it would not be safe to move it. The reigns of Claudius and of Nero at first gave promise of encouragement to the arts; the latter emperor required decoration for his Golden Palace, which he constructed on the Palatine Hill; and although the vast number of works that had already been procured from Greece would seem to have robbed that country of all its treasures, he procured no fewer than five hundred bronze statues from the temple of Apollo at Delphi. Two of the best works of antient sculpture, the Apollo Belvedere and the so-called Fighting Gladiator, were found among the ruins of a villa or palace of Nero at Antium. Winckelman has conjectured that these statues may have formed a part of the collection, above spoken of, from the temple of Apollo. It is the opinion of some distinguished artists that the Apollo is an antient copy from a bronze original; and its date has been placed in the Augustan age. The argument for the original having been in bronze is founded on certain technical peculiarities of treatment, which, it is thought, indicate the fact of its being the conception and work of a sculptor in metal. The question of the date of the execution of the existing statue is still undecided; but the very close resemblance or identity of its material with the marble of Luna is considered to be strong evidence of its being a work produced in Italy. (Thiersch, *Epochen der Bildenden Kunst*, p. 312, 2nd ed.) Zenodorus the sculptor was employed by Nero to make a colossal statue of him, of bronze. One account says it was a hundred and ten feet high; another, one hundred and twenty. (Plin., *Hist. Nat.*, xxxiv. 18; Suet., *Ner.*, 31.) Zenodorus was called to Rome from Cisalpine Gaul, where he had executed a colossal statue of Mercury, a work which had occupied him ten years. Menodorus, an Athenian sculptor, lived at this time. His statues of athletæ, and subjects of that class, are mentioned in terms of commendation. It is probable that there were two artists of this name.

This may be considered the period at which the introduction of variously coloured marbles in statues became the fashion in Rome. The Roman *polylithic* sculpture differed in some respects from that practised by the Greeks. The Roman mode was to imitate the different stuffs of which real draperies were composed, as well as the ornamental dressings of the figures, with marbles (usually Oriental alabasters, &c.) closely resembling them in colour. The Greeks occasionally used different materials, not often marbles, for this purpose; but not with the intention of imitating the particular colour or texture of the object represented. The Romans carried this so far as to express, in white and dark marble, the colours of the eyes in a statue, in black marble, of an Ethiopian. More than one example of this may be seen in the various collections of antient statues. The reigns of Otho, Galba, and Vitellius were too short and too disturbed to give those emperors time or opportunity to encourage sculpture. Otho ordered a large sum, ninety millions of sesterces, to be appropriated for the completion of the Golden Palace of Nero. Busts of these emperors are extremely rare. There is one of Vitellius in the Museum of the Louvre, of very high merit; but most of the portraits of this prince have been considered modern.

Vespasian, Titus, and Domitian encouraged sculpture. Titus erected two statues, one of gold, the other equestrian, of ivory, in honour of Britannicus, the son of Claudius, who was poisoned by Nero. (Suet., *Tit.*, 2.) Statues of Domitian are rare, in consequence of the order issued by the senate, after the tyrant's death, that all statues of him should be destroyed.

But little now occurs in the history of sculpture worthy of notice till the time of Trajan. The taste and energy of this prince reanimated the arts both in Greece and Italy. Zeno of Aphrodisias was a sculptor of this time. The column of Trajan is an interesting monument of the art in the latter part of the first century after Christ. The reigns of Trajan, Hadrian, and the Antonines may justly be accounted the golden age of sculpture in Rome; though even then it is probable that the art was little practised by native artists. In Hadrian especially the arts found a munificent protector. He restored many of the antient temples which were falling to decay; he erected others in a style worthy of the best ages of the art; and, among other public-spirited undertakings, completed the temple of the Olympian Jupiter at Athens. [ATHENS, p. 11.] Among the enrichments bestowed upon it was a statue of Jupiter in gold and ivory, several other works placed there by Hadrian, and finally a colossal statue of the emperor himself. The scale of magnificence in which this prince indulged may be estimated from the remains of his celebrated villa near Tivoli, about eighteen miles from Rome. It was embellished with all the finest works that could be procured, whether the productions of antient Greek artists or of those of his own time. Some of the most interesting and valuable remains of antiquity have been discovered there; and even at the present day every fresh excavation that is made among these ruins restores to the world some object of interest. Some of the Egyptian superstitions having been introduced into Italy about this time, they were mixed up with the existing forms of worship, and the gods of the Nile were admitted among those of the Romans. The example of the capital was soon followed by the smaller communities; and as the new worship was extended over the whole empire, a great demand arose for statues, and other symbols of Egyptian deities and ceremonies. The imitations of Egyptian figures and subjects which are found in Italy, and which particularly abounded among the ruins of Hadrian's villa, may be assigned to this period.

The numerous specimens of sculpture of the time of Hadrian that are preserved in modern collections are evidence of the high state of the art. The statues and busts of himself, and of the emperors who immediately preceded and followed him, as well as the portraits of Antoninus and Lucius Verus, exhibit qualities that would do honour to the best ages of Greek sculpture. There are two statues of Antinous in the museum of the Capitol, one treated in the Greek style, entirely naked, and the other with Egyptian attributes, which are particularly worthy of notice for the simplicity and beauty united with grandeur that pervades them. They carry us back to the very finest period of the practice of the art.

Sculpture declined after the death of Hadrian. The difference observable, both in style and execution, in the two columns of Trajan and Antoninus, exhibit a marked change in the condition of art, even in the short period that elapsed between the execution of these works. Antoninus Pius was not however neglectful of art; but the chief employment of that time seems to have been in portraits and busts, a sure indication of indifference towards the higher class of design.

Herodes Atticus claims a distinguished place in the list of promoters of the fine arts. He employed his immense wealth in embellishing Athens and other cities of Greece. Chryselephantine sculpture was still practised; for it is recorded that he caused a quadriga, with a group of Neptune and Amphitrite, made of gold and ivory, to be placed in a temple of Corinth. By the time of Septimius Severus (about A.D. 200) the arts of design had rapidly declined. The schools for their cultivation, which had been established by Hadrian, were no longer kept up, and the effect of the neglect of pure design is visible in the monuments of this period. The sculpture on the arch of Sept. Severus, in the Forum of Rome, as well as that called the Arch of the Goldsmiths, also at Rome, offer undeniable evidence of the low condition of taste, and the inferiority of practice in art. Considerable care was shown in the littlenesses of execution; but everything that indicated boldness of conception, breadth of treatment, and style, had vanished. With the exception of busts, some of which must be admitted to have great merit, the monuments which remain of the time of Caracalla, Geta, Alexander Severus, and their successors, only confirm the rapid fall of sculpture. Alexander Severus endeavoured to revive a taste for architecture, and even instituted schools for the education of students; but the calamities that disturbed Italy during the contentions for the empire, left men little leisure for elegant pursuits. The degraded state of sculpture in the third century of our æra is sufficiently declared by the quality of the bassi-rilievi on the arch of Constantine in Rome. Those which are of the date of the erection of the arch exhibit the utmost poverty of design, with feebleness of execution; but it is well known that the greater part of the sculpture was taken from an arch erected in honour of Trajan, to commemorate his victories over the Dacians and Parthians. The appropriation, on such an occasion, of sculpture executed for another purpose, and at a distant period, offers very conclusive evidence as to the state of art in Rome at this time. It is probable that there really were no sculptors then living to whom it was expedient to entrust the decoration of a work of that description. Indeed, wherever it was absolutely necessary to introduce any work of design of the time, there is ample proof of extreme deficiency in all the requirements of art.

The dismemberment of the Roman empire by the establishment of a seat of imperial government at Constantinople, was a fatal blow to the grandeur and magnificence of Rome; and from this time may be dated the downfall of the city. At the time when Constantine succeeded to the purple, sculpture, as already observed, had fallen into a very low state, and events hurried on its complete degradation. To Constantine himself some honour is however due for his endeavours to restore a feeling for the arts, by the scale on which he proposed to decorate the new imperial residence. Sensible of the want of artists capable of doing justice to his splendid conceptions, he instituted schools, especially for architecture; and, by distributing rewards and giving privileges to students, he endeavoured to induce young men to devote themselves to acquiring a knowledge of the art. He so far succeeded that several considerable buildings were erected, but they were indebted for their decoration to the sculptors of a past age. By the emperor's commands the cities of Greece and Asia Minor were despoiled of what had been left them by preceding collectors. Statues of gods, heroes, sages, and poets were brought together from all parts, to contribute to the splendour of the new city, and nothing, Cedrenus observes, seemed wanting, but the souls of the illustrious individuals whom these admirable monuments were intended to represent. Some attempts were made to restore sculpture by giving employment to contemporary artists; and statues in metal were erected in this reign and in the subsequent reigns of Constantius, Theodosius, and Honorius; but the spirit of antient art was lost, and these works, of a totally distinct character from that of the finer Greek schools, appear to have had so little merit, that the names of their authors have not been recorded.

The state of Italy in the fifth and sixth centuries rendered the restoration of the fine arts utterly hopeless. During this unhappy period of her history she suffered from the inroads of the northern nations. In the year 412 Alaric, king of the Goths, ravaged the country and gained possession of Rome. At a later period the city was given up to pillage by Odoacer; and Genseric and his Vandals subsequently added to the destruction. In 545 Rome was attacked by the Goths under Totila; they set fire to the city, which continued burning for several days. In this siege, the Romans, driven to their last hold, defended themselves from the Mausoleum of Hadrian (now the Castle of St. Angelo); and, we are told, threw down upon their enemies the statues which decorated that sumptuous edifice. To the losses occasioned by these and similar means are to be added those consequent upon the anti-pagan zeal of some of the early Christians. They used to drag down the statues of the divinities of the Greek and Roman mythology, and pound them to dust. The finest productions of the greatest masters of sculpture were thus demolished; and so sweeping had been the destruction, that when Arcadius and Honorius issued fresh edicts for carrying on the work of demolition, it was said, 'Si qua etiam nunc in templis fanisque consistunt' ('If indeed there should be any still left in the temples').

The greatest treasures of art were preserved at Constantinople, and the palace of the Lausi boasted one of the finest collections of antient statues. An immense number of these fell a prey to the flames in 479. In the year 661 Constans was driven from Constantinople by the infuriated people, and passed over into Italy. He visited Rome, where he remained a few days, but in this time he despoiled it, as far as he could, of whatever it still possessed of value in art. These works, chiefly in bronze, were carried by his orders to Syracuse, where he proposed to establish himself, and where he died.

The public attention both in the Eastern and Western empire was now too fully occupied with intestine troubles and the attacks of external enemies, to be able to think of the arts. The fury of the Iconoclasts and the conquests of the barbarians forwarded the work of destruction, and though Theodoric, and afterwards Charlemagne, attempted to stop the ravages which were consequent upon the successes of their followers, and to afford some protection to the remains of antiquity, their influence was quite inadequate to effect their object or to save the monuments of genius from the violence of an uncivilized and ill-disciplined soldiery. Theodoric (about 500 A.D.) laments, in a letter to Symmachus, the ruin of works of genius, and observes that Rome still possessed a population of statues. Charlemagne formed the plan of renovating art, and most probably would have accomplished his object, if the age had been worthy of the emperor. His great purpose however was to obliterate the remembrance of the splendour of paganism by the magnificence of Christian art; and the entirely new feeling introduced occasioned a totally new style of design, which, as it has little connection with our present subject, will be considered in another place.

The Empire of the West and the glory of the Roman name had passed away. The resuscitation of art and science belongs to another period of our history.

We still watch, with interest, the existence of some of the masterpieces of Grecian sculpture preserved at Constantinople: but even these were destined to destruction, and in no short time shared the common fate.

In the twelfth century Constantinople, after a series of distresses and difficulties, was taken possession of by the victorious Latins and their allies under Boniface and Baldwin; and the city, which had already been nearly destroyed by a succession of fires, was given over to pillage. Nicetas Choniates has described some of the fine remains of art that were there in his time, and which, during this reign of plunder, were broken or melted down to be coined into money, or sold for the value of the metal. Among them we find various bronze statues of charioteers that stood in the Hippodrome; a group of Bellerophon and Pegasus; Paris presenting the apple to Venus; an exquisite statue of Helen; a colossal Hercules, by Lysippus; and the celebrated colossal statue of Juno, which had once adorned her temple at Samos.

The real history of antient sculpture may be said to have ended even before the period to which it has here been carried. It is both unsatisfactory and painful to attempt to trace it farther, when each step taken only shows ruin and devastation. The monuments of the Romans are numerous, and have been useful in illustrating antient writings and in making us acquainted with the manners and customs of that people; but Roman sculpture has not the same claim upon our attention as that of the Greeks. Indeed in following the history of the art in Italy it is obvious that the interest is chiefly kept up by considering sculpture in Rome as a continuation of that of Greece, and not as an art which the Italians cultivated with any original feeling. The best works produced were by Greek artists; and the attempts of the Romans are characterised, if it can be called character, by poverty of invention, meanness of design, and for the most part unskilful execution. The art was seldom patronised but when it was required to flatter the pride or please the vanity of individuals by portrait statues or busts; and consequently it never rose to that excellence or elevation which it attained in Greece, where it was made the means of embodying the grand conceptions of genius by the union of expression and sentiment with the most beautiful forms.

Revival of Sculpture.—After the subjugation of the Greek and the division of the Roman empire, the fine arts gradually declined. Occasionally efforts were made to revive them, but as these arose from individual feeling, and were not supported by any general interest in the subject, the attempt had little success. Charlemagne endeavoured to restore them; but his edicts, unresponded to by the sympathy of those about him, were unable to effect his object.

Still the arts were kept alive by the monks of the early Greek and Latin churches, who, with pious diligence, illuminated manuscripts, and sometimes even decorated the walls of their chapels and convents with rude paintings. Some examples of this kind of art (miniature embellishments of books) are perhaps as old as the third century of our æra.

It has been usual to date the revival of art in Italy at about the tenth or eleventh century The beginning of modern art may however be reckoned from an earlier time; rather, as Flaxman says, from the reign of Constantine, seven centuries earlier, when Christianity became the religion of the empire. Painting and sculpture then ceased to be employed, as heretofore, on the pagan gods, but were engaged to illustrate subjects connected with Christian worship. Even during the reigns of those emperors by whom the Christians were most persecuted, they ornamented their subterraneous retreats with sacred portraits and subjects from Scripture. (Flaxman's *Lectures on Sculpture.*) The artists to whom the chief merit of reviving art is due, are supposed to have derived no small benefit from the study of the remains of antient sculpture which were still scattered about Italy, and particularly in Pisa, the native city of the presumed founder of the first school of modern sculpture. Without denying this very probable effect of superior works upon minds just awakening to the beauties of art, it may be disputed whether its influence was so great as some have imagined. It scarcely can be traced where it might most reasonably be supposed to exist, namely, in any peculiarities or finer qualities of style or execution; and it surely must be conceded that the mind and spirit that are observable in the paintings and sculptures of the time of the revival are of an entirely original character and quite independent of the antient schools. This is remarkable in a class of design which at first seems peculiarly calculated to tempt modern artists to recur to the manner of the antients, namely, that in which symbols and allegorical figures are employed. In the examples that exist by one of the earliest painters, Giotto di Bondone (chiefly in the Capella 'dell' Annunziata' and in the 'Salone' at Padua), there certainly is no apparent imitation of any of the numerous and varied modes of treating such subjects that were offered to him in the monuments of antiquity. Without the most remote idea of underrating the excellence of fine antient models, it seems only just to assert a claim for the distinct and original character which divides modern Christian art from that of the Greek schools. A depth of thought, an intention pervades the Christian art, which shows an entirely altered feeling; and, after the first period of the rude and almost frightful attempts at design (usually in single figures, gaunt and staring images of the Apostles and saints), the revivers of art seem to have aimed at appealing to the sympathies, rather than gratifying the eye and pleasing the fancy only, by presenting to them beautiful forms. On this ground the artists of this age were essentially men of genius; for, instead of servilely copying, they drew from their own original sources; and the art that proceeded from them eventually became, as was the case with Greek art while master-spirits directed it, great and admirable.

Passing over the performances of the artists who were employed in different parts of Italy in the century before his appearance, Niccolo Pisano may be considered the father of modern sculpture. Many of the artists alluded to, united, as was usual in those days, the three professions of painting, sculpture, and architecture, and their works are interesting monuments of their ingenuity; but sculpture only assumed a distinct and appropriate character when the two Pisani, Niccolo and his son Giovanni, devoted themselves to it, and by their talents diffused a love of art throughout Italy. The cathedrals of Pisa, Pistoja, Siena, and Orvieto are rich in the productions of the Pisani. They consist of magnificent marble pulpits enriched with bassi-rilievi and statues, and are evidence of great power both in composition and in deep feeling. Among the more remarkable and beautiful of the works executed by Niccolo and his scholars are the rilievi which decorate the façade of the cathedral of Orvieto. They are in white marble, and the execution is careful, though it bears marks of want of practice in the mechanical requirements of the art. Their higher qualities compensate however for these minor defects. The subjects are illustrations of the Old and New Testaments; the Creation of Adam and Eve, the Temptation, the Expulsion from Paradise, &c. It is not easy to convey by description a just idea of the merits of these compositions. They are chiefly admirable for the simplicity of the arrangement of the groups, and for the grace and feeling which pervade some of the figures, particularly those of the angels. The draperies are also well understood, and are treated with considerable skill as regards the workmanship. Cicognara (*Storia della Scultura*) thinks that these are the productions of the scholars of Niccolo, and he denies that he executed any of them himself. One of the most masterly compositions of any school of sculpture is a work of Niccolo Pisano representing the 'Taking down from the Cross.' It is a semicircular basso-rilievo, in marble, and is placed over one of the side doors in the front of the Duomo of Lucca. Another remarkable work of Niccolo Pisano is a basso-rilievo representing the Last Judgment and Punishment of the Wicked, in the cathedral at Siena. The subject is not of that character in which the mind of Niccolo, judging from his other works, could satisfactorily be employed. His power seems to have been in treating gentle, delicate, or touching representations; but the performance alluded to has great merit for the boldness of the conception, the eager crowding or fearful shrinking of the figures, and for the masterly composition. The opportunity to introduce beautiful expression has not been lost: two figures of angels are particularly striking. Niccolo Pisano commenced his profession early in 1200. Some of his best works are at Bologna, where he was diligently employed in 1225. He lived to an advanced age, and was succeeded by his son Giovanni di Pisa, Arnolfo of Florence, and other scholars. Giovanni executed some esteemed works, but in natural genius he was inferior to his father, and he was satisfied rather to imitate what had been done, than desirous or able to advance the art. Sculpture did not make that progress after the death of Niccolo that might have been expected from the merit of his works and the fine opening he had made for its improvement. Arnolfo was much employed both as an architect and sculptor. Two of his works in the latter art, the monument of Boniface, and the Tabernacle in the church of St. Paul (fuore le mura), are preserved in Rome. The date of their execution is about A.D. 1300, or rather later. Among the more successful imitators of Niccolo Pisano may be noticed Margaritone d'Arezzo, Guido da Como, and 'Maestro' Buono.

In the year 1330, Andrea Pisano, the son of Ugolino, who was settled in Florence, executed one of the bronze gates of the Baptistery in that city. The sculpture illustrates the life of St. John. This work is admirable for its beautiful sentiment and simplicity, though it must be allowed to be deficient in the mechanical excellences of sculpture. He also executed some statues in marble, but Flaxman thinks they are not equal to the productions of either Niccolo or Giovanni. Cicognara, in his 'Storia della Scultura,' gives a long list of the productions of this artist, and justly considers him entitled to the highest praise. Andrea Orcagna, contemporary with Andrea Pisano, was an architect, painter, sculptor, and poet. His works in sculpture, notwithstanding a certain dry quality of execution that pervades them, have great merit. His most esteemed performances are the sculptures on the altar in the chapel or oratory of Or San Michele in Florence. One of the compartments represents the Presentation in the Temple. In another are some heads, especially one of the Virgin, which are full of beauty. Orcagna showed great talent in the management of his draperies, preserving considerable breadth in the forms and disposition of the folds, and so composing them as not to conceal the action of the limbs. There are some curious monuments of this early period at Naples, where sculpture was practised by the followers and imitators of Niccolo and Giovanni Pisani. The Neapolitans pretend indeed to cite names of sculptors even earlier than the Pisani; and mention is made of 'Maestro' Fiorenza and Agnolo Cosentino of as early a date as the ninth and tenth centuries. Approaching however nearer to the time under consideration, we find the name of Pietro da Stefani mentioned as a respectable sculptor at Naples. His works are particularly commended for expression, a quality of difficult attainment in what may truly be considered the infancy of art. The two Masucci are also recorded among the sculptors who were at that time decorating Naples with their works. The chief occupation for the artists was in 'Depositi,' or tombs, monumental sculptures, and occasionally enrichments, in reliefs and small figures, on altars. The monuments were often of a very elaborate kind, uniting sculpture with architecture. Stories of figures in niches, or mixed up with Arabesque or Gothic ornaments, rose one above the other, till, at a certain elevation, the work took a pyramidal form, the apex of which was surmounted by a statue either of the Madonna and Child, or of a patron saint, or sometimes by an equestrian figure of the deceased. There are some very curious specimens of these compositions in many parts of Italy; one of the most remarkable is at Naples, in the church of S. Giovanni dei Carbonari.

The works of Luca della Robbia abound in Italy. They possess merit not only as works of art, but as specimens of a manufacture, or rather, a process, of which this sculptor is said to be the inventor and exclusive possessor. This was the art of covering *terra-cotta* models with a beautiful and peculiar coloured varnish, which renders them as hard as stone. He is supposed never to have disclosed this secret; but there is a tradition that he committed it to writing, and enclosed the paper, or whatever it was inscribed on, in some one of his models, before he sent it to be baked; so that it could only be known at the price of destroying, or at least injuring, a number of his works, till the document should appear. Among his productions are some of great beauty. They consist chiefly of groups, in alto-rilievo, of the Madonna and infant Saviour, or Christ and St. John as children, and similar subjects. Two works of Luca, bassi-rilievi in marble, formerly in the Duomo of Florence, according to Cicognara, but now preserved in the Gallery of Sculpture, deserve particular attention for their composition and the expression. They represent a choir, or groups, of singers. They are admirable for their truth to nature; and they only want a more elevated class of form to render them equal to the productions of the best works of the best periods of art. It is said that these rilievi were executed in competition with Donatello, whose rival performance is still in existence. Luca della Robbia died in 1442.

In the Gallery of Sculpture at Florence are preserved some extremely interesting specimens of art of this period, by Benedetto da Rovezzano and others. These works merit a careful examination, as they offer not merely valuable illustration of the progress that was being made in the art at the time they were executed, but they possess qualities which claim for them high praise as examples of rich composition and appropriate expression. Many of them are likewise worthy of attention for an approach to great beauty of form, and for the skilful treatment of the draperies.

The next distinguished names which occur in the annals of restored sculpture are those of Lorenzo Ghiberti and Donato di Betto Bardi, better known as Donatello. Ghiberti has secured a lasting reputation by his celebrated bronze gates of the Baptistery of Florence, the edifice on which so many preceding sculptors had been employed. The first gates mentioned by historians were executed by Buonano, in 1180: they were destroyed by fire. Andrea Pisano was the next artist employed upon them, and his and the later works at that edifice are fortunately still preserved. The contribution of Lorenzo is in a series of rilievi, ranged in compartments, illustrating subjects from the Old Testament. Michel Angelo is said to have admired them so highly, that he declared they were fit to be 'the gates of Paradise.' Lorenzo brought to this work a great knowledge of composition, a superior acquaintance with the more beautiful forms and movements of the human figure, a refined feeling for expression, and considerable powers of execution. They very far surpass the works of his predecessors in the revival of sculpture, and, in many respects, have not often been excelled. It is not pretended that these reliefs are free from faults. Their chief imperfection arises out of the undefined notions which then existed of the true principles that respectively govern, or should govern, composition in painting and sculpture. It is obviously out of the province of the latter art (which is confined to representing objects by defined forms alone) to attempt perspective appearances and effects which can only be truly and correctly given by aid of colour, or by the skilful distribution of light and shadow. In the work under consideration this principle is invaded. Objects are represented in various planes, and those which should be subordinate are, in consequence of the necessary relief given to them in order to define their forms, forced upon the attention, or cast shadows to the injury of more important features in the design. The number of small parts, and a too great minuteness of detail, are also defects in this remarkable work, and deprive it of that breadth of effect which is so admirable a quality in art. Ghiberti was less successful in a bronze statue of St. Matthew, on the exterior of the church of Or S. Michele. Flaxman observes of it, that 'it wants the severe chastity of the apostolic character; and the head is inferior to those in the spandells of his gates; the attitude also is affected, and the drapery unnatural.'

Donatello was a scholar of Lorenzo de' Bicci, and was born in Florence in the year 1383. The works of Donatello are numerous, and remarkable for their superior qualities. His conceptions were bold, and his execution vigorous, and it is easy to see in his performances the reason for the compliment paid to his statue of St. Mark by one who could so well appreciate these qualities as Michel Angelo: 'Marco, perchè non mi parli?' This, and a statue of St. George, also in marble, decorate the exterior of the church of Or San Michele at Florence. The St. George is a fine example of grand and simple expression. The figure, dressed in plate armour, stands firmly on both legs, and he rests his hands on his shield, which is held before him, its pointed base on the ground. There is a calm determination and a quiet dignity in this work. It is probable that the somewhat exaggerated treatment which is observable in this and other productions of Donatello, as well as of Ghiberti, arose from their desire to avoid the dryness and poverty of form in the works of some of their immediate predecessors. The gallery of sculpture in Florence contains some curious bassi-rilievi, in marble, by Donatello, representing groups of children dancing to music. The composition is most skilful, and the expression and character most carefully and successfully attended to. The relief is much more flattened than is usually seen in early works, and the background is studded with gold-leaf, laid on in small circles about as large as (and indeed much resembling) guineas or sovereigns: these probably are the rilievi which he made in competition with Luca della Robbia. Some bassi-rilievi by this sculptor exist at Padua; and making allowance for the age, they are very remarkable works. Donatello enjoyed a great reputation, and there is scarcely a city of any consequence in the north and middle of Italy that cannot boast some specimen of his talent. He introduced a mode of working reliefs that has not often been practised since his time. The sculptured portion is scarcely raised above the plane of the background. It has the appearance of the design having been drawn on the marble, and then engraved, as it were, under a strong side-light. This kind of work hardly comes legitimately under the name of sculpture, and can only be fitted for certain situations, in which, at a little distance, it has more the effect of a picture than of sculpture.

Brunelleschi, or, as he is called by the Italian historians, Filippo di ser Brunellesco, was contemporary with Donatello. He was an architect as well as a sculptor, and was the originator of the bold idea, which he so successfully carried out, of building the cupola of the Duomo of Florence. Vasari gives an interesting account of the difficulties this great artist had to contend with through the ignorance, the jealousy, or the want of confidence of those about him, when he first advanced this great project. Brunelleschi and Donatello, practising in the same city, were accustomed, it appears, to consult each other upon their works. The latter had carved in wood a crucifix for the church of Santa Croce at Florence, and the following anecdote of the two artists is related by Vasari:—Donatello, having finished his work, and being satisfied that he had produced a very admirable performance, invited his friend Brunelleschi to see it. Brunelleschi went, and, having had his expectations much raised by Donatello's own description and praise of it, could not conceal his disappointment, but gave evidence of it by the slight commendation he bestowed upon his friend's work. Upon being pressed to give his real opinion and sentiments, he said, 'that the figure placed upon the cross appeared that of a day-labourer, rather than a representation of Jesus Christ, whose person was of the greatest possible beauty, and who was in all respects the most perfect man that ever was born.' Donatello, already disappointed of the praise that he had anticipated, could not brook the unexpected severity of this remark: 'It is easier to criticise than to execute,' he retorted; 'do you take a piece of wood, and make a better crucifix.' Brunelleschi said no more; but upon his return home went to work, and after the labour of several months he finished a crucifix. This done, he invited Donatello one day, as if accidentally, to dine with him, and he having accepted the invitation, the two friends walked together towards the house of Brunelleschi, till they came to the old market-place, when the latter purchased various eatables, and giving them to Donatello, requested him to go on with them to the house, where he would join him presently. Donatello having reached the apartment of his friend upon the ground-floor, had his attention immediately arrested by the crucifix of Brunelleschi, which that artist had taken care to place in an advantageous light; and, standing before it, he became so absorbed in the contemplation of its extraordinary merits, as entirely to forget the provisions committed to his charge: for opening his hands which supported his apron, down came the eggs, cheese, and other things upon the floor. Notwithstanding which, he still continued in the attitude of one overcome with admiration, until the arrival of Brunelleschi, who, laughing, asked him how they were to dine now that he had spoiled everything. 'I,' answered Donatello, 'have had quite dinner enough for this day. You perhaps may dine with better appetite. To you, I confess, belongs the power of carving the figure of Christ; to me, that of representing day-labourers' ('A te è conceduto far dei Christi, à me dei contadini'). (Vasari, *Vite dei Pittori, &c.*; Ottley, *Italian School of Design;* Cicognara, &c.) These two works are still preserved. The crucifix of Donatello is in the church for which it was originally executed, and that of Brunelleschi is in the church of Santa Maria Novella. Though it is far from the perfection that the above anecdote would imply, it is a remarkable work for expression, and in that respect ranks deservedly before the performance of Donatello. It was evidently one of this artist's early performances, and this rivalry doubtless led him to pay greater attention to expression in his subsequent works. Those at Bologna and in other places are evidence of his application and success. Donatello died full of years and honour. He left a brother, Simon, who was invited to Rome by the pope, in 1431. While there he executed one of the bronze gates of St. Peter's. Giovanni di Pisa was another of the numerous scholars of Donatello. There is a large basso-rilievo in terra-cotta by this sculptor over the altar in a chapel of the great church of the Eremitani at Padua, which deserves notice for the simplicity and breadth of the composition, and for the peculiar manner in which it is executed. It is remarkable for the flat style of the relief—a mode of working that Donatello frequently adopted, and which, when judiciously managed, has a very broad and fine effect. The frieze of the Parthenon may be selected as a beautiful example of this style of executing basso-rilievo. The subject of the work alluded to at Padua is the Madonna and infant Christ, with three figures of saints on each side of them.

Italy was at this time filled with artists, many of them of distinguished merit, who found ample employment in what may be called church sculpture, and occasionally in executing statues of illustrious persons. Florence perhaps boasted the highest names in the several arts, but Bologna, Padua, Milan, Naples, Siena, Venice, Modena, and even the smaller cities of Italy, all had their schools of artists. The Majani and the two Pollajoli, Andrea Verrochio, Andrea Ferrucci, and Mino da Fiesole, are among those whose works claim attention among the best productions of the fifteenth century.

Andrea Verrochio is chiefly celebrated as having been the master of Lionardo da Vinci, and of Pietro Perugino, the master of Raffaello. It is said that Verrochio was at first a painter, but having desired Lionardo da Vinci, then a mere lad, to paint an angel in an altar-piece on which he was engaged, Verrochio found the performance of the scholar so superior to his own portion of the work, that in a fit of jealousy he resolved to paint no more, and he soon after devoted himself to the sister art. A bronze equestrian statue of Colleoni, by Andrea Verrochio, may be seen at Venice in the Piazza di S. S. Giovanni Paolo; it is interesting as a specimen of art of the time, but it is heavy in form, and the action of the horse is not true to nature. Verrochio provided the design and model for this group. It was cast in bronze by Alessandro Leopardo. Several of the works of Andrea are preserved at Florence.

It is a reproach to the artists of the fourteenth and fifteenth centuries, that, not satisfied with carrying out their own original ideas, and endeavouring to advance the practice of art within the limits of consistent design, they suddenly had recourse to the incongruous mixture of antient mythology with the existing religion, an unfortunate innovation which tended to check the steady progress of sculpture by engrafting a totally foreign class of design or ideas upon their own original sentiment; they only misused or abused the one, and at the same time materially injured the effect of the other.

Michel Angelo Buonarotti was born in 1474. At an early age he became the scholar of Domenico Ghirlandajo, the most celebrated painter of his time, and afterwards studied under Bertoldo, the director of the academy established by Lorenzo de' Medici at Florence. The genius of M. Angelo was remarked by Lorenzo, who received him into his house, giving him apartments in the palace, and otherwise honouring him with marks of peculiar favour. As he increased in years, his wonderful powers as an artist were developed; and his powerful and vigorous genius placed him at once in the distinguished station which he still occupies. Till the time of Michel Angelo, the works of art since the revival were all more or less meagre and dry in style, although considerable feeling and talent were occasionally displayed in their conception (or invention) and composition. Extraordinary efforts were sometimes made, as by Ghiberti and Donatello, to infuse into them a better and more elegant quality of form, but it was left to Michel Angelo to effect that total revolution in style which has stamped not only his own productions, but the art of his age with a character peculiarly its own. The most striking quality in the works of Michel Angelo is an undefinable vastness and grandeur of effect that takes entire possession of the mind. This power is strongly felt in the presence of his Moses, in the monument of Pope Julius II, and of his statues of Lorenzo de' Medici (not 'il Magnifico') and Guiliano de' Medici, in their monuments in the family chapel at Florence. The Moses is a grand effort of genius. It is as original in conception as it is masterly in execution. The figure, of colossal dimensions, is represented seated. One hand rests upon the tables of the Commandments; the other crosses the front of the figure, and meets the ends of the beard, which falls in ample masses to the waist. The statue is draped, but the arms from the shoulders are naked, and, thus treated, contrast finely with the voluminous folds beneath, which, collected in the lap of the figure, fall in rich profusion on the ground. The turn of the head is remarkably striking; but the expression of the face is open to criticism, and the horns on the forehead, though they give a superhuman character, produce a disagreeable effect. The characteristic feature of this statue is its vast energy; but it is sufficiently tempered to preserve the repose which is essential to true dignity. This work requires to be studied with attention: its merits will then be found to compensate for those minor faults which at first sight offend the fastidious spectator, and which, it must be admitted, the manner of Michel Angelo threw more or less into most of the productions of his chisel and pencil. As a whole it illustrates the forcible expression applied to the general character of this artist's works, '*Di Michel Agnol' la terribile via.*' The statue of Lorenzo is also seated. He is represented absorbed in thought. He rests his face upon his hand, which partially covers the chin and mouth. The general action is one of perfect repose, and the expression that of deep meditation. It is impossible to look at this figure without being forcibly struck with the *mind* that pervades it. For deep and intense feeling it is one of the finest works in existence. It has been well observed of this statue, that it has no resemblance to the antique, but it rivals the best excellences of the antients in expression combined with repose and dignity.

In the lower part of the two monuments of Giuliano and Lorenzo, in the chapel of the Medici, are allegorical figures of Day and Night, and the Dawn, or Morning and Evening. They bear the impress of the master-mind and hand; but the violence of action and forced expression of these statues are not in character, in the first place, with the repose which is appropriate to monumental sculpture, and they do not harmonise with the figures above them. The intimate knowledge of anatomy possessed by Michel Angelo, and the evident mastery he had over all difficulties of execution, appear sometimes to have tempted him, as in these statues, to indulge in their display at the expense of propriety of design.

In the Minerva church at Rome is a much admired statue of Christ by M. Angelo. It has less of violence of action than usually characterises his works; but though it has qualities of a high order, and displays great knowledge of form and skill in execution, it is by no means one of his most successful efforts. The figure wants that calm dignity and refinement which should pervade the representation of the divine nature under a human form. Another work of Michel Angelo, which is often referred to as a specimen of this master, is the statue of David, in the Piazza del Gran Duca at Florence. The powerful hand of the great sculptor is visible in it, and the grand air that is given to the figure by the turn and expression of the head and throat justly claim our admiration; but it is not one of Michel Angelo's finest works. It was executed under very unfavourable circumstances, Buonarotti having been called upon to finish it when the block had already been worked upon by an inferior artist, and considered to be spoiled. In the gallery of Florence is a half-drunken Bacchus, also the work of this sculptor. An antient subject, it still has the merit of being filled with Michel Angelo's own feeling for character and expression, but it falls short of the manner in which the Greeks would have treated it. It wants purity of taste, and the beautiful form, free from affectation or display, which the antients knew so well how to apply in all their conceptions. Michel Angelo in this work attempted to represent what he could not feel as a Greek sculptor would, and to this only is to be attributed its inferiority. Among the best-known groups by Michel Angelo are the Madonna and Child, in the chapel of the Medici at Florence—unfinished; a Pietà, in a small chapel at St. Peter's at Rome; and a group of Nicodemus supporting the dead body of Christ, with the Madonna and Mary Magdalen. These, as compositions, are of the highest merit. They also abound in pathos, and are in many respects finely executed. The Dead Christ, in the Pietà, is particularly worthy of attention. The tranquillity and perfect repose of death are most successfully shown throughout this figure, and with some slight exception (in the face and in the articulations of the joints, in which the usual exaggeration of Michel Angelo is perceptible), it must be considered one of his finest productions. His works in relief are not very numerous. We possess in this country one in marble, of very great merit, consisting of three figures, representing the Virgin, the Infant Christ, and St. John. It is unfinished, but the master is declared in the composition of the group, in the grand style of the forms, and in the bold and vigorous character of the execution. It is in the Royal Academy of Arts, having been bequeathed to that institution by the late Sir George Beaumont, who purchased it in Italy. There is another work very similar to this, and like this also unfinished, in the Gallery of Sculpture at Florence. In the Vatican is another of a different class. It is an allegorical subject, and is a monument of the perfect knowledge of the human figure possessed by Michel Angelo; but it is more remarkable for this than for other qualities requisite in sculpture, namely, simplicity and unity of design. The composition is both crowded and complicated. In taking this rapid survey of some of the principal works of this master, the object has been to bring before the reader the most celebrated of his productions, in order that the accompanying observations might be immediately applied to well-known examples, and the characteristics of his school be more easily understood. Notwithstanding our admiration of the originality of invention, the vigour and mental energy, the knowledge of anatomy, and mastery of execution that appear in his productions in this art, it is generally admitted that the sculpture of Michel Angelo does not give that high satisfaction which is felt in the contemplation of the best works of antient and some even of modern times.

Michel Angelo has had many imitators who have had neither genius nor originality to compensate for the imperfections which are overlooked or forgotten in the mighty inventions of the master-mind, and who for the most part have only been able to copy and increase the faults of his style. Michel Angelo died in 1564, and was buried in the church of Santa Croce in Florence, and a monument is over his grave, in which there is a basso-rilievo, by himself, of a Madonna and Child. The design of this 'deposito' consists of a bust of Michel Angelo over a sarcophagus, in front, and on each of which are statues supposed to represent Painting, Sculpture, and Architecture. The bust and the statue of Sculpture are the work of Lorenzi, one of his scholars; those of Painting and Architecture are by Valerio Cioli and Giovanni dell' Opera. In the 'Dictionnaire des Beaux Arts,' Lorenzi is made the scholar of Bandinelli.

There is a group, in marble, in the Chigi Chapel, in the church of Santa Maria del Popolo at Rome, representing Jonas with the sea-monster, which is remarkable for the grand style of its composition, as well as for the breadth and beauty of its forms. It is attributed to a sculptor who lived in the sixteenth century, called Lorenzetto, but there is a tradition that the design was furnished by Raffaello, and that he even made the model from which the sculptor executed the marble figure. Michel Angelo had a very high opinion of the works of Beggarelli, a sculptor of Modena, and is said to have exclaimed, on being shown some of his models, 'If this clay could but become marble, woe (*guai*) to the antique.'

Jacopo Tatti, better known as Sansovino, is more deserving of celebrity as an architect than as a sculptor. His chief productions, in both arts, are at Venice. Some statues on the Scala dei Giganti (the Staircase of the Giants), at the Palace of the Doge at Venice, and some bassi-rilievi in other places, especially a bronze gate at St. Mark's, are examples of his ignorance of or indifference to the true principles of design in sculpture, though it would be unjust to refuse them the merit of much elaborate execution. Many of his scholars became distinguished artists. Among them may be mentioned Nicolo Tribolo, Danese Cattaneo, some of whose works are in the church of S. Antony in Padua, Bartolomeo Ammanati, Alessandro Vittoria, a sculptor of great merit, and probably Tommaso Lombardo. About this time a profusion of ornament began to be associated with works in sculpture, and led artists to neglect the simpler qualities of design for high finish and minutiæ of mouldings, flowers, scrolls, and other objects of minor importance. Among the ornamented works of the *cinque cento* which are most worthy of notice, are the splendid altar candelabra in some of the Italian churches. There are some particularly fine specimens of this kind of work at Venice. Baccio Bandinelli, born in 1487, is among the distinguished contemporaries of Michel Angelo, Sansovino, and the great sculptors of that time. He appears, from some anecdotes related of him by Vasari, to have been extremely unpopular with his brother artists, and his works were criticised with unsparing severity; but, although some exaggeration in design and defects in execution may be visible in them, they possess qualities which claim for their author a distinguished place among modern sculptors. There are some bassi-rilievi in marble, by Bandinelli, round the screen of the high altar in the Duomo of Florence, which are admirable for their breadth and the fine treatment and disposition of their draperies. The fault of his composition generally, whether of one or several figures, is in its too picturesque arrangement, and in his placing his figures in somewhat forced and affected attitudes. He made a portrait of himself in a group in marble, the size of life, of Nicodemus supporting Christ. It is in the church of the Annunziata at Florence, and was intended for his own monument. In the Palazzo Vecchio is a group, or rather two single statues, of Adam and Eve, with the tree and serpent between them; this is inferior, in all respects, to the former work. The restoration of the right arm of the celebrated group of the Laocoon was entrusted to Bandinelli. Some critics believe this arm should be turned back, and that the hand or some part of the serpent should touch the head of the figure. [Laocoon.] In Bandinelli's restoration the arm is extended.

There is a work of considerable merit, and also of some interest from the circumstances under which it was executed, in the church of S. Petronio at Bologna. It represents the story of Joseph and the wife of Potiphar, and is the production of Propertia de' Rossi, a lady of great personal beauty, and highly accomplished in various branches of the fine arts. It is said she became enamoured of a young artist who did not return her love, and the disappointment threw her into a languishing disorder which terminated in her death. Her last work was the basso-rilievo above mentioned. In it she represented herself as the wife of Potiphar, and the object of her affection as Joseph escaping from her. She died, in the flower of her age, in the year 1530.

Benvenuto Cellini, born in Florence, in 1500, was one of the most distinguished sculptors, founders, and chasers in Italy. All his larger works are in bronze, and are preserved in his native city; but numerous specimens of his skill in smaller productions, as medals of gold and silver, bucklers, dagger hilts, and tasteful ornaments, are in foreign collections and afford ample evidence of the superior talents of their author. The particulars of his life and the history of many of his works are graphically told by himself, in one of the most entertaining autobiographies extant. [CELLINI, BENVENUTO.]

The list of sculptors of this school, or rather of this division of time (for each effected changes that tended to interrupt the existence or continuance of schools), must close with Guglielmo della Porta, the most skilful of all the artists of Lombardy. He was the scholar of Pierino del Vaga. He was also a favourite of Michel Angelo, from whom he received a very high compliment. Guglielmo had been employed to restore the legs of the famous Hercules (now called the Farnese) of Glycon, which he did so admirably, that when, after a time, the original legs were found, Michel Angelo was unwilling to remove Della Porta's for those which had so unexpectedly been recovered. Della Porta executed few works. The most remarkable, as an example of the influence of the style both of Michel Angelo and of Raffaello, is the monument of Paul III., in St. Peter's at Rome. Two recumbent statues in this work, one a female of advanced years, representing Prudence, and the other, a young and beautiful woman, as Justice, are particularly fine. The latter figure is deficient in the expression and character proper to the subject, but it is a remarkable performance for the roundness and richness of its execution, and for the knowledge of form displayed in it. This statue was originally naked; since Della Porta's time it has been partially covered with bronze drapery. This artist effected some changes in the process of casting in bronze. [BRONZE.]

At the end of the sixteenth and the beginning of the seventeenth centuries the sculptors aimed chiefly at fine and curious execution. The works of that time exhibit very high merit in many respects, but they are deficient in repose and simplicity. Instead of grace, we find affectation, and mechanical skill was held in higher estimation than what may not improperly be called the moral qualities of art. The works of Giovanni di Bologna, a native of Flanders, but established in Italy, offer ample illustration of this meretricious and destructive taste in sculpture. They are full of imagination, and are executed with a boldness and ability that both surprise us and call forth our admiration, but there is at the same time an exaggeration in the attitudes and an endeavour after picturesque effect that disappoint us. Baldinucci, in his 'Life of Giovanni di Bologna,' records the following anecdote:—At the early part of his career as an artist he showed Michel Angelo a figure, which he had finished with extreme care. 'Young man,' said Michel Angelo, after looking at the work, 'learn to compose your figure before you endeavour to finish it.' One of the most remarkable performances of this artist is his well-known group, in marble, of the Rape of the Sabines. As a specimen of invention it is wonderful for its expression and its energy of action; and it is impossible not to admire the courage of the sculptor who ventured to execute so daring a work in such a material; but it is open to criticism for the extravagant corkscrew contortions of the composition. His famous bronze statue of Mercury is conceived in the true spirit of poetry, and is deservedly admired as one of the most elegant productions of modern art. The form is light, and the action graceful. He had many imitators, who, like copiers in general, chiefly exaggerated his faults. There are few works of Stefano Maderno, but there is a simplicity of composition and a beauty in the sentiment of his statue of St. Cecilia that justly claim for him a place among the most worthy of the sculptors of this age. This statue was executed when he was very young. The supposed body of St. Cecilia was found in Rome, in 1599, during the pontificate of Clement VIII., and Stefano Maderno was employed to make a careful copy of it before it was removed to where it now lies, in the church of the convent dedicated to this saint in Rome. This may account in a great measure for the superiority of this work over others by the same artist. Limited by the circumstances, and by the pontiff's command to take nature as his model, he had no opportunity to introduce any of the prevailing bad taste. The result is a work of great beauty, one of the best of that age, and in certain qualities not surpassed by later artists.

Bernini was born at Naples, in the year 1598, and exhibited at a very early age his predilection for the art in which he afterwards became so celebrated. It is pretended that a marble head was executed by him at ten years of age. Bernini possessed genius, imagination, ambition to excel, unceasing industry, and great powers of execution; and still, with all these means and dispositions, he was, beyond all others, instrumental in precipitating the decline of sculpture; and the tendency, already exhibited, to prefer minute execution to the higher qualities of design was confirmed by the popularity it acquired in the hands of this artist.

It would be difficult to conceive two styles more opposed to each other than that adopted by the sculptors of this age and that of the great artists of antiquity. In one the pervading principle was simplicity and expression, united with beautiful and appropriate form. In the other, simplicity was of all things most studiously avoided; and complicated arrangement in composition, forced action in the figures, flying draperies, elaborate carving and undercutting (in works in marble), and other means of little more than mere mechanical display, were resorted to, in order to create surprise or to please the eye. Under Bernini all the distinctive bounds of the classes of art were trampled down. Sculptors endeavoured to imitate the effects of the pencil, and architects to introduce into their compositions the curved line of beauty.

The faults and merits of Bernini as a sculptor will be best shown by a reference to and criticism of a few of his best-known works. His group of Apollo and Daphne, in the Villa Borghese, is a production of great merit for its invention and power of telling its story. The god has just reached the object of his pursuit, and, at the moment when he seizes her, Daphne's prayer is heard, and the beautiful form is being metamorphosed into a tree. Instead of generalising this part of the history, Bernini appears to have delighted in the opportunity of showing his skill in execution. The hair and drapery of Apollo are floating in the air, while the change that is to preserve Daphne from violence is shown in detail, in her tresses, the toes and fingers becoming elongated into roots and branches, the latter terminating in carefully-worked laurel-leaves. St. Peter's at Rome contains various works of this artist. The most remarkable of these are the splendid monuments of Urban VIII. and Alexander VII., which may be said to exhibit all his excellencies and all his defects. The former stands opposite a celebrated work of Guglielmo della Porta before mentioned (the monument of Pope Paul III.), and is a melancholy proof of the consequences of losing sight of purer principles. Della Porta's was not a school of perfection; but the contrast between the grandeur of manner of his time and the handicraft display of Bernini's period is distressing. The composition of the second work alluded to, the monument of Alexander VII., is as strange as the execution is wonderful. The sitting figure of the pope occupies the centre of a large and deep niche. The whole of the lower part or ground is filled up with curtain and cloud, in the corners of which are plunged four allegorical groups or figures. Of those at the back of the recess but little can be seen except the heads and shoulders. In the front corners are Truth and Charity, the latter a gigantic female, with fleshy infants pressed against her breast, to whose weight the marble appears to yield with all the elasticity of a soft pulpy substance. This work is a triumph of execution, but debased by the worst taste. A group of the Extacy of St. Teresa in the church Della Vittoria at Rome is another instance of the want of simplicity. In this it is difficult, amidst the flutter of the drapery and the ample convolution of clouds, to discover either the figure of the saint or the subject of the composition. Of the single statues of Bernini, that of David preparing to throw the stone has merit for the earnestness and energy of the expression. The figure is a portrait of the artist, who was very young when he executed this work. His statue of St. Bibiana is also considered one of his best productions; but compared with the St. Cecilia of Stefano Maderno (and the comparison is strictly just, as both represent draped female figures, of the same character, lying on the ground), it is an inferior work. The Four Doctors of the Church supporting the Chair of St. Peter, in the church of that apostle at Rome, is a grand idea; but its effect in execution is injured by the want of simple unaffected expression and attitudes. These statues are colossal. They are cast in bronze, and some parts of the figures and draperies are richly gilt. This composition, taking it altogether, has a magnificent effect. Fontana calculated, from the archives kept in Rome, that this work must have cost a hundred and seven thousand crowns. The sum expended on the whole edifice, up to his time, was forty-six millions eight hundred thousand and ninety-eight crowns; and Cicognara thinks he does not exaggerate when he calculates that a tenth of this was spent on works executed under the direction of Bernini. The fountain in the Piazza Navona at Rome is one of the strange and daring performances of this artist. Cicognara observes of Bernini, that he was architect, mechanist, sculptor, and founder. He was more than this. In proof of the versatility of his talents, mention is made of a theatrical entertainment given by him in Rome; for which he built the theatre, painted the scenes, cast the statues, constructed the engines, wrote the comedy, and composed the music. Bernini lived during nine pontificates; from that of Clement VIII. to Innocent XI. No artist ever had greater patronage, and few greater talents, which, unfortunately for sculpture, were ill-directed, or at least ill-disciplined; the variety of his pursuits and his inordinate love of picturesque effect ruined the progress of the art, induced a false taste in patrons and artists, and, from the injury effected by his bad example, it may safely be said that it would have been better for sculpture if Bernini had never lived.

Alessandro Algardi, a native of Bologna, was contemporary with Bernini, and executed many works of merit. Like other sculptors of the time, he was tempted away from the more valuable qualities that should characterise sculpture, by the endeavour to gain distinction by the display of execution and the picturesque effect of his compositions. The great work of Algardi is his alto-rilievo, preserved in St. Peter's, of the discomfiture of Attila by the miraculous appearance of St. Peter and St. Paul. This work is in marble, in five pieces, and measures about thirty feet in height by nearly eighteen in width. Algardi studied the paintings of his contemporaries for the manner of treating his subject; and the consequence is such as might be expected in an art in which it is totally impossible to produce those effects of distance, clouds, and perspective which only can be given by colour. There are merits in parts of this great composition, which increase the regret that is felt at the faults that are so apparent in other portions of it. In the unpleasing task of following the traces of this decay, it is refreshing occasionally to find examples of a purer taste. Francesco di Quesnoy, better known from his title of Il Flammingo, was a native of Brussels. His early works are said to partake very much of the character of those of Bernini and Algardi; but it is recorded that he was led to copy and study very young children (*putti*), from admiring the beauty of those introduced into his pictures by Titian, and he ultimately became the first sculptor in this class of representation. There are few, whether they have travelled or not, who have not had an opportunity of admiring some specimens of this artist's skill in the round, healthy, playful character of his infants. No artist, except perhaps Raffaello, ever succeeded so entirely in portraying the peculiar charm of beautiful childhood. He preserved just the right medium between tameness and exaggeration. In the church of La Madonna di Loreto at Rome there is a work by Flammingo, which represents St. Susanna, and it may fairly be considered one of the most successful efforts in sculpture of the age. The expression of the head is especially worthy of attention. It has simplicity and intenseness combined with considerable beauty of form. Francesco Mocchi obtained a high reputation in his time. The work by which his merits may best be judged of is in the Duomo of Orvieto. It represents the Annunciation, in two distinct figures. The angel is supposed to be descending, and is supported on a cloud; while the Virgin, in an attitude of shrinking modest fear, is bowing her head as she receives his announcement. Its faults are the faults of the age,—a want of simplicity and too much of the picturesque in effect. The figures are life-size, and executed in marble. The forms are rather heavy, and want that refined character appropriate to a subject of this kind. As examples of elaborate execution, further illustrating the decay of pure taste and the fall of sculpture, the works of San Martino and Corradino may be noticed. Some statues by these artists are preserved at Naples, in the church of S. Severo. One represents the dead body of our Saviour, covered with drapery, under which may be traced all the forms of the figure: a piece of ingenuity of no very difficult attainment, but which always surprises and delights those who are ignorant of the mechanical processes of sculpture, and who think that whatever has the *appearance* of being difficult in art must be so, and measure out their admiration according to their estimate of the ingenuity with which it is overcome. The other is a figure of Modesty, veiled. There is also a third statue, of Deceit, within a net,—a very curious piece of execution. These works attest the patience of their respective authors, and are monuments of their bad taste.

The works of the contemporary and immediately succeeding sculptors do no more than prove the rapid consummation of the fall of sculpture. Occasionally an artist of better taste or higher feeling appeared; but he was not seconded or supported by any refined feeling in patrons, nor inciting sympathy in the public; and the enumeration of works by the Rusconi, Bonazzi, Tagliapietra, Torretti, Morlaiter, Foggini, and others, would assist but little in conveying any distinct impression of the slight shades of difference in the generally fallen and decayed practice of the art.

In the general survey of the rise, progress, and decline of sculpture in modern Italy, may be seen, very nearly, the history and condition of the art in other European countries. The artists of Italy spread themselves over the Continent, and wherever works of design were required, they probably were called upon to execute them. The influence of the taste of the schools of Lionardo da Vinci, Primaticcio, Benvenuto Cellini, Rustici, and others, will be visible in the works of their different times, in France and other countries; and even when it can be ascertained that sculpture was produced by native artists, it generally will be found that their knowledge of art was due to Italian models or Italian masters.

The French historians attribute to native artists the tomb of Philip le Hardi, which was executed in 1404, as well as that of Francis II. The first sculptor who really was distinguished in that country was Goujon. He executed various important works in the sixteenth century. Amongst the most distinguished sculptors of succeeding times may be honourably mentioned Pilon, Anguier, Puget, Girardon, Le Poutre, Le Moine, and Coustou; but sculpture soon became decorative in France, and flutter in composition and design, and minuteness in execution, characterised their art almost from the sixteenth century to a very recent period. The extreme of the worst style of French sculpture is seen in the monument of Marshal Saxe by Pigal, which was erected about the year 1775.

The earliest sculptors of Spain who are mentioned by their historians of art are Aparicio and Rodolfo, who lived about the year 1033. The next is Jayme or Jacques Castyls of Barcelona, who is said to have executed various statues in the façade of a church at Taragona in the year 1376. The name of Anrique occurs in 1380, and of F. Gonzalez in 1399. It seems however that no great progress was made in the arts in this country till the sixteenth century, when Spanish artists went to Italy to study, or Italian artists established themselves in Spain.

The history of sculpture in Germany would lead us into a wide field of inquiry. It is not necessary towards illustrating the general history of the progress of the art, which may be traced with sufficient accuracy through the different Italian schools; and the examination of the causes of its rise and the changes of style it has undergone amongst the Germans would carry us into speculation, or at best into its merely national or local history, rather than assist us in giving a general and comprehensive view of the art. Läffler, or Löffler, is said to have executed the bronze statues which stand round the tomb of the emperor Maximilian at Inspruck; he died in 1565. Others attribute them to two brothers of the name of Godi, who lived at the beginning of that century. The latter name suggests the probability that artists from Italy were then established in Germany or were called upon to execute works of this description.

The political disorders in which Italy was involved in the earlier part of the eighteenth century, may account in some measure for the inactivity in which the arts remained for some years. The wars of the Succession in the kingdom of Naples, the change of dynasty in Florence in the year 1737, and the unsettled state of other parts of the country, diverted men's minds from such pursuits. Cicognara attributes much also to the debased or degraded state of feeling among his countrymen. He says, 'The Italians were too much inclined to love their state of slavery and their ease; to prefer the pleasures they could procure from other countries, and foreign frivolities;' and he exclaims, 'Dove è spento ogni amore, ogni odio, che vita aver' possono le arti che solamente son mosse dalla fantasia e dal cuore.' (*Storia della Scultu.* u, vol. iii., p. 209.) This condemnation is more general and severe than appears to be warranted by facts, and it certainly seems unjust to attribute to the moral degradation of Italians of the eighteenth century the decline of art which had commenced so long before. It is admitted that, prior to this time, taste in art had greatly deteriorated. The effect of the state of feeling described as existing in this later time was to leave sculpture in its fallen state, when a little energy might possibly have restored it. From 1748 to 1796 Italy enjoyed an uninterrupted course of peace; and it is true that during that period there scarcely was a work in sculpture of any magnitude or comparative excellence produced.

The first sovereign who contributed to revive the arts from this state of torpor was Charles III. of Naples. He encouraged architecture on a grand and extensive scale. At Rome, Cardinal Albani formed a collection of the finest remains of antient sculpture that could be procured; and by attaching to him all the most distinguished litterati and the best artists of his day, made his palace the resort of all who felt an interest in the pursuits to which he himself was so devoted. Under the auspices of this 'Hadrian of his age,' as Cardinal Albani has been justly called, Winckelman produced the first work in which the history of the arts of design had been treated in a learned, philosophical, and scholarlike manner; and it has been the model and groundwork of all succeeding and improved works upon the same subject. The popes Clement XII. and Benedict XIV., as well as Clement XIII. and Clement XIV., contributed also to create a feeling for the sculpture of the antients by accumulating monuments of various kinds in the pontifical palace. To Clement XIV. we are indebted for the foundation of the Museo Clementino in the Vatican; which received such noble additions by the liberality of his successor Pius VI., that the name of the latter pontiff was associated with that of its founder in giving a title to the collection; and a considerable portion of the gallery of antient sculpture is still known as the Museo Pio-Clementino. Till Pius VI. issued an order to prevent the removal of works of art, the remains of antiquity discovered in Rome and its neighbourhood could be sold and taken out of the country. The pope, desiring to increase his collection, and preserve to Rome whatever could be recovered by excavation, prohibited anything being removed out of his dominions without a special permission. This order procured for his agents the first choice of whatever statues or other monuments of sculpture were found; and the extensive purchases effected by this means soon filled the Vatican with works of antient sculpture, which, with the additions made by succeeding popes, have made it the most celebrated as it is the most valuable collection of its kind in the world. The discovery of the long buried remains of art in Herculaneum and Pompeii led to the formation of a museum of the same kind at Portici; and in bronzes especially, the Neapolitan collection is without a rival. Among the sovereigns of Italy who contributed to the revival of design, Leopold, grand-duke of Tuscany, must likewise be included. The sculptors of this period were Cavaceppi, Penna, and a few others, in whose hands sculpture made some progress towards a more healthy state. The immediate influence of the Bernini school had ceased to be felt, and the opportunity was given, which these artists in some degree availed themselves of, to introduce art upon purer principles. It must be admitted that what they produced was eminently deficient in original feeling; and their best works were little more than somewhat tame copies or adaptations of antient subjects and models; but at least the practice of the art was continued, and when men of greater power and more vigorous minds appeared, they had not to begin afresh from the infancy of sculpture, nor from the miserably low point to which the Bernini manner had reduced it. Before touching upon the most celebrated sculptors who reformed and restored the taste for art in our age, we shall take a rapid survey of the history of sculpture in England.

The Britons had not the advantage of very skilful instructors in the Roman soldiers by whom the country was so long held in subjection, but during this foreign dominion the native inhabitants had learned to adopt many of the arts. The making of arms and coining money had also taught them some important processes in the more refined arts, and the knowledge thus acquired was not allowed to fall into entire disuse; and it appears that after the departure of the Romans the Britons continued to practise some branches of sculpture. Speed (quoted by Flaxman, *Lect.* I.) says that 'king Cadwallo, being buried in St. Martin's church, near Ludgate, his image, great and terrible, triumphantly riding on horseback, artificially cast in brass, was placed on the western gate of the city,' &c. The workmanship of this 'great and terrible' statue was doubtless very rude and barbarous, but it is interesting to find the tradition of a work of art cast in brass in this country at so early a date. The death of Cadwallo is placed at A.D. 677.

The edifices erected in England after the final settlement of the Saxons in this country, and down to the reign of Henry I., seem to have been nearly in the same style, exhibiting plain fortress-like construction, and repetitions of heavy columns and arches. Sculpture was so little employed, that it is believed there is no sepulchral statue in England of earlier date than towards the end of the eleventh century, though the French had begun to decorate their coffin-lids with figures, &c. as early as the ninth. We may conclude therefore that this practice was first introduced into the country at the Norman invasion.

All the oldest monuments in which figures are thus represented are of ecclesiastics. Two specimens of these sculptured effigies, carved in very low relief on coffin-shaped slabs, may be seen in the cloisters of Westminster Abbey. They are supposed to represent two abbots, Vitalis, who died in 1087, and Crispinus, who died in 1117. Similar monuments are preserved in Worcester cathedral, of St. Oswald and Bishop Wulstan. These sculptures, of extremely rude design and workmanship, have been much injured by time and violence, but they are curious as the earliest examples of the kind in this country. It has been thought probable that one reason for not decorating with figures, or any distinguishing device, the stone coffins in which more illustrious persons were enclosed, was to preserve them from the chance of violence which might have been offered to them, in order to gain possession of the ornaments that usually were deposited with individuals of exalted rank. Several monuments of bishops and abbots which have been opened have shown the deceased fully habited in his episcopal robes, with his ring on his hand, and an enriched crozier either lying by his side or across the body. The more sacred character of the occupant of the tomb, and of the objects buried with him, might prevent any indignity being offered to them; but kings and princes would not be considered in the same view, and, as they would no doubt be even more richly dressed than ecclesiastics, however high their rank, their tombs would offer greater temptation to sacrilegious avarice. The circumstance of the tomb of William Rufus in Winchester cathedral being entirely devoid of ornament may be thus accounted for. That of Gundred, daughter of William the Conqueror, at St. John's church, Southover, is inscribed, and embellished with foliage, heads, and other decorations, but there is no figure of the deceased on it.

When the Crusaders returned from the Holy Land, they endeavoured to introduce into England a taste for the magnificence they had witnessed in foreign countries, and imitations were attempted of the rich foliage and other decorations employed in their architecture. In the west door of Rochester cathedral are some figures so applied.

We believe the earliest specimen in England of figures in armour is of the time of Richard I. Those in the Temple church, of Magnaville or Mandeville, earl of Essex, and of two other knights similarly habited, are probably of this date.

The first example that occurs in England of a monumental figure in royal costume is that of king John, on his tomb in Worcester cathedral. An interesting proof that the figures carved on the lids of tombs were tolerably accurate representations of the persons whose remains they contained, was afforded by the opening of the coffin of king John in the year 1797. The body, &c. was in a state of sufficient preservation to show that it had been dressed in precisely the same costume as that represented in the sculptured effigy.

Wells cathedral was built by Bishop Joceline, who died in 1242. The west front of this church is richly studded with sculpture, consisting of representations, in relief, of Scripture subjects, and of statues, many of them of colossal dimensions, of kings, queens, saints, bishops, and other patrons or dignitaries of the church. This work must have been in progress at the time that Niccolo Pisano, the restorer of sculpture in Italy, was exercising his art in his own country. Flaxman (*Lectures on Sculpture*) thinks that the greater part of the sculpture was by English artists. Some of the statues exhibit much grace and simplicity, and, allowing for the very rude state of art at the time they were produced, they deserve the attention of the curious. The sculpture of the succeeding reign was probably by Italian artists, scholars or imitators of Niccolo Pisano, and who travelled about in search of employment in those countries where ecclesiastical buildings were being erected. The richly decorated Crosses that were raised to distinguish the spots wherein the body of Queen Eleanor rested, were probably by these artists, as well as the statues of Edward I. and Eleanor in Westminster Abbey. The flat brasses with figures sculptured, or rather engraved on them, and let into stone slabs, are mostly of the fourteenth century, few being met with earlier than the reign of Edward II.

Under Edward III. it appears that our own countrymen were capable of exercising some branches of the arts of design. Many specimens of that date remain to prove both the extent to which sculpture was employed, and the merit of the artists by whom the several works were executed. Some interesting examples of art of the fourteenth century may be seen in three recumbent statues in memory of the sons of Edward III.: one is of the Black Prince, in Canterbury cathedral; another of Prince William of Windsor, in Westminster Abbey; and the third of Prince William of Hatfield, in York Minster. These works were executed between the years 1344 and 1378. There are also three remarkable windows of this date at Dorchester church near Oxford: one of them is adorned with between twenty and thirty small statues relating to the genealogy of our Saviour; the others contain reliefs representing Scripture subjects. Various other equally interesting works, exhibiting the progress of the art, belong to this date; and the names of several English artists employed by Edward III. at Westminster are recorded. (*History of Westminster Palace*, by Smith; Flaxman, &c.) The figure, in plate armour, of Beauchamp, earl of Warwick, on his tomb in the Warwick chapel, with the numerous smaller statues let into niches around it, are the work of William Austin, an English sculptor and founder. It was executed in 1439.

The chapel of Henry VII. in Westminster Abbey is one of the most beautiful specimens of rich architectural decoration that exists in this or perhaps any country. The statues within and without it are said to have amounted originally to 3000, but the number is probably exaggerated. An Italian artist, Torreggiano, assisted in the construction of this magnificent tomb; but there is strong reason to believe he was employed on the tomb only, and that the greater portion of the sculptures in other parts of the chapel were executed before he arrived in the country, and it is presumed they were the productions of native artists. Some of these statues show a beautiful feeling for art, and are well worthy of attention for the simplicity and grace of their action, and for the tasteful arrangement and careful execution of the draperies.

From the reign of Henry VIII. to Charles I. sculpture fell into neglect. Indeed it frequently happened that, during the religious animosities and the party violence that prevailed, works of art, and more especially works of sculpture, were purposely destroyed. Charles I. showed a strong disposition to encourage the arts. The celebrated Cartoons of Raphael were purchased by order of the king, and, with other fine works, were brought into this country. In this reign we meet with the names of English sculptors. Christmas executed a monument to Sir William Pitt and his lady, at Strathfieldsay in Hampshire; and Stone is the author of a monument in Westminster Abbey, in memory of Sir George Holles, which is not without merit. Generally speaking however, the style and composition of these and other works of the time are utterly worthless, but there is some boldness occasionally in the conception, which may claim for them a passing notice. The sculpture on the pedestal of the Monument of London representing Charles II., attended by allegorical groups, raising the City of London (under the form of a prostrate female figure), is a striking example of the pseudo-classical and false taste, in art, of the seventeenth century. After this time, the principal works in England were by foreigners; and the names that most frequently occur are Cibber, Steevens, De Vere, Bertocini, Scheemacker, and Roubiliac, as the authors of monuments and whatever other productions that were required in sculpture. This variety of artists, as Flaxman observes, from different countries,—French, Flemings, and Italians, —sometimes brought the taste of John Goujon or Puget, sometimes a debased imitation of John di Bologna and the Florentine school, and sometimes the taste of Bernini, but never a pure and sound principle. In 1766 an English sculptor, Nathaniel Read, executed a monument, which may be seen in Westminster Abbey, in memory of Admiral Tyrrell. It would not be easy to convey by description any just idea of the strange conceits and incongruous imagery that abound in this work; and without the aid of the inscription it would be impossible to comprehend the purpose and subject of the artist's ingenious, and, it may truly be said, costly labours. Admiral Tyrrell died at sea, and his body was committed to the deep. In the lower part of the composition are three allegorical figures, life-size; one of them represents Ireland, as the admiral, we are told, was descended from an antient family of that country, and above is the apotheosis of the deceased. The 'Historical Description of Westminster Abbey,' after giving the explanatory inscription, notices the work in the following words: 'On a piece of rock—"The sea shall give up her dead, and every one shall be rewarded according to his works." The figures of History, Navigation, and Hibernia are well cut; they are represented among the rocks, with the sea above their heads, the admiral himself ascending amidst heavy clouds.' This fully describes the style of the art during the greater part of the eighteenth century. Allegorical pictures were executed in stone and marble, and it was absolutely necessary to have explanations attached to the work in order to enable the spectator to comprehend the meaning of the sculpture. The monuments contain every variety of a most confined idea; and Time, Fame, and Death, represented in the most absurd, and often most objectionable forms, are made the accompanying illustration to almost every work on which the sculptor was employed. The works of Roubiliac, with all their defects, have merits which redeem them from this general and deserved condemnation [ROUBILIAC]; but, with the qualified exception in his favour, the productions of the artists who practised with him, and after his death, can only be classed in the lowest grade of art; it is impossible to imagine anything more false and poor than the style that prevailed.

Early in the present century, the first step was taken towards forming in England a national collection of antient works of art. The Townley Marbles were purchased by a grant of parliament, and placed in the British Museum in the year 1808. Since this period the collection has been enriched by the addition of the Athenian (or Elgin) Marbles, the Phigalian Marbles, various fine bronzes, and other valuable specimens of antient sculpture.

The honour of giving a new direction to taste, or rather, of leading it back to a recognition of true principles, is eminently due to Flaxman and Canova. 'To Canova Italy owes her emancipation from those false perceptions which had, from the influence of the Bernini school, so long diverted the current of pure taste. . . . . To Flaxman the art owes equal obligation. Banks had corrected the grosser impurities, and had stemmed the torrent of bad taste.' 'No modern sculptor has entered so deeply into the recesses of antient art as Flaxman; his style was founded upon their principles, combined with the simplicity of the Pisani and others of the fourteenth century.' The above short extracts from the address of Sir R. Westmacott, who succeeded Flaxman as professor of sculpture in the Royal Academy, place the merits of these two distinguished artists—the restorers of sculpture—in their true light. In the Theseus of Canova, one of his best and earliest works, we recognise the long-lost purity of form and a decided devotion to the simplicity of the antique. In the designs of Flaxman simplicity, grace, and expression resume their influence, in place of the affectation and display of fanciful ingenuity that had so long prevailed. The later works of Canova show a tendency in that great artist to a more minute execution and attention to small parts than is quite consistent with the best taste in sculpture; and it may be objected to Flaxman, that, in his admiration of the beautiful and impressive in design, he too often neglected the means of making his works effective in execution; but it is not expedient to enter here into a critical examination of their respective merits and defects. Their works, the best evidence of the superiority of these distinguished sculptors, are before the world, and a comparison of their productions with those of the entire series of artists from the time of Michel Angelo (and the best of his immediate followers) down to our own age, will at once exhibit their merit in its true point of view—in

Google

the influence they have had in restoring a degraded and fallen art to its proper position.

Mechanical Process of Sculpture.—The technical or mechanical processes of sculpture are for the most part extremely simple. The sculptor, having conceived or invented his subject, usually begins by making a slight sketch of it, either drawing it on paper, or at once modelling it, in small, in clay or wax. This preliminary step enables him to judge of the arrangement, and to correct and improve the general composition of his figure or group. He next proceeds to build up his statue of the desired size. The first thing necessary is to construct a sort of *nucleus*, or skeleton, by which the clay may be supported. This is made of wood or iron, according to the strength required, and the limbs are usually made moveable, by attaching the skeleton parts to the main support, or trunk, by wire joints. The figure is then built up in clay; and whether it is ultimately to be draped or not, it should always be modelled naked, in order that the true forms may be easily distinguished, and the drapery made to fall naturally. In modelling in *relief*, a plane, or ground as it is called, is prepared, upon which the sculptor carefully draws his design. The clay is then laid and pressed upon this, the outline of the figures being bounded by the lines of the drawing. The projection or fullness of the forms must of course depend upon the fancy of the artist, or the purpose or situation for which the work may be intended. The same rule with respect to modelling the figures naked should be observed here as in figures or groups in the 'round.' To preserve the models from shrinking and cracking, it is necessary to sprinkle the clay occasionally with water; and on leaving them, to cover them over with damp cloths.

The next process is 'casting.' The model being completed, a mixture is made of plaster of Paris and water, which is thrown over the whole. When this is 'set,' or hardened, the clay within it is picked out, and there remains an exact mould of the model. This is washed, and the interior is brushed over with any greasy substance, usually a composition of oil and soap, to prevent the fresh plaster, with which it is next to be filled, from adhering too firmly to it. After the mould is thoroughly filled in all its parts with this plaster, mixed to about the consistency of cream, the latter is left to set. The mould is then 'knocked off' with chisels, and a 'cast' of the model is produced entire. If it is intended to execute the work in bronze, the same general principle is observed in the moulding; but there are particular processes to be attended to, in order to enable the mould to bear the weight of the metal, and to ensure the soundness of the 'cast.' [Bronze.]

In copying a model in marble, the first step is to prepare two stones of the same size, or at least with an exactly corresponding graduated scale marked on the front of each, on which the block of marble and the model are respectively to be placed. The fronts of the two scales are so constructed or fitted up, that a 'pointing' instrument can be applied to them. This instrument is usually composed of a pole or standard, to which a long brass or steel 'needle,'—capable of being extended and withdrawn, loosened or fixed, and moved in every direction by means of ball-and-socket joints,—is attached. This is made to touch a particular part of the model. The whole instrument is then removed to the scale-stone on which the rough block is placed, and the marble is cut away till the needle reaches as far into the block as it had been fixed at upon the model. A pencil mark is then made upon the two corresponding parts of the model and block, and thus what is technically called 'a point' is taken. This process is repeated till the numerous points at fixed depths, corresponding throughout with the surface of the model, are attained, and a rough copy of the sculptor's original work is thus mechanically made. These instruments for pointing marble statues are not always constructed in precisely the same manner. The practice of different sculptors has suggested various changes in detail, by which either the movement of the whole machine from one scale-stone to the other is facilitated, or a greater rapidity and security in taking points is attained; but the principle on which they act seems to be exactly similar in all. The statue being rudely blocked out or pointed, the marble is in this state put into the hands of a superior workman called a carver, who copies the minuter portions of the work, by means of chisels of various sizes, rasps, and files; the pencil marks or points showing him the limits beyond which he is not to penetrate into the marble. When the carver has carried the work as far as the sculptor desires, he proceeds himself to give it the finishing strokes, by retouching and improving the details of form and expression, by producing varieties of texture and surface, and by giving that general quality or appearance to the whole which constitutes what is termed harmony of effect.

SCURF is a material composed of minute portions of the dry external scales of the cuticle. These are, in moderate quantity, continually separated by the friction to which the surface of the body is subject, and are in due proportion replaced by others deposited on the inner surface of the cuticle. Sometimes however they separate in unnatural quantities, and this constitutes the disease called Pityriasis. [Pityriasis.]

SCURVY. This word, as well as its Latin synonym *scorbutus*, has been used very vaguely, both by medical men and by the public at large, to designate various diseases of the skin, often differing essentially from each other. Its derivatives, *scorbutic* and *antiscorbutic*, of which the former is employed to designate a supposed virus, the source of these diseases, and the latter the remedies employed for their cure, have been misapplied in a similar manner.

Scurvy, properly so called, is a malady of a peculiar nature, which occurs either at sea or on land as the result of various moral and physical causes of disease, especially of deficient nutriment and a scarcity or total deprivation of succulent vegetables or fruits. Its origin is involved in obscurity, and it is a question still debated whether it was known to the Greeks and Romans. Of its prevalence in the middle ages we have abundant testimony, but the frequent famines that resulted from the imperfect state of agriculture at that day gave rise to so many diseases, which, though different, yet had many points of resemblance, that we run considerable hazard of confounding them. Thus there is a great similarity between scurvy, the disease which was then called St. Anthony's fire, ergotism (the peculiar disease produced by spurred rye or other grain), and some of the pestilential fevers of the middle ages, both in their causes and symptoms, and there can be no doubt that the chroniclers of those times often mistook one for the other. It is customary to fix upon the year 1260 as the date of the first authentic mention of the malady, which then appeared in the Christian army during the campaign of St. Louis in Egypt. In the north of Europe however it would seem that scurvy has been known from the most remote antiquity, and until within the last two centuries it prevailed there endemically. With the improvements in gardening and agriculture, it gradually became less frequent, and land-scurvy is now nearly extinct in Europe. As late as the middle of the last century it was common not only among the peasants on the borders of the Baltic, but it prevailed in Scotland and in some of the sea-port towns of Devonshire and Cornwall, breaking out in winter, and disappearing as vegetable food became more abundant with the return of spring. Even down to the present day the disease has occurred in camps, as in the French army of the Alps at the close of the last century; and in besieged towns whose inhabitants have been deprived of fresh vegetables. A famous French physician, M. Foderé, mentions that isolated cases occur every year in the more unhealthy quarters of Paris. Some of its earlier symptoms may occasionally be observed in patients admitted into the London hospitals; and our Prison Reports prove it to be by no means uncommon in persons sentenced to long periods of confinement. Diseases are still endemic in various parts of Europe, which present a great analogy to scurvy both in their causes and symptoms; such as the Radesyge in Norway, the Mal de la Rosa in the province of Asturias in Spain, and the Pellagra in Lombardy.

But though frequent upon land, it is at sea that the ravages of scurvy have been most severely felt, and any one at all familiar with the accounts of our early navigators must remember many heart-rending tales of suffering which they record. Even as recently as the time of Lord Anson scurvy was so fatal that during the first two years of his voyage he lost more than four-fifths of his original crew The sagacity of Captain Cook however, only thirty years afterwards, suggested to him such means for the preservation of the health of his ship's company, that in a voyage of more than three years only one sailor of the Resolution died. The improvements which, at the suggestion principally of the late Sir G. Blane, were introduced into the victualling of the navy at the end of the last century, and especially the free employment of lemon-juice, have banished this disease from our navy, though it is still by no means infrequent in the merchant service.

The causes and treatment of Scurvy are described under ANTISCORBUTICS. The reader may also consult with advantage, 'A Treatise of the Scurvy,' by James Lind, M.D., Edinburgh, 1753, and Dr. Budd's 'Treatise on Scurvy,' in vol. v. of the 'Library of Practical Medicine.' The following remarks may be considered as an addition to what was said some years ago on the causes of scurvy, in the article ANTISCORBUTICS.

The use of salt provisions has been very generally regarded as one of the most powerful exciting causes of scurvy. This notion however is not altogether free from error, for scurvy occurs even among those who never taste salted food. Such was the case with some of our troops quartered in the province of Adelaide at the Cape of Good Hope, among whom scurvy appeared in the year 1836. The men at that time had no hard duty to perform, and were supplied with fresh meat in abundance, but were deprived of vegetables. The annual occurrence of scurvy among the inmates of the lunatic asylum at Moorshedabad in India is an additional confirmation of the same fact. We may with more propriety refer the disease to the absence of vegetables than to any directly injurious effects produced by salt provisions.

The greatest attention to ventilation was not found during Lord Anson's voyage to diminish the severity of the disease; and this circumstance, coupled with other facts, such as the non-occurrence of scurvy in the ill-ventilated houses of the poor in London, warrants the conclusion that impure air is not an exciting cause of scurvy.

Some facts have led to the supposition that cold and moisture tend much to produce scurvy, but Dr. Budd, in his able treatise on scurvy, in the 'Library of Practical Medicine,' states that the men admitted with scurvy into the Dreadnought hospital-ship come almost exclusively from the Mauritius, India, Ceylon, or China. The non-existence of scurvy at Venice, and in other similar situations, proves that moisture alone cannot produce the disease.

It has been asserted, but never satisfactorily proved, that scurvy is propagated by contagion; an opinion which is now usually regarded as erroneous.

From all investigations, we may conclude that there is one condition which never fails to produce scurvy in persons, however various their situations may be in other respects, namely, a prolonged abstinence from succulent vegetables or fruits or their preserved juices as an article of food. But we are hardly warranted in asserting, as some men of eminence have done, that a deficiency of vegetable food is the only cause capable of producing scurvy. A disease very similar to scurvy, which used to attack the negroes in the West Indies, was attributed to their living exclusively upon bananas, and its cure consisted in changing their diet, and giving them fish and flesh to eat. Bad nutriment, of whatever kind, will, according to M. Foderé, sometimes produce the disease, and Dr. Henderson, a naval surgeon, recently stated in a medical periodical, that he has seen scurvy occur in persons who were taking daily doses of lemon-juice as a prophylactic against the disease.

Previous debility appears to predispose to scurvy, as does also an advanced age; the disease being rarest between twenty and thirty years of age, though it occurs more frequently between the fifteenth and twentieth year than in the succeeding ten years. The first symptoms of the affection are a change of the natural healthy complexion to a pale or sallow tint, accompanied with pains in the legs and loins, great languor and despondency, and indisposition to exercise. The gums soon become sore, apt to bleed on the slightest touch, livid and spongy. As the disease progresses the debility becomes greater, the slightest exertion inducing breathlessness and palpitation, and the complexion assumes a brownish or dingy hue. The gums become more livid, and swell more, so as sometimes to conceal the teeth, which drop out without undergoing decay. Hæmorrhage takes place from the lungs and from various internal organs, ecchymoses appear, and blood is effused under the skin in various parts, especially on the lower extremities and around the seat of any old injury. In the ham this effusion of blood is sometimes so considerable as to cause contraction of the knee-joint. Any wounds or ulcers put on an unhealthy appearance, and become covered with coagulated blood, and the slightest scratches degenerate into troublesome sores. In high degrees of scurvy, as in the case of Lord Anson's sailors, old wounds break out afresh, and a broken bone will become disunited, although the fracture may have been consolidated for some time. With these symptoms there is not so much derangement of the general functions as might be expected. The appetite usually continues good, though the patients are unable, owing to the state of their gums, to masticate their ordinary food; they sleep well, and the intellect is unaffected, though the spirits are much depressed. Scorbutic persons swoon readily, and not unfrequently die suddenly on making some more considerable exertion than usual.

If the disease should prove fatal, discoloured spots are found in many internal organs, while their tissue generally is of a paler colour than natural. The blood contains a less quantity of red particles than usual, but they are not dissolved in the serum, as some have supposed.

SCUTAGE. [ESCUAGE.]

SCU'TARI (*Skodrë*, in Albanian, and *Iskanderë*, in Turkish), a considerable town of Northern Albania, and the capital of a pachalik which is considered one of the most important in European Turkey, is situated at the southern extremity of the lake Zenta or of Scutari, where the Boyana issues from it, and about eighteen miles from the coast of the Adriatic. It is a fortified town, and has two castles. The population of Scutari is reckoned at about 16,000, more than one-half of whom are Christians, chiefly of the Greek church, and have a bishop. There is also a Roman Catholic bishop for those of that communion. Scutari has manufactures of arms and of woollens; the fishery on the lake constitutes another branch of industry. The lake is about sixteen miles in length from north-west to south-east, and from three to five miles in breadth, and it contains several small islands. The lake lies in the high land of Albania, and is surrounded by offsets of the chain of the Scardus, and borders, on the north, on the territory of Montenero.

SCU'TARI, a town on the Asiatic shore of the Bosporus, facing Constantinople, of which it may be considered as a suburb. It is built on the slope of a hill, and has several fine mosques and magnificent burying-grounds planted with cypresses. Many of the wealthier Turks of Constantinople choose to be buried at Scutari, from an old tradition that their race will one day be driven out of Europe. There are also fine country-houses and kiosks in the neighbourhood. The late sultan Mahmood built handsome barracks at Scutari for his regular troops. One of the best views of Constantinople is from the hill just above Scutari. The population of Scutari is reckoned by Malte-Brun at 35,000 inhabitants. The place is one of considerable traffic, being the great thoroughfare between the capital and the Asiatic provinces of the empire.

SCUTIBRANCHIA'TA, M. de Blainville's name for his third order of *Paracephalophora Hermaphrodita*, consisting of the families *Otidea* [HALIOTIDÆ and ANCYLUS], and the *Calyptracea* (*Crepidula* and *Calyptræa* [CALYPTRÆIDÆ]), *Capulus*, and *Hipponyx* [PILEOPSIS], and *Notrema*.

SCYLAX of Caryanda, a town of Caria near Halicarnassus, a mathematician and musician, was the author of a 'Periplus of the parts beyond the Columns of Hercules,' of the 'History of Heraclides, king of the Mylasseis,' of a 'Periodos of the Earth,' and an 'Answer (ἀντιγραφή) to the History of Polybius.' (Suid., Σκύλαξ.) If all these works are rightly assigned to the same person, Scylax was at least not earlier than the age of Polybius. But it seems probable that there were two writers of the name.

Herodotus (iv. 44) says that Darius, the son of Hystaspes, wishing to know where the Indus entered the sea, sent various persons in whom he had confidence, and among them Scylax of Caryanda, to make the discovery. They set out from the city Caspatyrus and the territory Pactuica, and sailed down the river to the east and the rising of the sun. On reaching the sea they sailed westward, and in the thirtieth month arrived at the place whence the Phœnicians had set out who were sent by the king of Egypt to circumnavigate Libya. To this Scylax some writers attribute the extant work entitled Περίπλους τῆς Οἰκουμένης, or the 'Periplus of the Inhabited World,' which contains valuable information on the settlements of the Carthaginians, on the towns and colonies of the Greeks, and other matters. Consequently

Scylax must have lived about 500 B.C. Other critics assign the authorship of the extant Periplus to the middle of the fourth century B.C. Dodwell considers the author of this 'Periplus' to be a contemporary of Polybius, and consequently he would belong to the second century B.C. The 'Periplus' was first published by Hoeschel, with other minor Greek geographers, Augsburg, 1600, 8vo. It is also comprised in the first volume of the 'Geographi Græci Minores' of Hudson (and in the first volume of the same work, edited by Gail, Paris, 1826, 8vo.), which contains the Dissertation of Dodwell. This dissertation, and that of Sainte-Croix, in the 42nd vol. of the 'Recueil de l'Académie des Inscriptions,' appear to exhaust the subject of Scylax the geographer.

SCYLITZES. [BYZANTINE HISTORIANS.]

SCYLLA'RIANS, a tribe of *Macrurous Decapods*, established by M. Milne Edwards on the genus *Scyllarus* of Fabricius, and forming one of the most remarkable groups, distinguished at the first glance by the singular conformation of the external antennæ.

Carapace very wide and but little elevated, its anterior border nearly straight, and presenting a horizontal prolongation which advances between the base of the external antennæ and covers the insertion of the first pair. The eyes are lodged in well-formed orbits, and are somewhat distant from the median line. The *antennæ* are inserted on the same line below the eyes; the first pair are slender, and present nothing remarkable; their first joint is nearly cylindrical and much stouter than the two following ones; finally, they terminate by two very short multi-articulate filaments. The external antennæ are foliaceous and extremely wide; the piece which carries the auditory tubercle is confounded with the epistome, and followed by four joints, the second and fourth of which are lamellar and extremely large. The buccal frame is small, and the jaw-feet are moderate and nearly pediform.

Jaw-foot of Scyllarus.

The *sternal plastron* is very wide, and composed of a single piece. The first four pairs of feet are terminated by a styliform tarsus, and so are the posterior feet in the male, but in the female they terminate in an incomplete pincer. The abdomen is very wide, and terminates by a great fan-shaped fin composed in the ordinary manner, but with its foliations soft and flexible for the three posterior fourths of their length. The first abdominal ring is without appendages, but the four succeeding segments carry each a pair of false feet, the form of which varies according to the sexes. In the male the first pair are large, and have two foliaceous laminæ; but the succeeding pairs have only one, the size of which diminishes rapidly, so as to become rudimentary on the fifth ring. In the female all these appendages are much more developed, and serve to suspend the eggs. The *branchiæ* are composed of brush-like filaments, and are arranged in tufts, between which the great flabelliform plates belonging to the thoracic feet raise themselves. There are twenty-one branchiæ on each side, two above the second pair of jaw-feet, three above the external jaw-feet, three above the anterior feet, four above each of the three succeeding feet, and one above the posterior foot.

M. Milne Edwards divides the tribe into three genera, *Scyllarus*, *Thenus*, and *Ibacus*.

Scyllarus. (Fabr.)

The *Scyllari*, properly so called, differ, observes M. Edwards, from the other crustaceans of the same tribe, in the general form of their body, which is much more elongated than that of the others, and diminishes but very little in width towards the tail. The carapace is much longer than it is wide. The lateral borders are parallel. The *orbits* are situated very far away from the median line, very near the external angle of the carapace, but not reaching it; they are circular, and directed upwards. The *sternum* is of moderate size, and narrows but little or not at all between the posterior feet. The generative apertures of the male are circular and of moderate size. The *abdomen* is very thick, and longer than the whole of the anterior portion of the body, the antennæ included.

M. Edwards divides the genus into two sections:—

1.

Species the rostriform prolongation of whose carapace is very wide, but slightly projecting, and terminating anteriorly by a straight border.

Example, *Scyllarus arctus*.

Description.—Brown with transverse red lines on the abdomen. Length about three inches.

Locality.—The Mediterranean.

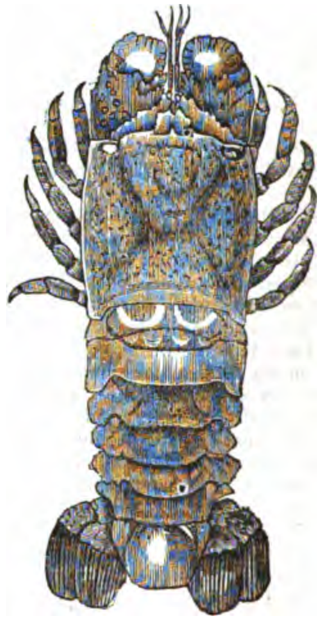
2.

Species the rostral prolongation of whose carapace projects very much, is nearly square, and terminated forwards by one or two more or less marked horns.

Example, *Scyllarus Æquinoxialis*.

Description.—Yellowish mingled with red. Length about a foot.

Locality.—The Antilles.

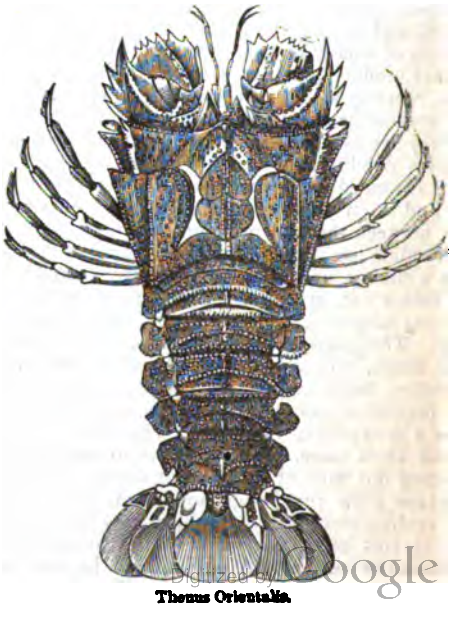


Scyllarus Æquinoxialis.

Thenus (*Scyllarus*, Fabr.; *Thenus ?*, Leach).

Body very much depressed, and much narrowed from before backwards. Ocular peduncles very long. Eyes going beyond the carapace laterally; the orbits, directed outwards, occupy the external angle. Sternum much wider than in *Scyllarus*. Abdomen with nearly the same proportional length as in those crustaceans.

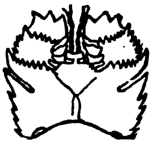
Example, *Thenus Orientalis*. Length about eight inches.



Thenus Orientalis.

Ibacus. (Leach.)

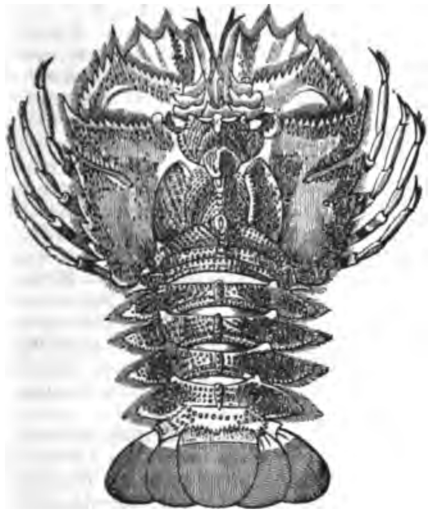
Carapace much wider than it is long, and with a lamellar prolongation on each side, which covers the greater portion of the feet, nearly as in CALAPPA, the *Cryptopods* [ŒTHRA], &c., among the *Brachyurous Decapods*. These prolongations are greater forwards than backwards, whence it results that the carapace is narrowed posteriorly. Thus in these animals there is a wide and deep fissure, which, on each side, divides these shield-like prolongations into two unequal portions. The orbits, instead of being placed near the external angle of the carapace, are very far distant from it. The abdomen is very short, and is suddenly narrowed from before backwards.



Carapace of Ibacus, seen from above.

Example, *Ibacus Peronii*. Length about five inches

Locality.—The seas of Australasia.



Ibacus Peronii.

FOSSIL SCYLLARIANS.

Under the name of *Scyllarus Mantelli*, M. Desmarest, in his 'Histoire Naturelle des Crustacés Fossiles,' describes a fossil crustacean, the antennæ of which are unknown, but which presents in the organization of the carapace and the base of the feet a striking resemblance to the living *Scyllarians*.

SCY'LLARUS. [SCYLLARIANS.]

SCYLLIS and DIPŒNUS. [SCULPTURE, p. 126.]

SCYMNUS of Chios, who was alive about 80 B.C., wrote a description of the earth (περιήγησις) in Greek iambic verse, which he dedicated to Nicomedes, king of Bithynia, probably the third of the name. The first 741 verses are extant, and fragments of 236 other verses. His description begins at Gades, and follows the left coast of the Mediterranean as far as the entrance of the Pontus Euxinus, where the last verse ends. Among the remaining verses there are about 90 on the coast of Asia. The work has no value as a poem, and very little as a geographical description. Still it contains some curious facts. It was first printed by Hoeschel with Scylax in 1600, but under the name of Marcianus of Heraclea. It is also comprised in the second volume of Hudson's 'Geographi Græci Minores,' and in the edition of that work by J. F. Gail, vol. ii., 1828, 8vo.

SCY'TALE (Zoology), Merrem's name for a genus of *Boïdæ* (*Pseudoboa*, Schn.), which has plates not only on the muzzle, but on the cranium, like the colubers; no fossets, the body round, and the head all of a piece with the trunk, as in *Tortrix*. N.B. The *Scytale* of Daudin is the genus *Echis* of Merrem.

SCY'TALE (σκυτάλη, a stick) is the name of a secret mode of writing which was used by the ephors at Sparta in their communications with their kings or generals when abroad. The ephors cut the material upon which they intended to write into one long stripe, like a narrow riband, which they wound about a round staff so as to cover the whole. The command or communication which they had to send was then written upon it, and then the slip of writing-material was taken from the staff and sent to the king or general. The slip appeared only covered with single letters, which none could read unless he wound the slip around a staff of precisely the same size as that used by the ephors. Kings and generals therefore, when they went abroad, were provided by the ephors with a staff precisely like that which the ephors themselves intended to use in their communications with them. (Plut., *Lysand.*, 19; *Schol. ad Thucyd.*, i. 131; Suidas, *s. v.*) This rude mode of sending a message must have originated at a very early period, but no instance of it is recorded previous to the time of Pausanias. (Corn. Nepos, *Paus.*, 3.) After the Peloponnesian war, we find the Spartans using the scytale also as a medium through which they sent commands to their allied cities. (Xenoph., *Hist. Gr.*, v. 2, 37.)

SCYTHE. The common scythe is an instrument too well known to require a minute description, but as much of its utility in agriculture depends on a correct adjustment of its parts, we shall briefly advert to them. The blade of the scythe, which is always curved, with the cutting edge on the concave side, is fixed to the handle at an angle both to the plane of the blade and to the tangent to the curve. It is on the nice adjustment of these angles that the perfection of the instrument depends. A scythe must cut the corn or grass, especially the latter, as near to the ground as possible, and where the land lies flat and the stones have been removed from the surface, a good scythe, in the hands of a skilful mower, will cut the grass so near to the ground that little or no stubble is left. Every farmer knows well that an inch of the grass near the ground adds more to the weight of the hay than several inches higher up, and that a skilful mower with a good scythe can easily add much more to the value of the crop than his earnings amount to, however liberally he may be paid, and that it is of the greatest importance that none but the best mowers be entrusted with the work, and that attention be paid to the form of their scythes and to their being frequently whetted.

It is the custom in England for the mowers to stoop much in mowing, by which they imagine that they have a wider sweep. The angle at which the handle is fixed is very acute to the plane of the blade. In other countries the mowers stand more upright, and a longer handle gives them a greater radius. Habit makes that position easier to which we have been long accustomed; but it is probable that a man can endure fatigue, and continue his exertion the longer, the more nearly his position is erect. In some countries the handle of the scythe is nearly straight, and the end of it passes over the upper part of the left arm. The position of the mower is then nearly erect, and his body turns as on a pivot, carrying the blade of the scythe parallel to the ground, and cutting a portion of a considerable circle. The position of the handle in this case must be such that when the scythe is in the middle of its swing, and the blade parallel to the ground, it rests naturally on the left arm above the elbow, while the mower is nearly in an erect position. By turning his body to the right, and stooping towards that side, he begins his cut, and by raising himself up, the muscles of his back greatly assist in swinging the scythe round.

The blades of the scythes on the Continent are mostly made of natural steel, such as is found in parts of Germany, and they are so soft that the edge can be hammered to sharpen it and keep it thin. In England the scythes are forged thin and well tempered, and to prevent their bending they have a rim of iron along the back to within a few inches of the point. This saves much time in sharpening, and they very seldom require the grindstone.

Most scythes have two projecting handles fixed to the principal handle, by which they are held, and these are variously put on, according to the fashion of the district. The real line of the handle is that which passes through both the hands and ends at the head of the blade. This may be a straight line or a crooked one, generally the latter, and by moving these handles up or down the main handle, each mower can place them so as best suits the natural size and position of his body. Hence it is that a man can seldom mow well with another man's scythe.

In mowing corn when ripe which is an economical mode of reaping, the scythe need not have so great a sweep; nor is it necessary to cut the straw so near to the ground. The great difficulty here is to lay the cut corn evenly, so that the binders can readily collect it and tie it into sheaves. This is most effectually done by adding to the bottom of the handle a small hoop at right angles to the line of cutting, and by mowing always towards the standing corn, which is easily done by beginning at one end and going round toward the left in an irregular spiral to the centre of the field. The straw is thus laid leaning against the standing corn, and is readily collected with the arm by the binder, who follows the mower. As the straw is not always upright, but frequently bent to a side, this mode of mowing is not always practicable. When the corn is only slightly bent down, a scythe with an addition of a cradle, as it is called, collects the slanting straw more easily. The cradle is a species of comb with three or four long teeth parallel to the back of the blade, and fixed in the handle. This inserts itself behind the straw to be cut, raises it up, and, by a peculiar twist of the scythe after the stroke, it is left so as to be easily collected. Those who are accustomed to use the cradle-scythe do the work rapidly and well.

When the corn is much laid and entangled, it is impossible to use the common scythe, even with a cradle. This has probably suggested a scythe to be used with one hand, while a hook in the other gathers the straggling corn. The most perfect of these scythes is called the *Hainault scythe*, from a province of that name in Belgium, where it was first noticed. It is commonly used in different parts of the Continent. The Hainault scythe is swung by the power of the wrist principally. It does not cut the straw by so obliquê a stroke as the common scythe, but rather as a bill-hook or axe would do, meeting the straw nearly at right angles. The hook collects a small bundle, which is severed at a stroke, and the left foot assists in holding what is cut and rolled together with the hook, in the hollow of the blade. It is thus laid aside, and fit to be tied up. This instrument is a great improvement on the English fagging-hook, which is used in the same manner, the left arm of the reaper acting the part of the hook; but as the handle is inserted in the plane of the blade, it causes the reaper to stoop low, which is fatiguing to the loins, especially of elderly people, who can more readily reap with the Hainault scythe.

The scythe is an instrument which should be more generally introduced in harvest, and experience has proved that it had many advantages over the sickle or reaping-hook. [HARVEST.]

SCY'THIA, SCY'THIANS. (Σκυθική, Σκύθαι.) The name of Scythians is sometimes applied by the antient writers to all the nomade nations in the north of Europe and Asia; but this use of the word is not general, and it is more correctly confined to certain distinct nations.

The term Scythia was originally given to a part of Europe, and was for a long time restricted to that country. This Scythia was, according to Herodotus (iv. 101), a square, of which each side measured 4000 stadia, one side being 2000 stadia from the Ister to the Borysthenes, and 2000 from the Borysthenes to the Palus Mæotis, both measurements being along the coast; and another side being 4000 stadia, measured from the sea (the Pontus) to the Melanchlæni. There is considerable difficulty in determining the boundaries of the Scythia of Herodotus; but it may be said in general terms to have comprised the south-eastern part of Europe, between the Carpathian Mountains and the Tanais or Don. Different accounts are given of the origin of these Scythians; but the statement which Herodotus (iv. 11) considered the most probable, ascribed to them an Asiatic origin. According to this account they were driven from their settlements to the north of the Araxes by the Massagetæ, and after crossing that river descended into Europe, and drove out the Cimmerians from the country, which was afterwards called Scythia. The date of their migration into Europe may be determined with tolerable accuracy, if the irruption of the Cimmerians into Lydia in the reign of Ardys (about B.C. 640) was the immediate consequence of their defeat by the Scythians. (Herod., i. 15.)

The Scythians seem to have been a Mongolian people, from the description which Hippocrates gives of their appearance, and Herodotus of their customs and habits. Hippocrates (p. 292) speaks of their gross and bloated bodies, their joints buried in fat, their swollen bellies, and their scanty growth of hair. They were divided, as the Mongols have always been, into various hordes, which were all in the time of Herodotus dependent on the horde of the Royal Scythians, who dwelt above the Palus Mæotis. (Herod., iv. 20.) The general and genuine name of the Scythians is said to have been Scoloti; the name of Scythæ or Scythians was given to them by the Greeks. (Herod., iv. 6.)

The only two important events in the history of Scythia mentioned by Herodotus are, 1st, the invasion of Media by the Scythians in the reign of Cyaxares (B.C. 635-595), and their conquest of Asia as far as the confines of Egypt, which they held for 28 years; and, 2ndly, the invasion of Scythia by Darius, the son of Hystaspes, in which the Persians were unsuccessful.

In subsequent times the Scythians lost all their power. The Getæ conquered a great part of the west of their country, and the Sauromatæ pressed upon them from the east; the latter people eventually obtained possession of the greater part of Scythia, and gave their name to the whole country. [SARMATIA.] In the time of Pliny (*Hist. Nat.*, iv. 25) the Scythians had become extinct as a people: their place was occupied by the Germans and Sarmatians, and the Scythian name was confined to the most remote and unknown tribes to the north.

The name of Scythia began to be applied to the northern parts of Asia in the Macedonian period. Herodotus distinctly separates from Scythia all nations east of the Tanais, such as the Thyssagetæ, Issedones, &c.; and this fixed use of the word still subsisted at the time of Alexander's conquest of Asia. But when the Macedonians found on the Jaxartes nations resembling the Scythians, they gave the name of Scythia to this part of Asia, and thus an Asiatic Scythia was supposed lying to the east of the true one. This is the Scythia proper of Strabo, as the antient Scythia had in his time become Sarmatia.

In the time of Ptolemy the name of Scythia was given to the country between Asiatic Sarmatia and Serica: it was bounded on the south by India. Its limits to the north were undefined. It was divided into two parts by the Imaus (*Altai* and *Chaltai*), a range of mountains which runs in a north-easterly direction from the Himalaya. The western part was called Scythia intra Imaum, and the eastern Scythia extra Imaum.

(Niebuhr's *Researches into the History of the Scythians, Getæ, and Sarmatians*, published in his *Kleine Schriften*, and translated, Oxford, 1830; Heeren's *Researches*, &c., 'Asiatic Nations,' vol. ii.; Rennell's *Geography of Herodotus*.)

SCYTHROPS, Dr. Latham's name for a genus of birds allied to the Toucans. [RAMPHASTIDÆ, vol. xix., p. 287.] The general structure accords with that of *Pteroglossus*, but there are no serrations on the margins of the mandibles. The wings are long, the two first quills are graduated, and the third is the longest. The long tail is graduated.

Locality.—Australia. (White's *Voyage*.)

SEA is a term by which the whole volume of water is designated, which occupies the lower portion of the surface of our globe, and thus separates the more elevated and larger masses which are called land, and which rise above the level of the sea. The proportion of the solid surface of our globe to that which is covered with water, is about one to three, so that three-fourths of the entire superficies of the globe are sea.

Sea-water has a salt and somewhat bitter taste, and in its natural state is unfit for drinking or for culinary purposes. It has been ascertained that the specific gravity of sea-water is about 1·0277, rain-water being 1·0000. The water of closed seas into which many rivers fall is lighter, as that of the Baltic, which is only 1·0067, and that of the Black Sea, whose specific gravity has not been ascertained. But the water of the Mediterranean is more salt than that of the Atlantic Ocean. In those parts of the ocean which approach the poles the water is of less specific gravity than in those parts which lie towards the equator, which may be due to the melting of the enormous masses of ice which are found in the lower latitudes.

Sea-water has repeatedly been analyzed; the latest results are stated under SEA-WATER. That of the Baltic contains only 1·18 per cent. of salt, but the water of the Mediterranean contains 4·18 per cent.; the former being considerably below and the latter somewhat above the average of the oceanic water. The sea is therefore a weak brine, from which the salt may be extracted by the heat of the sun and dryness of the climate.

Besides mineral substances, sea-water contains a slimy fœtid matter, which imparts to it a nauseous taste, and which is probably the produce of the decomposition of animal and vegetable substances, which abound in the sea. It has been observed that the sea-water, when not agitated for a long time, is very subject to pass into a certain state of putrefaction, and in that state it exhales very unpleasant odours, which are a real nuisance to the seaman. It is likewise known that some low coasts between the tropics are subject to diseases, which are attributed to the miasma arising from the sea after a long continuance of calm weather.

It has often been maintained that sea-water has no colour, but it is well known that the sea at a great distance from the land has an exceedingly fine ultramarine tint, which cannot be considered due to reflection from the atmosphere, as the colour of the sea is frequently of a deeper hue than that of the sky, and does not change even when the sky is covered with clouds. This colour undergoes some changes in shoals, where it is modified by the colour of the matter which forms the bottom. The greatest variety in the colour of the sea seems to occur in the Greenland sea between 74° and 80° N. lat., where it varies from ultramarine to olive green, and from the most perfect transparence to deep opacity. The green colour is liable to changes in its position, but still it is always renewed near certain situations from year to year. According to Scoresby, from whom we take this account, it frequently constitutes long bands or streams, lying north and south, or north-east and south-west, but of various dimensions, sometimes extending two or three degrees of latitude in length, and from a few miles to ten or fifteen leagues in breadth. This occurs very generally about the meridian of London, and the whales chiefly feed in this green-coloured water. When examined by Scoresby, it was found to contain a great number of semi-transparent spherical substances, with others resembling small portions of fine hair. The semi-transparent globules appeared to consist of an animal of the medusa kind, but Scoresby was unable to ascertain whether the fibrous or hair-like substances were living animals and possessed of locomotion.

The transparency of the sea-water seems to be connected with its colour. It is much greater than that of river-water, which contains much heterogeneous matter in suspension. The light penetrates to about the depth of 60 feet. This transparency of the sea-water increases with the distance from the shores, and is generally greater in the higher than in the lower latitudes, which may arise from the circumstance that the number of organic substances in the sea is much greater in warm climates. But there are many remarkable exceptions to the last-mentioned fact. Some parts of the sea between the tropics are distinguished by the transparency of their waters, especially the Caribbean Sea, where zoophytes and sea-plants, though growing on a bottom twenty or thirty feet deep, appear to be near enough to the surface to be plucked by a person in a boat: indeed some navigators pretend that the bottom of the sea may be seen at the depth of 150 feet. In the northern seas indeed it is asserted that the bottom may be seen at the depth of from 400 to 500 feet.

One of the most remarkable properties of sea-water is a certain luminous appearance, which has been observed in all seas, but appears in its greatest splendour between the tropics. In calm weather, when the water is moved by the motion of a vessel, the light assumes the form of brilliant stars, or round masses of a greenish hue, frequently eighteen inches in diameter. They float by the vessel in every part of the water which her bottom has touched, as deep as the lowest part of her keel, and form behind her a long and fiery train. At other times, when the breeze is strong, and the billows break and foam, the light appears like fields of flashing fire, through which the vessel is making her way. When the night is dark, the brilliancy of the water forms a beautiful contrast with the black concave of the sky; but as soon as daylight returns, the splendour disappears and the sea exhibits only its usual dingy colour. This extraordinary phenomenon has long attracted the attention of naturalists, who have endeavoured to explain it. Buffon and others supposed that it was produced by electricity excited by friction; for friction in most cases seems to assist in the production, if it be not essential to the existence of this brightness. The slight agitation of the water occasioned by the action of a steady breeze upon the surface is generally sufficient for producing it. But the hypothesis of Buffon is inadmissible, for the friction of fluid bodies never excites electricity. The common opinion at present is that it is chiefly owing to the presence of several kinds of animated beings, which have the power of emitting a phosphorescent light. It is however also supposed that it owes its origin partly to the decomposition and putrefaction of animal substances. The animalculæ, which emit a phosphorescent light, and are supposed to be most active in producing this luminous appearance of the sea, belong to the Mollusca, Crustacea, and Infusoria.

From the well-known laws of gravitation it is inferred that the surface of the sea is always at the same distance from the centre of the earth, and that consequently it forms a uniformly regular curve. This surface of course maintains the same level, and it is consequently the best basis from which to determine the relative elevations of the different parts of the land. But though the surface of the sea is a regular curve, minute investigation has shown that there are some irregularities, and that some parts of the sea are more elevated than others. This is particularly the case with closed seas, which are generally more elevated than the ocean. The level of the closed seas is higher than that of the ocean when the mass of water brought to them by the rivers which discharge into their basin is greater than that which is lost by evaporation, and the straits by which they are united to the ocean are not wide enough to carry off the surplus waters quickly. On the other hand, when the evaporation is greater than the supply of water from rivers, the level of the closed sea sinks below that of the ocean, and it must be supplied with water from the latter by the straits which unite them.

The Baltic, though of no great extent, and though united to the open sea by three straits, one of which is of considerable width, receives so great a supply of river-water, that its level is higher than that of the North Sea. Very exact measurement has shown that this difference amounts to more than a foot between the level of the North Sea near the mouth of the river Eider and that of the Baltic near the town of Kiel. It is true that when the level of the North Sea has been raised by a continuance of western and north-western winds, a current sets from the Cattegat into the Baltic, but in calm weather it is always found that the current sets northward through the three straits. The difference of level between the Black Sea and the Mediterranean is much greater. The large rivers which fall into the Black Sea bring down an immense volume of water; and accordingly a very strong southern current is constantly found to be setting southward through the Strait of Constantinople into the Sea of Marmora. It generally runs with a velocity of about three miles an hour, which however at one place, called the 'Devil's Current,' is much greater, and at times between five and six miles per hour. The velocity of this current must vary with the seasons; for it is stated that the level of the Black Sea in winter is between two and three fathoms higher than in summer. The Sea of Marmora, which thus receives the surplus of the waters of the Black Sea, must also be more elevated than the Mediterranean; for the current which sets through the Strait of the Dardanelles is likewise constant and rather quick, though not so quick as that in the Strait of Constantinople.

The Mediterranean, on the other hand, receives a very scanty supply of water by rivers; for with the exception of the Nile, no large stream falls into its basin, which is of much greater extent than that of other closed seas, and therefore it must lose a great volume of water by evaporation. Halley showed that the Mediterranean, whose temperature is from 4° to 5° Fahr. higher than that of the Atlantic under the same latitude, must lose by evaporation nearly three times as much water as is brought into it by the rivers. The deficiency is supplied in two ways: by the current of the Dardanelles, which brings to it the surplus waters of the Black Sea and of the Sea of Marmora; and by that which sets through the Strait of Gibraltar from the Atlantic Ocean. The Atlantic current runs somewhat more than one mile and a half per hour. It has been supposed that, though this current constantly sets into the Mediterranean, an under-current runs in an opposite direction, carrying back a portion at least of the water to the Atlantic; but the attempts which have been made to establish this fact have failed, and it is probable that this supposed under-current does not exist. Notwithstanding the large supply of water which the Mediterranean receives at its two extremities, the level is below that of the Atlantic. Corabœuf found that the difference of level on the Mediterranean near Perpignan, and on the Bay of Biscay near Bayonne, amounted to nearly six feet; and Délambre and Mechain found it to be nearly three feet between the North Sea at Dunquerque and the Mediterranean near Perpignan.

In these instances the difference of level is satisfactorily explained; but the explanation is not so easy with respect to the great difference between the level of the Mediterranean and that of the Red Sea. These two seas are separated by the Isthmus of Suez, which extends about 70 miles from north to south. When the French occupied Egypt, they executed an extensive levelling across this isthmus; and the result was, that the Red Sea is above 32 feet higher than the Mediterranean. No river of importance, not even a perennial stream, falls into the Red Sea, which must also lose a considerable volume of water by evaporation. This loss of water is probably supplied by the current which sets into the Red Sea from the Indian Ocean; and some persons are of opinion that the difference of level between the Red Sea and the Mediterranean might be produced by this current. But it seems improbable that such an effect can be produced by this cause. According to Horsburgh and Wellsted (*London Geogr. Journal*, vol. vi., p. 82), a current sets from the Indian Sea into the Red Sea between October and May, and it often runs with great rapidity. But between May and October the northern winds prevail through the whole extent of the Red Sea; and these winds, which frequently blow a gale, cause a continual current to set through the straits into the Gulf of Aden. Under such circumstances, it is evident that the sea must fall to its natural level, especially as this state of things continues for more than three months. Wellsted observes that in this season, from May to October, the reefs in the northern part of the Red Sea have about two feet less water on them than in the remaining months of the year. This therefore appears to be the whole extent of the difference produced on the level of the Red Sea by the current, which enters it through the Strait of Bab-el-mandeb from October to May; but the French, as already observed, found the difference between the levels of the Red and Mediterranean seas to be not less than 32 feet. It would therefore appear that the Indian Ocean itself must be about 30 feet higher than the Mediterranean, and probably also higher than the Atlantic near the Strait of Gibraltar, and that the difference of level in the different parts of the ocean is much greater than is commonly supposed. This is also proved by the difference of level between the Atlantic and the Pacific on both sides of the Isthmus of Panama. According to Lloyd (*Philos. Transactions*, 1830), the mean rise and fall of the Pacific two days after full moon is 21·22 feet, and in the Caribbean Sea 1·16 feet. The water at high-water mark in the Atlantic is 13·55 feet lower than in the Pacific. The mean between the high and low water in the Pacific is 10·61 feet, and in the Atlantic 0·58. It would therefore appear that the level of the Pacific is 3·52 feet higher than that of the Caribbean Sea, as at low-water, two days after full-moon, the Pacific sinks 6·51 feet below the level of the Atlantic; but it rises at high-water 13·55 feet above it.

In this comparison of the level of the two oceans, the Caribbean Sea is placed in opposition to the Pacific; but in reasoning from existing data and our present knowledge, we must admit that the level of the Caribbean Sea is much higher than that of the Atlantic near the Old Continent. The north-eastern and eastern trade-winds force a great volume of water from the North Atlantic into the Caribbean Sea, and this is increased by another large volume of water which is brought to that sea by the Guiana current, and which enters it by the straits between the islands of Martinique and Trinidad. [ATLANTIC OCEAN, vol. iii., p. 29.] Such volumes of water, being arrested by the long isthmus which separates the Caribbean Sea and the Gulf of Mexico from the Pacific, must produce a considerable accumulation of water along the western shores of those seas, and raise them above the common level of the Atlantic, and this fact is confirmed by the rapid current called the Gulf Stream. [ATLANTIC OCEAN, vol. iii., p. 29.] Opinion varies considerably as to the difference of level between the Gulf of Mexico and the Atlantic. Poussin found the level of the Gulf at the mouth of the river Suwanee 3·75 feet higher than that of the Atlantic at the mouth of St. John's River in Florida; but when Darby, in his 'View of the United States,' estimates the difference between the Gulf near the island of Cuba and the entrance of Chesapeake Bay as at least 83 feet, we must suppose that he has formed his opinion on erroneous data. Also, we cannot accede to the opinion of Humboldt, who, in comparing some barometrical observations made at Cumana, Cartagena, and Vera Cruz, with others made at Acapulco and Callao, came to the conclusion that in these parts the Pacific was about 9·5 feet lower than the Caribbean Sea and the Gulf of Mexico. Lloyd found the reverse to take place at the mouth of the Chagres and at Panama, as we have mentioned above.

The bottom of the sea is similar to the surface of the land as to the irregular succession of elevations and depressions, and it is diversified by mountains and valleys and plains of different elevation. The summits of the submarine mountains rise above the level of the sea in the form of islands. In several parts large table-lands are found, whose surface is not at a great depth below the level of the sea: when their surface is covered with sand, they are named sand-banks; and when it consists of coral rocks, coral-banks. Near the edges of these banks the depth of the sea is generally very great. The most extensive formation of these submarine table-lands occurs in the North Atlantic. Its most north-eastern portion is formed by the Outer Bank and the Great Bank of Newfoundland. [NEWFOUNDLAND, vol. xvi., p. 190.] West of the Great Bank of Newfoundland are Whale Bank, Green Bank, Banquereau, and Mizen Bank. The three last-mentioned banks are situated in front of the entrance of the Gulf of St. Lawrence. Opposite the coasts of Nova Scotia are Sable Bank and Le Have Bank; and then follow, in the same south-western direction, St. George's Bank, or the banks of Nantucket, which approach the continent of North America in the vicinity of New York. From this point the banks occur at a short distance from the shores of the United States, and extend, almost without interruption, to Cape Florida and Sable Point, the most southern extremity of the peninsula of Florida. West of this peninsula is the Tortuga Bank, the continuation of which skirts the shores of the United States in the Gulf of Mexico as far west as the mouths of the Mississippi. This series of banks occupies more than 1400 miles in length; but there is always water enough on them for the largest vessels, with the exception of the Virgin Rocks on the Great Bank of Newfoundland, and the shoals of St. George's Bank. In all the other parts the least depth is not less than ten fathoms, and in general forty fathoms of water are found on them. The surface of these banks is very level. Along the northern and north-western edge, which lies opposite to the coast of America, the depth suddenly descends to 100 fathoms, and along the southern edge to 300 fathoms. The descent from the edge of the bank to the deep sea is nearly perpendicular. The banks, especially those north of 40° N. lat., are frequented by immense shoals of fish, especially cod.

The Columbian banks, under which name are comprehended all the banks which begin opposite the eastern shores of the peninsula of Florida and extend in a south eastern direction to the Mona Passage between Haïti and Puerto Rico, are divided from the North American banks by the Florida Gulf-stream. They consist of two larger banks, called the Little and Great Bahama Bank, which occupy the north-western portion of the group, and of five smaller banks, which occur at great distances from one another in a south-eastern direction. These banks have from 15 to 20 fathoms water on their edges, but they are beset with rocks and numerous shoals, of which a few are dry at low-water: they are therefore shunned by vessels. The surface of the banks consists of coral, covered with an accumulation of shells and calcareous sand. On their eastern edges, along the Atlantic, are the Bahama Islands.

Of the smaller banks which occur in the Atlantic we shall only mention the Bank of Arguin, which lies near the western coast of North Africa, beginning at Cape Blanco (21° N. lat.), and extending to the neighbourhood of Portendik (about 18° N. lat.). It is dangerous for navigators, as there are many parts in which the water is not deep enough for large vessels, many of which have been lost on it. The Abrolhos, near the coast of Brazil, between 16° and 18° S. lat., is not extensive, but it is extremely dangerous on account of the soundings being very irregular, varying between 36 and 4 fathoms. In two successive casts of the hand-lead the soundings frequently vary from 30 to 10, and sometimes even to 4 fathoms. As both banks, that of Arguin and the Abrolhos, abound in fish, they are much resorted to by fishermen.

There are several banks in the Indian Ocean: the most extensive are the Saya de Malha and the Bank of Nazareth. The Saya de Malha extends in length from north to south between 8° 18′ and 11° 30′, and is cut by 61° 30′ E. long. The surface is uneven, and in many places there are not more than between 6 and 10 fathoms water: it consists of corals and shells. The most southern extremity of the Nazareth Bank consists of the islands called Cargados, in 16° 47′ S. lat. and near 60° E. long. From this point the bank extends in a north-north-east direction to 14° S. lat. The surface is tolerably level, and the least depth of water does not fall short of 14 fathoms.

An extensive bank, called the Needle or Agulhas Bank, surrounds the southern extremity of Africa. It extends towards the west beyond the Cape of Good Hope, and towards the east beyond Cape Padrone, east of Algoa Bay. As it is not divided, like the other banks, from the continent by a tract of deeper water, it is not to be considered as a table-land, but as a submarine prolongation of the continent. Between Cape Agulhas (10° E. long.) and Cape Vaccas (22° E. long.), it extends to 37° S. lat., or to a distance exceeding 150 miles from the continent. The depth of water on this bank varies between 30 and 90 fathoms. The surface is composed of coarse sand, corals, shells, and small stones. Along its western edge it is skirted by a mud-bank, which is covered by water from 50 to 120 fathoms deep.

There are numerous banks in the Pacific, especially south of 20° N. lat. All the larger banks are surrounded by coral reefs, on which islands of small extent often occur. [REEFS.]

Near banks, the sea usually deepens to 200 and 300 fathoms, and even more; but in general we are very little acquainted with the depth of the deeper parts of the sea. Experiments have been made for determining whether the temperature of the sea-water increases or decreases in proportion to the depth; but only a few isolated spots in an immense space have been determined. We are however better acquainted with the depth of several close seas, especially those which are much navigated. The depth of the Baltic is inconsiderable; it usually varies between 30 and 40 fathoms, and only in two or three places sinks below 100 fathoms. The North Sea is somewhat deeper in its northern part. Between the Shetland Islands and the coast of Norway the depth varies between 80 and 140 fathoms, but it gets gradually shallower towards the south. In the Straits of Dover the deepest place is only 26 fathoms. The depth of the English Channel increases as we proceed towards the west, but very slowly. East of the Eddystone it does not exceed 50 fathoms. The Irish Channel is in general deeper. Though there are some places between Wales and Ireland in which it does not exceed 40 fathoms, its general depth may be said to vary between 60 and 80 fathoms; and in the strait between the counties of Antrim and Wigton in Scotland it attains 100 fathoms. The Mediterranean is much deeper than the Baltic and North Sea, more especially along the southern coast of Spain and about the island of Sardinia, where the depth varies between 500 and 1000 fathoms. A shallow tract extends from Trapani in Sicily to Cape Bon in Tunis: it is called by the Italian sailors *scherchi*, and is of inconsiderable but very variable depth. That portion of the Mediterranean which lies east of this shallow tract is not so deep as the western part. The Red Sea may be compared in depth with the eastern part of the Mediterranean. [RED SEA, xix., p. 344.] The sea which surrounds the islands of the Indian Archipelago seems nowhere to sink much below 50 fathoms.

The main body of the sea has a much greater depth. In most parts of the Atlantic, where the sea has been sounded, no bottom was found with 300 fathoms. It seems however that between Europe and America it is not so deep; but in these parts the bottom seems to offer great inequalities, being furrowed by deeper tracts, which run north and south. The small depth of this part of the Atlantic has given rise to the opinion that the sea round the North Pole is not so deep as that which surrounds the South Pole, but this opinion has no foundation. Phipps and Scoresby sounded in several places between Spitzbergen and Greenland with from 780 to 1200 fathoms, without finding a bottom; and Ellis and Ross did the same in Hudson's Bay and Baffin's Bay. In the Pacific Ocean the depth seems also to be very considerable, but few soundings have been made there.

The depth of the sea near the land varies with the nature of the shores. Where the country near the sea is elevated, and terminates in high and rocky shores, the sea is generally of considerable depth. Such shores have generally good and safe harbours. But when a low plain terminates on the sea with a flat sandy bank, the sea is shallow and frequently continues to be so to a great distance from the shore. In many places such shores are inaccessible even to boats, and vessels must keep at a distance of many miles. Such shallows consist either of sand or of mud. These low shores are generally destitute of harbours, or at least they occur only at great distances, and much expense is required to maintain them in an efficient state: the harbours on rocky coasts are not subject to this inconvenience.

It is a well established fact that places near the sea have a more uniform climate than those which are at great distances from it, though in the same latitude. Inland places experience a much greater degree both of heat and cold than places on the coast, and the difference between these degrees of heat and of cold increases with the distance of the place from the sea. This phenomenon has been variously explained. The explanation is now pretty clear, since it has been proved by observation that the temperature of the air over the sea is less subject to changes than, or rather does not undergo such great changes as, that of the air which is over the land. But as the temperature of countries situated between the tropics is not subject to so great changes as that of countries in the temperate zone, and these again are less affected by them than the frigid zone, so it is found to be the case on the sea also. Beginning with the smallest natural division of time, the day, it is found that between the tropics the difference of temperature within 24 hours seldom exceeds two degrees of Fahrenheit, and rarely amounts to more than three degrees. The following table from Meyen's 'Reise um die Welt' shows the changes of temperature on the sea during 24 hours between the tropics:—

1830, October 25; lat. 14° 17′ N., long. 26° 37′ W.

1h.	79·88°	9h.	80·96°	5h.	81·14°
2	80·06	10	80·96	6	81·14
3	80·06	11	80·96	7	81·14
4	80·06	12	80·96	8	80·96
5	79·88	1	81·14	9	80·78
6	79·70	2	81·50	10	80·96
7	79·70	3	81·96	11	80·24
8	79·70	4	81·68	12	80·24

The difference between the highest and lowest temperature is only 2·26°. The mean temperature of the day is 80·65°, which is only 0·95° above the lowest and 1·31° below the highest temperature. It must however be remembered, that during the day to which these observations refer, the vessel on which they were made advanced through nearly 1½ degrees of latitude, which of course must have had some effect on the temperature.

There is a greater difference in the daily temperature of the sea within the temperate zone; though when compared with the changes which occur in any place situated in the same zone, but not immediately on the shores of the sea, it will be found considerably less than in the latter. The following table from Berghaus, of the changes on the sea, may be compared with the changes in the temperature of London in the middle of March:—

March 16; lat. 51° 0′ N., long. 64° 11′ W.

1h.	43·7°	9h.	44·6°	5h.	43·7°
2	43·7	10	44·6	6	42·8
3	43·7	11	44·6	7	41·0
4	43·7	12	44·6	8	41·0
5	44·6	1	46·4	9	41·0
6	44·6	2	45·5	10	41·9
7	44·6	3	44·6	11	41·9
8	44·6	4	43·7	12	42·8

The difference between the maximum and minimum of the daily temperature in this table amounts to 5·4°, and the mean temperature of the day is 43·7°. The maximum is 2·7° above the mean temperature, and the minimum is 2·7° below it.

We come to the same conclusion that the temperature of the air over the sea is subject to less considerable changes than that which surrounds the land, when we compare the changes that occur during the seasons. Since the travels of Humboldt in South America were published, much attention has been paid to this subject. He was the first to publish a table representing the temperature of the air in places situated on the sea-shores at different seasons and in different latitudes, but since that time numerous observations have been made. We subjoin the table which Berghaus made from data which are the result of regular observation at sea.

Temperature of the Air incumbent on the Atlantic Ocean.

	Lat.	Winter.	Spring.	Summer.	Autumn.	Annual Mean.	Difference between Winter and Summer.
Northern Atlantic.	55° N.	40·82°	45·32°	57·92°	50·54°	48·56°	17·10°
	50	47·48	50·18	60·08	53·96	51·08	12·50
	45	52·16	55·58	63·86	55·94	56·84	11·70
	40	57·20	59·36	70·12	60·80	61·88	12·88
	35	61·88	66·02	76·28	68·36	68·00	14·40
	30	64·40	71·60	79·16	76·46	72·86	14·76
	25	68·36	76·64	79·52	77·36	75·38	11·16
	20	72·68	77·72	79·70	78·80	77·18	7·12
	15	73·40	79·70	81·14	80·06	78·70	7·74
	10	75·92	79·70	82·58	80·78	79·70	6·66
	5	79·16	80·60	80·96	80·42	80·24	1·80
	Line.	79·88	80·24	80·60	79·88	80·06	0·72
Southern Atlantic.	5° S.	78·80	79·34	80·42	79·88	79·52	1·62
	10	77·36	78·08	80·42	79·34	78·80	3·06
	15	74·66	77·00	78·08	77·90	76·82	3·42
	20	70·88	76·82	77·82	74·84	75·02	6·94
	25	67·90	71·06	72·82	69·44	70·52	5·92
	30	66·20	70·88	71·78	67·28	69·08	5·58
	35	56·30	59·18	67·64	65·66	62·24	11·34
	40	50·08	57·20	64·04	59·00	57·74	13·96
	45	41·90	47·48	53·60	47·48	47·66	11·70
	50	38·84	42·80	51·44	43·70	44·24	12·60
	55	33·80	37·40	42·80	36·50	39·38	9·00

Though the data on which this table is constructed have been obtained by regular and uniform observations, their number is not sufficiently great to give a result on which we can rely; we cannot obtain any tolerably exact notion of the temperature of the air at any given place on the land, except by observations continued for more than ten years. Besides, a much greater number of observations is requisite to determine the temperature of the air on the sea than on the land, on account of the difficulty of making exact observations on board a vessel: the above table therefore can only be considered as a very imperfect attempt to give something like an approximation to truth. Still, imperfect as it is, a few interesting facts may be inferred from it. In applying it first to the question whether the southern hemisphere is colder than the northern, we find that the greatest mean annual temperature is not on the equator, but in 5° N. lat. If the girdle which runs round our globe between 0° and 5° N. lat. is considered as the equator of temperature, from which the degrees are counted, we find a remarkable coincidence of nearly equal temperature between the corresponding degrees both of the southern and northern hemisphere, at least as far as 40° lat., that is to say, the temperature of 20° in the southern is about equal to that of 25° in the northern hemisphere. Hence it may be assumed as a general law, that the southern hemisphere is colder than the northern by five degrees of latitude. This difference however increases when we proceed south of 40° and north of 45°, but as our observations do not extend much beyond these parallels, it is impossible to say at what rate the decrease of heat in the southern hemisphere exceeds that in the northern.

Looking at the difference of temperature between the hottest and coldest season, we find that this difference is much greater and at the same time more irregular in the northern than in the southern hemisphere. But this may be accounted for. The great difference between the mean temperature of the winter and summer in 55° N. lat. is doubtless owing to the great masses of ice which during the former season extend as far south as 60°, and which during the prevailing northern gales must depress the temperature of the air very considerably. But this seems to be the only case in which the temperature of the winter is rendered irregular by a local phenomenon. For between 50° and 20° the increase of the mean temperature of the spring is tolerably regular, rising, except in one instance, which perhaps may be owing to an error, from 4½° to 5° for every five degrees of latitude. The other irregularities are evidently produced by a greater increase of the heat in summer. The mean temperature of the summer increases pretty regularly tween 55° and 45° by from two to four degrees for every five degrees of latitude. But between 45° and 40° it rises suddenly to more than six degrees. This sudden rise is probably produced by the warm vapours arising from the Gulf-stream, which in these parts runs across the Atlantic. Another rise of more than six degrees occurs between 40° and 35° N. lat. The air of the Sahara, when raised to the highest degree of heat by the continuance of the sun near the northern tropic, seems to affect the mean temperature of the summer between 40° and 15°, and to raise it nearly to the mean temperature of that season under the equator. We may suppose that the effect of this heated air ceases near Cape Verde, but the effects of another phenomenon begin to operate. The region of calms [ATLANTIC OCEAN, vol. iii., p. 26] frequently extends in summer to 12° and 13° N. lat. Of these three agents, the heated air of the Sahara seems to have the greatest effect in raising the summer temperature of the Atlantic. Though the table exhibits a much greater conformity between the coldest and hottest seasons in the southern hemisphere, there are two or three deviations from a regular course at 20°, 35°, and 40°, for which we are at present unable to account. We are rather inclined to attribute them to the insufficiency of the observations, or to some error which has crept in. It is however remarkable that these great differences are owing to the depression of the temperature in the winter season, and may perhaps be derived from some natural cause. The comparatively small difference between the mean temperature of the summer and winter in 55° S. lat., which amounts only to half of that which takes place in the northern hemisphere, is certainly owing to some natural causes, as Captain King is decidedly of opinion that the difference of these two seasons is not so great in the Strait of Magalhaens as in the same latitude in the northern hemisphere.

It is interesting to see how far the temperature of the sea and the changes it is subject to all the year round, differ from those of places which are situated near the sea, but whose temperature must be affected by the land. It would lead us too far from our object to enter fully into this matter. But that the reader may be convinced of the importance of such an investigation, we add the temperature of a few places situated on the shores of the Northern Atlantic or near them.

Temperature of some Places situated on the Shores of the Northern Atlantic.

NAMES OF PLACES.	Lat.	Winter.	Spring	Summer.	Autumn.	Mean Temperature of the Year	Difference between Winter & Summer.
Edinburgh	55° 58'	38·25°	45·70°	57·33°	46·98°	47·06°	19·08°
London	51 31	39·32	54·12	61·19	43·97	49·65	21 87
Gosport	50 48	40·71	49·80	63·46	52·97	51·48	22·75
La Rochelle	46 9	40 60	51·76	66·60	53·24	53·06	26·00
Erasmus Hall (New York)	40 37	35·36	50·10	71·34	54·03	52·71	35·98
S. Augustine (Florida)	29 50	49·40	71·47	82 76	75·16	72·23	33·36
Sierra Leone	8 30	81·37	83·49	79·16	80·09	81·03	2·21

The table in the other column of this page shows the increase of the temperature of the air incumbent on the Atlantic Ocean in proceeding from the poles to the equator. There are some facts which seem to indicate that within the tropic the temperature of the air increases in proceeding from the coast of Africa to that of America, but the number of these facts is too small and the discrepancies between them too great to authorise us to infer from them any general law. The same observation applies to the temperature of the Pacific, which, on account of its greater extent, requires a much larger number of observations before any conclusion can be drawn from them.

When two elements, such as air and water, approach each other, there can be no great difference in their temperature. Still there must be some difference, as the air is the better conductor of heat, and the water, as a more dense body, is capable of retaining it for a greater length of time. Many observations have been made for the purpose of establishing this difference more precisely. It was found that the temperature of both was subject to regular changes during the day, but that the air attained its highest temperature about two o'clock, whilst the sea attained its highest temperature, according to some at three o'clock, and according to others not before four o'clock. Further, it has been ascertained that the temperature of the air is greater shortly before and after noon, and that of the sea about midnight, but in the morning and evening the two elements have the same temperature or nearly so. This is also stated to be the case between the temperature of the water of the Amazonas and the incumbent air. The wild tribes which inhabit its banks bathe in the river in the day time to cool themselves, and early in the morning for the purpose of getting rid of the chill which is caused by the cold air of the night. When these slight changes are excluded, it is found that the difference of temperature in both elements is either little or very inconsiderable, and that it hardly amounts anywhere to more than 3° Fahr. Very exact observers do not agree to which of the elements the higher temperature belongs. Humboldt thinks that the temperature of the sea is greater. In traversing the Northern Atlantic between 16° 20′ to 11° N. lat., he found the maximum of the temperature of the sea between 72·50° and 78·44°, and that of the air at the same place between 71·6° and 77·90°. Péron, who accompanied the expedition of Bourdin, is also decidedly of opinion that the temperature of the water is somewhat higher, at least between 49° N. lat. and 45° S. lat. Others however assert that the temperature of the air is higher; and this was the opinion of Irving and Forster. Berghaus, to whom were intrusted the numerous observations made upon a uniform plan in several voyages across the Atlantic, thinks that the air has a higher temperature between 35° N. lat. and 20° S. lat., but that in the higher latitudes the temperature of the surface of the sea is higher. He has embodied an abstract of these observations in the following table:—

Mean Temperature of the Air and Sea of the Atlantic Ocean.

Northern Atlantic.				Southern Atlantic.			
Lat.	Air.	Sea.	Difference.	Lat.	Air	Sea.	Difference.
	°	°	°		°	°	°
56°	48·56	49·64	+1·08	55°	39·38	41·00	+1·62
50	51·08	53·96	+2·88	50	44·24	48·02	+3·80
45	56·84	57·74	+0·89	45	47·66	52·52	+4·86
40	61·88	62·24	+0·36	40	57·74	58·64	+0·90
35	68·00	66·92	−1·08	35	62·24	64·40	+2·16
30	72·86	69·80	−3·06	30	69·08	69·26	+0·18
25	75·38	71·78	−3·60	25	70·52	71·60	+1·08
20	77·18	74·30	−2·88	20	75·02	73·58	−1·44
15	78·70	76·10	−2·60	15	76·82	75·90	−1·08
10	79·70	78·26	−1·44	10	78·80	77·72	−0·92
5	80·24	80·24	−0·00	5	79·52	78·44	−1·08
Equ.	80·06	78·98	−1·08	Equ.	80·06	78·98	−1·08

This table, as Berghaus states, is the result of numerous observations, and seems therefore to be entitled to some credit. As it established a new principle in this matter, we looked for confirmation of it in the numerous observations made by Captain Fitzroy during the surveying voyages of the Beagle, which are contained in the abstract of his 'Meteorological Journal' in the appendix to the Surveying Voyages. But the observations of this able navigator do not confirm the table, so far as it establishes the higher temperature of the air between the tropics. On the contrary, if those observations are eliminated, which he made near the land, and a few others, where probably local circumstances were operating, he found the temperature of the water constantly higher than that of the air, and sometimes as much as 5°.

Winds must of course affect the temperature of both elements. It has been constantly observed that high gales depress the temperature of the air, but it has been maintained that they increase that of the sea by the agitation of the waves. But the observations of Péron appear to have established the contrary, as he always found that the temperature of the water was diminished during a gale, but at a much slower rate than that of the air. In common cases he thinks that the decrease of the temperature of the air during gales, compared with that of the water, is as 1:6. How great a difference between the temperatures of the two elements may be produced in such a case, we learn from Weddell, who, when in 53° S. lat., experienced a chilling south wind, in which the difference was ten degrees, the temperature of the air being 39·30°, whilst that of the sea was 49·30°.

It is a very remarkable phenomenon, which has not yet been satisfactorily explained, that the temperature of the sea decreases as the land is approached, and it also decreases on shoals and banks; and as this decrease may be detected by the thermometer at a considerable distance from land, this instrument is now used for the purpose of ascertaining the approach to land or the presence of shoals. It must however be observed that though this decrease generally takes place, it is not universal. Fitzroy, when surveying the most dangerous of all banks, the Abrolhos, did not observe the least change in the temperature of the water; but a change is observed on all the banks which skirt the eastern shores of North America from the Great Bank of Newfoundland to the mouth of the Mississippi. We find also that when Fitzroy approached the continent of South America in his surveying voyages, the temperature of the sea sunk below that of the air. It must however be admitted that some competent judges are of opinion that the temperature of the sea increases as we approach the land, among whom is Péron. But the evidence against him is so abundant and strong, that this point may perhaps be considered as settled.

As late as the end of the last century it was a generally received opinion that the whole mass of sea-water, from the surface to the bottom, had the same temperature in the same latitude. But numerous observations, which have been more recently made, have shown the inaccuracy of this assumption. It has been found that the law which is constant for the earth must be inverted for the sea. The farther we descend into the interior of the earth, the higher is the temperature; but the deeper we dip into the sea, the lower is the temperature of the water. But this does not take place in the same ratio in the whole sea. Captain Ross found the temperature of the sea in Baffin's Bay, 3900 feet below the surface, + 25·52°, while the surface itself was + 33·80°. Beechey, in 47° 18′ N. lat., at a depth of 5194 feet, found the water + 39·56°, and at the surface it was 46·22°. Sabine found that the water in the Caribbean Sea, at a depth of 1000 fathoms, had a temperature of 45·50°, whilst at the surface it was 83·30°. According to an observation of Franklin, the water at a depth of 650 fathoms, in 57° 44′, was 40·5°; at 450, it was 41°; and at the surface, 45°. These instances show that the change of temperature is by no means connected with the latitude. Almost all the observations which have been made tend to show that the temperature near the surface decreases very slowly, and more rapidly at a certain distance from it; but at a great depth it again decreases at a slower rate, and afterwards it becomes stationary. There are a few instances in which a new increase of the temperature has been observed at a very great depth. In the following observations made by Beechey, in the Pacific, the temperature became stationary at a great depth:—

23° 28′ N. lat.		*58° 48′ N. lat.*	
Temp. at the surface	63°	Temp. at the surface	54°
At a depth of 300 ft.	62°	At a depth of 600 ft.	45°
At a depth of 900 ft.	50°	At a depth of 1200 ft.	41°·5
At a depth of 1260 ft.	47°·5	At a depth of 1962 ft.	40°·5
At a depth of 1860 ft.	47°·5	At a depth of 2652 ft.	40°·5

As a proof of the increase of the temperature of the sea at a great depth, we copy the following observations, of which the two first were made by Beechey, and the last by Prescott; the first in the Pacific, and the two last in the Atlantic Ocean:—

14° 22′ N. lat.		*55° 58′ S. lat.*	
Temp. of the air	91°	Temp. of the air	37°
Of the sea at its surface	88°	Of the sea at its surface	43°·5
At a depth of 600 ft.	57°	At a depth of 600 ft.	42°·5
At a depth of 1200 ft.	55°	At a depth of 1380 ft.	42°·5
At a depth of 1800 ft.	48°·5	At a depth of 1980 ft.	40°·5
At a depth of 2400 ft.	49°·5	At a depth of 2580 ft.	41°·4

12° 22 N. lat.	
Temp. of the air	83°
Of the sea at its surface	82°
At a depth of 180 ft.	71°
At a depth of 360 ft.	61°
At a depth of 540 ft.	57°

At a depth of 660 ft. 58°
At a depth of 720 ft. 58°
At a depth of 1320 ft. 60°

The renewed increase at a great depth is a very difficult problem to solve: it is possible that it may be owing to submarine currents of different degrees of temperature, as some have supposed.

But there are facts on record which clearly show that in certain parts of the ocean there must exist some agency by which the water acquires a higher degree of temperature than could be expected from natural causes. Horner, in Krusenstern's 'Travels,' observes that in some places in the Gulf-stream the hand-lead, when it had descended to a depth of between 480 and 600 feet, was heated to such a degree that it was impossible to take it into one's hand. A still more remarkable anomaly is presented by the temperature of the sea between Greenland and Spitzbergen. In nearly every trial Scoresby found that this sea at a depth of from 100 to 200 fathoms was from 6° to 7° warmer than at the surface; and Franklin states that when he accompanied Captain Buchan in his expedition to the North Pole, the water brought from any great depth was invariably found to be warmer than that of the surface. Some persons are of opinion that the melting of the great masses of ice, by which that sea is surrounded and partly covered even in summer, may have had the effect of cooling the surface. But this is contrary to the well established law that the colder water, being the denser, sinks to the bottom, and the warmer rises to the surface; and further, it may be asked why Ross and Parry, in navigating Davis's Strait, Baffin's Bay and Hudson's Bay, where the masses of ice are neither less numerous nor less extensive, always found the contrary to take place.

Masses of ice surround the two poles. It is probable that in the vicinity of the poles the ice constitutes one continuous and unbroken mass. It was formerly conjectured that the mass of ice supposed to enclose the North Pole extended to the vicinity of 81° N. lat., because all navigators who had attained that latitude agreed in stating that the ice there rose to a great height, and stood firm like a wall. This general opinion gave rise to the attempt of Captain Parry to reach the pole by travelling on this ice, which was supposed to be immovable. But Parry was soon aware that he was travelling on ice which was in motion towards the south and south-west, and this circumstance occasioned the failure of the undertaking. When he had advanced, according to his calculation, several miles to the northward in twenty-four hours, he found, on observing the altitude of the sun, that the motion of the ice had carried him as far southward, and that for several days he had advanced very little nearer to his object. He was obliged to abandon the attempt, after having nearly reached 83° N. lat. Thus we have learned that the exterior parts of the great mass of ice supposed to enclose the poles consists of moving masses, which lie close together, and are only occasionally divided from one another by narrow straits. The pieces of ice which detach themselves from this great accumulation and enter the open sea are called *heavy drift-ice*. The larger pieces of ice of this description are a mile in length and breadth, and upwards of thirty feet in thickness, but others are of less dimensions. The farther they advance southward, the more their dimensions are reduced by the action of the sun and of the water. But there are two other descriptions of ice-masses in the sea, which appear to have a different origin, the ice-fields and the icebergs. The term *ice-field* is applied to sheets of ice so extensive that their limits cannot be discerned from the mast-head. They often occur of the diameter of twenty or thirty miles, and, when they are very closely united, they sometimes extend to the length of fifty or a hundred miles. Their average thickness may be from ten to fifteen feet, and their surface is mostly level, except where *hummocks* or low ice-hills occur, and then the thickness is often forty and even fifty feet. These hummocks are produced by two fields coming into contact, when their broken edges are raised by the violent concussion, and thrown upon the fields themselves. These hummocks therefore are usually situated near the edges of the field. In some fields the hummocks form ridges or chains; in others they consist of isolated peaks. The smaller fields, or those whose extent can be seen from the mast-head, are called *floes*. The surface of these masses of ice, before July, is always covered with a bed of snow from a foot to a fathom in depth; this snow dissolves in the end of summer, and forms extensive pools and lakes of fresh water. The great extent and the level surface of the fields show that they cannot be portions of the ice over which Parry travelled. It is therefore supposed that they are generated in the sea which lies between Greenland and Spitzbergen, and which, though navigable during the summer, is covered with a continuous sheet of ice in the colder season. The fields appear to be the parts of this great sheet, formed by its breaking up at the approach of summer. The *icebergs* are immense pieces of ice rising to a great height above the level of the sea; some of them attain a height of 100 feet above the surface of the sea, and a few have been found which seem to be more than twice that height. Their base near the sea-level is not extensive, the larger masses generally being not more than 4000 feet in circumference, though Middleton states that he saw one which was from three to four miles in circuit. The most common form of the iceberg is for one side to rise perpendicularly to the very summit, the opposite side being very low, while the intermediate surface forms a gradual slope. Some have regular flat surfaces, but frequently they present a great variety in form and appearance. Some of them resemble palaces, or churches, or old castles, with spires, towers, windows, and arched gateways; while others resemble pyramids and obelisks, and others are like ships, trees, animals, and human beings. When a number of them are near one another, which frequently happens, they present the appearance of a mountainous country. When seen from a short distance, they look like huge hills of marble; and when the sun shines on them, they glitter like silver. Sometimes earth, gravel, and sand may be observed in them. Their prevailing colour in the fresh fracture is greenish-grey, approaching to emerald-green. This colour resembles that of the glaciers of Switzerland, and the icebergs are pieces broken off from glaciers. They are rarely met with in the sea between Greenland and Spitzbergen, because in these parts only a few glaciers approach near the water's edge. But on both sides of Davis's Strait and Baffin's Bay, and also on the eastern shores of Greenland as far north as 70 N. lat., glaciers cover the land, and in many places advance to the shores of the sea. In some places they terminate in a precipitous edge on the coast. It is only in the sea which surrounds these coasts that the icebergs are numerous. They seem to owe their origin to the circumstance of glaciers being in a continual state of progress. The glaciers of Greenland, which are situated on the margin of the sea, protrude their exterior parts over the ocean, and in summer, when the ice becomes brittle, the force of cohesion is overcome by the weight of the prodigious masses that overhang the sea, and they are detached from the glacier with a dreadful crash. Thus an iceberg is formed. These icebergs, as it seems, are most common along the eastern shores of Greenland, and at the distance of 15 to 20 miles from the coast, where they occur by hundreds and thousands, forming a sort of barrier outside the drift-ice which is near the shore, and preventing its removal by an off-shore wind. Graah states that this barrier of icebergs renders it impossible for vessels to approach these shores.

These masses of ice render navigation very dangerous; and the ice-fields especially have caused the loss of many whaling-vessels. These extensive masses are frequently put into a rotatory movement by a cause which has never been discovered. When thus whirled about, their outer edges acquire a velocity of several miles per hour. A field thus in motion, coming in contact with another at rest, or with one that has a contrary direction of movement, produces a dreadful shock. A body of more than ten thousand millions of tons weight, meeting with resistance, when in motion, produces a destruction which it is scarcely possible to conceive. The strongest ship is a mere atom between two such masses of matter in motion, and many vessels have thus been destroyed. Some have been thrown upon the ice, some have had their hulls completely torn up or split in two, and others have been run down by the ice, and buried beneath its fragments. The ice-fields are particularly dangerous in foggy weather, as their motions cannot then be distinctly observed. Icebergs are much less dangerous, partly on account of the small space which they occupy when compared with ice-fields, and partly because they are easily distinguished at a distance in the night by their natural brightness, and in foggy weather by a peculiar blackness of the atmosphere. As however they occur far from land and often in unexpected situations, sailors when crossing the

Atlantic between 50° and 60° N. lat., or even farther to the south, must always be on the watch for them in the night time. Occasionally the whale-fishers derive some advantage from them. As they sink deep into the sea, they are very little affected by the wind, and they furnish secure mooring to a ship in strong adverse winds, or when it is required for other purposes. But mooring to lofty icebergs is attended with considerable danger. Being sometimes very nicely balanced, they are apt to lose their equilibrium; and vessels have often been staved and sometimes wrecked by the fall of their icy mooring, while boats have been overwhelmed even at a considerable distance by the swell occasioned by such a catastrophe. Water is sometimes procured by whaling-vessels from the deep pools of water that are formed in the summer season on the depressions in icebergs, or from the streams which run down their sides. For this purpose casks are landed upon the lower bergs, and filled and rolled into the sea, but from the higher the water is conveyed by means of a long tube of canvas or leather into casks placed in the boats at the side of the ice, or even upon the deck of the ship.

On approaching a field or any compact aggregation of ice, the *ice-blink* is seen whenever the horizon is tolerably free from clouds, and sometimes even under a thick sky. It consists of a stratum of lucid whiteness, which appears over the ice in that part of the atmosphere which joins the horizon. A clear sky presents a beautiful and perfect map of the ice, 20 or 30 miles beyond the limit of direct vision, but less distant in proportion as the atmosphere is more dense and obscure. Each kind of ice has a different blink. Field-ice has the most lucid blink, accompanied with a tinge of yellow; that of packed ice is more purely white; and ice newly formed upon the sea has a greyish hue.

According to the experiments of Scoresby, the specific gravity of the ice, when compared with that of sea-water occurring in the Greenland Sea, at the temperature of 35°, was ascertained to be 0·894 to 0·900. That part of the ice therefore which is above the surface appears to be, to that below the surface, in the proportion of 1 to 8·2. For every solid foot of ice which is seen in a mass floating in the sea, there must be at least eight feet below. Hence it sometimes happens that large icebergs, when they are carried into shallow water, take ground, and remain stationary for one or two years, until so much of their volume has been wasted by the action of the sun and of the atmosphere, that they begin to float again.

It excited some surprise when it was discovered that the ice floating about in the sea consisted of fresh water. It is true that it generally contains a very small portion of salt, but it is probable that this small portion of salt is derived from the salt water contained in the pores of the ice. If, says Scoresby, in confirmation of this opinion, the newest and most porous ice be removed into the air, allowed to drain for some time in a temperature of 32° and upwards, and then be washed in fresh water, it will be found to be nearly quite free from salt, and the water produced from it may be drunk. On account of the salt contained in it, sea water does not, like pure water, freeze at the temperature of 32°, but in the Greenland Sea, where its specific gravity is 1·0263, it begins only to freeze at 28½°. Water saturated with sea salt remains liquid at a temperature of zero.

It appears that there is scarcely any portion of the surface of the sea which is not subjected to some kind of motion, and this circumstance must tend greatly to preserve its purity. The water in some parts of the sea is always propelled in the same direction by the currents. [CURRENTS; ATLANTIC OCEAN; PACIFIC OCEAN.] Nearly the whole sea is four times in the day subject to a change in its level by the movements of the tides. The motion produced by the winds, and known by the name of waves, is much less regular. The wind striking the surface of the sea in an oblique direction, pushes some of the water on the surface over that which is contiguous to it, and thus raises it above the common level, until so much water is accumulated that the wind is unable to maintain it in that position, and it falls down. Each wave presents a gently ascending surface to the windward, and a perpendicular descent leeward. The elevation of the waves varies according to the strength of the wind. A rather heavy gale raises them from six to eight feet above the common sea-level; but in very strong gales they attain an elevation of thirty feet. This motion of the surface of the sea is not perceptible to a great depth. In the strongest gales it is supposed not to extend beyond 72 feet below the surface, and at a depth of 90 feet the sea is perfectly still. The form and even the size of the waves vary according to the depth and the extent of the sea. In shallow water, where the lower part of the waves approaches the bottom, and meets with resistance, the waves are abrupt and irregular, and this is also the case in confined seas; whilst on the open ocean they are wide and long, and rise and fall with great regularity. When the waves run to a low shore, the slope of the ground breaks their force, and they terminate in a tranquil manner; but when they are impelled against an elevated rocky coast, being repelled by the rock, they produce what is called a *surf*. This violent rising of the sea on a rocky coast sometimes attains an elevation of 100 feet above the sea-level. The surf is always dangerous to pass, except in boats of a peculiar construction. The waves do not subside simultaneously with the wind. The sea continues in its agitated state for many hours. The air being little agitated, or not at all, is unable to depress the undulations of the sea, and therefore the waves during a calm after a gale rise higher, and their most elevated part forms a more acute angle than during the gale. Such a state of the sea is called a *hollow sea*.

The proportion which exists between the sea and land has contributed to maintain the productive powers of the earth. If that proportion were materially changed, its productive powers would be changed also. The sea, by means of the vapours continually rising from its surface, supplies the atmosphere with sufficient moisture for the support of organic life. Countries which do not partake of the benefits derived from this source, and which are not refreshed by rain or dew, are uninhabitable and destitute of all kinds of vegetation. Those parts of the earth which are farthest from the sea are much less fertile and populous than those which, owing to their greater vicinity to it, receive a larger supply of moisture from this great source. The sea contributes also considerably to the advancement of civilization. At the first view it seems to constitute an insuperable obstacle to the communication between nations who inhabit countries widely apart from one another; but the ingenuity of men has converted the ocean into the most frequented high road on the globe. The easy communication which is thus established between nations at great distances from one another, has perhaps more than any other circumstance contributed to improve the condition of the human race. It is at least certain, that all those nations which have acquired any considerable degree of civilization inhabit countries either contiguous to the sea or at no great distance from it.

SEA-WATER, *Saline Contents of.* Although the saltness of the ocean must have attracted the notice and excited the curiosity of mankind in the earliest ages, yet the investigation of the nature and proportions of the several salts has been accurately conducted only within a comparatively few years. The most abundant principle is common salt, it constituting nearly two-thirds of the whole saline matter, which fluctuates between three and four per cent.; the specific gravity of the water varies, according to the proportion of the saline ingredients, from about 1·026 to 1·030 The late Dr. Marcet made some interesting experiments on this subject, and the general conclusions which he drew from them are thus stated by Dr. Prout, in his 'Bridgewater Treatise:'—

1. That the Southern Ocean contains more salt than the Northern Ocean, in the ratio of 1·02919 to 1·02757.

2. That the mean specific gravity of sea-water near the equator is 1·02777, or intermediate between that of the Northern and that of the Southern hemispheres.

3. That there is no notable difference in sea-water under different meridians.

4. That there is no satisfactory evidence that the sea at great depths is more salt than at the surface.

5. That the sea in general contains more salt where it is deepest and most remote from land, and that its saltness is always diminished in the vicinity of large masses of ice.

6. That small inland seas, though communicating with the ocean, are much less salt than the ocean.

7. That the Mediterranean contains rather larger proportions of salt than the ocean.

Dr. Marcet afterwards mentions that sea-water contains a double sulphate of potash and magnesia, hydrochlorate of ammonia and carbonate of lime, whilst chloride of calcium and nitrates are absent, as also mercury or mercurial salt, which it had been stated by Rouelle to contain.

Dr. Marcet justly observes, that the discovery of some substances not previously known to exist in sea-water, and the absence of others which it was supposed to contain, will require that former analyses of sea-water, and his own in particular, should be corrected and revised; and this is become even more necessary since Dr. Marcet wrote, for two new elements, viz. iodine and bromine, have been discovered in the waters of the ocean.

Omitting therefore all previons analyses, we subjoin two, the first by M. Laurens, of the water of the Mediterranean (*Journal de Pharmacie*, xxi. 93):—

	Grains.
Water . . .	959·06
Chloride of Sodium (common salt)	27·22
Chloride of Magnesium .	6·14
Sulphate of Magnesia .	7·02
Sulphate of Lime . .	0·15
Carbonate of Lime .	0·09
Carbonate of Magnesia .	0·11
Carbonic Acid . .	0·20
Potash . . .	0·01
Iodine—quantity undetermined	
Extractive Matter—a trace	
	1000·

M. Laurens states that he could not detect the presence of any bromine in the water, though he made repeated trials for that purpose.

More recently Dr. G. Schweitzer has examined the water of the English Channel near Brighton. His results are,—

	Grains.
Water	964·74372
Chloride of Sodium . .	27·05948
Chloride of Magnesium . .	3·66658
Chloride of Potassium . .	0·76552
Bromide of Magnesium . .	0·02929
Sulphate of Magnesia . .	2·29578
Sulphate of Lime . .	1·40662
Carbonate of Lime . .	0·03301
	1000·

The specific gravity of the water was 1·0274, and it was the same when taken from the bottom of the sea ten fathoms deep. Iodine could be detected only in the minutest quantity; 174 pounds troy of sea-water of the Channel not containing one grain of it.

Dr. Schweitzer remarks, that when these analyses are compared, the Channel water contains nine times as much lime as the Mediterranean, which is to be accounted for by its flowing over a bed of chalk; the water taken in a fair calm day, when very transparent, did not yield the slightest trace of extractive matter. It contains minute traces of free carbonic acid, which probably holds the carbonates of lime and magnesia in solution as bicarbonates; and traces of hydrochlorate of ammonia were obtained, as had been formerly done by Dr. Marcet.

Dr. Schweitzer states that the potassium exists in the state of chloride; while, according to Dr. Marcet, it is in the form of a double sulphate of potash and magnesia, and this we are of opinion is the correct view of the case.

The water of the Dead Sea, according to Dr. Marcet, has a specific gravity of 1·211; and by his analysis 1000 grains consist of—

	Grains.
Water . . .	754·20
Chloride of Sodium . .	103·60
Chloride of Calceum . .	39·20
Chloride of Magnesium .	102·46
Sulphate of Lime . .	·54
	1000·

M. Gay-Lussac's analysis gives 16·6 grains more of saline contents, and he differs considerably from Dr. Marcet as to the proportions of the various salts.

While the substances above described may be regarded as the usual saline constituents of sea-water, it has been lately shown by Professor Daniell (*London, Edinburgh, and Dublin Phil. Mag.*, July, 1841), that the waters of the western coast of Africa and other localities spontaneously evolve sulphuretted hydrogen, and in very considerable quantities. It will be sufficient to state one example:—Water from the river Bungo, taken at sea at forty miles distance from the mouth, contained in the imperial gallon 4·35 cubic inches of sulphuretted hydrogen gas. It appears that this gas, so prejudicial to health, and so destructive to the copper of ships' bottoms, contaminates the sea upon the western coast of Africa, in enormous quantities through an extent of more than 16° of latitude, and reaching in places forty miles seaward, making altogether an area of 40,000 square miles in extent.

Professor Daniell has shown, we think satisfactorily, that the production of this gas is owing to the mutual reaction of the immense quantities of vegetable matters which must be brought down by the intertropical rivers, and the sulphates of sea-water. For an account of the modes which Professor Daniell has proposed of avoiding the evil effects of this gas, both on the health of man and the coppering of ships, we refer to the work above quoted.

SEA-BEAR. [Bear, vol. iv., p. 192; Seals.]

SEA-CALF. [Seals.]

SEA-COW. [Seals.]

SEA-DUCKS. [Fuligulinæ.]

SEA-EGGS. [Echinidæ.]

SEA-ELEPHANT. [Seals.]

SEA-LEOPARD. [Seals.]

SEA-LION. [Seals.]

SEA-MOUSE. Cuvier remarks that the *Aphrodita* of Linnæus is easily recognised among the *Dorsibranchiate Annelids* [Annelida; Dorsibranchiata] by the two longitudinal rows of wide membranous scales which cover the back, and under which are hidden their *branchiæ*, in the form of small fleshy crests. Their body is generally flattened in form, and shorter and wider than it is in the other Annelids. Their very thick and muscular œsophagus is capable of being extruded like a proboscis. They have an unequal intestine, furnished on each side with a great number of branched cæca, the extremities of which go to fix themselves between the bundles of bristles that serve for feet.

No. 442 A., *Mus. Coll. Chir.*, exhibits a Sea-Mouse, laid open longitudinally, to expose the alimentary canal. The first division of this canal is commonly considered as the stomach, but it is rather a preparatory organ than a true digestive cavity, and is protruded like a proboscis when the animal takes its food, as above noticed. It is seen in the preparation to be strong and muscular, like a gizzard, and communicates with the second portion of the canal by a narrow passage. The true digestive cavity is wide and membranous, and has a series of elongated cæcal appendages passing from it on each side. No. 782 of the same museum shows the alimentary canal and intestinal cæcal appendages. The intestine is laid open, displaying the orifices of the cæca, into some of which orifices bristles have been inserted. The author of the catalogue remarks that this preparation is called by Mr. Hunter, in the original manuscript catalogue, the 'Intestinal canal and liver of the Sea-Mouse,' evidently regarding the cæcal appendages as representing that viscus. Thus, after exhibiting the salivary glands under the form of elongated cæca in the Holothuria, and the pancreas under the same form in the osseous fishes, he lastly shows us the complicated liver of the higher classes also commencing in the animal series by separate and simple follicles. No. 783 consists of the intestine and hepatic cæca. The dilated extremities of the latter are filled with a dark-coloured substance, with which the intestine is also distended. (*Cat.*, vol. i.)

Savigny's *Halithææ* consist of those which have three tentacles, and, between them, a very small crest: they are without jaws.

Example, *Halithæa aculeata*, *Aphrodita aculeata*, Linn., the *Sea-Mouse*.

This is a very beautiful animal, and most superbly coloured. It is oval, six or eight inches long, and two or three wide. The scales of the back are covered and hidden by a kind of flocky down, like tow, which springs upon the sides, and from which issue groups of strong spines, that pierce, in part, the flocky covering, and bundles of flexuous bristles, glittering like gold, and changing into all the colours of the rainbow. Cuvier says, and without exaggeration, that they do not yield in beauty either to the plumage of the Humming-birds nor to the most brilliant precious stones. Lower down is a tubercle, out of which come spines, in three groups, and of three different sizes, and finally a fleshy cone. There are forty of these tubercles on each side, and between the two first are two small fleshy tentacles. There are fifteen pairs of scales, which are wide and sometimes puffed up, on the back, and fifteen small branchial crests on each side.

Some of the *Halithææ* (*Halithées Hermiones*, Sav.) have no flocky down upon the back, and such is *Aphrodita Hystrix* (genus *Hermione*, De Blainv.).

The genus *Polynöe*, Sav. (*Eumolpe*, Oken), is another subdivision. This genus has no flocky covering on the back; the tentacles are five in number, and their proboscis is furnished with horny and strong jaws. *Polynöe lævis* is an example.

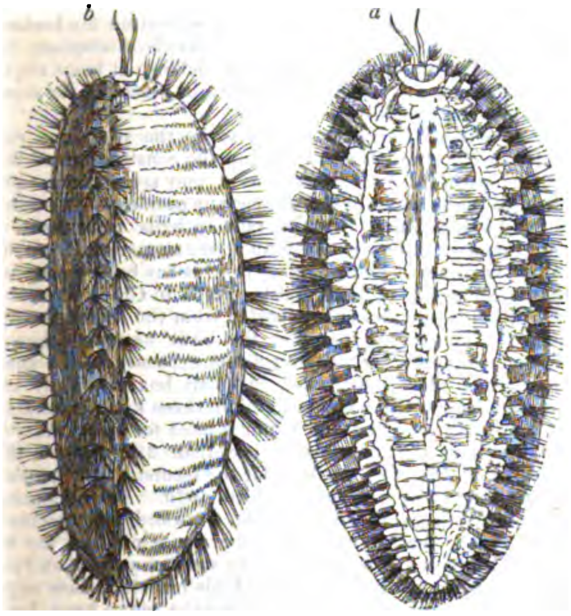
Then there are the genera *Sigalion* and *Acoëtes* of MM. Audouin and Milne Edwards.

The first of these is more elongated in form than the other *Aphroditæ;* it has cirrhi on all the feet. Such is *Sigalion Mathildæ*.

The second has cirrhi, which alternate with the *elytra* (as the two rows of membranous scales which cover the back are somewhat oddly called, the term being already applied to the horny external wings of coleopterous insects), in great length; their jaws are stronger and better toothed. There is a large species at the Antilles, which inhabits a sheath or pipe of the consistence of leather.

Here Cuvier places his *Chætopterus*, which has a mouth devoid of jaws and proboscis, furnished above with a lip, to which are attached two very small tentacula. Then comes a disk with nine pairs of feet, then a pair of long bristly bundles, like two wings. The *branchiæ*, in the form of plates, are attached rather below than above, and are placed along the middle of the body.

Example, *Chætopterus pergamentaceus*. This is eight or ten inches long, and inhabits a pipe of the substance of parchment, in the seas of the West India Islands.



Aphrodita aculeata.
a, ventral view; *b*, dorsal and lateral view.

SEA-PIE, one of the names for the *Oyster-catcher, Hæmatopus ostralegus*, Linn.

Generic Character.—Bill long, strong, compressed; point very much compressed, chisel-like. Nostrils lateral, longitudinally slit in the groove of the bill. Feet strong, muscular; three toes directed forwards, middle toe united to the external one, up to the first joint, by a membrane, and to the internal toe by a small rudiment; toes bordered with the rudiment of a membrane. Wings moderate, the first quill longest.

Habits of the Genus.—The species live along the seashore, on the beach or sands; following the retreat of the waves, to gather such crustaceous or marine animals as they wash up. They assemble in great flocks for their migrations, but live solitarily during the time of pairing and incubation. Their nests are made in the herbage and in the marshy meadows near the sea, and they both run and fly with rapidity. Their cry is shrill and resounding. They moult twice, in autumn and spring, but the colours of the plumage scarcely change at all at those periods; the only marked difference observed, at this change of plumage, exists in the absence or presence of the white gorget. There is no difference in the sexes. (Temm.)

Example, *Hæmatopus ostralegus*.

Description.—Male and Female in Winter Plumage.—Head, nape, upper part of the breast, back, wings, and extremity of the tail, deep black; a very marked gorget under the throat; rump, origin of caudal feathers and quills, transverse band on the wings, as well as all the lower parts, pure white; bill and naked circle round the eyes, very bright orange; iris crimson; feet obscure red.

Young of the Year.—These have the black of the plumage clouded and bordered with brown; the white dirty; bill and naked circle of the eyes blackish brown; iris brown; feet livid grey.

Summer or Nuptial Plumage.—All the upper parts of the front of the neck of the same black as the wings, which black is more lustrous, and with reflections. (Temm.)

This is *L'Huiterier*, *Pie de Mer*, and *Becasse de Mer* of the French; *Beccaccia di Mare* of the Italians; *Marspitt* and *Strandskjura* of the Swedes; *Tialldur* (fem. *Tilldra*) of the Icelanders; *Kielder* of the Feroe Islanders; *Tield, Kield, Glib*, and *Strand-Skiure* of the Norwegians; *Strand-Skade* of the Danes; *Geschackte Austernfischer* of the Germans; *Scholackster* of the Netherlanders; *Oyster-catcher* and *Sea-Pie* of the modern British; and *Piogen y Môr* of the antient British.

Geographical Distribution.—The whole of the European continent. Common in Denmark, Sweden, and Norway, Russia, Siberia, and extending to Kamtchatka; the British Islands (where it is indigenous, and breeds), from the Scilly Isles to Shetland; common and resident in Ireland. Temminck states that this species also lives in North America, but that the oyster-catcher of Brazil and the whole of South America forms a distinct race. He adds that it also inhabits Japan. The Prince of Canino, in his 'Birds of Europe and North America,' however, does not include it among the North American birds, but places opposite to it (in the American column) *Hæmatopus palliatus*, Temm. (*Hæm. Ostralegus*, Wils.; *H. Brasiliensis*, Licht.).

Food, Habits, &c.—Small crustaceans, &c., and bivalve mollusks, which last its powerful bill and frame well enable it to open, so as to get at the contents. It will frequently wade far out, and trust to swimming back for its return. Their four eggs, of a bright hue, inclining to olive or yellowish stone colour, spotted with ash-grey, or dark brown, or blackish, are deposited in a shallow hole, scratched in the gravel or sand, and sometimes among the shingles of the beach, but most frequently among the herbage of marshy places near the sea. It can hardly be said to make a nest. Time of incubation three weeks. Young when first hatched covered with down of a brownish grey colour. It is sometimes seen far up rivers and inland, where it feeds on earthworms, &c., and fresh-water insects and mollusks. Easily domesticated in poultry-yards. Several used to be kept upon the grass in front of the Pavilion at Brighton, and there are some now, in a half-tamed state, in the gardens of the Zoological Society in the Regent's Park.

Hæmatopus ostralegus.

SEA-SWALLOWS. [Terns.]

SEA-URCHINS. [Echinidæ.]

SEA-WEEDS are those plants which are found growing at the bottom of the sea. They form a large proportion of the numerous family Algæ [Algæ], and are all of them cryptogamic plants. Although many of the jointed and disjointed Algæ are found in sea-water, and might be called sea-weeds, we shall confine our remarks here to those forms of the jointless Algæ which comprehend the genus Fucus and its allies, and contain the most striking and useful forms of these plants.

The first section of this group of water-plants is the FUCOIDEÆ, which have for their type the genus *Fucus*. They are all of them marine plants, of an olive brown or greenish colour, and very fine in their texture. The cellular structure of which all the Algæ are composed is in these plants in a very condensed state, assuming a leathery and sometimes even a woody character. The base of their stem or stipes forms a dense shield-like root, whilst their upper part is often expanded into a broad foliaceous appendage. The reproductive organs consist of small black or very dark spores, which are collected into sori or are found scattered on various parts of the frond. These spores are enveloped in a thick gelatinous mucus, which seems to be a provision for the purpose of attaching them more securely to the rocks on which they grow in the midst of the restless element to which they are constantly exposed. They are of very rapid growth, and only a few months serves to cover a surface of naked rock with a forest of various species of Fuci. Kelp is manufactured from the species of plants belonging to this section of Algæ; the one most commonly collected for this purpose is the *Fucus vesiculosus*. Kelp is not now manufactured to any great extent in this country, but a few years since it was a source of great wealth in the Western Islands and the western shores of Scotland. [KELP.] At one time the quantity made in Scotland and its adjacent isles was not less than 20,000 tons annually, which sold at the average price of 10*l*. per ton.

Although, from the simple structure of the Algæ, we should not expect that they would elaborate many of those secretions which in higher plants are found subservient to the use of man and other animals as food, yet among many of these an albuminous matter is secreted, which is highly nutritious. In Gothland, the *F. vesiculosus* is given as provender to hogs, and hence is called swine-tang. Many other animals will also eat this plant as food, in times of scarcity. It is also collected in Jersey, and when dried is used as fuel. The fishermen both of our own and the Dutch coasts use this Fucus and the *F. serratus* for packing up their fish; the latter is however preferred, as, from containing less mucus, it is less likely to ferment. The Fuci were at one time used considerably in medicine, as well as other forms of Algæ, but since the discovery of their active principle, iodine [IODINE], they have been comparatively little used. According to Ecklon, the *Laminaria buccinalis* of the Cape of Good Hope is the sea-weed that produces the greatest quantity of iodine.

The *Largassurum vulgare*, or tropic grape, the *Fucus natans* of older writers, is remarkable for the immense quantities in which it occurs in certain portions of the ocean. It only grows within forty degrees of the equator, on each side, although occasionally thrown up by currents on our own shores. In some parts of the ocean it is so constant that it is said to assist pilots in rectifying their longitude. It was the occurrence of immense fields of these weeds that struck the sailors of Columbus with so much awe, and led them to suppose that Providence had determined to frustrate their course, which nearly terminated in the giving up of their great attempt to discover the New World.

The LICHINEÆ are a small group of these plants, which are interesting in a botanical point of view on account of their resemblance to the Lichens, or Liverworts, thus serving to connect the Algæ, which are the Lichens of the sea, with those which grow on the land. There is only one genus *Lichina*, of which there are two species, both British, the *L. pygmæa* and the *L. confinis;* they both grow on rocks which are never permanently submerged, and thus in habit as well as in structure they approach the liverworts.

The LAMINARIEÆ, or tangles, have a densely fibro-cellular structure, and their spores are collected together in sori on the surface of the frond. These plants are coriaceous or membranaceous in structure, and are little changed by exposure to the air. Some of these are used. *Laminaria esculenta* is an edible species. It grows to the length of twenty feet, and the midrib, stripped of its membranaceous covering, is the part that is eaten. *L. saccharina*, or the sugar sea-belt, is said to be eaten by the Icelanders. In Japan it is also considered a great delicacy. *L. digitata*, or sea-wand, is eaten in Scotland, and is cried about the streets of Edinburgh as *tangle*. Many of the sea-weeds belonging to this and other genera have been found to make excellent manure for grass-lands. Kelp has in many instances been used, and it has perfectly succeeded. It has been tried as a top-dressing, and singly or in combination with other manures on corn, pasture, potatoes, turnips, &c. with the best effect.

The SPOROCHNOIDEÆ is a small group composed of the scatter-tuft (*Sporochnus*) and three other genera, which are remarkable for bearing little tufts of fine green filaments on the fronds. They are of an olive or yellowish green colour: they become flaccid on exposure to the air, acquiring a verdigris colour, and possess the property of decomposing other algæ with which they may come in contact.

The DICTYOLEÆ, or sea-networks, are a larger section than the last, and are characterised by the beautifully reticulated texture of the tegument. Their fronds are of various forms, but all of them are ribless. To this section belongs the *Chorda filum*, sea-whiplash, or sea-whipcord, which is often found thirty or forty feet in length. The frond of this plant is hollow within and interrupted at short distances, which appears to be for the purpose of enabling the plant to float in the water, and thus securing the same end as the more highly developed vesicles of *Fucus vesiculosus*.

The FLORIDEÆ are an extensive section, and include some curious and valuable species. They are distinguished by their brilliant and little-fading tints, their leaf-like fronds, and the collection of their spores into sori, or, if scattered, by the spores being arranged on a ternary plan. The *Chondrus crispus*, or Carrageen moss, belongs to this section. In Ireland it is used extensively as an article of food, and has lately been sold in London as a substitute for Iceland moss. It is frequently employed, instead of isinglass, for the manufacture of blanc-mange and jellies. It has a slight bitter flavour, which may be removed by steeping for some time previous to boiling.

A species of *Gelidium* is said to be the substance collected by the swallows and used in the construction of the edible nests of Java. Strange as it may seem that a taste for birds' nests should exist among any people, yet so strong is this taste in China, that the trade in birds' nests forms a very lucrative and extensive branch of commerce. Burnett, in his 'Outlines of Botany,' observes, 'It has been estimated that 242,400 lbs. of birds' nests, worth in China 234,290*l*. and upwards, are annually exported from the Indian Archipelago.' The only preparation the birds' nests undergo is that of simple drying, without direct exposure to the sun; after which they are packed in small boxes. They are assorted for the Chinese market into three kinds according to their qualities; and the common price for birds' nests of the first sort at Canton is no less than 3500 dollars the pecul, or 5*l*. 18*s*. 1½*d*. per lb.; for the second, 2800 Spanish dollars the pecul; and for the third, 1600.' The collecting these birds' nests, according to Mr. Crawford, is as perilous a toil as our fearful trade of gathering samphire; for he says, 'The nests are obtained in deep and damp caves, and are most esteemed if taken before the birds have laid their eggs. The coarsest are those collected after the young have been fledged. The finest nests are the whitest, that is, those taken before they are defiled by the young birds. They are taken twice a year, and if regularly collected, and no unusual injury offered to the caverns, the produce is very equal, and the harvest very little if at all improved by being left unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. In one place the caves are only to be approached by a perpendicular descent of many hundred feet by ladders of bamboo and rattan, over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed by torch-light, by penetrating into the recesses of the rock, where the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock.' (Crawford's *Eastern Archipelago*.)

Several other species of Gelidium are made use of as food, more especially in the East, where they are added to dishes to render the hot and biting condiments more palatable.

The species of *Gracillaria* are also used as food, and one of them, *G. lichenoides*, is highly valued in Ceylon and other parts of the East, and bears a great resemblance to *G. compressa*, a species of the British coast, and which Dr. Gre ville says is little inferior to the first, and has been used in this country both as a pickle and a preserve. The *G. tenax*, the *Fucus tenax* of Turner, is invaluable to the Chinese as the basis of an excellent glue and varnish. 'Though a small plant,' says Dr. Greville, 'the quantity annually imported at Canton from the provinces of Fokein and Tchikiang is stated by Mr. Turner to be about 27,000 lbs. It is sold for sixpence or eight-pence per pound, and is used for the purposes to which we apply glue and gum arabic. The Chinese employ it chiefly in the manufacture of lanterns, to strengthen or varnish the paper, and sometimes to thicken or give a gloss to silks or gauze.' Mr. Neill thinks it probable that the gummy matter called chinchou, or hai-tsai, in China and Japan, may be composed of this substance. Windows made of slips of bamboo, and crossed diagonally, have frequently their interstices wholly filled with the transparent glue of hai-tsai.

A celebrated vermifuge on the Continent is prepared from the *Helminthocorton*, a genus which grows in the Mediterranean, and goes by the name of the coralline of Corsica. It has also been recommended as a remedy in cancer, but is seldom used in this country.

The *Plocamium*, or hair-flag, is one of the most elegant plants of this section. It was formerly used much in the construction of artificial landscapes on paper, and its collection and preparation gave employment to many of the poor on our coasts.

The THAUMASIEÆ consist of the curious genus *Thaumasia*. Agardh says, 'This genus is of so singular a nature, that it is difficult to say whether it should be arranged among the zoophytes or the algæ. It is an alga with a skeleton, the skeleton is that of a zoophyte, but the softer parts are those of a flag. The skeleton or frame-work consists of meshes formed of hard filaments about the size of a hog's bristle, rigid, fragile, and of a shining brown colour; internally they are solid, not tubular. The foliaceous substance with which the network is overspread is then flexible and blackish.' It has been found in the roads near Ceylon.

The GASTROCARPEÆ are known by their ribless veinless fronds, with a cellular tissue extremely hard and tough, but internally soft and gelatinous, the latter having the sori imbedded in it. The *Iridea edulis*, edible dulse, is a favourite food with many of the crustaceæ, as lobsters, crabs, &c.: it is also eaten by fishermen, both raw and roasted. It is said to resemble in flavour roasted oysters. The *Halymenia palmata* was at one time used as a masticatory, but its use has been supplanted by tobacco. It is still however used as a popular remedy in scorbutic and other cutaneous diseases. 'To the Icelanders it is a plant of considerable importance. They prepare it by washing it well in fresh water, and exposing it to dry, when it gives out a white powdery substance, which is sweet and palatable, and covers the whole plant; they then pack it in casks to keep it from the air, and thus preserve it ready to be eaten, either in this state with fish and butter, or, according to the practice of wealthier tables, boiled in milk, and mixed with a little flour of rye. The cattle are also very fond of this sea-weed, and sheep are said to seek it with such avidity as often to be lost, by going too far from the land at low-water.' (*Quart. Rev.*, vii. 68.) From this latter circumstance it was called *fucus ovinus*, or sheep dulse. In Kamtchatka it is used for making a fermented beverage, which is easily produced on account of the great quantity of sugar this plant contains.

The above sections of the family Algæ contain most of the sea-weeds: a few more are mentioned under Ulvaceæ [ULVACEÆ], which are not exclusively marine plants.

SEAFORD, a small seaport town, and a member attached to Hastings, one of the Cinque Ports [CINQUE PORTS], is situated between two ridges of the South Downs on the coast of Sussex, 61 miles almost due south from London. It was formerly the port where the river Ouse emptied itself into the sea, but the great storm of 12th Eliz. (1570), which diverted the channel of the Rother, made a fresh mouth for the Ouse by breaking through the beach just below Bishopstone, and forming what is now called the Old Harbour, which was used till a safer exit was made at Meeching, since called Newhaven. The present harbour of Newhaven is formed in the channel of the river Ouse, at its entrance into the sea, by wooden piers carried out in a southerly direction across the beach to the line of low-water. The river is navigable without locks two miles beyond the town of Lewes and with locks 10 miles farther up the stream, making 18 miles altogether, and affords a powerful backwater for scouring the entrance. The average rise of spring-tides at the harbour's mouth is from 19 to 20 feet, and of neap tides about 14 or 15 feet. The bar however is left dry at low-water of spring-tides, although within the piers there is at such times two feet water, and this depth continues uniform for a mile up the channel. The distance between the pier heads is only 106 feet. During the flood-tide and fine weather the harbour is easy of access, from the indraught and eddy tide, which set towards the mouth; but from the rapidity of the stream during the ebb it is not considered safe for a sailing vessel to enter. The harbour is managed by trustees acting under a local act of parliament. The town of Seaford was a Roman station; the remains of Roman villas have been discovered on the site, and an extensive Roman cemetery on Sutton farm. On the hill above the town to the east there was a large Roman camp, the outline of which may still be traced. Some antiquarians have considered this the site of the city called Anderida by Pancirollus, in his Notitia, and Andredes-ceaster by the Saxons, one of those fortresses established by the Romans in the south and eastern parts of the island towards the sea, for watching the approach of pirates and other enemies. According to the Saxon chronicle, every inhabitant was slain and the city wholly destroyed by Ella and Cissa in 490. The lordship formed part of the possessions of the Earls de Warren. The town, during the reigns of the Henries, was subject to those marauding visitations from the French so common on the southern coast; in one of these it was burned, and several religious edifices, not afterwards rebuilt, together with the original chancel of the church, were destroyed. Seaford is now little more than a large fishing village, with a few houses for persons who resort to this spot for bathing; but the sea, having greatly receded, has left a bar of beach nearly a mile in breadth. The town was incorporated in the 35th Henry VIII. (4th August), and is governed by a bailiff and an indefinite number of jurats and freemen, who hold an annual court of sessions and gaol delivery of unlimited jurisdiction: the style is, 'the bailiff, jurats, and commonalty of the town and port of Seaford in the county of Sussex.' The corporation was left untouched by the Act 5 & 6 William IV., c. 76. Seaford returned two members to parliament from 26th Edward III. to 21st Richard II.; it again sent two, 1 Edward IV., but ceased to elect till the right was restored after a resolution of the House of Commons, 16 Charles I. (1640), from which time it regularly returned two members till disfranchised by 2 William IV., c. 45. Seaford is within the diocese of Chichester. The church is in the decorated style of the thirteenth and fourteenth centuries. The living is a discharged vicarage, with that of Sutton annexed. The population in 1831 was 1098.

(Horsfield's *History of Sussex*, 4to., 1835; Cooper's *Parliamentary History of Sussex*. 4to., 1835; *Excursions in Sussex*, 8vo., 1832; *Burrell MSS.*; *Parliamentary Papers*, &c. &c.)

SEAFO'RTHIA, a genus of palms, indigenous to the eastern coast of tropical New Holland, and found also in the nearest Asiatic islands, named by Mr. Brown in honour of Francis, lord Seaforth, a patron of botany. The species are elegant in appearance, with pinnate fronds, the flowers polygamo-monœcious, sessile on a branched spadix, with several incomplete spathes, the male flowers above, and with two supporting each female flower. The calyx and coral are trifid. The male flowers with numerous stamens, and the rudiment of a pistil. The female flowers without any rudiments of stamens, ovary one-celled. Style very short. Stigmas three, spreading. Berry, fibrous, small, oval, one-seeded. Albumen ruminated. Embryo basilary. The genus is described by Labillardière under the name of Ptychosperma.

SEALS, PHO'CIDÆ, a family of marine carnivorous mammiferous quadrupeds.

The *Amphibious Carnivora* of Cuvier form a perfectly natural group. Their feet are so short and enveloped in the skin, that they are not available for any purpose on land, except a kind of creeping; and indeed terrestrial progression is effected by means of a sort of shuffling, jumping motion, in which the spine and the muscles of the body are principally employed, though the extremities are used in getting or rather climbing out of the water upon a rock or other projecting body. The webbed intervals of the toes, which last are completely enveloped in membranes that leave a considerable power of expansion to the extremity, serve as excellent oars; and these *amphibia* therefore pass the greatest part of their life in the sea, coming on shore only to bask and sleep in the sun, and suckle their young ones. Cuvier remarks that their elongated body, their very moveable spine, provided with muscles which put it in action with powerful flexibility, their narrow pelvis, their close thick fur, all unite to make them good swimmers, and the details of their anatomy confirm the impression produced by their external form. (*Règne Animal.*)

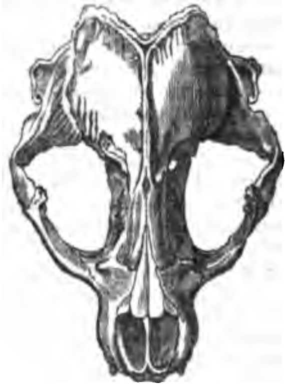
Two genera only, taking the term genus in its most comprehensive sense, belonging to this group, have as yet been discovered, the seals (*Phoca*, Linn.), and the walrus or morse (*Trichechus*, Linn.).

SEALS.

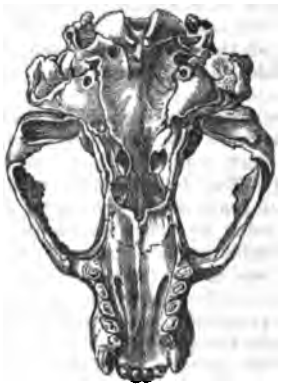
Organization.

Skeleton.—If the *skull* of the common seal (*Phoca vitulina*) be compared with that of an OTTER [vol. xvii., p. 64], a great resemblance will be found to exist between them in the shortness of the muzzle, the compression of the interorbital region (which is greater in the seal), the width and flatness of the *cranium*, and especially of the whole region of its base or under part, with the exception of the tympanic portions, which are large and convex. The orbit is very large, and the frontal bone does not complete it backwards by a postorbital apophysis, nor is it distinguished from the temporal bone, except by the convexity of the last-named portion of the skull. The temporal crests are but little marked, and the occipital crest is insensible. The frontal bone does not form in front that triangular enlargement, the traces of which are still to be found in the otter; but the postorbital apophysis of the zygomatic arch is very strongly marked, and the jugal and temporal bones equally contribute to form it. The intermaxillary bones terminate near the nasal, without reaching to them: their suture below traverses the palate opposite the canines, and even, in the middle, opposite to the first molars. The palatine bones do not pass in front of the last molar, but their posterior border is situated very far back: this posterior border of the nostrils is notched by a re-entering angle. The pterygoïd apophyses of the palatine bone run very far back, slipping over those of the sphenoïd, which are very early soldered to the body of the bone, and have a tubercle on their anterior border, at the point where they touch the edge of the posterior nostrils. The part of the palatine bone which is in the orbit is moderate, and so is the orbital wing of the sphenoïd: the temporal bone is small and narrow; the parietal bones are early soldered to the occipital. Cuvier could neither detect a lachrymal bone nor a lachrymal hole. The membranous space at the junction of the maxillary, the palatine, and the frontal bones is very large and placed very backward: this is the membrane that occupies the place of the lachrymal bone. The suborbital hole is large, but less than in the otter, and its canal is very short. The analogue of the spheno-palatine bone is very large. The round aperture (*foramen rotundum*) is confounded with the spheno-orbital slit. Cuvier could not detect any vidian canal except a hole within the anterior border of the pterygoïd apophysis of the sphenoïd bone. The oval hole (*foramen ovale*) is small. The carotid canal (*canalis caroticus*) is united to the jugular hole (*fossa jugalis*), and gives off a recurved canal lodged in the lower internal wall of the tympanic portion, and which opens at its internal and posterior surface. The jugular hole is very large, as well as the condyloïd and mastoïd *foramina*. Externally, the tympanic bone has a plaited depression, in the middle of which the *foramen mastoïdeum* is pierced. The cavity of the cranium is large, wide, and high; its front is very much flattened; the cribriform plate is moderate, not very full of holes, elevated, and not sunk in a canal, as in the dogs, the *crista galli* is very distinct; the anterior clinoïd apophyses are hardly elevated, and the optic region is very flat. The region of the *sella* is on a level with the lateral regions; the *ossa petrosa* within have no pointed crest, but the hollow of their upper part is very deep, and wider at the bottom than at the entrance. A space in the basilary region in front of the occipital aperture remains for a long time unossified. The bones of the cranium are thin, and there are no frontal sinuses.

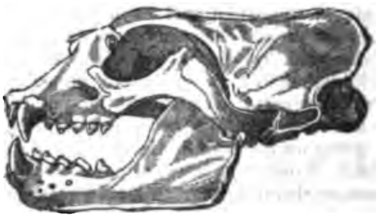
The skull of the Monk Seal (*Phoca Monachus*, Herm.) presents, independently of its size, some rather striking differences when compared with that of the *Phoca vitulina*. The zygomatic arches are more open and robust in the former; the anterior region of the frontal bone is convex; a very marked sagittal crest commences on the middle of the orbits and proceeds to join an occipital crest as strongly marked, which notches the back part of the cranium with a re-entering angle. There is also a notch at the posterior border of the palate, and the intermaxillary bones are very distinctly articulated to the nasal. On the anterior border of the orbit is a projecting point formed by the maxillary bone; and an obtuse longitudinal crest projects under the basilary region. In the upper jaw there are only four pointed molars, the external ones being very slightly the largest; below there are four, also smaller; altogether five molars on each side of each jaw, less trenchant, and with lateral points much less marked than in *Phoca vitulina*.



Skull of Phoca Monachus, seen from above.



Skull of Phoca Monachus, seen from below.



Skull of Phoca Monachus (profile).

The shoulder-blade of the seal (Cuvier takes the last-named species as principal type) widens very much from before backwards; its antespinal fossa is much wider than the other: the anterior border is very convex, and the anterior angle is lost in this convexity. The posterior edge is slightly concave, and the posterior angle rather sharp; the spine projects but little, and is terminated by a small depressed acromion which does not advance so far as the edge of the articular surface. The acromial tuberosity is almost obsolete. In *Phoca vitulina* and *Phoca mitrata*, the antespinal fossa and the shoulder-blade altogether are much smaller, and there can hardly be said to be an anterior angle. In *Otaria*, on the contrary, the antespinal fossa is still wider in proportion than in *Phoca monachus*; it is divided longitudinally by a ridge less elevated than the spine and without an acromion. The humerus is remarkable for its relative brevity, and for the great projection of its internal tuberosity and of its deltoïd crest; its lower pulley is hollowed by an obtuse gorge, and divided into two parts—one external and wider, convex in two directions, for the head of the radius; one internal and narrower, for the cubit. Both the *Phoca vitulina* and the *Phoca mitrata* have the internal condyle pierced with a hole for the cubital artery, but this hole is wanting in *Phoca monachus* and *Otaria*. The upper head of the radius is rounded and has a simple concavity, is short and very much compressed, and dilated vertically for its lower two-thirds.

The *ulna* or cubit is very much compressed on its upper part, where the olecranon is much higher than it is long, and gives off a pointed apophysis towards the lower part. Its sigmoïd facet in *Phoca Monachus* is short and slightly concave in the longitudinal direction, and wider and convex in the transverse direction; the radial facet is below it, but in *Phoca vitulina* and *Phoca mitrata* the sigmoïd facet is longer and has the radial on its side. The *carpus* consists of a single bone for articulation with the radius, and one again sees in *Otaria* traces of the suture which, in early age, divided it into the scaphoïd and semilunar bones. The cuneiform bone gives attachment to the metacarpal bone of the little finger. The trapezial and trapezoïd bones are placed in *Phoca Monachus* nearly one above the other, so that it seems as if there were three rows of little bones to the radial border of the carpus, but in *Otaria* they have the ordinary position. The *os magnum*, which deserves its name in the human subject, is in the seal reduced almost to nothing; and the cuneiform bone is also very small. The hand of the seal, being principally destined for swimming, is cut obliquely, so that the thumb forms its point and its most powerful edge; it has nevertheless only two phalanges as in ordinary, but its metacarpal bone and its two phalanges make it longer and stouter than the other fingers. The articulations of the phalanges are not well marked. The ungueal phalanges of the seals have one remarkable conformation, namely, that the point which is sheathed in the claw comes out, in some degree, from the upper surface of the bone, and the rest of the bone forms, as it were, two little wings. In the *Otariæ*, which have no claws before, the ungueal phalanx is simply depressed and obtuse.

The *pelvis* of the seals, and especially the *ossa ilii*, are reduced to very small dimensions. These last are very small: their anterior border, in *Phoca vitulina* and *Phoca mitrata*, curves outwards and is truncated nearly squarely; in *Phoca Monachus* it is less reflected and more rounded; in *Otaria* it is less wide than it is long, and consequently of an oblong form, and nearly without any recurvature. The edge of this small pelvis is narrower, sharper backwards, and more parallel with the spine in *Phocæ vitulina* and *mitrata* than in *Phoca Monachus*. Their oval holes (*foramina thyroïdea* or *ovalia*) are also more elongated and narrower, and the posterior part either of the *pubis* or the *ischium* more dilated. It can be said that there is an ischiatic notch, for the ischium closely approaches the sacrum and tail, but without being united to them.

Of all the bones of the seals, the *femur* is the most extraordinary for its shortness; it is hardly longer than it is wide: in the lower part especially it is flattened and dilated laterally, having a crest at its internal border and a tuberosity on its external border. Its rotular pulley is flat and nearly vertical. The articular surfaces for the tibia are wider than they are long.

The *tibia* is twice and a half as long as the femur, and is rather stout, especially above, where, in age, it becomes soldered with the *fibula*, but always remains distinct from it below. The interval between them is rather wide. The fibula itself is rather stout.

The *astragalus* of the seals is very extraordinary; for instead of being more or less hollow in the middle of its articular surface, it offers to the leg a convex pulley formed of two faces, which together form a projecting angle like a roof, and one of which responds to the tibia, and the other (the largest) to the fibula. This bone has not only an apophysis forward for the scaphoïd bone, but has another backward, terminated by a tuberosity and forming a sort of internal heel, so that if looked at, separate from the rest, it might be taken for the os calcis. Upon this tuberosity of the astragalus the long flexor of the toes passes in a groove.

The true *os calcis* is placed on the external side of the astragalus, and does not carry its tuberosity farther backwards than that of the astragalus.

The *scaphoïd*, the *cuboïd*, and the three *cuneiform* bones have nothing very remarkable, but there is a small supernumerary bone at the internal border between the scaphoïd and the great wedge-shaped bone.

The great and little toes are larger than they are long, and the middle toe is the shortest, so as to give the hind-foot a forked appearance; the great toe nevertheless has but two phalanges. All the articulations of these phalanges are as little developed as in the fore-feet.

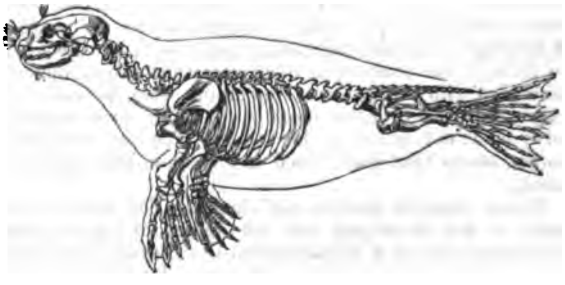
In *Phoca vitulina* and in *Otaria*, the ungueal phalanges terminate, as in the fore-feet of the former, in points furnished with small bony *alæ* at their base. In *Phoca Monachus*, which is without claws, they are, on the contrary, hollowed out into a small irregular fosset.

Cuvier remarks that what the seal loses of facility of motion on land, in consequence of the shortness of its limbs, is made up to it by the swimming power given by the mobility of the *spine*: all the vertebræ are distinct, very moveable upon each other, and furnished with very distant apophyses, which do not interfere with each other. There are 7 cervical, 15 dorsal, and 5 lumbar, 4 sacral and 12 caudal = 43; at least Cuvier found in all his skeletons the number given for the cervical, dorsal, and lumbar regions, and the number stated for the sacral and caudal regions in *Phoca Monachus*; and he adds that he has reason to believe that there would have been four sacral vertebræ in his other seals, if they had been adult, that he doubts whether *Otaria* has more than three, and that the tails consist generally of from ten to twelve vertebræ. The spinous processes are very much elevated in *Phoca Monachus*, moderate and more depressed (couchées) in *Otaria* and *Phoca vitulina*, and nearly effaced in *Phoca mitrata*.

The *ribs* are angular rather than flat, and slight when compared with those of the *Dugongs*. In the seals there are ten whose cartilages are attached immediately to the sternum, and nine only in *Otaria*. The ninth rib in the seals is attached to the side of the eighth bone of the sternum, and the tenth, as ordinarily, to the interval of the eighth and ninth: this last is cylindrical, longer than the others, and terminated by a cartilaginous dilatation. The others are depressed. In front of the first and last pairs of ribs there is in the seals a pointed cartilaginous prominence, which in *Otaria* is ossified, and makes part of the body with the first bone. (*Ossemens Fossiles.*)

In these *Pinnigrade Feræ* the whole form is adapted for progression in water. Instead of the lengthened anterior extremities and phalanges of the bats, framed to support a wing for their passage through the air, we have all the bones of those extremities in the seal short and compact, in order to support the finlike arm and deteriorated hand. We have the conical shape of the body and the extremely narrow pelvis, to favour that shape so as to produce the least resistance in passing through the water, with the short femur and posterior extremities directed backwards. In the skull we have the defective orbit observable in all the *Carnivora*, by which space is gained for the zygomatic arch and the highly developed temporal muscle. The broad development of the transverse processes of the atlas is here also remarkable, and the cervical vertebræ are framed for extensive motion. The spinous processes of the vertebræ have a posterior deflection so as to act in unison for the necessary aquatic progression. The clavicle is absent, as in the Feræ generally, but the scapula is broad. The number of carpal bones is the same as in the Lion, and the number of ribs may be stated at fifteen pairs.

Considerable differences exist, as we shall presently see, in the *crania* of the various *Phocidæ*, well justifying, with other discrepancies of structure, the division of the family into several genera.



Skeleton of Seal.

Organs of Digestion.—The stomach of the seal (*Phoca vitulina*) differs from the ordinary form: the œsophagus enters directly at the left extremity, so that there is no blind sac in the stomach. No. 534 A, in the Museum of the Royal College of Surgeons, exhibits the stomach of a seal (*Phoca vitulina*) injected, and its posterior parietes removed, to show the character of the internal surface, and the situation and form of the cardiac and pyloric orifices. Professor Owen, who made the preparation, observes that the circumstances most worthy of notice in this simple form of stomach are,—the absence of the *saccus cæcus* to the left of the cardiac orifice,—the large size of that orifice,—and the very small size of the pyloric aperture, which is further provided with a small valvular projection, in order to prevent more effectually the passage of undigested substances into the duodenum. The rugæ of the lining membrane are hardly perceptible in this specimen, and its vascularity appears to be slight, except at the pyloric end: this portion is acutely bent upon the cardiac. No. 697 is a portion of a small intestine, injected, of a seal (*Phoca vitulina*), showing the simple disposition of the mucous membrane, and the villi shorter and less numerous than in the Lion. No. 832 is the spleen of a seal, well injected by the veins, and showing that the injection is not confined in vessels, but in cells. The distended cells give a granular appearance to the whole external surface. No. 805 is a small portion of the liver of a seal minutely injected, apparently by the hepatic veins. (*Physiological Series*, Gallery.—*Cat.*, vol. i.)

Organs of Circulation and Respiration.—The seals have the power of opening or closing their nostrils at pleasure, and the interval between their respirations is very long. This may be observed in those which are kept in confinement; and the closing appears to be effected by sphincter-like muscles acting upon valvules which shut the aperture most effectually. Such a provision is absolutely necessary for animals that pass so much of their life in the water and take their food there: for ordinarily the seal eats in the sea, though it can eat upon land, as those who have seen the individual fed, which was lately exhibited in the gardens of the Zoological Society in the Regent's Park, well know. The breathing is not only slow, it is also irregular. After opening the nostrils and making a strong expiration, the animal inspires a large quantity of air, and closes the nostrils. In the intervals of this infrequent respiration, it is evident, from the free motion of the ribs and the general deportment of the animal, that the lungs receive their regular supply of air. In a state of nature a quarter of an hour and as much as twenty-five minutes have been known to elapse between their descent from the surface and their ascent thither for the purpose of obtaining a fresh supply; and in confinement they have been observed to remain asleep with the head under water for an hour at a time, and consequently without breathing during that period. To account for this power physiologists were of opinion that the *foramen ovale* remained unclosed in these animals, and that thus the sanguiferous circle was not interrupted during the time of their stay under water; but Cuvier and Lawrence found it closed in the seals dissected by them, and we must look to some other conformation for the endowment of this faculty. Thus Cuvier states that there is a great venous sinus in their liver, which assists them in their divings by rendering their respiration less dependent upon the circulation; and Mr. Houston has pointed out other venous reservoirs in the neighbouring parts. These provisions seem to be quite different from the great arterial plexus first pointed out by John Hunter in the WHALES; for in the seals the blood appears to be laid up not in a network of vessels, but, so to speak, in wide canals. The term *veineux* is certainly used by Cuvier, and a reservoir of arterial blood would, reasoning from analogy, be required for the purpose of keeping up healthy life during submersion; but there can be little or no doubt that these reservoirs are intimately connected with the power of remaining long beneath the water, though, as yet, the mode of operation is not satisfactorily made out, as it is in the Whales. The last-mentioned author states that their blood is very abundant and very black.

Brain, Nervous System, and Senses.—The brain of the Seals is well developed, and the degree of sagacity and attachment shown in domestication (for they are very easily tamed and taught to perform tricks) is evidence of superior intelligence. This has been long ago observed:—'Accipiunt disciplinam,' says Pliny (*Nat. Hist.*, ix. 13), 'voceque pariter et visu populum salutant, incondito fremitu: nomine vocati respondent.' M. F. Cuvier too saw one display much intelligence; he performed what he was ordered to do. When desired to raise himself erect on his hind-legs and to take a staff in his flippers, like a sentinel, he obeyed the word of command: he would lie down on his right side or on his left, according to order, and tumble head over heels when directed to do so. He gave a paw when requested, like a dog, and protruded his lips for a kiss. This animal appeared to be very fond of its master.

Sight.— Blumenbach remarks that it has long been known that the sclerotic coat in several mammals is, as in the human subject, not of equal strength throughout; but that its posterior part is much thicker than its anterior. It has also, he remarks, been conjectured that this structure might influence what are termed the internal changes of the eye, by which the form of the eyeball, and consequently the length of its axis and the relative situation of the lens are adjusted according to the proximity or distance of the object, or indeed with reference to any other relations. Blumenbach remarks that he flatters himself that he has ascertained the truth of this conjecture by discovering the admirable structure of this coat in warm-blooded animals, which have not only the power of seeing at various distances, but also in two media of such different density as air and water. In the eye of the Greenland Seal, where he first noticed the fact, the cornea was thin and yielding; the anterior segment of the sclerotica, or that which is immediately behind the latter membrane, was thick and firm; its middle circle thin and flexible; and lastly, the posterior portion very thick, almost cartilaginous. The whole eye-ball was surrounded with very strong muscles; and it may be easily understood how their action, modified according to circumstances, produces the requisite changes; how the axis of the eye is shortened when the animal sees in the air, by bringing the lens nearer to the back of the globe, in order to obviate the strong refraction which the rays of light undergo in passing from the thin medium of air into the thicker one of the eyes, and *vice versâ*. No. 1694, in *Mus. Coll. Chir.* (Gallery) exhibits the tunics of the eye of a seal (*Otaria*, Péron). The cornea and a longitudinal section of the sclerotica have been removed, showing the extended tapetum, which is not limited to the under side of the back part of the eye, as in those quadrupeds that move the upper eyelid principally, but is continued of nearly equal breadth all round the entrance of the optic nerve, a disposition which is in accordance with the uniform expansion of the aperture of the circular eyelid by which light is admitted to the eye in this tribe, and which is found associated with a similar form of eyelid in the cetaceans. On the part of the choroïd which is reflected from the cavity of the globe may be observed the broad ciliary zone, the large and deep ciliary processes, and the converging striæ of the uvea. The cut edge of the sclerotica shows the great thickness of its anterior and posterior parts, and the sudden thinness of that part which corresponds to the base of the ciliary zone. (*Cat.*, vol. iii.)

Hearing.—The auditory nerve in the seal is very large, and though the auricular aperture is closed by a mechanism somewhat similar to that which shuts the nostrils in order to protect the internal parts of the organ from the consequences of the great pressure of the water when the animal is in deeps, it is evident that seals hear very well even under water. Music, whether from the sounds of a fife or flute or violin, or even whistling, has been known to bring them to the surface of the sea near the performer, and to keep them there till the strain ceased, when they all disappeared. In *Mus. Coll. Chir.*, No. 1611, is a section of the integument of the head of an eared seal (*Otaria*, Péron), showing the small pointed external ear. The size, shape, and position of the concha are such as to present no impediment in swimming. The meatus auditorius is long and tortuous, and its parietes are supported by a series of oblong fibro-cartilages, which are moveably connected together. (*Cat.*, vol. iii.)

Taste.—That this sense is evidently well developed is shown by the keen relish of the seals for their food and the copious secretion of saliva secreted both in anticipation and during deglutition; and the structure of the tongue (which is notched or bifurcated at the tip) corroborates this evidence. No. 1508, in *Mus. Coll. Chir.*, is the tongue and larynx of a seal (*Phoca vitulina*), showing its bifid extremity fringed with delicate papillæ, its flattened upper surface, and the fossulate papillæ and rugæ at its base. The tonsillar cavities and glands are indicated by black bristles. (*Catalogue*, vol. iii.)

Smell.—Acute. A Greenlander always tries to approach a seal against the wind.

Touch.—Well developed. The whiskers are very sensible: placed on each side of the mouth, and at the corner of the eye; they communicate with nerves of considerable size, and the slightest impression produces sensation.

Generative and Urinary Organs, &c.—There is nothing particularly worthy of notice in the male organs, excepting that there is a bone in the intromittent organ. No. 2794, A, *Mus. Coll. Chir.*, exhibits the female organs with the rectum, urinary bladder, and umbilicus of a young *Phoca vitulina.* The ovaries are enclosed in the peritoneal capsules; the one on the right side is opened, and the ovary bisected. The capsules are situated close to the ends of the *cornua uteri.* The inner surface of these tubes is beset with thick soft eminences, chiefly in the longitudinal direction, and which fall into longitudinal ridges as they approach the corpus uteri. This part is very short, but the cornua are externally united some way before they open into the common cavity. The uterus opens into the vagina on a well-developed round os tincæ. The vagina is separated, at the immature period of the subject from which the preparation was taken, by a well-marked constriction from the urethro-sexual canal. The urethra opens into the beginning of this canal upon a mamillary prominence. The clitoris projects from a small semilunar depression, just within the verge of the anterior part of the urethro-sexual canal. The rectum terminates close to the opposite side of the vulva, and a common cloacal sphincter-muscle embraces both apertures. (*Cat.*, vol. iv.)

Sir Everard Home (*Phil. Trans.*, 1824) states that in the placenta of the seal, the trunks of the vessels of which the *funis* is composed are not twisted upon each other; and that at about a third part of their length from the placenta, they divide into branches, which freely anastomose together, and are connected to the placenta itself by membranous folds, between which the blood-vessels are conveyed to its substance, on which they ramify with great minuteness; a structure that will obviously give greater facility to the circulation.

The *mammæ* are ventral, and are said to be two only in some of the *Phocidæ*, and four in others. The teats are concealed in the skin, so as not to suffer from crawling or rather shuffling on land, and some see in the bifid termination of the tongue an adaptation for enabling the young to seize the nipple under comparatively difficult circumstances.

No. 1263 in *Mus. Coll. Chir.* shows the kidney of a fœtal seal with the capsule removed to show the numerous small renules of which it is composed. (*Cat.*, vol. ii.)

Genera.

Calocephalus. (F. Cuv.)

Generic Character.—Molars formed principally of one great point placed in the middle, one smaller situated below, and two, also smaller, placed posteriorly. Cranium convex on the sides, flattened on the top: slight rugosities, instead of occipital cristæ.

Example, *Calocephalus vitulinus.*

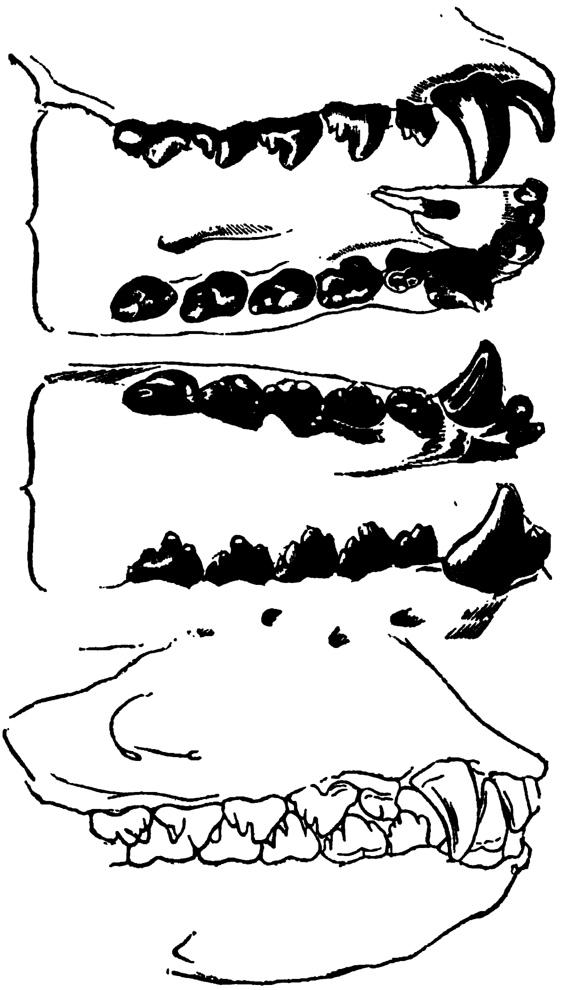
Description.—The ground-colour of the hair or skin, when the animal is alive and dry, is pale whitish grey with a very slight tinge of yellow; when just out of the water and wet, the ground-colour is ash; after death, and, as seen in museums, the ground-colour is pale yellowish grey, the oil having penetrated the skin, and rendered the hair of a more yellow hue. The body above is clouded and marbled with blackish grey. Space round the eyes and muzzle, sides of the body, all the lower parts and the feet, pale greyish, becoming nearly white beneath. There is some brown on the muzzle and upper part of the tail, whiskers moderate, undulated. Claws black and rather strong. Length from 3 to 5 feet.

This is the *Phoca vitulina* of Linnæus; *Le Veau Marin* and *Phoque Cummun* of the French; *Vecchio marino* of the Italians; *Lobo marino* of the Spanish; *Meerwolf* and *Meerhund* of the Germans; *Zee-hund* of the Dutch; *Sæl-hund* of the Danes; *Sial* of the Swedes; *Common Seal* and *Sea-calf* of the modern British; and *Moelrhon* of the autient British.

Geographical Distribution.—The northern seas generally. Coasts of England, France, &c. It is comparatively scarce on the southern coasts of Britain now, but still haunts the estuaries of the Tees.

Dental formula:—

Incisors $\frac{6}{4}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$; = 34.

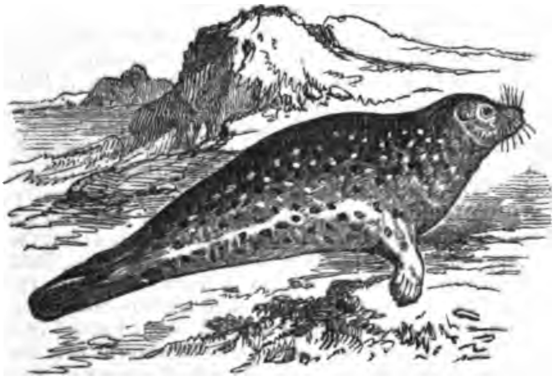


Teeth of Calocephalus.

Habits, &c.—Mr. Farrington, then of Dinas in Caernarvonshire, wrote thus to Pennant:—'The seals are natives of our coasts, and are found most frequently between Llyn in Caernarvonshire and the northern parts of Anglesey; they are seen often towards Carreg-y-Moelrhon, to the west of Bardsey, or Ynys Enlli, and the Skerries, commonly called in the British language Ynys-y-Moelrhoniad, or Seal Island. The Latin name of this amphibious animal is *Phoca;* the vulgar name is sea-calf, and on that account the male is called the bull, and the female the cow, but the Celtic appellative is *Moelrhon*, from the word *Moel*, bald, or without ears, and *Rhon*, a spear or lance. They are excellent swimmers and ready divers, and are very bold when in the sea, swimming carelessly enough about boats; their dens or lodgments are in hollow rocks or caverns near the sea, but out of the reach of the tide. In the summer they will come out of the water to bask or sleep in the sun, on the top of large stones or shivers of rocks, and that is the opportunity our countrymen take of shooting them; if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them as they scramble along, at the same time expressing their fears by piteous moans; but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth till they are killed.'

Dr. Borlase, in a letter dated October, 1763, gives the following account:—'The seals are seen in the greatest plenty on the shores of Cornwall in the months of May, June, and July. They are of different sizes; some as large as a cow, and from that downwards to a small calf. They feed on most sorts of fish which they can master, and are seen searching for their prey near the shore where the whistling fish, wraws, and polacks resort. They are very swift in their proper depth of water, dive like a shot, and in a trice rise at fifty yards distance, so that weaker fishes cannot avoid their tyranny except in shallow water. A person of the parish of Sennan saw not long since a seal in pursuit of a mullet (that strong and swift fish); the seal turned it to and fro in deep water as a greyhound does a hare; the mullet at last found it had no way to escape, but by running into shoal water; the seal pursued, and the former, to get more surely out of danger, threw itself on its side, by which means it darted into shoaler water than it could have swum in with the depth of its paunch and fins, and so escaped. The seal brings her young about the beginning of autumn; our fishermen have seen two sucking their dam at the same time, as she stood in the sea in a perpendicular position. Their head in swimming is always above water, more so than that of a dog. They sleep on rocks surrounded by the sea, or on the less accessible parts of cliffs left dry by the ebb of the tide, and if disturbed by anything, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving, seldom longer than a minute; then raise their heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little, and reclining them alternately in about a minute's time.'

The seal-hunters in Caithness assured Pennant that their growth is so sudden, that in nine tides from their birth they will become as active as their parents. On the coast of that county immense caverns open into the sea, and run some hundred yards beneath the land. These are the resort of seals in the breeding-time, where they remain till their young are old enough to go to sea, which is in about six or seven weeks. The first of these caves, says Pennant in continuation, is near the Ord, the last near Thrumster. Their entrance is so narrow as only to admit a boat: within they are spacious and lofty. Into the mouths of these caverns the seal-hunters enter about midnight in the month of October or the beginning of November, and having rowed up as far as they can, land. Each of them being provided with a bludgeon and properly stationed, they light their torches, and make a great noise. This brings down the seals from the recesses of the cavern in a confused body with fearful shrieks and cries. The men at first are obliged to give way for fear of being overborne, but when the first crowd is past, they kill as many as straggle behind, chiefly the young, by striking them on the nose. When the slaughter is over, they drag the seals to the boats. This is described as a most hazardous employment; for should their torches go out, or the wind blow hard from the sea during their continuance in the cave, their lives are lost.



Calocephalus vitulinus.

Utility to Man.—To the Greenlander the seal is all in all: it gives him light, food, and clothing. Mr. Farrington above quoted says of the Welsh seals, that they are taken for the sake of their skins, and for the oil their fat yields, 'the former,' says he, 'sell for four shillings, or four and sixpence a piece, which, when dressed, are very useful in covering trunks, making waistcoats, shot-pouches, and several other conveniences.' Pennant, speaking of the Caithness seals, states that those of six weeks old yield more oil than their emaciated dams; 'above eight gallons have been procured from a single whelp, which sells from sixpence to ninepence per gallon; the skins from sixpence to twelve-pence.' That the flesh was thought not unworthy of the tables of the great in this country is evident from the bill of fare at the 'intronazation' of George Nevell, the archbishop of York, to which we have often had occasion to allude; for we there find 'Porposes and seals 12:' and, indeed, Low, in his *Fauna Orcadensis*, states that at North Rolandsha they were taken for food, and that they made good hams. The numbers killed on the coast of Newfoundland in a good year amount to hundreds of thousands.

Calocephalus Grœnlandicus.

Description.—Hair drier, closer to the leather, and more free from wool than that of the other species; each hair flat and lustrous. A large brown oblique band, irregularly dentilated, commences nearly above the shoulders, where it joins that of the other side, and is carried along upon the sides and up to the hind legs, becoming by degrees brighter there and losing itself in the white of the belly: the posterior extremity approaches that of the other side at the root of the tail. Some small brown spots are scattered about both in the grey of the back and in the pale part of the band. The bands and spots become more and more black with age.

The *females* and the *young* have the skin of the same ground-colour, but without bands, and with unequal, well defined, angular, brown spots, thrown, as it were, at hazard on different places of the upper and lower part of the body.

Cuvier, whose description this is, says that the ground-colour of the *old male* is grey-white, and that he is five feet long. The face is entirely black.

According to Crantz, this species, when newly born, is quite white and woolly. In the first year it is cream-coloured; in the second, grey; in the third, painted with stripes; in the fourth, spotted; and in the fifth, wears its half-moons as the sign of its maturity.

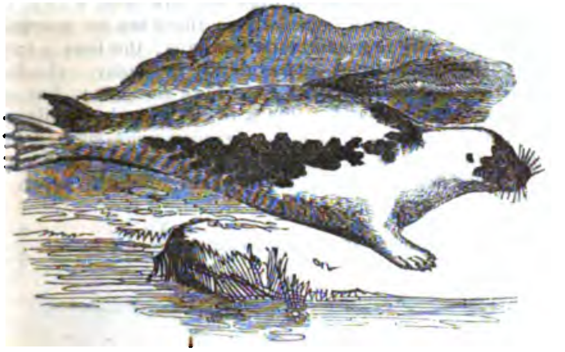
This is the *Phoca Grœnlandica* of Müller; *Phoca semilunaris* of Boddaert; *Phoca dorsata* of Pallas; *Phoque à croissant* of Buffon; *Harp-Seal* of Pennant and others; and *Attersoak* of Crantz.

Geographical Distribution.—The Frozen Ocean. Greenland, Newfoundland, Iceland, the White Sea, Kamtchatka. Rare in Britain.

Habits, Chase, &c.—According to Fabricius this species is very numerous in the deep bays and the mouths of the rivers in Greenland. They leave the coast twice a year: at first in March, returning in May; again in June, and re-appear in September. Their young, one, rarely two, at a birth, are brought forth in spring and are suckled on the ice far from shore. They avoid the fixed ice, but live and sleep in vast herds near the floating ice-islands, among which they are sometimes seen swimming in great numbers under the guidance of one who seems to act as leader and sentinel for the whole. Their food consists of all kinds of fish, shell-fish included, but they prefer the arctic salmon. When on the feed, and one comes to the surface to breathe, he lifts his head only above the water, and quickly dives without changing his place. These seals swim in many attitudes, on their back, on their sides, as well as in the ordinary position, and occasionally whirl themselves about, as if in sport. They sleep frequently on the water, and are considered incautious, especially on the ice.

They are said to have a great dread of the toothed whales. If a grampus perceive a seal of any species basking on floating ice, it is asserted that he does his best to upset the ice or beat the seal off with his fins, when the latter becomes an easy prey.

Crantz avers that this is a careless stupid seal, and that it is the only one which the Greenlander will venture to attack alone. He goes to hunt it in his kajak, which is in the form of a weaver's shuttle. When he perceives a seal, he endeavours to surprise it unawares with the wind and sun in his back, that he may be neither heard nor seen. He approaches it rapidly but silently till within four or six fathoms. He then takes hold of the oar in his left hand, and with his right throws the harpoon. If it is fixed, the Greenlander throws the attached buoy overboard on the same side that the seal dives, and he dives upon the instant. The struck victim often carries the buoy under water, but, wearied and wounded, it must at last come up to breathe. The Greenlander, who is on the watch, now attacks it with his long lance till the animal is exhausted, when he releases it from its sufferings with his short lance; and then, blows it up like a bladder that it may swim the easier after his kajak. This is a service of danger to the seal-hunter. If the line should be entangled, or if it should catch hold of the kajak, an oar, the hunter's hand, or his neck, as it sometimes does when the wind is high, or if the seal should make a sudden turn to the other side of the light boat, the kajak would be drawn under the waves. Then, unless the Greenlander has presence of mind and dexterity to disentangle himself, he is lost. Nor is this all the danger, for the dying seal may attack him; and if it be a female followed by young ones, she will not unfrequently turn on the pursuer, injure him, or bite a hole in his kajak and sink it.



Calocephalus Grœnlandicus (Male).

Calocephalus discolor, Marbled Seal.

Description.—Blackish-brown or deep grey marked with twisted and irregular lines of whitish-grey. Under parts lighter and the greyish lines broader and yellower. Sometimes the whitish-grey of the belly is more extensive, ascending to the sides. Size, similar to that of *Calocephalus vitulinus.*

Locality.—Coasts of France.

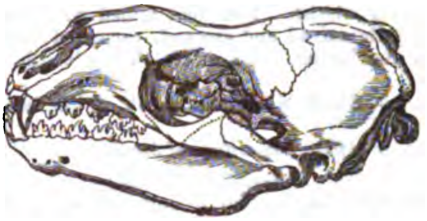
This was at first thought to be a variety of *Calocephalus vitulinus*, or one of that species exhibiting a modification of colouring from age or sex. Baron Cuvier observes that it does not appear to be a variety of the last-named species proceeding from age and sex only; but, he adds, that its cranium does not show a sensible variation from that of the common seal. Dr. Hamilton states that Professor Nilsson regards it as a distinct species, giving it the name of *Annellata.*

Calocephalus discolor.

M. F. Cuvier was for a long time acquainted with the individual on which he founded this species. It was young, and its size appeared to correspond with that of the common seal. It was captured on the coasts of France, and lived for several weeks in the Paris Managerie. M. F. Cuvier declares that he never knew any wild animal that was more easily tamed or attached itself more strongly. When it first came to the *Jardin des Plantes*, it did its best to escape, when M. F. Cuvier tried to touch it; but in a very few days its timidity vanished, and it rather courted his caresses than shunned them. In the same enclosure with it were two little dogs, and they amused themselves by mounting on the seal's back, barking, and even biting it: the seal however took it in good part, and seemed pleased with them, though it would sometimes give them slight blows with its paws, as if more to encourage their play than repress their liberties. When the little dogs made their way out of the enclosure, the seal tried to follow them, not deterred by the rough and stony ground. In cold weather they all three huddled kindly and warmly together. If the dogs snatched the fish from the seal's mouth when he was feeding, he bore it patiently: but he exhibited very different conduct to another seal, who shared his mess; for they generally had a fight over their meal, the combat ending, as usual, in the defeat of the weakest.

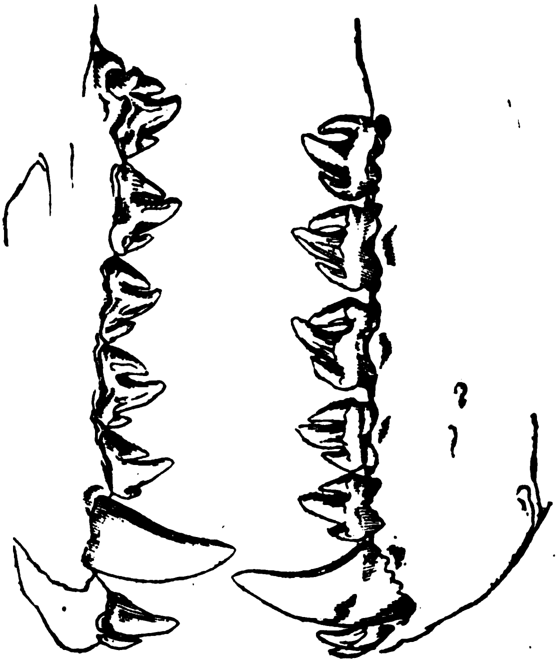
Stenorhynchus.

Generic Character.—Muzzle prominent; teeth composed of a long, median, rounded, cylindrical tubercle, curved backwards, and separated from two other tubercles which are rather smaller, one anterior and one posterior, by deep notches. Claws very small.



Skull of Stenorhynchus leptonyx.

Dental formula incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{6-6}$ $=32$



Teeth of Stenorhynchus.

Two species only of this genus appear to be known, namely, *Stenorhynchus leptonyx*, *Phoca leptonyx*, De Blainv., the *Small-nailed Seal*; and *Stenorhynchus Weddellii*, Less., *The Sea-Leopard.* Of the natural history of the first

Stenorhynchus leopardinus.

named species, which is a native of the Falkland Islands and New Georgia, little or nothing seems to be known; and the accounts of the latter, which we proceed to describe, are very meagre, though there is a very accurate description by Dr. Hamilton, in the 'Naturalist's Library' (*Mammalia*, vol. viii.). Professor Jamieson appears to have been the first who referred the species to F. Cuvier's genus *Stenorhynchus*.

Description.—Head small, no external ear. Hair soft, thin, and covering the whole of both extremities above and below, greyish above, yellowish below, the upper parts of the body spotted with whitish. Fore feet armed with sharp black claws, slightly curved and grooved, carinated beneath; no nails on the hinder extremities. Total length 9 feet 10 inches.

Locality.—South Shetlands, in 60° 37′ S. lat. (Weddell.)

This is the *Phoca leopardina* of Jamieson.

Pelagius. (F. Cuv.)

Generic Character.—Muzzle enlarged and elongated at its extremity; chanfrein very much arched; upper incisors notched transversely at their extremity; lower ones simple; molars thick and conical, having before and behind small rudimentary points only.

Dental formula: incisors $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}$ $=32$.

Example, *Pelagius Monachus; Phoca Monachus*, Herm.; *Phoque à ventre blanc* of the French; *The Monk Seal.*

The skull of this species is given above, p. 158.

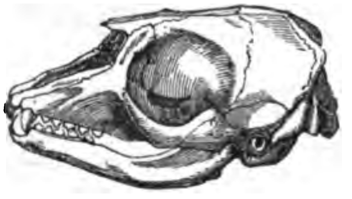
Description.—Hair short, smooth, and shining; dark-brown, mixed with grey on the neck and head, above; white below. No external ear. Whiskers smooth and strong. Length from 7 to 10 or 12 feet.

Locality.—The Adriatic; coasts of Sardinia.

This appears to be the *Phoca bicolor* of Shaw, and *Phoca leucogaster* of Péron. It is the species which afforded Buffon and M. F. Cuvier their interesting descriptions, and is supposed to be that whose skin was always carried everywhere (semper et ubique) by the emperor Augustus as a protection against lightning. (Suet., *Oct.*, 90.) The Romans generally seem to have considered seal-skins in the same light. Pliny, in his chapter headed 'Quæ non feriantur fulmine,' says, 'Ideo pavidi altiores specus tutissimos putant: aut tabernacula è pellibus belluarum, quas vitulos marinos appellant, quoniam hoc solum animal ex marinis non percutiat.' (*Hist. Nat.*, ii. 55.)

Stemmatopus. (F. Cuv.)

Generic Character.—Head surmounted by a peculiar organ (whence the name of the genus), the nature of which is not well known. Molars with simple roots, short and wide, and striated only on their crown; muzzle narrow and obtuse

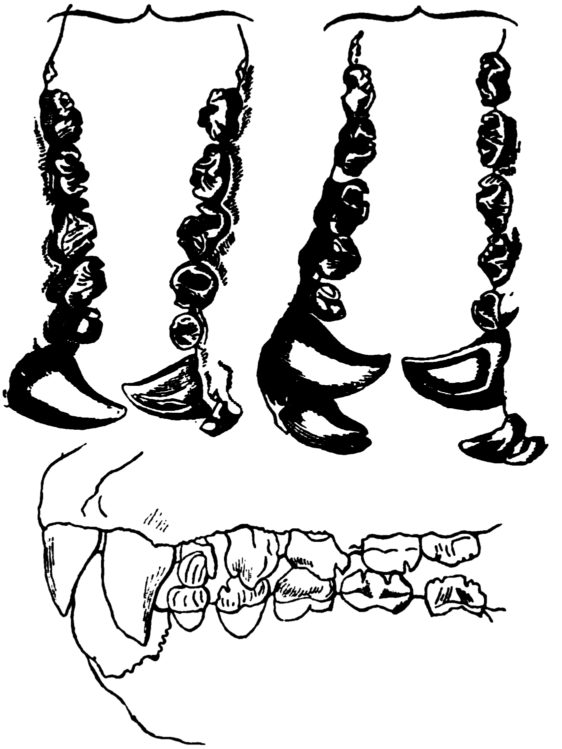


Skull of Stemmatopus.

Example, *Stemmatopus cristatus; Phoca cristata*, Gmel.; *Phoca leonina*, Fabr.

Description.—About two inches from the extremity of the upper jaw, on the superior surface, a cartilaginous crest rises, increasing rapidly in height as it passes backwards, about seven inches high at its posterior or vertical edge, which is separated into two planes by an intervening depression an inch deep. The superior edge is slightly convex, and the whole structure is an elongation of the septum of the nose, the true nostrils opening on each side of it by an oblong figure. This crest runs into the hood or sac-like appendage of the head. This hood is strongly muscular, with an aggregation of circular fibres round its external orifices, which are two, situated at the lower anterior part of the head. These probably served the purpose of sphincters, so as perfectly to close the sac. The length of the upper jaw beyond this crest is chiefly attributable to the intermaxillary bones, which are long and broad. The eye is very peculiar, perfectly spherical, with the nerve entering directly in the axis of the ball. The sclerotic or external covering is divided at its middle entirely round, its two edges being connected by an elastic membrane thickly covered by muscles. The posterior half is subdivided into four longitudinal segments, extending from its edge to within a quarter of an inch of the entrance of the optic nerve. This structure, by elongating the axis of vision, may enable the animal more clearly to discern distant objects, and also, by the reverse, to draw the eye deep within the socket during repose, especially as there are no moveable eyelids, but only the membrana nictitans; the lens is spherical; the iris is broad, and evidently muscular. (Ludlow and King, Dekay. *Annals of New York Lyceum.*) Fur soft and long, woolly beneath; black in old individuals, silvered beneath; white and grey in young specimens, spotted irregularly with brown. The dilatable sac which crowns the head covered with short brown hair. Length seven to eight feet.

Dental formula:—incisors $\frac{4}{2}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$ $= 30.$



Teeth of Stemmatopus.

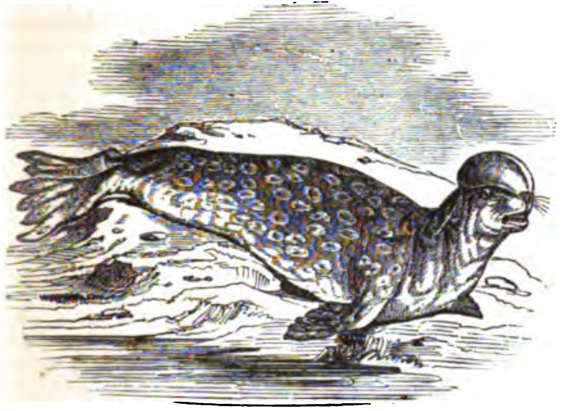
Locality.—The coast of Greenland, and of North America down to the United States.

Fabricius describes the crest to be a tuberculous body like an inflated bladder; keel shaped in the middle, covering the anterior part of the head, and so protecting the forehead, and confined to the males only; the females and young having it quite rudimentary, forming a slight projection on the part. In addition to the true nostrils, the male had spurious tuberculous ones, sometimes single, sometimes double, according to their age. The fishermen think that it is a reservoir for air when the animal is beneath the surface; and it has been suggested that the connection of the nostrils with this hood, its configuration, and internal structure, indicate its importance as ancillary to the sense of smelling; but it is confined, in anything like development, to the male, and perhaps is a mere distinguishing ornament, like the proboscis in the male elephant-seal.

Habits, &c.—This species, which especially haunts the open sea, is said to visit the land in April, May, and June chiefly. They are found for the most part on large ice-islands, where they sleep without precaution; and occur in great numbers in Davis's Straits, where they are stated to make two voyages a year, in September and March. They depart to bring forth their young, and return in June, very lean and exhausted. In July they proceed again to the north, where they appear to procure plenty of food, for they return in high condition in September. The crested seal is said to be polygamous, and to have its young on the ice.

Its bite is formidable, and its voice is stated to resemble the bark and whine of a dog. When surprised by the hunter, it weeps copiously. Among themselves they have fierce encounters, and inflict deep wounds in the conflicts with their claws and teeth.

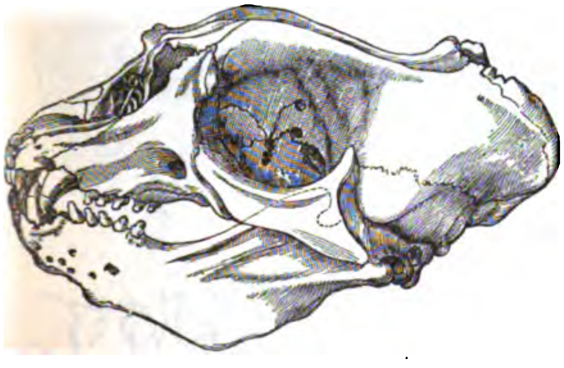
Utility to Man.—This is one of the species most generally pursued, and, together with the rough seal (*Calocephalus hispidus*), furnishes the greatest number of skins brought to Great Britain. The natives clothe their women with the skins of the young, and cover their boats and houses with the skins of the old ones. They head their hunting-spears with the teeth, and blow up the stomachs into fishing-buoys



Stemmatopus cristatus.

Macrorhinus. (F. Cuv.)

Generic Character.—Differing widely from that of the other seals. Incisor teeth curved like the canines, but smaller; canines strong and well developed; molars with simple roots, larger than the crowns, which last resemble a pedunculated mammilla.



Skull of Macrorhinus.

Example, *Macrorhinus proboscideus.*

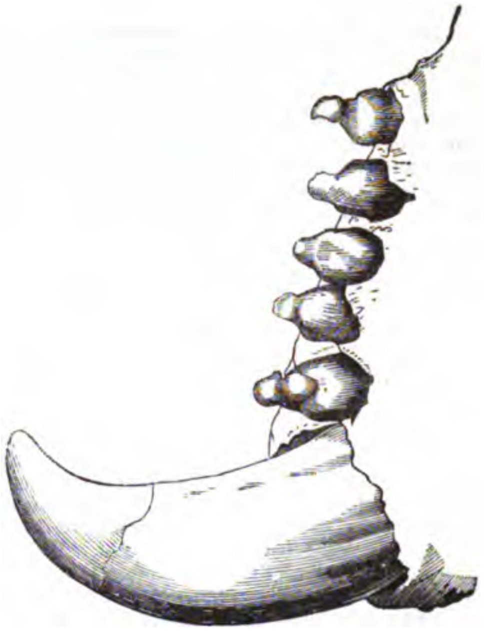
Description.—*Male.*—Nose prolonged into a kind of proboscis, which respires violently when the animal is excited, or is elongated in the form of a tube about a footlong, when it is preparing for attack and defence. When the animal is in a state of repose, the nostrils are shrunk, and the proboscis flaccid, giving the face a larger appearance. No external ears. Whiskers strong, coarse, long, and screw-twisted. Eyes very large and prominent. Swimming-paws very well developed, the nails very small. Hair short and close. Colour greyish or bluish-grey; rarely blackish-brown. Length from 20 to 30 feet. Girth from 15 to 18 feet.

Female.—No proboscis. Dark olive-brown above, shading away to a yellowish-bay upon the belly. Under part of the cheeks and chin approaching a full dark brown, and rather longer there than elsewhere. Hair lying in patches in all directions, giving a spotted appearance to the body, somewhat like watered silk. No nails on the hind toes. (Lizars.)

Geographical Distribution.—Southern hemisphere, both in the Atlantic and Southern Oceans, between 35° and 55° S. lat. Kerguelen's Land, South Georgia, Juan Fernandez, South Shetland, and the Falklands.

This is the *Phoque à trompe* of Péron; *Phoca proboscidea*, Desm.; *Elephant Marin* of the French; *Sea-Elephant* and *Elephant-Seal* of the English; *Bottle-Nose* of Pennant; *Miouroung* of the Australians.

Dental formula:—incisors $\frac{4}{2}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$ $= 30$.



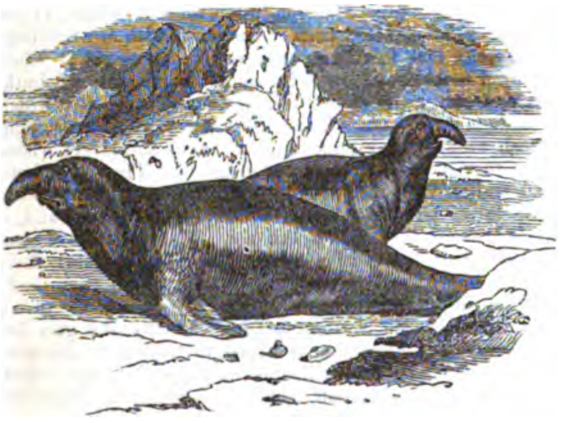
Teeth of Macrorhinus.

Habits, Food, &c.—This enormous animal, which, to use the expression of Mr. Lizars, 'compared with any ordinary seal three or four feet long, appears like an elephant when compared to a sheep,' owes its name to its size and bulk, most probably, quite as much as to the proboscis with which the male is furnished. These seals are fond of wallowing in fresh-water swamps, and resort to lakes and rivers, whose waters they drink with apparent pleasure. They sleep both afloat and on the sands of the shore: when a flock reposes in the latter situation, some of them keep watch, and, if alarmed, down they go to the sea. Those who have seen them in progress describe their gait as very singular, their motion being a kind of crawling, during which their body trembles like a great bag of jelly. At every 15 or 20 paces they halt, as if from fatigue. If any one gets before them, they stop, and if urged to motion by repeated blows, appear to suffer much, and the pupil of the eye, which is ordinarily bluish-green, becomes blood-red. Notwithstanding their unwieldiness however, they have been known to ascend low downs of 15 or 20 feet elevation, in order to reach small ponds of water. The cry of the female and the young is said to resemble the lowing of an ox, but the hoarse gurgling singular voice of the male, strengthened by the proboscis, is described as being audible to a great distance, and as wild and frightful. To obtain shelter from the heat of the sun, when lying on the shore by day, they cover themselves, by the aid of their paws, with the moist sand. They perform a sort of migration in order to avoid the extremes of heat and cold, leaving the south in the beginning of winter for more temperate climes, and retiring southward again in summer. About a month afterwards, the females bring forth one, very rarely two, according to Péron; generally two, according to Anson. The young weigh about 70lbs., and are between four and five feet long at their birth, the male, even at that early period, being larger than the female. At this time it is stated that the mothers are all collected near the shore, surrounded by the males, who prevent them from returning to sea till the period of suckling is past, during which operation the female lies on her side. The young grow so rapidly that they are said to double their original dimensions in eight days, and at the end of the third year they have attained a length of from 18 to 25 feet and upwards, when they increase principally in fatness. At this period the proboscis appears in the male. Six or seven weeks elapse before the young are conducted to sea, to familiarise them with which the whole troop abandon the shore, swimming about for three weeks or more, when they return to the coasts for the purpose of breeding.

The young males stay with the females till their proboscis is developed, announcing that they have arrived at maturity. During the breeding season, bloody battles take place among the males, in which they are often severely wounded, but rarely killed, while the females calmly wait the issue, and receive the conqueror. The period of gestation is said to be nine or ten months.

They are a harmless race, never attacking man unless in defence of themselves and their young. One of Anson's sailors lost his life by exasperating a mother in whose presence he skinned her young one. Their disposition is however gentle and affectionate; and a young one, petted by an English seaman, became so attached to his master from kind treatment for a few months, that it would come to his call, allow him to mount upon its back, and put his hands into its mouth. Their length of life is estimated at 25 or 30 years.

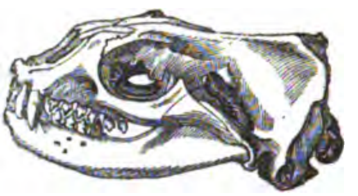
Utility to Man.—The tongues of Sea-Elephants, when salted, are considered savoury and wholesome, but the flesh is black, oily, and indigestible. The heart, though tough and hard, is sometimes eaten, but the liver appears to be unwholesome. The skin, though not valued for its fur, is extensively used for carriage and horse harness, on account of its thickness and strength. But the oil is the great object for which the animal is hunted. It is clear, inodorous, and is said never to become rancid, nor to give out any disagreeable savour in cooking. It burns slowly, but, according to general report, produces neither smoke nor smell. The quantity afforded by a large individual amounts to 1400 or 1500 lbs., for the blubber is as thick as it is in many of the whales, often more than a foot. The blubber is prepared like that of whales, excepting that in the case of the seals the operation is performed on shore. It is employed in England chiefly in the manufacture of cloth; and is also used to a considerable extent in China.


Elephant Seal. Males.

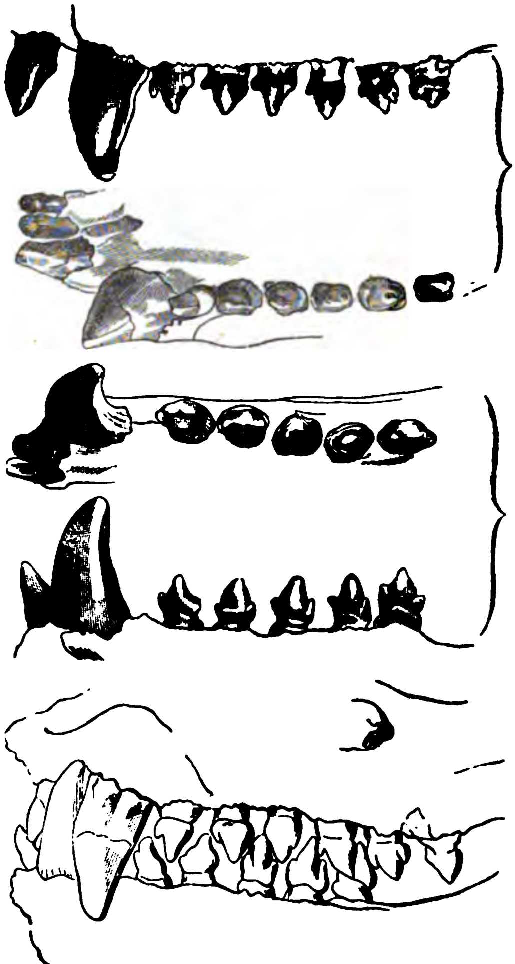
Elephant Seal. Female.

Arctocepalus. (F. Cuv.)

Generic Character.—Head with a narrow retracted muzzle. The four intermediate incisors of the upper jaw separated in their middle by a deep notch; the lower incisors notched from before backwards. Molars with a single root, less thick than the crown, which consists of a tubercle, furnished at its base before and behind with a smaller tubercle. External ears.


Skull of Arctocephalus.

Dental formula·—Incisors $\frac{6}{4}$; canines $\frac{1-1}{1-1}$; molars $\frac{6-6}{5-5}$ = 36.


Teeth of Arctocephalus.

Example, *Arctocephalus ursinus.*

Description.—Size of a large bear; girth at the shoulder five feet, near the tail 20 inches. Fur brown, acquiring a greyish tint at the point of the hairs in old age. External ears 1 inch 8 lines long, conical, erect, covered with short hair, and opening by an oblong slit, which is shut in the water. Nails very slender and minute. Length 7½ feet.

Geographical Distribution.—Islands on the north-west point of America. Kamtchatka. The Kurile Islands.

This is the *Otaria ursina* of Desmarest; *Phoca ursina* of Linnæus; *Ursus marinus*, *Sea Bear*, of Steller; *L'Ours Marin* of Buffon; the *Ursine Seal* of some authors.

Habits, &c.—When these migratory seals appear off Kamtchatka and the Kuriles early in the spring, they are in high condition, and the females are pregnant. They remain on or about the shore for two months, during which the females bring forth. They are polygamous, and live in families, every male being surrounded by a crowd of females (from 50 to 80), whom he guards with the greatest jealousy. These families, each, including the young, amounting to

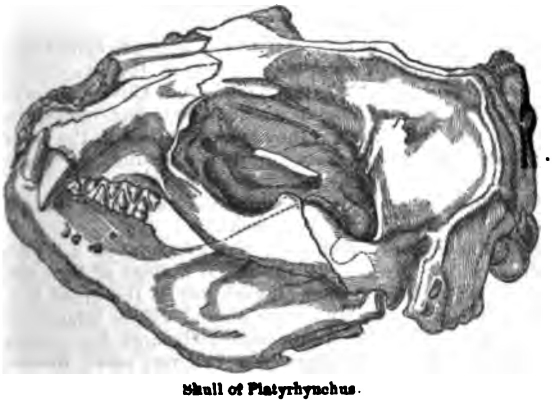
100 or 12), live separate, though they crowd the shore, and that to such an extent on the islands off the north-west point of America, that it is said they oblige the traveller to quit it and scale the neighbouring rocks. Both male and female are very affectionate to their young, and fierce in their defence; but the males are often tyranically cruel to the females, which are very submissive. If one family encroaches on the station of another, a general fight is the consequence. They will not, in fact they dare not, leave their stations, for if they did they must encroach on that of some other family. Steller relates that he had been beset by these seals for six hours together, and was at last obliged to climb a precipice to get rid of the infuriated animals, at the imminent peril of his life. They have their war-notes and several other intonations. When amusing themselves on the shore, they low like a cow, chirp like a cricket after a victory, and, when they are wounded, cry like a whelp. They swim very swiftly, and are as great a terror to other seals as the Sea-Lion is to them.

Utility to Man.—The skin, which is very thick, is covered with hair, like that of the common seal, but a great deal longer, standing erect, and very thick. There is a very soft brownish-red wool close to the skin. In the old males there is hair two inches long round the neck, erect and stiff, so that when the animal is dry, it looks larger than when it is in the water. The black hairs are tipped with white in the aged. The females are some ash-coloured, some partly ash-coloured and partly brown. The skins of the young are highly prized for clothing; and Steller speaks of a garment which he had made for himself from one, when he was in Behring's Island, with grateful remembrance.

Arctocephalus ursinus.

Platyrhynchus. (F. Cuv.)

Generic Character.—Incisors pointed; molars with no secondary point, except at their anterior part. Cerebral region very much elevated, and the muzzle much more enlarged than in *Arctocephalus.* The complete number of teeth the same as in that genus. External ears.



Skull of Platyrhynchus.

If a number of species have been confounded under the name of Sea Bear, there have been several honoured with the name of Sea Lions, and, among them, the Elephant Seal above noticed. M. Lesson enumerates three species of *Platyrhynchus:*—1, *Platyrhynchus leoninus* (*Otaria jubata,* Desm., the Sea Lion of Steller and Pernetty); 2, *Platyrhynchus molossinus,* Less. (*Otaria molassina* of the zoology of La Coquille. Less., and Garnot); and 3, *Platyrhynchus Uraniæ* (*Otarie Guérin* of Quoy and Gaimard) To the first of these he assigns the antarctic islands, such as the Falklands and Tierra del Fuego, adding that Steller found it in the northern hemisphere at the Kuriles; for the second and third the Falklands are the only locality given (*Manuel.*)

Dr. Hamilton also records three species:—1, *The Sea Lion of Steller* (*Phoca jubata,* Gmel.); 2, *the Sea Lion of Forster* (*Leo marinus,* Buff.); and 3, *the Sea Lion of Pernetty* (*Platyrhynchus leoninus* of F. Cuvier). To the first of these he assigns the eastern shores of Kamtchatka and the Kurile Islands and as far as Matsmai, adding that they abound in Behring's Island, and that Steller also saw them in abundance on the coasts of America in July; he assigns the southern hemisphere to the second, and the Falkland Islands to the third. We select as our example *the Sea Lion of Forster.*

Description.—Skin thick. Hair reddish, yellowish, or dark brown; no fur or short woolly hair under the long hair. A mane on the neck of the male reaching to the shoulders. Head small in proportion to the body, which is everywhere equally thick-looking, as Buffon describes it, like a great cylinder, more suited for rolling than walking. Ears conical, about 6 or 7 lines long, cartilage firm and stiff, but yet rather curled at the margin. Upper lip overhanging the lower, both furnished with long, coarse, black whiskers, which become white with age. Length from 10 to 14 feet; the females shorter and more slender.

Habits, &c.—Captain Cook states that it is not at all perilous to go among these animals, for they either fled or stood still. The only danger was in going between them and the sea; for if they took fright at anything, they would come down in such numbers, that the person in the way would be run over. When he and his party came suddenly upon them, or waked them out of their sleep, they would raise up their heads, snort and snarl, and look fierce, as if they meant to devour the intruder; but when the men advanced, the sea lions always ran away. He states that the male is surrounded by from twenty to thirty females, and that he is very attentive to keep them all to himself, beating off every male that attempts to come to his flock. Others, again, had a less number, some no more than one or two; and here and there was seen one lying growling in a retired place, suffering neither males nor females to come near him. These he judged to be old and superannuated.

Forster relates that the rocks along the shore in New Year's Harbour were covered with multitudes of these Sea Lions. 'We put into a little cove under the shelter of some rocks,' says he, 'and fired at some of these fierce animals, most of which immediately threw themselves into the sea. Some of the most unwieldy however kept their ground, and were killed by our bullets. The noise which all the animals of this kind made was various, and sometimes stunned our ears. The old males snort and roar like mad bulls or lions, the females bleat exactly like calves, and the young cubs like lambs. They live together in numerous herds. The oldest and fattest males lie apart, each having chosen a large rock to which none of the rest dare approach without engaging in furious combat.' Forster goes on to relate that they were often seen to seize each other with an indescribable degree of rage, and that many of them had deep gashes on their backs, which they had received in the wars. The younger active Sea Lions, with all the females and the cubs, lay together. They commonly waited the approach of the people; but as soon as some of the herd were killed, the rest precipitately fled, some females carrying off a cub in their mouths, while many were so terrified that they left the young behind. When undisturbed, they were often observed caressing each other in the most tender manner, and their snouts often met together as if they were kissing. The same author states that they come on shore on those uninhabited spots to breed, and that they do not feed during their stay on land, which sometimes lasts for several weeks; they then grow lean, and swallow a considerable quantity of stones to distend the stomach. He adds that the stomachs of many of them were found entirely empty, and those of others were filled with ten or twelve round heavy stones, each of the size of two fists.

Sea Lion of Forster.

Halichœrus. (Nilsson).

Generic Character.—Head very flat; muzzle very deep. Molar teeth of the upper jaw consisting of a simple point without tubercles: those of the lower jaw with a rudimentary tubercle before and behind the principal point. The number of incisors given in Mr. Bell's vignette (*British Quadrupeds*) is six in the upper jaw, and the same number apparently belong to the lower: canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$ = 36. No external ear.[*]

Example, *Halichœrus griseus.*

Description.—Coat white and silky, the hair two inches long, passing into a greyish lead-colour on the back. Wool under the hair short and white. Mr. Ball states that the very young females seem to be generally of a dull yellowish white, with rather long hair, which falls off in about a month or six weeks, and gives place to a shorter and more shining coat, variously blotched with blackish grey: this, he adds, is brighter at first, and gradually grows more dull, and the blotching more indistinct on the upper parts, as the animal advances in age; whilst on the breast and lower parts the blotches in some specimens show almost as distinctly as the spots on a leopard. From a peculiarity in the hair of the adult, which, Mr. Ball remarks, is considerably recurved, and as if its upper surface had been scraped with a sharp knife, this seal, when dry, and with its head turned towards the spectator, appears to be of a uniform silvery grey, whilst, viewed in the opposite direction, it appears altogether of a sooty brown colour; the spots or blotches being only visible on a side view. The only male specimen possessed by Mr. Ball died young· it had long yellowish hair, slightly tinged with brownish-black on the back, and was black on the muzzle, chin, and cheeks, extending round the eyes, but not to the upper part of the nose; the palms of the fore paws were black. Length from 7 to 8 feet.

Geographical Distribution.—Seas of the North of Europe, Baltic, coasts of Pomerania, south coast of Ireland.

This is the *Phoca Gryphus* of Fabricius; *Phoca barbata* of Fleming; and *Long-bodied Seal* of Parsons.

Habits, &c.—Professor Nilsson states that in the Baltic it is solitary; but Mr. Ball says that on the south coast of Ireland (Cork and Waterford) he has often seen this seal in small parties, and he learned from the fishermen that they had noticed as many as thirteen congregated on a rock. The same author has heard them in a cave baying like large dogs.

The comparatively small cerebral development and great expanse of the bones of the face, compared with that of the cranium, indicate a form inclining from the true Seals to the Walrus. All that is known of the habits of the Grey Seal tends to the conclusion that it is less susceptible of domestication and less intelligent than the other Seals.

FOSSIL SEALS.

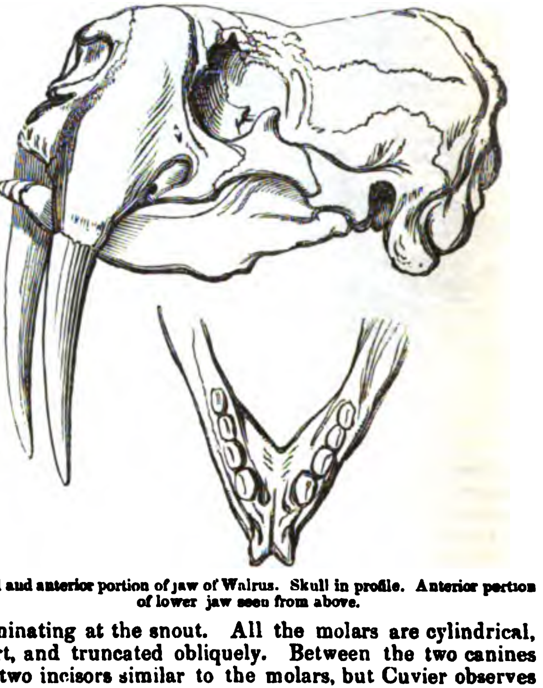
Cuvier, after adverting to the notices of so-called fossil bones of Seals from the caves of Franconia, Gailenreuth, &c., and the figures of the supposed remains of Sea Bears and Sea Lions published by Buffon, truly states that nothing is more rare than the fossil bones of Seals and Lamantins. No fossil remains of the Walrus, he observes, had ever been found when he wrote, and he had only been able to obtain well authenticated remains of Seals from the environs of Angers. These remains consisted of the upper part of a humerus and the lower part of a similar bone, but smaller. The first of these, in his opinion, belonged to a Seal once and a half larger than *Phoca vitulina*, and the other to a Seal rather smaller than that species.

Dr. Buckland, in his instructive plate 1 (*Bridgewater Treatise*), figures a Seal (Phoca) and a Walrus, indicating that their remains have been found in the tertiary strata (Pliocene period of Lyell). In the Fitzwilliam Museum at Cambridge is a portion of the jaw and two or three molar teeth of a large extinct species of Seal from the tertiary of Malta. This was Woodward's fossil, and was figured many years ago by Scilla.[*] In the tertiary of Suffolk, in which the remains of the monkey and the bat have also been discovered, the distal extremity of the femur of a Seal has been found.

WALRUS.

Organization.

Skeleton.—Though the general structure of the skeleton in the Walrus resembles that of the Seals, there is a striking difference in the cranium and the teeth. In the adult lower jaw there are neither incisors nor canines, and the lower jaw itself is compressed anteriorly so as to fit between the two enormous tusks (canines) of the upper jaw, which are sometimes two feet long and proportionably thick, and directed downwards. The great alveoli, or sockets for containing these formidable teeth, produce the characteristic form of the skull of the Walrus, and make the anterior part of the upper jaw present an immense convex muzzle, the nostrils having an upward direction, and not terminating at the snout. All the molars are cylindrical, short, and truncated obliquely. Between the two canines are two incisors similar to the molars, but Cuvier observes that the greater number of authors have not considered them as incisors, although they are implanted in the intermaxillary bone; and between them, besides, in young individuals, are two small and pointed teeth.



Skull and anterior portion of jaw of Walrus. Skull in profile. Anterior portion of lower jaw seen from above.

The stomach and the intestines are nearly the same as those of the Seals. (*Règne Animal.*)

Mr. MacGillivray found in the cranium of a young Walrus, in the Museum of the Royal College of Surgeons in Edinburgh, three incisors on each side of the upper jaw; the first or inner very small, the second a little larger, and the third or outer both disproportionately large, being equal to the largest molars. There were two very small incisors on each side in the lower jaw. The incisors are obliterated in adults.

There is a bone in the intromittent organ, and Nos. 1264 and 1265, *Mus. Coll. Chir.*, exhibit the kidneys of a fœtal Walrus, and the left kidney of a young Walrus injected, and the capsule removed to show its component renules (upwards of 400 in number). Their complete separation from each other is shown by the circumstance that where the artery in any of them has been obstructed, they remain uninjected, in consequence of the absence of anostomoses between their vessels and those of contiguous renules. (*Catalogue*, vol. ii.)

---

[*] N.B. When it is stated in this article that any of the *Phocidæ* have no external ear, the sense intended to be conveyed is that they have a mere auditory aperture.

[*] 'De Corporibus Marinis Lapidescentibus quæ defossa reperiuntur,' &c.; 4to., Rom., 1747, pl. xii., fig. 1.

There is a general resemblance between the organization of the walrus and that of the seal; but the development of the brain is not so great in the former as it is in the latter, and the Walrus appears not to be gifted with so high a degree of intelligence as the Seal, though it is far from stupid.

Sir Everard Home (*Phil. Trans.*, 1824) pointed out some 'curious facts' in the anatomy of the Walrus and Seal, derived from the examination of specimens brought to this country by the Arctic expeditions then lately terminated. The results of his examination were: 1, That the hinder flipper or foot of the Walrus possesses a structure perfectly analogous to, or rather identical with, that of the apparatus by means of which the Fly supports itself in a perpendicular or dependent position. 2, That the duodenum of the Walrus does not receive the bile through a common duct formed by the union of those of the liver and gallbladder; but that this latter organ, which lies behind the duodenum in the form of a large cylindrical hard body, receives the bile laterally by a single duct from the liver, and pours it immediately into the intestine by means of an opening projecting in the manner of the os tincæ. This structure differs from any that has hitherto been observed: the food with which the stomach was found filled consisted wholly of the *Fucus digitatus*.*

With regard to the first of these alleged facts, which has been repeated by good authorities and widely disseminated, it becomes necessary to state that, upon a careful examination of the flippers, no such structure appears to exist. Those who had the best opportunities of observing the animal alive and when recently killed, never detected it; and a letter from the late lamented Captain Lyon, R.N., is now before us, with drawings explanatory of the real state of the Walrus's hind flipper when closed, and of the specimen whose accidental distortion, by being pickled in a small cask, led Sir Everard astray.

Generic Character.—Head well proportioned, round, obtuse, eyes small and brilliant, upper lip remarkably thick, covered with pellucid whiskers or bristles as large as a straw. Two very large canines (in the upper jaw only) directed downwards. Nostrils large, rounded, placed on the upper part of the snout. No external ears.

In adults, according to Mr. MacGillivray, from whom the formula is taken, the incisors are obliterated, except the lateral pair of the upper jaw; the fifth grinder also disappears, and sometimes the fourth.

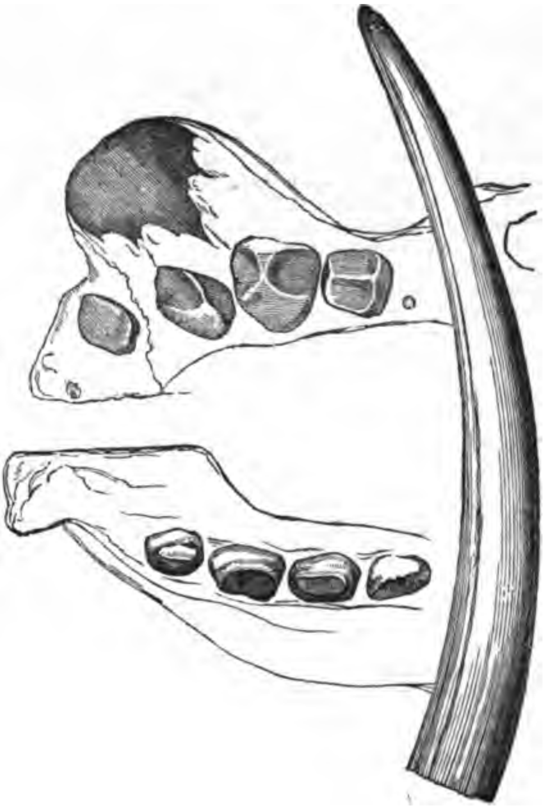
Example, *Trichechus Rosmarus.*

Description.—Neck short, body very bulky, broadest round the chest, and diminishing towards the very short tail. Hair close; colour, according to Fabricius, varying with age, the young being black, then becoming brown, and gradually paler and paler, till the animal in old age becomes white. Limbs very short. Inside of the flippers defended by a horny kind of coat, or callous, produced, in all probability, by climbing over ice and rocks. Length from 10 to 15 or even 20 feet in the case of the largest bulls. Girth 8 or 10 feet, and upwards. Length of the tusks when cut out of the skull generally from 15 to 20 inches, sometimes 30, and their weight from 5 to 10 lbs.

Geographical Distribution.—The Icy Sea and Northern Ocean, Spitzbergen, Nova Zembla, Hudson's Bay, Gulf of St. Lawrence, &c. Rare on the north coasts of Britain.

This is the *Walrus*, *Sea-Horse*, *Morse*, and *Sea-Cow* of the British; *Morse*, *Vache Marine*, *Cheval Marin*, and *Bête à la grande dent* of the French. It is the *Horse-Whale* or *Whale-Horse* (*Hval-ros*) of Octher the Norwegian, who, about the year 890, made his report of it to Alfred, as having in its teeth bones of great price and excellency, some of which he brought to the king on his return from his voyage beyond Norway; also *Rosmar* of the Norwegians; *Morss* or *Morsh* of the Russians; and *Morsk* of the Laplanders.

Dental formula:—incisors $\frac{6}{4}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5}$ = 34.



Molars and Tusk of Walrus. (F. Cuv.)

Food, Habits, &c.—We have above seen that the contents of the stomach of a Walrus noticed by Sir E. Home consisted entirely of the *Fucus digitatus*, and Schreber affirms that it is not at all carnivorous. Fabricius and Crantz are of opinion that Walruses feed on shell fish and marine vegetables which adhere to the bottom of the sea, and that one of the uses of their tusks is to root up their food from the spot to which it is fixed. Buffon states that they live on fish, like the seals, especially on herrings and the smaller fishes. Mr. Scoresby found in their stomachs shrimps, a kind of crawfish, and the remains of young seals. Upon the whole of this evidence, the conclusion would be that the Walrus is omnivorous. The molar teeth certainly appear to be more adapted for bruising the 'long branches of sea-weeds, *Fucus digitatus*,' which Mr. Fisher informed Sir Everard filled the stomach of the animal that he examined, than for dividing fish or flesh; and the probability is, that though the Walrus does not abstain entirely from carnivorous habits, marine plants form the bulk of its food. The tusks must be a great help as ice-hooks or grapplings in assisting the animal to climb upon the ice from the sea. Though they swim so rapidly, that, according to some authorities, it is as difficult to follow them with boats in rowing, as the whale itself, their progress on land is awkward and tedious. Martens compares their gait to a kind of jerking, probably like that of the seals, but he says they can make considerable springs, and can advance pretty rapidly with the help of their teeth.

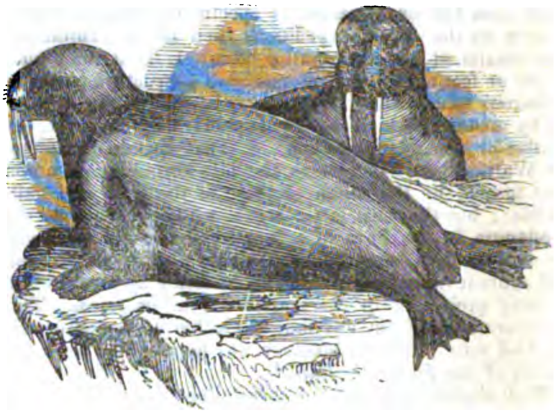
They appear to be monogamous, and consequently are exempt from the terrible combats which are the result of the jealousies of the polygamous seals. The female is said to bring forth her young, one only at a birth, either on shore or on the ice. When born the young is about the size of a year-old pig. Till taught by fatal experience the Walrus seems to be a fearless animal, and to be undisturbed by the face of man; but he soon learns his lesson of distrust. Still the animal is not incautious, for Captain Cook never found the whole herd asleep, some being always on the watch. These on the approach of the boat would rouse those next to them, and the alarm being thus gradually communicated, the whole herd would presently awake. In the North Pacific Ocean he got entangled with the edge of the ice, on which lay innumerable sea-horses. They were lying in herds of hundreds, huddling one over the other like swine, and were roaring and braying very loud; and indeed in the night or in foggy weather they gave the voyagers notice of the vicinity of the ice before it could be seen. They were seldom in a hurry to get away till after they had been once fired at, when they would tumble over each other into the sea in the utmost confusion. Vast numbers of them would follow the boats and come close up to them, but the flash in the pan of a musket sent them down instantly. Before they were put upon their guard by persecution, as many as 300 or 400 were killed at a time. That they are not without courage or sympathy for their wounded companions there is ample testimony. When Martens wounded one, others speedily surrounded the boat, and whilst some endeavoured to pierce it with their tusks, others raised themselves out of the water and endeavoured to board her. Captain Phipps, afterwards Lord Mulgrave, relates that when near a low flat island opposite Waygat's Straits, in 1773, two of the officers went in a boat in pursuit of Sea-horses. They fired at one and wounded it. The animal was alone when it was wounded, but diving into the sea it brought back a number of others. They made a united attack upon the boat, wrested an oar from one of the men, and were with difficulty prevented from staving or oversetting her; but a boat from the Carcass joining that from the Racehorse, they dispersed. Captain Phipps adds that one of that ship's boats had before been attacked in the same manner off Moffen Island. Sir Edward Parry encountered about 200 in Fox's Channel, lying piled as usual over each other on the loose drift-ice. A boat's crew from both the Fury and Hecla went to attack them, but they made a desperate resistance, some with their cubs mounted on their backs, and one of them tore the planks of a boat in two or three places. Their parental affection is great. The boats from the Resolution and Discovery were hoisted out to attack sea-horses in Behring's Straits. Captain Cook states that on the approach of the boats to the ice all the Walruses took their cubs under their fins, and endeavoured to escape with them into the sea. Several whose young were killed and wounded, and were left floating on the surface, rose again and carried them down, sometimes just as the people were going to take them into the boat; and they might be traced bearing them to a great distance through the water, which was coloured with their blood. They were afterwards observed bringing them up at times above the surface, as if for air, and again diving under it with a dreadful bellowing. The female in particular whose young had been destroyed and taken into the boat, became so enraged that she attacked the cutter and struck her tusks through the bottom of it.

---

* See post, p. 170.

That the Walrus is capable of a degree of domestication, in youth at least, appears from the testimony published by John de Laet,* who gives no bad wood-cut of a full-grown animal and a young one, and relates that 'Ælius Everhardus Vorstius, M.D. et Professor,' saw a cub ten weeks old, according to those who had brought it from Nova Zembla, about the size of a mastiff (canis Britannici majoris), which followed its master (magno nisu et grunnitu) for its food, consisting of a mash of oatmeal or millet (pulmentarium ex avena miliove), which it ate slowly, et suctu magis quam deglutiendo. The tusks had not yet projected from the mouth, but tubercles were perceived in the upper lip. There were two heads of adults, and those who showed them said that with the tusks they ascended rocks and suspended themselves from them, and that their food consisted of the long and great leaves of some plant growing from the bottom of the sea. 'Vidi ibidem,' adds Vorstius, 'penem ejusdem animalis osseum, rotundum, cubitum et amplius longum, crassum, ponderosum, ac solidum, in fine prope glandem longe crassiorem ac rotundiorem. Hujus pulvere ad calculum pellendum Muscovitæ utuntur.'

Utility to Man.—The flesh is highly valued by the inhabitants of the Arctic regions, nor does it seem to have come amiss to our northern voyagers. Cook, after stating that he procured some, being in want of fresh provision, observes that till then they had thought them Sea-cows (Manatus probably), so that they were not a little disappointed, especially some of the seamen, who, from the rarity of the thing, had been feasting their eyes for some days. Nor would they, continues Cook, have been disappointed now, nor known the difference, if they had not had some on board who had been in Greenland, and declared what animals these were, and that no one ate them. Notwithstanding this however, Cook and his crew lived upon them as long as they lasted, and there were few on board who did not prefer them to salt meat. Sir Edward Parry remarks that the flesh was found tolerably good, affording a variety amid the ordinary sea-fare. But the tusks, the skin, and the oil are the parts and products for which the Walrus is more particularly hunted. The ivory of the first is highly esteemed, and is used in Europe for artificial teeth. The skins make excellent carriage-braces, and are very useful about shipping, making very good wheel-ropes, &c. The oil is more valued than that of the whale, though not more than twenty or thirty gallons are afforded by one animal.



Walrus. (Bell.)

FOSSIL WALRUS.

See above, p. 168.

We here conclude this sketch of the *Phocidæ*, a family still requiring much elucidation. It is not at all improbable that some of the stories of Mermen and Mermaids have taken their origin from those who have seen Seals and Walruses with their heads lifted out of the water. The latter especially, in such a situation, bear a strong resemblance to the human head before their tusks have grown, and when seen at some distance. Mr. Scoresby notices a remarkable instance of this; the surgeon of the ship having actually taken one of them for a man, and having so reported it to his captain.

SEAS, PHYSICAL CHANGES OF. The relations of sea and land in respect of area, height and depth, interchange of moisture, aerial currents, and many other circumstances which influence mechanical, chemical, and vital phenomena on our globe, are so important, and, within the compass of the few hundreds or thousands of years which belong to history or tradition, appear to have suffered so little change, that nothing short of the complete proof furnished by geology ought to satisfy our minds that every one of the conditions which make up the now harmonious mutual dependence of land and sea is variable, that the present aspect of the globe is but one term of a long series of successive transformations, the law of which—the great problem of geology—is perhaps not beyond the reach of observation and induction.

Are the relative areas of sea and land constant? To this geology replies, that what is now land was formerly the sea; that in some of the parts which are now covered by water land antiently existed, so as to pour down rivers, conveying sediments of different sorts through valleys and plains clothed with various vegetation. The land which we behold is the bed of the antient sea; or, to speak more precisely, it is composed of the dried indurated sediments and the cooled volcanic products which, during long intervals of time, were accumulated beneath the ocean. Whether, during the process by which the antient sea-bed was raised to constitute our now dry land, a proportionate area of what was formerly land was depressed to constitute the modern sea-bed, is an unsettled question; but it is clearly proved that if any proportion of areas between sea and land is a necessary condition of our globe, all the parts of these areas are displaceable and have been displaced.

---

* 'Novus Orbis,' 1633, lib. ii.

Is the relative level of the land and sea constant? We cannot affirm it. We cannot deny the existence of causes which may change generally and continually this relation, any more than the operation of agencies which locally and at intervals are known to derange it. If there be a general change of temperature in the earth itself, or communicated from the planetary spaces around it, or occasioned by any condition affecting the radiation of heat in the atmosphere above it; the unequal influence of this change on the unequally expanding and contracting liquid and solid masses will necessarily occasion variations in the relative level of sea and land. Now geology appears to have established many facts regarding the fossil organic remains of plants and animals, which admit of no clear general explanation except by supposing extensive, perhaps general changes of climate. There is nothing positively known which forbids the belief that such changes may be still really, however slowly, in progress; there is abundant proof of innumerable local derangements of the level of land and sea in comparatively modern geological, historical, and even very recent periods, and it is perhaps generally allowed that a slow upward movement of land is actually traceable and measurable on the coast of Sweden and Norway.

A change of a few degrees of temperature, a change of the relative height of the land, a change even in the polar distance of the masses of land, would materially affect many secondary phenomena. The atmosphere would be affected in regard to its moisture, translucency, rate of diminishing temperature, prevalent winds, and quantity of rain. Its power of sustaining particular organic structures both on the land and in the sea would be altered; and thus we see in the variable nature of the relations which unite the land and the sea, elements of continual change in the mechanical, chemical, and vital phenomena of the globe.

What is the actual mean level of the sea? By the researches of Captain Denham at Liverpool, by the careful measurements taken by Mr. Bunt in the Bristol Channel, under the direction of Professor Whewell, and by some unpublished experiments of Mr. De la Beche on the coasts of Pembrokeshire, it appears that the mean of high and low water is nearly at the same point, whether spring or neap tides be measured. This mean or half-tide level, which is often nearly coincident with the middle point of time between high and low water, can be ascertained by a few observations at any age of the moon in quiet weather, and should always be employed as the datum or zero line in recording elevations of mountains, heights of canals, summits, railway stations, &c. Above all it should be taken for the term of comparison whenever it is wished to determine the relative elevation of different parts of the open sea, though there may be cases when landlocked waters and tide rivers may require the use of another line of reference. The horizontal line which bounds the land and sea, the outline of the coast, is variable; it is annually displaced by the wasting of some tracts and the augmentation of others. Since the Roman sway in Britain a large portion of the rich marsh-lands of Norfolk, Cambridge, Huntingdon, &c. have been recovered from the retiring sea; but in the same period the east coast of Yorkshire has lost many square miles of territory, and is still losing at a fearful rate. (Mr. Lyell has collected abundant examples in his 'Principles of Geology.')

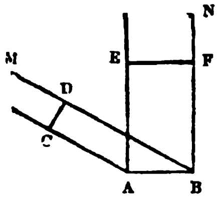
This unequal action depends partly on the *slope* with which the land and sea meet; partly on the nature of the materials comprising the coast; partly on the *set* of the tides and currents. When Dr. William Smith, the geologist, stopped out the sea from the enormous breaches which it had made on the coast north of Yarmouth, he employed the principle of a *moderate slope*, and instead of clay, fascines, &c., simply used the sand and pebbles, trusting with these yielding materials, at a gentle inclination, to imitate the process of nature, and gradually to weaken and destroy the dangerous power which high cliffs and solid constructions had no power to resist.

The modern ocean is the theatre of many operations similar in kind to those by which the materials of dry land were formerly accumulated beneath antient seas. The bed of the Adriatic was found by Donati to resemble the surfaces of sub-Apennine tertiary strata: the shallow soundings of the English Channel and German Ocean show, in the distribution of shells and fish-teeth, analogies with several of the secondary rocks; while in the coral reefs of warm latitudes, on sandy or pebbly shores generally, and at the mouths of great rivers, we see the production of limestone, sandstone, and clay deposits, very similar to those which abound in the stratified masses of land. Whoever will compare with attention the ripple or current mark on the seashore with the corresponding undulations on slates and sandstones of every geological age, will be convinced of the identity of the causes of these impressions; and when he beholds such surfaces in rocks covered by other deposits thousands of feet thick, will not hesitate to admit in such cases that great depressions happened along the margin of the antient sea during the formation of these strata, followed by still greater elevations at a later period.

The distribution of life in the modern ocean is one of the circumstances most important to know, and yet is not so perfectly nor so extensively investigated as it deserves. Probably to each different sort of sediment on the sea-bed, and to each different depth below the surface, as well as to every degree of shelter or exposure, and every degree of temperature, belong specific influences on animal and vegetable life. Below some moderate depth (moderate at least as compared with the thicknesses of the strata) life ceases in the ocean from deficient light and air, and augmented pressure; to a few hundreds of feet perhaps some particular forms may reach; but corals which form reefs cease to live at one hundred feet, and the abundance of other orders of zoophyta, of mollusca, and crustacea, within a few feet from the surface, appears to justify the belief that the deep bottoms of the dark sea, like excessive heights in the cold air, and the centres of dry deserts, are nearly devoid of life.

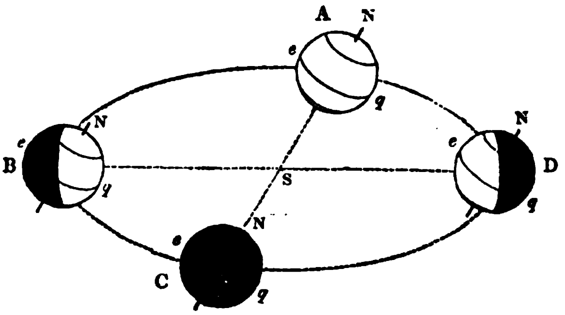
(See a valuable table of depths at which mollusca have been found living, in De la Beche's 'Geological Researches.')

SEASONS, CHANGE OF. The phenomena of the seasons may be divided into those which always recur every year and those which are different in different years. We have in every year the same succession of longer and shorter days, with a summer and winter; while the summer of one year is of a higher temperature, and accompanied by finer days, than that of another. The unvarying phenomena can be explained by what we know of the sun's (or earth's) motion; the varying phenomena belong to the science of meteorology, and depend upon atmospheric and other circumstances, with which we have little or no acquaintance. At any given moment, the light and heat received from the sun, at any given place, depend upon the altitude of that body in two ways. In the first place, the lower the sun is, the greater the thickness of the portion of the atmosphere which its rays have to traverse before reaching the spot; the greater then is the light and heat which is lost in the passage. In the second place, the less the altitude of the sun, the less the actual quantity of light and heat which falls upon any given spot. If AB be the diameter of a circular portion of the earth's surface, and if the sun be seen in the direction BM, the light which falls on that circle is a cylinder of rays with the diameter CD; but if the sun be seen vertically, or in the direction BN, the cylinder of rays has EF for its diameter, besides which, the rays of the first cylinder are weaker than those of the second, as having passed through more of the atmosphere. Neglecting this latter consideration, the quantities of light and heat received when the sun is at two different altitudes are as the sines of those altitudes. Thus the sine of 30° being ½ and that of 90° being 1, the quantity of light which falls on a given spot when the sun is vertical is double of that which falls when its altitude is 30°.



The earth's axis preserves its direction throughout the whole of the yearly motion. The consequence is, that places which are distant from the equator have very unequal days at different times of the year. [SUN.] The accompanying figure, which is generally given in connection with this subject, represents the earth in its four principal positions: the sun being at S, and N being the north pole of the earth.

A is at the vernal equinox, the intersection of the equator and ecliptic passes through the sun, and days and nights are equal all over the world. B is at the summer solstice, where the sun is most above the equator on the northern side; the diurnal circles north of the equator have more day than night, and have their longest days: and *vice versâ*. C is at the autumnal equinox, the phenomena of A being repeated. D is at the winter solstice, where the sun is farthest from the equator on the southern side; the phenomena of B are now reversed, the days being shortest on the north side of the equator. This figure very well explains the variation of days and the main reason for the phenomena of seasons in the extra-tropical parts of the earth. It is evident that, speaking of the northern hemisphere, the sun, being above the equator, gives not only longer days, but greater altitudes; more powerful light and heat, and more of it in duration.



The average temperature being nearly the same in different years, the northern side of the earth must be receiving more than it parts with during a portion of the year, and parting with more than it receives during the remainder. The summer half of its year is that half during which it gains, on the whole, more than it parts with; the surplus being that which is lost during the winter half. The day in which most heat is received is the longest day; but it is notorious that the hottest weather is generally some time after the longest day. This is easily explained, as follows:—The time of greatest heat is not that at which most heat is received, but that at which the quantity of heat is the greatest, namely, just before the daily receipts of heat begin to fall short of the daily expenditures. As long as the receipt exceeds the expenditure, heat is daily added to the hemisphere, and the weather becomes hotter. The same reason may be given for the greatest cold generally following the shortest day, with a considerable interval. All these circumstances however depend much on the atmospheric circumstances of the year.

The preceding explanation does not serve for the tropical climates; the days and nights are here so nearly equal throughout the year, that seasons are caused more by the effect of the winds (which are very regular, and depend mainly on the sun's position) than by the direct action of the sun's light and heat. The seasons are not a summer and a winter, so much as recurrences of wet and dry periods, two in each year.

With regard to the quantity of heat received in a day, it might be expressed, so far as it is not modified by the atmosphere, in a formula depending on the latitude of the place and the sun's declination. It will be enough to say that this formula shows that, the sun being in the equator, the day's heat in different places is as the cosine of the latitude; and that for all places at the equator, the day's heat for different days is as the cosine of the sun's declination.

The different distances at which the earth is from the sun, at different times of the year, do not affect the heat received in a given portion of the orbit. The sun is nearest to the earth in our mid-winter, but for that reason the winter is shorter, since the earth moves more rapidly when nearer to the sun. The compensation is exact, for the quantity of heat received at any one moment, while the radius of the earth's orbit moves through any small angle, is greater or less in the inverse proportion of the square of that radius. But the time of describing that angle is less or greater in the direct proportion of the same square. Consequently the heat actually received by the earth in the two halves of its orbit is the same in both.

SEAT in a Church. [Pew.]

SEAWORTHINESS. [Ship.]

SEBA, ALBERT, a native of East Friesland, was born on the 2nd of May, 1665. He at first followed the occupation of a druggist at Amsterdam; but afterwards, entering the service of the Dutch East India Company, acquired great wealth. His early studies had given him a taste for natural history, and he spent his large fortune in forming a collection of the most interesting objects in the animal, vegetable, and mineral kingdoms. In 1716 Peter the Great purchased his museum, and removed it to St. Petersburg; but Seba immediately set about forming another collection, which soon surpassed every other in Europe. This was unfortunately dispersed after his death, which took place on May 3, 1736.

Seba wrote several papers on scientific subjects; but his great work was a description of his museum, published in Latin and French, in four volumes, folio, between the years 1734 and 1765. The first volume only was published during Seba's lifetime; the last three were edited by different persons after his death. The work is noted for the beauty and accuracy of its engravings, which caused it for many years to be regarded as the standard authority on subjects connected with natural history. The bad arrangement of the subjects however, and the inaccuracy of the descriptions, which resulted from Seba's want of scientific knowledge, greatly diminish its value. There is a notice of Seba in the 'Dictionnaire des Sciences Médicales, Biographie Médicale,' tome vii., article 'Seba.'

SEBACEOUS GLANDS. [Hair.]

SEBACIC ACID. This acid is obtained by subjecting lard or suet to distillation: the product consists of sebacic acid, mixed with much margaric and oleic acids, a little acetic acid, and empyreumatic oil: these are separated by a tedious process; and the sebacic acid, when pure, has the following properties:—it crystallizes in small colourless needles, is inodorous, has a slight taste, is heavier than water, and reddens litmus. It is much more soluble in hot water than in cold, and a hot saturated solution solidifies on cooling; alcohol dissolves it in great quantity at common temperatures. When heated it melts, and a large portion of it vaporizes: the air has no action upon it.

With the alkalis it forms neutral soluble salts; and if sulphuric, hydrochloric, or nitric acid be poured into a concentrated solution of a sebate, a large quantity of sebacic acid is immediately deposited.

Dumas and Peligot have analyzed this acid, and find it consists, when anhydrous, very nearly of

Eight equivalents of hydrogen	8	or	8·7
Ten equivalents of carbon . .	60	or	65·2
Three equivalents of oxygen .	24	or	26·1
Equivalent	92		100·

When sublimed, it contains an equivalent of water.

SEBASTIAN. [Portugal.]

SEBASTIAN, DOM, the posthumous son of the Infante Dom Joam, by Joanna, daughter of the emperor Charles V., was born at Lisbon, July 20th, 1554. After the death of his grandfather, Joam III., in 1557, Sebastian, who was then only three years old, ascended the throne of Portugal, the regency being vested in the widowed queen, Catherine of Austria, in conformity with the will of the late king. From infancy Sebastian showed that the love of arms would be his ruling passion. Possessed of a romantic disposition and an extraordinary admiration of chivalrous exploits, all his thoughts tended to the entire subjection of Africa, where his ancestors had made considerable conquests. At the age of twenty (in 1574) he undertook a campaign against the Moors of Africa, in which however he gained no advantage. Soon afterwards, the troubles which arose in Africa gave him the opportunity of carrying his gigantic projects into execution. Muley Abdullah, sultan of Fez and Marocco, had been succeeded by his son Muley Mohammed, in opposition to the order of succession established by the sherifs, that the sons should succeed in the order of their birth, to the exclusion of the grandsons, and which would have required the succession of his uncle. Knowing that his life was in danger, Abdu-l-múmen, the next brother of Abdullah, on whom the crown should have devolved, accompanied by his younger brothers Abdu-l-málik and Ahmed, fled to Tremecen, where he was put to death by assassins who were paid by his nephew. Abdu-l-málik retired to Algiers, whence, having obtained the succour of the Turks, he marched to Marocco, defeated the usurper, who went out to meet him, and made himself master of that capital. Mohammed then solicited the aid of Philip II. of Spain; but as that monarch refused to give him any, he applied to Sebastian, who readily promised to replace him on his throne, against the advice of his best and wisest friends. However, before starting on his wild expedition, Sebastian communicated his design to Philip, who earnestly dissuaded him from it; though he has been unjustly accused by the French historian Laclède (*Histoire Génerale d'Espagne*, vol. v., p. 170) of having encouraged him in his attempt, in the hope that he might perish, and the crown of Portugal devolve on himself. The preparations being completed, and the cardinal Enrique vested with the regency, in June, 1578, the armament put to sea. It consisted of nine thousand Portuguese, two thousand Spaniards, three thousand Germans, and six hundred Italians; in all about fifteen thousand men. These forces landed on the 10th of July at Arsila, where they were joined by Muley Mohammed at the head of his army. A council of war was immediately summoned; and after losing eighteen days, during which time the provisions of the army were greatly diminished, and the enemy were enabled to collect their forces, it was resolved to begin the campaign by the siege of Larache. Though on the arrival of his enemies Muley Abdu-l-málik, improperly called Moluc by the chroniclers of the day, was suffering under a disease which soon after caused his death, he had prepared with activity for their reception, and he hastened to the shore borne in a litter. His army, which was far superior in numbers to the Portuguese, being increased by the arrival of his brother Ahmed, governor of Fez, who joined him near Alcasr-kebir (Alcazarquebir), Abdu-l-málik determined to oppose the passage of the Christians over the river Luk in the way to Larache; and with this view he posted his troops at the only ford in the neighbourhood. Perceiving however that Sebastian, by the advice of his ally Mohammed, had desisted from his former intention, and was attempting to reach Larache by a more circuitous route, he crossed the river and offered him battle. The cavalry of the Christians, unable to withstand the impetuous onset of the Moors, at first gave way; but Sebastian placed himself at the head of his infantry, and charging the enemy, compelled him to fall back on his artillery. At this moment, Muley Abdu-l-málik, fearful of the result, mounted a horse, drew his sabre, and placing himself at the head of a body of cavalry, chiefly composed of Spanish Moriscoes whom Philip had banished from his kingdom after the revolt in the Alpujarras, made a desperate charge, by which the Portuguese infantry, consisting of raw soldiers, was broken. Though a vigorous resistance was made on the right and left wings, which were composed of the Germans and Spaniards, the rout soon became general. Sebastian made every effort to rally the fugitives; but in vain. Most of the officers and courtiers by whom he was surrounded fell by his side. Two horses had already been killed under him, and the third was exhausted. His retainers, anxious to save his life, earnestly entreated him to fly; but he haughtily refused, and plunged into the thickest of the fight, where he met with an honourable death, according to some authorities; others assert that he was taken prisoner by some Moors, but that as they were about to dispute about the possession of so rich a prize, one of their officers came up and killed him with his own hand. On the morning after the day of the battle a search was made, and a body was found, which, though much disfigured, was instantly recognised by Resende, a valet of Sebastian, to be that of his master. Mohammed succeeded in escaping from the field of battle; but he was drowned whilst attempting to cross the river. Abdu-l-málik, exhausted by the fatigue of the day, had also breathed his last during the action, though his death was kept secret by his orders; so that the three kings who entered the field perished on the same day.

Sebastian was succeeded by his brother Ahmed. The news of Sebastian's death caused the greatest consternation. The Portuguese could scarcely believe in his death, and for many years after it was generally supposed that he was still living in captivity. This belief produced several impostors, such as Alvarez, the stone-cutter, Gabriel de Espinosa, called by the Spaniards el Pastelero de Madrigal, and two others, who ended their days on the scaffold or in the galleys. By the death of Sebastian without issue, the kingdom of Portugal became annexed to Spain.

(Cabrera, *Historia de Felipe II.*, Mad., 1619, lib. xii.; Faria y Sousa, *Epitome das Historias Portuguezas*, part iii.; Vasconcellos, *Anacephalæosis*.)

SEBASTIAN DEL PIOMBO. [PIOMBO.]

SEBASTIAN, SAN, a large Spanish town, the capital of the province of Guipuzcoa, is situated at the mouth of the river Urumea or Gurumea, the Menosca of the antients (Pliny, lib. iii. 20), between two arms of the sea which form a peninsula. San Sebastian is much better built than many other Spanish towns. The streets are clean and wide, and the houses are elegant. The new square, Plaza Nueva, is characterised by correctness of design, and is surrounded by fine buildings. Being situated only ten miles from the mouth of the Bidassoa, which forms the boundary between the kingdoms of France and Spain, San Sebastian has long been a place of great strength, being surrounded with walls, and defended by bastions and half-moons, besides having a strong citadel called 'La Mota' upon an almost circular mountain of considerable height, which is ascended by a spiral road. The harbour is small, but very secure, being nearly enclosed by two moles, and protected from the winds by the neighbouring hills. The environs contain much romantic scenery, the whole being bounded by the lofty Pyrenees. A wooden bridge on eight piers serves as a communication between the two banks of the Urumea. San Sebastian has no monastic buildings of any importance, the whole having been set on fire and destroyed, together with the town, in the two sieges which it sustained during the Peninsular War. After the battle of Vittoria, Wellington dispatched General Sir Thomas Graham to occupy the town, which was then defended by General Rey. He besieged and bombarded it from the beginning of July, 1813; but, on his attempt to carry it by storm, he was repulsed by a sally of the garrison, and compelled to raise the siege. On the defeat of Soult at the foot of the Pyrenees, on the 30th of the same month, the siege was renewed, and continued to August 31st, during which the British suffered heavy losses in repeated assaults. On that day they became masters of the most important works, with the loss of about three thousand men; but the French still kept possession of the citadel, which did not surrender till the 9th of September. In 1823, when the French invaded Spain, to put down the constitutional government, they succeeded, after several assaults, in getting possession of San Sebastian by capitulation. More recently, during the Carlist insurrection in the northern provinces of Spain, it became the head-quarters of the British auxiliary legion, under General Sir De Lacy Evans, who, in the summer of 1836, had to sustain several attacks from the Carlists, who occupied the neighbouring heights.

SEBASTOPOL, or SEVASTOPOL, is a town in the south of European Russia, in the province of Taurida, which has risen within these few years into a place of great importance. When the Russians got possession of the Crimea, they soon became sensible of the value of the harbour, which is the finest in the Black Sea; in 1797 it was resolved to make it a harbour for ships of war, and in 1821 it was declared free for ships of all nations, coming from healthy ports, and laden with Russian or foreign goods. Sebastopol is built amphitheatrically on an eminence, and has broad straight streets. The view as you approach it on the land side is very striking. The houses are all of stone, and the public buildings, the Admiralty, the Arsenal, the barracks, the hospitals, the Lazaretto, and other establishments, such as the docks and dockyards, are on the most extensive scale, no labour or expense having been spared to make this port in all respects suitable to its destination as the station of the great Black Sea fleet. The bay runs nearly five miles into the land, is from 600 to 800 fathoms broad, and from 10 to 12 fathoms deep; it is perfectly protected from all winds and has no shoals. It divides into several branches or bays called by different names, as the Quarantine Bay, the Artillery Bay, and the Ship Bay, which is the finest and largest. 'The most and best of the fortifications of Sebastopol,' says Dr. Köhl, 'have been erected during the reign of the present emperor. The material is a white calcareous stone, obtained in the neighbourhood of the town. It resembles the shell-limestone of which Odessa is built, and is so soft that the walls would have little to fear from an enemy's ball, which would be buried in them as in sand; but this stone is extremely perishable, as we see in the houses of Odessa, which fall to pieces of themselves.' Dr. Köhl, who was at Sebastopol in 1838, says, 'It is more than laughable when our statistical works (for instance, the recent publications of Schnitzler) tell us that Sebastopol has only 5000 inhabitants. There are 10,000 resident inhabitants, not to mention the troops constantly employed on the fortifications, of whom nearly 30,000 are now encamped about the town, and the crews of the numerous men-of-war in the harbour.' The population is purely Russian, with a small mixture of Greeks.

(Hörschelmann; Cannabich; Köhl, *Reisen in Süd Russland*, 2 vols. 8vo., 1841.)

SEBENI'CO, a town in Austrian Dalmatia, is situated on the bank of a lake or bay of the same name, which is formed by the river Kerka, united with the Cicola, before it falls into the sea. The lake, which forms a large and excellent harbour, is connected with the sea by the channel of St. Antonio, a narrow strait between lofty rocks. The town is built on the declivity of a mountain, rising amphitheatrically from the sea, and has a striking appearance; but the streets are uneven and irregular, and the ascent to some of the higher parts of the town is by steps. With the two small suburbs, Sebenico contains about 800 well-built houses and 5000 inhabitants. The walls of the town are old and decayed, but there are two forts which lie above and command it, and the harbour is defended by the new and strong fort St. Nicolo, built on a rock at the mouth of the canal. It is the see of both a Roman Catholic and a Greek bishop. The large Gothic cathedral is accounted the handsomest in the whole country. There are two Roman Catholic churches and one Greek church, three monks' convents, and two nunneries. The adjacent country produces abundance of wine and oil. The inhabitants have distilleries of maraschino, and are reckoned excellent sailors. The coral fishery in the neighbouring seas is now abandoned.

SEBOO, River. [MAROCCO.]

SECA'LE CORNU'TUM. [ERGOT.]

SECAMO'NE, a genus of plants of the natural family of Asclepiadeæ, found in the warm parts of India, Africa, New Holland, and in the West Indies. The name is probably derived from the Arabic Sukmoonya, as this is the name in Prosper Alpinus of the *Secamone Alpinii*, or Periploca Secamone of Linnæus. The genus Secamone is characterised by having a quinquifid calyx and corol, the latter being rotate. Stamineous crown 5-leaved, with the leaflets compressed laterally. Pollen masses 20, erect. Stigma coarctate at top. Follicles smooth. Seeds numerous, hairy at the umbilicus. The species form erect or climbing smooth shrubs with opposite leaves; the flowers are small, and the inflorescence in cymes, which are dichotomous, arising from between the petioles.

Some of the species of Secamone secrete a considerable proportion of acrid principle, which makes them useful as medicines. Thus the roots of S. emetica, being emetic in action, are employed as a substitute for Ipecacuanha, whilst the substance called Smyrna Scammony is said to be obtained from the Egyptian species, Secamone Alpini of Ræmer and Schultes, the S. ægyptiaca of Mr. Brown.

SECANT, a line which cuts another; also a term in TRIGONOMETRY.

SECCHIO. [PO.]

SECEDERS, the name assumed, in preference to that of Dissenters, by the most numerous body of the Scottish Separatists. The term Dissenter, as being thought to imply a difference of doctrinal belief, is little used in Scotland, where all the more considerable non-conforming communities are equally Calvinistic with the established church, and indeed adhere to the same standard of belief (the Westminster Confession), differing only as to certain points of church government. Even as to that matter indeed the Seceders are at one with the national church in theory: their quarrel is, or at least originally was, merely about one or two points of practice.

The Secession originated in the year 1733; and was occasioned by two acts of the General Assembly; the first, passed in 1730, for putting an end to the practice of recording the protests, or reasons of dissent, given in by individual members against the decisions of church judicatories; the other, passed in 1732, providing that in cases in which what is called the *jus devolutum*, or right of the presbytery to nominate to vacant livings in consequence of no qualified person being presented by the patron within six months, came into operation, the presbytery should always appoint the person chosen by the heritors and elders. This was in fact to restore in such cases the comparatively popular mode of appointment which had prevailed universally from the year 1690, when presbytery was restored in Scotland, down to the year 1712, when the antient patrons had been reinstated by act of parliament in the rights taken from them at the Revolution. But the act of 1732 was dissatisfactory to a very small minority in the church because it did not go farther, so as, instead of the law of 1690, to restore (in the cases in which the appointment fell to presbyteries) the still more democratic practice which had been established in 1649, placing the election with the elders, or members of the kirk session, alone. This law had subsisted from 1649 till the Restoration. It is not uncommon to represent both the system of 1649 and that of 1690 as giving the right of election to the general body of the parishioners or congregation: but in truth it was not so. All that was left to the congregation under either system was the right of expressing their disapproval of the choice made by the elders, or by the elders and heritors; but it remained with the presbytery, or church court, to give what effect it chose to such disapproval; to order a new election, or to proceed to settle the nominee in defiance of the dissent of the congregation, which in that case was, according to the procedure under the system of 1649, declared to be 'grounded on causeless prejudices.'

The clergyman who took the lead in the movement against the acts of 1730 and 1732 was the Reverend Ebenezer Erskine, then one of the ministers of Stirling. He was one of fifteen members of Assembly who protested against the passing of the act of 1732. The Assembly having (in conformity with the act of 1730) refused to record this protest, Erskine inveighed against the proceeding as arbitrary and tyrannical, in a sermon which he preached a few months after before the synod of Perth and Stirling. Upon this sermon the synod passed a resolution of censure, from which Erskine appealed to the General Assembly; but the sentence was confirmed by that supreme court in 1733, and he was actually rebuked and admonished at the bar of the house. He protested, three other clergymen adhering to him, against this decision, and declared he would continue the conduct for which he had been censured; upon which the Commission of Assembly was authorized to proceed against the four protesters, and they were suspended in August, 1733, and deposed on the 16th of November following. This sentence of the Commission however was removed by the Assembly of 1734, which at the same time repealed both the act of 1730 and that of 1732. But in the meantime the deposed brethren, having been joined by four other clergymen, had constituted themselves into a separate presbytery; and they now refused to rejoin the general body of the church, until, as they said, they should have satisfactory evidence that its future conduct would be such as they could approve of. In this state matters remained, the eight clergymen all continuing to officiate in their several churches as usual, till the affair was once more brought before the Assembly of 1739. Even in that house the motion for proceeding to a sentence of deposition was lost; but they were finally deposed, and their parishes declared vacant by an act of the next Assembly, passed 15th May, 1740, by a majority of 140 to 30.

The Seceders, or Associate Synod, as they called themselves, remained a united body till the 9th of April, 1747, when they split into two on a quarrel about a clause in the oath required to be taken by the burgesses or freemen of some of the Scots burghs declaratory of their profession and hearty allowance of 'the true religion at present professed within the realm, and authorized by the laws thereof;' the larger division, who held that the oath might conscientiously be taken by Seceders, calling themselves Burghers, their opponents taking the name of Anti-burghers. But in 1820 the Burghers and Anti-burghers coalesced again into the United Associate Synod.

The practice of subscribing the Solemn League and Covenant was made imperative upon all members of the Secession by the Associate Synod in 1744; but although the act of the synod has never, we believe, been repealed, it fell into disuetude after a few years. One chief cause of this was the growth among the Seceders of opinions adverse to the principle of national religious establishments altogether, a principle strongly maintained, and placed on very high ground, in the Covenant. But this change of sentiment gave rise in 1806 to the separation of another portion of the body, who, adhering to the principle of an established church, which the founders of the secession, although objecting to some things in the existing constitution or practice of the church of Scotland, undoubtedly held, called themselves the Original Seceders; and these are also divided into the Original Burghers and the Original Anti-burghers. A good many of the congregations of the Original Burgher Synod have lately rejoined the national church.

All the divisions of the Seceders, we believe, agree in adopting as their standards, in addition to the Westminster Confession of Faith, what is called the First or Extra-Judicial Testimony, emitted by their founder Erskine and his brethren in 1733, and a more extended exposition of their principles and views, known as the Second or Judicial Testimony, which they published in 1736. The United Associate Synod, to which the great mass of the Seceders belong, now comprehends about 350 congregations, arranged in 22 presbyteries. The entire population, including members, hearers, and children, belonging to all the branches of the Secession church may be estimated at about 350,000.

(*Historical Account of the Rise and Progress of the Secession*, by the Rev. John Brown of Haddington; *Life and Diary of the Reverend Ebenezer Erskine*, by the Reverend Donald Fraser, of Kennoway, 1831; M'Culloch's *Statistical Account of the British Empire*, vol. ii.)

SECHEM. [PALESTINE.]

SE'CKENDORF, VEIT LUDWIG VON, was born on the 20th of December, 1626, at Herzogenaurach near Erlangen. He belonged to an old and noble family of Franconia, and his father held a high post in the army of Gustavus Adolphus during the Thirty Years' war. The boy lived with his mother partly at Coburg, partly at Mühlhausen, and partly at Erfurt. He began his studies at the gymnasium of Coburg in 1638; but Ernest, duke of Gotha, invited him to the gymnasium of Gotha; and after the death of his father, who was executed in 1642 by a Swedish court-martial, the duke acted towards the youth with all the care of a father. The young man showed great talent and unusual diligence, and persons of the highest rank gave him their protection and encouragement. From 1643 till 1646 he studied in the university of Strassburg; and applied most zealously not only to jurisprudence, history, and classical literature, but to philosophy and theology. After he had completed his studies, he made a journey through the Netherlands, and was appointed page to the duke of Gotha, who not only superintended his practical training as a statesman, but entrusted him with the care of his library. Seckendorf now gradually rose from the lower to the highest offices in the duke's service, and in 1664 he was appointed privy councillor and chancellor. In all his offices he took a most active part in the important changes which the duke made in the administration of his dominions, as well as in the affairs of religion and the education of the people. For reasons which are not known, Seckendorf, at the close of the year 1664, left the service of the duke of Gotha, and entered that of Moritz, duke of Zeitz, who appointed him his privy councillor, chancellor, and president of the consistory. In his new sphere Seckendorf showed the same activity and good will towards the people as before; but owing to some measures which he had proposed, he became involved in disputes with the clergy; and when Duke Moritz died in 1681, he laid down his offices, and retired to his country-seat, Meuselwitz near Altenburg. In 1691 Frederic III., elector of Brandenburg, invited him to Berlin as his privy councillor, and also appointed him chancellor of the newly established university of Halle. Seckendorf accepted the offer, but died in the year following, 1692, at Halle.

Seckendorf as a statesman showed great judgment and skill in the complicated affairs of the various houses of Saxony, but he was more distinguished as a political writer, an historian, a scholar, and a theologian. His principal political work is—'Deutscher Fürstenstaat,' Gotha, 1665, which for a long time was thought the most useful manual of political science. His theological and historical works are: 'Compendium Historiæ Ecclesiasticæ,' Leipzig, 1666; this work was completed by Artopæus; 'Der Christenstaat,' Leipzig, 1685; 'Commentarius Historicus et Apologeticus de Lutheranismo,' &c., Leipzig, 1688, &c., 3 vols. fol.: it is chiefly directed against Maimbourg, 'Histoire du Luthéranisme.' Seckendorf also wrote several smaller discourses in German, and sacred hymns, some of which are still sung in the Protestant churches of Germany. See Schreber, 'Historia Vitæ et Meritorum Viti Ludovici à Seckendorf,' Leipzig, 1733, 4to.

SECKER, THOMAS, born 1693, died 1768, a learned and eminent prelate of the English church, who was successively bishop of Bristol and Oxford, and archbishop of Canterbury.

The early history of this distinguished person is essentially different from that of many other persons whose early life, progress, and final success in the church we have had to describe; for while they have usually gone from the endowed grammar-schools to the universities of the realm, Secker (being born of parents who were not members of the Church of England, but dissenters from it), after he had been trained in the grammar-school at Chesterfield in Derbyshire, where a sister much older than himself and her husband Mr. Milnes resided (two relatives who had much to do with his early training), was sent to an academy which the dissenters of the north of England had established at a village called Attercliffe, about fourteen miles from Chesterfield. It was intended for the education of dissenting ministers, and for that profession young Secker was designed. Many ministers who were considered ornaments to the profession were educated in this academy. But after a residence of two or three years, he was removed to another establishment of the same kind, in which the studies appear to have been of a more liberal kind, and the learning communicated to the pupil more exact and critical. This academy was kept at Tewkesbury, and at the head of it was Mr. Jones, a divine of considerable eminence. Here Secker found Samuel Chandler going through the same course with himself, who was a minister of much celebrity among the dissenters, and author of various critical works, and Butler, the author of 'The Analogy of Natural and Revealed Religion,' who conformed and became bishop of Durham. With both of these divines Secker formed an intimacy, and they remained on friendly terms during the remainder of their lives.

It was in these academies that the foundation was laid of those eminent theological attainments by which he was distinguished, of which his printed works are some proof, but there is still stronger evidence in his manuscript notes on the Scriptures, which still remain in the library at Lambeth.

When he left the academy, the natural course would have been that he should have settled as the minister of a dissenting congregation. He preached among the dissenters occasionally, but he never became the settled pastor of any dissenting congregation. Perhaps the excellencies of his character were not appreciated as they ought to have been by the persons amongst whom he fell. However, it is certain that he soon determined to abandon the path which had been chalked out for him, and he devoted himself to the study of medicine, attending lectures in London, and going afterwards to Paris.

There were persons however who were unwilling that the talents and attainments of Secker should not be made available in the way that was first intended, though not as a nonconformist to the church, but as a minister of the church itself; and particularly his early friend Butler, who had conformed and was become preacher at the Rolls, and Mr. Talbot, to whom Butler introduced him, a son of the bishop of Durham. Secker was induced to enter fully into the question of conformity, and his deliberations issued in the determination to enter the church. He entered himself at Exeter College, Oxford, and in a very short time was ordained by the bishop of Durham; this was in 1723.

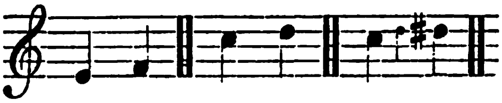
His progress in the church was rapid. He was made chaplain to bishop Talbot; had the living of Houghton-le-Spring, which he soon exchanged for that of Ryton, both in the diocese of Durham; but in 1732 he was brought into a more public sphere of action, being nominated one of the king's chaplains, and rector of St. James's, Piccadilly. Early in 1735 he was made bishop of Bristol; in 1737 he was translated to Oxford. In 1750 he gave up the rectory of St. James's, in which parish he had accomplished some useful reforms, and was made dean of Saint Paul's. In 1758 he became archbishop of Canterbury.

In all the various situations which he was called to fill, his conduct was that of a conscientious, liberal, and pious man; assiduous in the discharge of all his duties, acting with moderation and discretion. His printed works consist only of sermons, lectures, and charges.

He died on the 3rd of August, 1768, and is buried in an humble grave in the churchyard of Lambeth parish.

SECOND, the sixtieth part of a minute, whether of time or of angular measure. [Angle; Time.] For the derivation of this word, see Scruple.

SECOND, an interval in music, a discord, the ratio of which is 9 : 8. Of seconds there are three kinds: the minor second, or semitone, as EF; the major second, CD; and the extreme sharp second, CD♯. Ex.:



SECOND-SIGHT, a power believed to be possessed by some persons in the highlands and islands of Scotland, of foreseeing future events, especially of a disastrous kind, by means of a spectral exhibition of the persons whom these events respect, accompanied with such emblems as denote their fate.

Jamieson says, 'Whether this power was communicated to the inhabitants of the highlands and islands of Scotland by the northern nations, who so long had possession of the latter, I shall not pretend to determine; but traces of the same wonderful faculty may be found among the Scandinavians. Isl. *ramskygn* denotes one who is endowed with the power of seeing spirits: "qui tali visu præter naturam præditus est, ut spiritus et dæmones videat, opaca etiam visu penetret." Verel. Ind. The designation is formed from *ramm-ur*, viribus pollens; and *skygn*, videns; *q. e.* powerful in vision.'

Dr. Johnson, in his journey to the Western Islands of Scotland, carefully examined the questions of the second-sight; but neither he nor Dr. Beattie could find sufficient evidence of its reality.

In Sir John Sinclair's *Statistical Account of Scotland*, vol. iii., 8vo., Edinb., 1792, p. 380, the minister of Applecross, in the county of Ross, speaking of his parishioners, says, 'with them the belief of the second-sight is general.'

In MacCulloch's *Western Islands of Scotland*, 8vo., Lond., 1819, vol. ii., p. 32, the author says, 'To have circumnavigated the Western Isles without even mentioning the second-sight would be unpardonable. No inhabitant of St. Kilda pretended to have been forewarned of our arrival. In fact it has undergone the fate of witchcraft; ceasing to be believed, it has ceased to exist.'

In the Erse the second-sight is called *Taisch*.

(Johnson's *Works*, Murphy's edit., vol. viii., p. 329; Beattie's *Essays*, 8vo., Edinb., 1776, p. 480; Brand's *Popular Antiq.*, ed. 4to., vol. ii., p. 479; Jamieson's *Etymolog. Dictionary*, Supplem., *in voc.*)

SECONDARY, a name given to any circle on the sphere with reference to another circle: if the latter be called primary, the former is secondary when it passes through the poles of the primary. [Sphere.]

SECRETARY (French, *Secrétaire*), one entrusted with the secrets of his office or employer; one who writes for another. Its remote origin is the Latin *secretum*. The phrase 'notarius secretorum' is applied by Vopiscus (*Div. Aurelianus*) to one of the secretaries of the emperor Aurelian. This appellation was of very early use in England: Archbishop Becket, in the reign of Henry II., had his 'secretarius;' although the person who conducted the king's correspondence, till the middle of the 13th century, was called his clerk only, probably from the office being held by an ecclesiastic. The first time the title of 'secretarius noster' occurs is in the 37th Hen. III., 1253.

SECRETARY-BIRD. [Gypogeranus.]

SECRETARY OF STATE. The office of secretary of state is one of very antient date, and the person who fills it has been called variously 'the king's chief secretary,' 'principal secretary,' and, after the Restoration, 'principal secretary of state.' He was in fact the king's private secretary, and had custody of the king's signet. The duties of the office were originally performed by a single person, who had the aid of four clerks. The statute 27 Henry VIII., c. 11, regulating the fees to be taken by 'the king's clerks of his grace's signet and privy seal,' directs that all grants to be passed under any of his majesty's seals shall, before they are so sealed, be brought and delivered to the king's principal secretary or to one of the clerks of the signet. The division of the office between two persons is said to have occurred at the end of the reign of Henry VIII., but it is probable that the two secretaries were not until long afterwards of equal rank. Thus we find Sir Francis Walsingham, in the time of Queen Elizabeth, addressed as her majesty's principal secretary of state, although Dr. Thomas Wilson was his colleague in the office. Clarendon, when describing the chief ministers at the beginning of the reign of Charles I., mentions the two secretaries of state, 'who were not in those days officers of that magnitude they have been since; being only to make dispatches upon the conclusion of councils, not to govern or preside in those councils.' Nevertheless the principal secretary of state must, by his immediate and constant access to the king, have been always a person of great influence in the state. The statute 31 Henry VIII., c. 10, gives the king's chief secretary, if he is a baron or a bishop, place above all peers of the same degree; and it enacts that if he is not a peer, he shall have a seat reserved for him on the woolsack in parliament; and in the Star Chamber and other conferences of the council, that he shall be placed next to the ten great officers of state named in the statute. He probably was always a member of the privy council. Cardinal Wolsey in his disgrace earnestly implores Secretary Gardiner (afterwards bishop of Winchester), whom he addresses as a privy councillor, to intercede for him with the king. (Ellis's *Letters*, vol. ii.) Lord Camden, in his judgment in the case of Entick *v.* Carrington (11 Hargrave's *State Trials*, p. 317), attributes the growth of the secretary of state's importance to his intercourse with ambassadors and the management of all the foreign correspondence of the state, after the policy of having resident ministers in foreign courts was established in Europe. Lord Camden indeed denies that he was antiently a privy counsellor.

The number of secretaries of state seems to have varied from time to time: in the reign of George III. there were often only two; but of late years there have been three principal secretaries of state, whose duties are divided into three departments, viz. for home affairs, foreign affairs, and the colonies. They are always made members of the privy council and the cabinet. They are appointed (without patent) by mere delivery to them of the seals of office by the king. Each is capable of performing the duties of all the three departments, and the offices are all so much counted to be one and the same, that upon being removed from one secretaryship of state to another, a member of the House of Commons does not vacate his seat.

To the secretary of state for the home department belongs the maintenance of the peace within the kingdom and the administration of justice so far as the royal prerogative is involved in it. All patents, charters of incorporation, commissions of the peace and of inquiry pass through his office. He superintends the administration of affairs in Ireland.

The secretary for foreign affairs conducts the correspondence with foreign states, and negotiates treaties with them, either through British ministers resident there, or personally with foreign ministers at this court. He recommends to the crown ambassadors, ministers, and consuls to represent Great Britain abroad, and countersigns their warrants. The secretary for the colonial department performs for the colonies the same functions that the secretary for the home department performs for Great Britain. Each is assisted by two under-secretaries of state, nominated by himself; the one being usually permanent, the other dependent upon the administration then in power. There is likewise in each department a large establishment of clerks appointed by the principal secretary.

The power to commit persons on suspicion of treason is incidental to the office of principal secretary of state—a power which, though long exercised, has been often disputed. It is not necessary here to give the arguments on both sides; they are discussed with great care by Lord Camden in the case above cited (Entick *v.* Carrington), which was one of the numerous judicial inquiries arising out of the dispute between the Crown and John Wilks at the beginning of the reign of George III. The conclusions to which Lord Camden comes are—that the secretary of state is not a magistrate known to the common law; that the power of commitment for state offences, which he has for many ages exercised, was used by him as an immediate delegation from the person of the king, a fact which may be inferred, among other things, from the debates in parliament in the time of Charles I., when Secretary Cook claimed the power on that ground; that nevertheless courts of justice must recognise this power, inasmuch as there has been constant usage of it, supported by three judicial decisions in favour of it since the Revolution, viz. by Lord Holt in 1695 (Rex *v.* Kendal and Rowe); by Chief-Justice Parker in 1711 (Queen *v.* Derby); and by Lord Hardwicke in 1734 (Rex *v.* Earbury). In a more recent case (King *v.* Despard, 1798), Lord Kenyon says, 'I have no difficulty in saying that the secretaries of state have the right to commit,' and he hints that Lord Camden felt too much doubt on the subject.

There is also a chief secretary for Ireland, resident in Dublin (except when parliament is sitting), and having always an under-secretary there. He corresponds with the home department, and is under the authority of the lord-lieutenant. His office is called that of secretary to the lord-lieutenant; but it is analogous to the office of secretary of state. He has sometimes, though very rarely, been a member of the cabinet.

SECRETION, in animal physiology, is one of the processes by which a substance is separated from the blood or an analogous organic fluid. The same term is also often applied to the material separated. Secretion differs from nutrition, in which a fluid is also at first separated from the blood, in the purpose for which it is carried on, and in the mode in which the fluid is afterwards disposed of. In nutrition [Nutrition] the fluid is converted into the tissues of the body or into organized structures; in secretion it usually remains fluid, and if not, it never acquires any organization.

Secretion from the blood of animals (which may be regarded as the type of all fluids serving a similar common purpose) takes place in the interspaces of all the tissues, on the surfaces of all the membranes, into the interior of all the cavities of the body, and into the ducts of glands. In the three first situations the separation is sometimes called exhalation, and it is probable that in them it is effected by a force different from that under the influence of which it takes place in the secretion, peculiarly so called, in the glands.

The fluid which keeps all the tissues moist, and which is effused on the free surfaces of all the serous membranes, is exactly similar to the serum, or thinner fluid part of the blood. It is, in all probability, separated from the blood by the capillary attraction of the several tissues, which imbibe into their pores the thinner part of the fluid that continually traverses them in the minute capillary blood-vessels.* This imbibition is also assisted by the pressure with which the blood, impelled by the contractions of the heart, is forced upon the internal wall of those vessels; and hence it is that in all cases in which, by any obstruction to the circulation through the veins, this pressure of the blood is increased, some form of dropsy is produced; for the serous fluid is thus forced in excessive quantity into the pores of the tissues, and through the surfaces of the membranes, of all the parts in which the circulation is obstructed.

In the article Gland, Secernent, we have described the general character of the structures in which the secretions proper are produced. But since that was written, the researches of Boehm, Henle, and others have rendered it probable that the fluid of a secretion is not merely separated from the blood in the capillaries that ramify on the walls of the minute gland-ducts, and then made to traverse at once the walls of both those vessels and those ducts, but that it is first collected in minute cells which surround the terminations of the ducts, and that it is only when these cells burst or have their membranes removed that the secreted fluid is poured into the gland-duct. Through it, it is at once conveyed, probably by the contractile power of the duct and those to which it leads, to the part at which its ultimate purpose is to be effected. While collected in the minute cells it is highly probable that the fluid undergoes changes in its condition, and acquires the properties necessary for the peculiar offices (if any) which it has to perform. The nature of this change, and the force by which it is effected, are unknown; but we may imagine the change to be somewhat similar to that by which the juices contained in the cells of a fruit have their character gradually altered in the process of ripening.

The degrees of elaboration necessary for the production of the several secretions probably vary greatly. A part at least of the materials of some of them exist ready formed in the blood, as the urea and lactic acid of the urine and sweat, and some of the principles of the bile; of others no trace can be found in the blood itself. The former seem to require no particular structure for their separation, for though in general they are separated only by their appropriate glands, yet when they cannot pass off by them, they are found in all the fluids drawn from the blood by the ordinary imbibition of the porous tissues. The other fluids, which are not found in the blood, are probably elaborated entirely in their respective glands, though it must be admitted that the analysis of the blood is not yet sufficiently perfect to render it certain that they do not exist in it ready formed and requiring only to be selected from its other constituents.

The purposes which the secretions serve are various. Some, as already stated, have no other purpose than to moisten the several parts of the body; others are appropriated to the service of important functions, as the saliva the gastric juice, the bile, and the pancreatic and intestina fluids, which all assist in digestion. Such also are the tears, which serve for the cleansing of the front of the eye; the milk for the food of the offspring; and various materials for the defence and comfort of the animal, and for the propagation of the species. Other secretions again, which are commonly called excretions, are the refuse of the blood, and if retained in it would exercise an injurious influence on the whole economy; such are the cutaneous perspiration, the urine, and those parts of the bile and intestinal fluids which are not used in digestion.

For the account of particular secretions we must refer to the articles relating specially to them or to the parts by which they are produced, such as Bile; Gland; Intestines; Liver; Mammary Gland; Milk; Mucus; Pancreas; Saliva; Skin; Stomach; &c.

SECRETIONS, VEGETABLE, are those products found in plants which are chiefly the result of the decomposition of carbonic acid, and the appropriation of the carbon to which we have already alluded in the article Sap. [Sap.] These secretions are exceedingly numerous, and constitute the great bulk of the solid parts of the plant. The differences observed in the hardness and durability of the wood, the colour of the leaves and flowers, the flavour of the various fruits, the medicinal and economical properties of all parts of plants, are dependent on the nature of the secretions that constitute, and are deposited within, these tissues. The intricate and delicate chemistry by which the secretions of plants, possessing so many and varied properties, are elaborated from so small a number of elementary constituents, is at present very imperfectly understood. We however know that whatever compounds may be found in the structure of plants, the elements of which they are composed are derived from external sources, and that the chemical processes by which their elements are combined obey similar laws to those which govern them when independent of the influence of vitality.

In the lowest forms of plants we find the simple cell endowed with the power of abstracting from the medium in which it lives the elementary matters which it combines in those forms that are essential to its existence. In the simple cell the changes which are thus effected are very few, but as we ascend in the scale of organization the cells are united. Their forms are varied, the functions which were performed by one cell are assigned to different sets of cells, and the compounds required by the plant and the changes in its elementary matters become more numerous and complicated. In the article Sap it was stated what the nature of those elements is, which, on being introduced into the system of the plant, constitute the materials necessary for the formation of those secretions on which the growth and existence of plants depend, and in this place we shall proceed to enumerate those secretions and state their properties.

I. *Of General or Nutritious Secretions.*—These are found, in one form or another, in all plants, and are sometimes collected in large quantities in various parts of the plant, to serve as material for its future growth. They have hence been called general and nutritious secretions. They seem to be more immediately the result of the union of the elements of water with the carbon of the carbonic acid than any of the other secretions, and, on account of their composition, have been called, by De Candolle, *Hydro-carbonates*. The relative quantities of their component parts, according to Gay-Lussac and Thénard, are as follows:—

---

* There is reason to believe that the fluid which moistens the tissues and fills the cavities of the nervous centres is not separated in this common method.

	Carbon.	Oxygen.	Hydrogen.
Gum . .	42·23	50·84	6·93
Sugar . .	42·27	50·63	6·90
Starch .	43·55	49·68	6·77
Lignine .	52·00	41·25	5·75

It will be seen that there is a great similarity in the composition of all these substances, and that only a small addition or abstraction of elementary matter will convert the one into the other. There are two remaining substances, albumen and gluten, which, in addition to the other elementary bodies, contain nitrogen. Their composition in 100 parts is as follows:—

	Carbon.	Oxygen.	Hydrogen.	Nitrogen.
Albumen . .	52·8	23·8	7·5	15·7
Gluten . . .	55·7	22·0	7·8	14·5

1. *Gum* is the most widely diffused of these secretions, and in some of its forms appears to be the first product which is formed by plants. Vegetable *mucus*, which is the most simple form of gum, exists in a dissolved state in many of the Cryptogamia, also in Malvaceæ, Liliaceæ, Orchidaceæ, and many of the Boraginaceæ. In many other plants gum exists in a dissolved state in the fluids, but becomes hardened, either by being deposited in peculiar receptacles, in the leaf or other parts of the plant, or by being thrown out upon its surface. In this latter mode large quantities of gum are produced by some Leguminous plants. The various sorts of gum-acacia found in the markets are produced from the *Acacia Arabica*, *A. Senegal.*, *A. tortilis*, &c. [Gum.] The substance called *Bassorin* is also a modification of gum. It differs in not being soluble in cold water, but takes up fifty times its weight, forming a kind of jelly. In chemical composition it differs from gum in containing less carbon. Vegetable jelly, or *Pecten*, is another form of gum. It resembles bassorin in some of its properties, but is at last entirely soluble in cold water. With saccharine matter and various acids it exists in the juice of most fruits, as strawberries, raspberries, gooseberries, oranges, &c. It is also found in the fluid called cambium, which is secreted between the bark and the trunk of the tree in spring. According to Braconnot, pecten is capable of forming an acid and uniting with alkalis.

2. *Sugar* is the secretion which is found in the next greatest abundance to gum, and the chemical analysis will point out how little change is required for the formation of this substance from gum. It is very generally diffused throughout the vegetable kingdom, and if it does not exist in the fully developed plant, it is always found in the seed during the germination of the young plant. [Germination.] There are several varieties of sugar, or saccharine principles, developed in plants, which have received different names, as cane-sugar, or the sugar of commerce, grape-sugar, liquorice, manna, &c. [Sugar.]

3. *Starch*, or *Fecula*, is the most abundant of the nutrient secretions of plants, and is most used by man. It differs slightly in composition from the two last, and an addition of carbon and abstraction of oxygen will convert it into either the one or the other. It occurs in the form of little granules, which are always surrounded by a delicate tissue, which becomes coloured blue by iodine. As it is the great source of nutriment for the younger parts of plants, it is found deposited in the cellular tissue in almost all the organs of plants, as in the tubers intended to nourish young shoots, in all fleshy roots and bulbs or rootstocks which have to furnish food to young stems, in the stems, the receptacles, seeds, or other parts of plants where it may be required for affording nutriment to the younger growing organs of the plant. [Starch.] In what manner the granules of starch are appropriated by the younger parts of the plant we are in a great measure ignorant: when removed from the plant, starch requires boiling water to dissolve it, and this is effected by the bursting of the tissue that envelopes the granule. This process must take place in the introduction of the starch to the younger parts of the plant, but it cannot be by the same agency, and is probably the effect of causes that have hitherto evaded observation.

4. *Lignine* is the ultimate result of vegetation upon the secretions previously mentioned. Gum, sugar, and starch are produced and then converted into lignine, which is a harder secretion than the former, and is found to constitute the principal ingredient that is deposited in the hardened tissues of plants. It differs from the former in chemical composition by possessing less oxygen and hydrogen and more carbon. It thus possesses less of the elements of water and more solid matter, and it is probably according to the amount of the latter that the timber of various trees differs in hardness and durability. The following are the proportions of carbon in various kinds of wood, according to Gay-Lussac and Thénard and Prout:—

Cornonna-wood . .	55	per cent.
Iron-wood . . .	53·44	„
Oak	52·53	„
Beech	51·45	„
Box	50	„
Willow . . .	49·80	„

We may sum up the changes which these various secretions undergo, in the language of the writer of the article 'Botany,' in the *Library of Useful Knowledge*:—'The rising sap passes into the leaves charged with carbonic acid or matter capable of being converted into it; it loses a large proportion of its water by evaporation, and of its oxygen by the decomposition of its carbonic acid, and thus becomes reduced to carbon and water in an inspissated state, which is gum when free, and lignine when fixed. From the lignine is organised the tissue among which the gum circulates for its support and consolidation, and within which it is also enclosed and elaborated into various other principles, remaining as starch when but little changed. A portion of the gum settles downwards through the stem; that part which is in the bark, being intercepted by no opposing current, finds its way to the roots; that part in the alburnum is caught by the ascending sap, dissolved in it and carried again into the leaves, there to undergo changes similar to what it had previously experienced. Whenever the gum meets in its course with cells that are empty, it is absorbed by them, and becomes subject to their special vital powers, changing to the principles which each particular species or organ has the property of elaborating, and the most readily to those which, like sugar, have the greatest chemical resemblance to itself' (pp. 100, 101).

5. *Albumen*, *Glutin*, or *Emulsin*, is one of the vegetable secretions that contain nitrogen, and which thus form a link between the proximate elements of animal and vegetable tissues. Glutin is found in the milk of all plants, and also with the starch found deposited in various seeds. Fluids in which it is contained become flocky when exposed to heat. It is also thrown down from them by acids, alcohol, and tannin. When the tubers of the potato are submitted to heat, a glairy fluid is separated which contains glutin. In the milk of the cow-tree it is found in the greatest abundance. When it occurs in the seeds of plants, it is sometimes called *Emulsin*, and is the cause of the milkiness of the fluids called emulsions, formed by rubbing seeds of various kinds with water.

6. *Gluten* is another compound containing nitrogen, and is found frequently in combination with the last substance and starch. It is found in the greatest abundance in the seeds of gramineous and leguminous plants. When moist, it is a white, transparent, tenacious, elastic, glutinous substance. When dry, it is colourless and scentless, and insoluble in water. It is soluble in boiling alcohol and acids, and is precipitated from the latter by ferro-cyanuret of potassium. All fluids in which it may be present combined with sugar are capable of fermentation, and it forms the basis of the several ferments that are used for exciting this process. Both gluten and emulsin are important agents in the nutrition of plants; their presence also indicates the comparative nutritious qualities of food for man, as will be seen by the following analyses from De Candolle:—

	Amylum, or Starch.	Gluten and Emulsin.
Wheat . .	70·00	23·00
Barley . .	79·00	6·00
Rye . .	61·00	5·00
Oats . .	59·00	6·00
Rice . .	85·07	3·60

II. *Of Special or Local Secretions.*—The greatest variety in the secretions of plants is in those which are not generally secreted and diffused throughout the system of the plant, but are either secreted in a particular part of plants for a special purpose, or are secreted by particular species of plants. These may be arranged under the heads of acids, alkalis, neuter principles, resinous principles, colouring-matters, milks, oils, resins, &c.

1. *Acids* are the most numerous group of vegetable secretions, and the chemist is constantly adding new ones to their number. They are generally found in combination

with the various earths and alkalis which exist in plants; they are however frequently free, and contribute to the flavour of the fruits of many plants. The vegetable acids may be divided into two classes: those possessing only carbon and oxygen, as carbonic and oxalic acids; and those possessing hydrogen in addition, as acetic, malic, citric, tartaric, and equisetic acids. Of all the acids, acetic is most common in plants, which may be the result of changes taking place similar to those which occur in the process of acetous fermentation. The change of elements necessary for the production of acid from the fecula of vegetables may be seen by the following atomic analysis from Meyen (*Pflanzen Physiologie*, band ii., p. 301):—

	Amylum, or Starch.	Citric Acid.	Tartaric Acid.	Acetic Acid.	Malic Acid.	Equisetic Acid.
Carbon	12	4	4	4	4	4
Oxygen	10	4	5	3	4	3
Hydrogen	20	4	4	6	4	2

The most remarkable of the vegetable acids is tannic acid, or tannin. It is frequently placed among the neuter principles of vegetation, but it reddens litmus, combines with salts, and in other properties agrees with acids. [TANNIN.]

2. *Alkalis.*—The substances thus called resemble the alkalis of the inorganic kingdom only in the property they possess of uniting and forming salts with acids. They are compound bodies containing carbon, oxygen, hydrogen, and nitrogen. They do not dissolve readily in cold or hot water. Although they differ little in chemical composition, yet they possess all the properties of the plant in which they are produced. The following table by Liebig and others gives the atomic constitution of the most powerful of these alkalis:—

	Morphine.	Codine.	Narcotine.	Strychnine.	Brucine.	Quinine.	Cinchonine.
Carbon	34	32	40	30	32	20	20
Hydrogen	36	39	40	32	36	24	22
Nitrogen	2	2	2	2	2	2	2
Oxygen	6	5	12	3	6	2	1

To these might be added a long list of others, as almost every natural order has its peculiar alkali, which exists in the plant in a state of combination with a peculiar acid. The mode of obtaining these alkalis consists in adding a strong mineral acid to a decoction of the plant, which takes up the alkali, and which may be afterwards precipitated from its solution by some mineral alkali.

3. A number of principles have been detected and described by chemists, which are neither acid nor alkaline, and have therefore been called *neuter principles*. The progress of chemistry will however probably place them in some of the other classes. The most remarkable of these are pollenine, berberine, asparagine, emetine, coffeine, gentianine, and fungine. Another series of these principles are those which possess resinous properties, and hence are called *resinous principles;* to these belong quassine, cathartine, elaterine, piperine, jalapine, digitaline, and several other principles named after the plants from which they are obtained.

4. *Colouring-Matters.*—In the article SAP it was stated that a peculiar substance called *chromule* was the cause of the green colour in plants generally, and it is supposed that this substance may undergo some changes which enable it to give all the colours which are observed in the vegetable kingdom. Whether chromule is the origin of these secretions or not, they are exceedingly numerous, and many of them have been carefully analyzed by chemists. Colouring-matters may be divided into two classes, those which possess nitrogen, and those which are without it. In the former class is indigo, which exists in a great number of leguminous plants, and is an important article of commerce. [INDIGO.] The latter class contains the numerous red, yellow, blue, and brown colouring-matters, many of which possess peculiar properties, a knowledge of which is made subservient to the art of dyeing. Amongst these are santaline, the colouring principle of red sanders wood; polychroite, that of saffron; rheadine, that of the red poppy; rhubarbine, of rhubarb, &c.

5. *Milks, or Milky Fluids,* are occasionally very abundant in plants, characterising entire families. Euphorbiaceæ, Papaveraceæ, Apocynaceæ, Asclepiadaceæ, Campanulaceæ, Convolvulaceæ, and Artocarpaceæ, among the Dicotyledons, and Liliaceæ, Scitaminaceæ, Araceæ, and Alismaceæ, among Monocotyledons, are the orders which produce the greatest abundance of milk. But wherever it occurs, it must not be looked upon as a peculiar secretion, but as a modification of the proper juice. The nature of this juice and the vessels through which it flows have been described under SAP. The milky fluids vary in composition in different plants: some of them are poisonous, containing active principles, as the milk of Papaveraceæ, which contains opium; others contain caoutchouc in great abundance, and the Indian-rubber of commerce is prepared from the milk of ficus elastica, and plants belonging to the orders Apocynaceæ and Euphorbiaceæ. The cow-tree yields a milk which is used as an article of diet by the natives of South America, where it grows.

6. *Oils* are secreted by plants, and are divided into two very distinct classes, the volatile and the fixed. The former are the agents which produce the various odours of plants, and can be collected by distillation from the tissues in which they are deposited. The latter exist in the cells of cellular tissue of many plants, especially the seeds, where they seem to perform the same office as starch, gluten, &c. [OILS.]

7. *Resins* are found deposited in the tissues of plants, but not in a regular manner, as they form passages and intercellular cavities in the midst of the tissues. They are occasionally found on the surface of plants, but this is rather the result of accident than a constant occurrence.

For further information on the physiology of secretion in plants and the properties of the various secretions, the reader is referred to Meyen's *Neues System der Pflanzen Physiologie;* Bischoff's *Lehrbuch der Botanik; Library of Useful Knowledge,* 'Botany.'

SECT (from the Latin *Secta*). Two accounts are given of the origin of this word. By some persons it is represented as a derivative of *sequ-or* (*secu-tus*), 'to follow.' By others it is derived from *sec-o* (*sec-tus*), 'to cut.' It is in this case, as in many similar instances, not easy to decide between the pretensions of the two; and it is far from being improbable that some persons may have used the word as a derivative from one verb, and others as derived from the other.

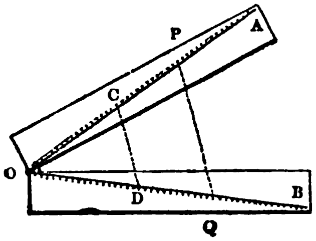
The *sects* of philosophers in antient times seem rather to have been persons who were *followers* of some distinguished teacher, than persons *cut off* from any general mass. But when we come to the word in its now more common and familiar use, namely, as denoting a particular community of Christians, the idea then predominates of *separation, cutting off,* over that of *following.* Thus no one thinks of calling the Catholic church a sect; and none, except it was designed to disparage and dishonour it, would call the English Protestant church a sect. But when we descend below it, we then see religious communities small in their numbers, and comparatively insignificant, who are *cut off* from a church, either by their own act, or by some supposed or real act of usurpation and unchristian tyranny on the part of the larger community. Thus the Quakers are a sect, the Anabaptists are a sect, the Methodists are a sect, and the Independents and English Presbyterians now are sects, though they, and especially the latter, were for some time in existence without falling under the description of a sect, being still incorporated in the church, in which they sought to accomplish certain reforms. In other systems there are similar bodies of sectaries.

SECTION, the curve made by the intersection of two surfaces. In the graphical arts it means generally a plane section, and most frequently a vertical section, the horizontal section being called the plan. In architectural designs, the longest vertical section is usually called the elevation, the term section being restricted to vertical sections which are perpendicular to the elevation.

SECTOR (Geometry), the figure made by two straight lines which meet, and a curve which cuts them both. The most common is the circular sector, made by two radii of a circle and the arc which they include. If r be the radius in linear units, and θ the angle measured in *theoretical* units [ANGLE], the area of the sector is $\frac{1}{2} r^2 \theta$ square units; but according as the angle is expressed in degrees and fractions of a degree, in minutes and fractions of a minute, or in seconds and fractions of a second, the area is found by the first, second, or third of the following formulæ:—

$$\frac{r^2\,\theta^\circ}{2\times 57\cdot 29578} \qquad \frac{r^2\,\theta'}{2\times 3437\cdot 747} \qquad \frac{r^2\,\theta''}{2\times 206264\cdot 8}$$

SECTOR (Drawing Instrument), an instrument invented by GUNTER, which has the appearance of a small carpenter's rule marked with scales in every part; the greater number of these scales not being laid down parallel to the edges of the rule, but converging towards the pivot on which the moving arm of the rule turns while the instrument is opened. These converging scales only properly belong to the sector; the others are merely laid down for convenience on such blank spaces as are left by the converging or sectorial scales.



The sector is a large number of pairs of compasses packed up into one, and most explanations of the instrument attempt to describe them all in one. It will however be more convenient to separate one pair of compasses from the rest, and to describe its use. Each piece of the ruler is marked with the same scales. Take one of these scales, OA, and that which corresponds to it, OB; then AOB is a pair of compasses which can be opened or shut at pleasure. Suppose two scales, say of chords, to be laid down on OA and OB, which are chords of 90°, OP and OQ being radii, or chords of 60°. If OP be four inches, we have then before us two scales of chords with the radius of four inches actually laid down, and any chords might be taken off them as from a common scale: for instance, if the marks of 35° be at C and D, then either OC or OD is the chord of 35° to a radius of four inches. But suppose it required to find the chord of 35°, not to a radius of 4 inches, but to one of 3·61 inches. We know that

$$4 : 3\cdot 61 :: \text{ch. } 35^\circ \text{ (rad. 4)} : \text{ch. } 35^\circ \text{ (rad. } 3\cdot 61);$$

and the fourth term of this proportion is to be found. Now this may be done with sufficient accuracy, and without any drawing, as follows:—Take a common pair of compasses, and open them to 3·61 on a subdivided scale of inches. Then open the sector until the points of the compasses are made to fall on P and Q, which, if the sector open rather easily, may be done very quickly. We have then $PQ = 3\cdot 61$ inches, and CD is the chord of 35° to that radius; for by similar triangles

$$\text{OP} : \text{PQ} :: \text{OC} : \text{CD};$$
$$\text{or} \quad 4 : 3\cdot 61 :: \text{ch. } 35^\circ \text{ (rad. 4)} : \text{CD};$$
$$\text{whence} \quad \text{CD} = \text{ch. } 35^\circ \text{ (rad. } 3\cdot 61).$$

Take the compasses then, and fixing one point at C, make the other fall on D; the distance CD may then be transferred with the compasses to the paper, or to the scales of inches, according as construction or arithmetical estimation is required.

The scales usually laid down upon the two sides of common sectors, such as are constructed upon a foot ruler, are:

1. A line of *polygons*, marked POL., showing the sides of polygons inscribed in a circle. And since the side of the hexagon is the radius of the circle, the radius of the scale is the distance from O to the figure 6. Thus, to inscribe a polygon of ten sides in a circle of two inches radius, open the sector until 6 and 6 on the counterpart polygon scales are two inches apart; then the distance from 10 to 10 on the same scales will be the side of the figure required.

2. A line of *chords*, as above described, the radius being the chord of 60°. But it is to be noted that upon the common sector the whole length OA of the scale is only the chord of 60°, so that angles above 60° do not appear. To construct an angle of more than 60°, first set off 60° on the circle drawn by means of the radius, and take the chord of the remainder from the sector. We think that the sector might be usefully copied in this respect on the common scales: giving all the length which the proposed scale will allow, to the chord of 60°, instead of to that of 90°.

3. A line of *sines*, the radius of which is the sine of 90°. Thus, to find the upright side of a right-angled triangle having an hypothenuse of 3·41 inches, and an angle of 32°, open the sector until 90° and 90° on the counterpart lines of sines are 3·41 inches apart; then the distance from 32° to 32° on the same lines will be the side required.

4. A line of *secants*, usually extending to about 75°, the radius of course being the secant of 0°. This scale is blank from O to 0°.

5. A first line of *tangents*, from 0° to 45°, the radius being the tangent of 45°, or the whole length of the rule.

6. A second line of tangents, on a smaller scale, beginning at 45° and proceeding to about 75°, the radius being the tangent of 45°, or the distance from O to the beginning of the scale.

7. A line of equal parts for operations answering to finding a fourth proportional to three numbers. Thus to find a fourth proportional to 36, 47, and 53, make 36 and 36 on the counterpart scales fall as far apart as from O to 47; then the distance from 53 to 53 on the same scales, measured on the scale, will show the fourth proportional.

To write on the applications of the sector would be to make a treatise on graphical trigonometry: one instance may suffice. It is required to calculate the formula

$$76 \times \frac{\text{sin. } 59^\circ}{\text{sin. } 38^\circ}$$

On the counterpart lines of sines make 38° and 38° (by opening the sector) fall as far apart as from O to 59° on the same scale; then the distance from 76 to 76 on the counterpart lines of equal parts will show, on that line of equal parts, the numerical value of the result required. Or make 38° and 38° on the counterpart lines of sines fall as far apart as from O to 76 on the line of equal parts; then the distance from 59° to 59° on the counterpart lines of sines will show the result required on the scale of equal parts.

The sector becomes an incorrect instrument, comparatively, when a great opening is required, and also when the result is much greater than the data from which it is produced. So much accuracy of construction is necessary, that those to whom the instrument is often really useful (not many, we suspect) should rather procure the larger ones, which are manufactured by the best instrument-makers, than be content with the six-inch lines which are found in the common cases of instruments. The sector is an instrument which requires much more care than the common scales, and in the use of which expertness can be gained by nothing but practice. Each scale is a pair of parallel lines with cross divisions; and it is important to note that the compasses must be applied to the inner of the parallel lines in every case. Also when the compasses are in the hand, with one point laid on one of the scales, the other scale being about to be moved to bring the other point of the compass on the right division of the counterpart scale, take care to hold the compasses only by that leg which is laid down on the scale.

SECTOR, ZENITH. [ZENITH SECTOR.]

SECULAR, a name given to those variations in the planetary motions which are of long duration, so that their periods are better expressed in centuries than in years.

SECUNDINES [EMBRYO.]

SECUNDUS, JOHANNES, is one of the most esteemed of modern Latin poets. His verses are chiefly amatory, and modelled after Catullus, whose passionate and tender spirit he had caught, without descending to the extent of his licentiousness. Like other learned men of the age, he took a Latin name: why that of Secundus, does not clearly appear. His family name was Everts, which in other languages is softened into that of Everardi and Everard. His father Nicholas or Klaas Everts, himself a learned man, and a distinguished jurist and magistrate, had five sons, all more or less eminent, among whom however John's fame stands highest. He early showed that taste for Latin poetry to which he owes his reputation; but he adopted the law as his profession, and graduated with distinction at Bourges, in 1533. That his talents and acquirements were well known may be inferred from the archbishop of Toledo having chosen him for private secretary. Through this connection he obtained the notice and esteem of Charles V., whom he accompanied to Tunis in 1534. Unfortunately the climate of Africa sowed in him the seeds of a mortal disease; and he was fain, instead of following up his fortunes by accepting an important post at Rome, to return to his native climate, only to die at Tournai, October 8, 1536, at the early age of twenty-five.

His Latin poems are—Elegies (3 books), 'Basia,' Epigrams, Odes, Epistles, Funera (elegies in the English meaning), and Miscellanies, one book each. There are many editions, among which that of Leyden, 2 vols. 8vo., 1821, is recommended. His works are published jointly with those of his brothers Nicholas and Adrian, who assumed respectively the names of Grudius and Marius, under the title *Poemata et Effigies Trium Fratrum Belgarum.* There are translations of the 'Basia' into English, French, &c. Of the former, that of 1775, with the Life of Secundus, and of the latter, that by Tissot, 1806, are said to be the best.

SECURI'FERA, a family of Hymenopterous insects of the section Terebrantia, the species of which are chiefly distinguished by their having the abdomen sessile, or joined to the thorax so as to appear a continuation of that part, and not separated by a slender peduncle. In the females, the abdomen is provided with a saw-like apparatus, which not only serves for depositing the eggs, but for preparing a place for their reception. The larvæ greatly resemble those of lepidopterous insects, and, like them, feed upon plants; they are cylindrical, soft, and fleshy; have the head vertical, and the three thoracic segments each provided with a pair of legs: besides these, the abdomen is often provided with pro-legs.

The *Securifera* are divided by Latreille into two sections, the *Tenthredinetæ* and the *Urocerata*. The first corresponds with the genus *Tenthredo* of Linnæus, the species of which have the mandibles elongated and compressed; the maxillary palpi are six-jointed, and the labial have four joints; the four wings are always divided by the nervures into numerous cells. The abdomen is composed of nine segments, the last of which is provided with an oviduct composed of two serrated lamellæ; these are pointed and lodged between two others forming a kind of sheath. By means of this saw-like ovipositor the female Tenthredo bores holes in the stems and other parts of plants, in which she deposits her eggs. In each hole, after the egg or eggs are deposited, a liquid is injected, the use of which, it is supposed, is to prevent the closing of the opening. The wounds thus made increase in volume, and form excrescences, which are either hard, or soft and pulpy, according to the nature of the plant or of the part wounded. These tumours then form the domicile of the larvæ, which inhabit them either solitarily or in society, and in them undergo their metamorphosis. Generally however the larvæ of the Tenthredinidæ live exposed on the leaves of the plants upon which they feed, and these larvæ are usually observed with the body more or less rolled in a spiral manner. When about to assume the pupa state, they enclose themselves in a cocoon which is sometimes fixed to the plant, but frequently they bury themselves in the ground previously to assuming the pupa state.

The second section (*Urocerata*) is distinguished from the preceding by the mandibles being short and stout, the ligula entire; the ovipositor of the females is sometimes exserted and composed of three slender appendages, and sometimes spirally rolled within the abdomen. It is composed chiefly of the Linnæan genus *Sirex*.

SEDAINE, MICHEL JEAN, born at Paris, July 4, 1719, died May 17, 1797, was a dramatic writer of considerable merit. On the death of his father, who was an architect, he was reduced to follow the trade of stone-mason. He continued however to study, and casually attracted the notice of his employer, an architect named Buron, who, on discovering his talents, gave him instruction, and finally took him into partnership. This service he afterwards repaid by educating the painter David, who was Buron's grandson. Sedaine made his first appearance as a dramatist in a piece taken from the 'Devil on Two Sticks,' played at the Opera Comique in 1756, which was very popular. After writing for that theatre during several years with brillant success, he took a bolder flight, and brought out his 'Philosophe sans le Savoir,' on the more classical stage of the Comédie Française. This, which is esteemed his most sterling piece, had a great run. He also wrote for the Grand-Opéra; and thus, it has been observed, shone at once on three of the chief theatres of France. The well-known opera of 'Richard Cœur-de-Lion,' for which, and many other of Sedaine's works, Gretry composed the music, procured for him, at the age of sixty-five, admission to the Académie Française.

Gaiety, originality, truth of dialogue, and skill in raising and sustaining interest in his plots, are the merits ascribed to Sedaine as an author. His style is censured for negligence, but it is forcible and flowing, and well adapted to his usual melodramatic composition. He himself maintained that what were called his faults really contributed to his success. 'They will have it,' he said, 'that I can't write French; and I say that none of them could write "Rose et Colas."' This was said in mortification at having been left out of the Institut National, when the pre-existing *Académies* were remodelled into that body. The catalogue of his plays amounts to thirty-two. There is a selection ("Œuvres Choisies de Sedaine") with a memoir, Paris, 1813.

SEDAN, a town in France, in the department of Ardennes, 157 miles from Paris, through Soissons, Reims, and Mézières. In the ninth century Sedan was the subject of a struggle between Charles the Bald and Louis of Germany; and in the course of the middle ages the lordship of Sedan was erected into a principality, which, after various changes, was united to the crown of France in the reign of Louis XIII. That prince deprived the town of its municipal franchises, a step which much depressed it; but it was revived by the protection of Colbert. The Protestants had an academy here, which continued down to the revocation of the Edict of Nantes.

The town is seated on the Meuse, in a district not remarkable for fertility, but well cultivated in fields and kitchen-gardens. It is fortified; but the fortifications, with the exception of the citadel, are not well kept up. The town consists of two parts, the upper and lower town, and has wide straight streets, lined with houses of respectable appearance, roofed with slate. The old castle, remarkable as the birth-place of Turenne, is occupied as an arsenal, in which are kept some fine and curious specimens of antient armour. There is a handsome bridge over the Meuse, which flows through the town; and there are a Roman Catholic church and three chapels, a Reformed church, and an establishment of the Sisters of Charity. There are three barracks, one of them for cavalry, very spacious and handsome. The military hospital has accommodation for 500 patients and an extensive garden attached to it. It is on an elevated spot, well fortified, and commanding the whole place There are a foundling hospital, a college, a drawing-school, a public library, a prison, and a theatre. A bronze statue of Turenne adorns the place or square of the town-hall.

The population, in 1831, was 13,661; in 1836 it was 13,719. The town is celebrated for its manufacture of fine woollen cloths, a branch of industry which was established here in the seventeenth century, and fostered by the patronage of Louis XIV., at the instigation of Colbert. Black cloths are chiefly made now. Kerseymeres and other woollens are also made. Woolcombers' cards and tools, and machines for shearing the cloth, are manufactured. To these articles may be added woollen yarn, woollen hose, and steel buckles. Trade is carried on in a variety of articles besides these; and there are tan-yards and dye-houses. Four fairs are held in the year. There are numerous iron-works in the surrounding district.

The arrondissement of Sedan comprehends 93 communes, and is divided into five cantons or districts, each under a justice of the peace.

There is a canal cut from the Meuse above the town, and carried through the ditches which surround the fortifications into the same river below the town. It has a small dock for the canal boats, and is provided with sluices at the extremities where it unites with the river. It was commenced in 1789, but was not finished till 1810, the works having been suspended from 1792 to 1806.

SEDATIVES are agents which produce a direct depression of the action of the vascular system, with little sensible evacuation. They differ from narcotics, inasmuch as their depressing effects are not preceded by any obvious excitement or increased action of the heart and arteries. Whether they act primarily on the heart itself, or secondarily by a previous influence on the nervous system, is not clearly ascertained. Some, such as the infusion of tobacco, and hydrocyanic acid, appear to destroy completely the sensibility of the heart, so that it no longer responds to the stimulus of the blood; but how this effect results is altogether unknown. Oxalic acid, when the dose is large, seems also to paralyse the heart; while in less quantities it operates differently. [OXALIC ACID.] The peculiar mode of action of the articles entitled to be considered as pure sedatives has been detailed under the respective heads of DIGITALIS, HYDROCYANIC ACID, NICOTIANA, &c., and need not be repeated here. The medical employment of these formidable agents should never be had recourse to without competent authority and superintendence; but as many cases of poisoning result from their accidental or criminal administration, it is needful to observe that the greatest promptness is requisite in the administration of appropriate remedies. Vital stimulants, such as ammonia and brandy, are the best; and electricity or galvanism may be resorted to after the others.

Sulphuretted hydrogen, when breathed, injected into a vein or the rectum, or even applied to the skin, acts as a sedative, and in a small quantity can occasion death. It is largely disengaged from many decomposing substances, such as exist in stagnant pools, ditches, drains, and cesspools. Proximity to these produce effects more or less serious according to the intensity of the gas. Even one of its compounds, hydro-sulphuret of ammonia, is a potent sedative. Cold, when extreme, likewise acts as a sedative, but its mode of action has been already explained under BATHING.

SEDBERG. [YORKSHIRE.]

SEDENTARY ANNELIDS, Lamarck's third order of his ninth class, *Annelids*. The following is his definition of this third order:—

Animal always inhabiting a tube, out of which it never comes entirely, and without eyes. *Branchiæ* always at one extremity of the body or near it, unless the tube of the animal is open on one side throughout its length.

Lamarck divides this order into three divisions:—

1. Those whose branchiæ are dorsal or disposed longitudinally on the body.

Dorsalians.

This division comprises the following genera, *Arenicola* and *Siliquaria*. [TUBULIBRANCHIATA.]

2. Those whose branchiæ, either known or supposed, are disposed at one of the extremities of the body or near it.

(*a*) Branchiæ not determined, supposed to exist at the posterior part of the body. Tube of the animal open at both ends.

Maldanians.

These consist of the genera *Clymene* and DENTALIUM.

(*b*) Branchiæ in general known, disposed on the anterior part of the body or near it.

(†) Branchiæ not separated nor covered by an operculum.

Amphitritians.

These are thus subdivided:—

(1.) Branchiæ short, never jutting out (avançées). Tentacula short or null. This subdivision comprises the genera PECTINARIA and *Sabellaria*.

(2.) Branchiæ or tentacula of considerable size, jutting out anteriorly, either in a tuft (aigrette) or in a flabelliform plume (panache). This subdivision consists of the genera *Terebella* and *Amphitrite*. [TUBICOLIDÆ.]

(††) Branchiæ separated or covered by an operculum. Tube solid and calcareous.

Serpulaceans.

Under this division Lamarck arranges the genera *Spirorbis*, *Serpula*, *Vermilia*, *Galeolaria*, and MAGILUS. [TUBICOLIDÆ.]

SEDGE-WARBLERS. [SYLVIADÆ.]

SEDGEFIELD. [DURHAM.]

SEDLEY, SIR CHARLES, an English poet, was the son of Sir John Sedley of Aylesford in Kent. His mother was Elizabeth, daughter of Sir Henry Saville, warden of Merton College, Oxford. At the age of 17, in the year 1655-6, he became a fellow-commoner of Wadham College, and taking no degree, retired to his own county, where he lived till the restoration of Charles II. After this event he came to London, and, to use the words of Antony à Wood, set up for a satirical wit, a comedian, poet, and courtier of ladies. In 1663 he was fined very heavily for a drunken frolic in which he had been engaged, the particulars of which are quaintly told by Wood. (*Athenæ Oxon.*) Shortly after this he represented the borough of New Romney in Kent. Several of his speeches in parliament are printed among his works.

During the reign of James II., Sedley appears to have retired from the court, which he had much frequented in the lifetime of Charles. At the Revolution he joined the party of William. He died August 20, 1701.

Sedley's works, with a short memoir prefixed, were published in 1722. They consist of various short amatory poems, a few speeches in parliament, translations from the classics, and the following plays: 'The Mulberry Garden,' a comedy; 'Antony and Cleopatra,' a tragedy; 'Bellamira, or the Mistress,' a comedy. ('Tunbridge Wells, or a Day's Courtship,' a comedy; 'The Tyrant King of Crete,' a tragedy; 'The Grumbler,' a comedy, are also attributed to him.)

As a poet Sedley has been well characterized by Lord Rochester's celebrated lines beginning—'Sedley has that prevailing gentle art.' In unaffected simplicity and ease of expression, in sprightliness of fancy, in the skilful treatment of common and trivial subjects, he is surpassed by none of his contemporaries. His licentiousness is of a very refined kind, and his pages are not disfigured by the grossness of language so common in his time. The best of his short poems are printed in Ellis's 'Early English Poets.' His plays have very little merit. For his Life, see Wood, already quoted; a Memoir prefixed to the edition of his works, 1722; and Hasted's 'History of Kent,' vol. i.

SEDLITZ, a village in the circle of Saaz in Bohemia, about a mile from Seidschuz, with two bitter salt-springs, which were discovered in 1724 by Frederick Hoffmann, physician of Halle, and from which the well-known salt is obtained. There are several such springs in the neighbourhood, including those at Seidschuz, in the circle of Leitmeritz. They are mostly situated round the great Serpina Marsh, to which they perhaps owe their origin. This marsh, which is nearly five miles from north to south, is often for half the year under water, and in dry weather is used as a meadow; pits are then dug in it, from which bitter salt is obtained. Above half a million of bottles of the water of Sedlitz and Seidschuz are annually sent to all parts of Germany.

SEDUCTION. [PARENT AND CHILD.]

SEDU'LIUS, CÆLIUS, a Christian Roman poet, is generally supposed to have lived during the first half of the fifth century of our æra; but who he was and where he lived is unknown. Some writers call him a presbyter, others an antistes, and others again call him a bishop. A few very late writers state that he was a disciple of Hildebert, archbishop of the Scots, and that he came from Scotland or Ireland to France, and thence to Italy. But these statements are either entirely groundless, or arise from the circumstance that the old Christian poet Sedulius was confounded with another Sedulius who lived in the eighth or ninth century of our æra.

There are four poems which are usually ascribed to Sedulius:—1, 'Mirabilium Divinorum, sive Operis Paschalis Libri (quatuor) Quinque:' it is preceded by a prose letter to an abbot Macedonius, from which we learn that the poet treated of the same subject in prose also, and that he himself divided the poem into four books, though in all our editions it is divided into five books. Whether the fifth book was added by Sedulius himself at a later period of his life, or whether it was added by some one else, is uncertain. The poem, which is in tolerably good hexameters, contains some portions of the history of the Old Testament and the life of Christ. The language is purer than that of many of his contemporaries and in some passages it is really poetical. 2, 'Collatio Veteris et Novi Testamenti.' This poem is written in elegiac verse, and in such a manner that the first words of every hexameter form the second half of the pentameter which follows. It contains narratives from the Bible, so arranged that those taken from the Old Testament always appear in juxta-position with those taken from the New Testament. 3, A 'Hymnus,' written in Iambic dimeters, in which the verses of each stanza begin with the letters of the alphabet in their usual succession (Acrosticha). It is a panegyric upon Jesus, and one of the best productions of the Christian poetry of the age. 4, 'De Verbi Incarnatione' is composed of verses taken from Virgil, which by slight alterations are combined into a Christian poem.

The editio princeps of Sedulius is the 'Ascensiana,' Paris, 4to., without date. The latest editions are by Cellarius, Halæ, 1704 and 1739, 8vo.; by J. Arntzen, Leuwarden, 1761, 8vo.; and by Faustino Arevalo, Rome, 1794, 4to.

Comp. Bähr, 'Die Christlichen Dichter und Geschichtschreiber Roms,' p. 54, &c.

SEDUM, a genus of plants belonging to the natural order Crassulaceæ. It is known by possessing a 5-parted calyx with ovate, usually turgid, leaf-shaped sepals; five petals, which are usually spreading; ten stamens, an hypogynous scale at the base of each carpel; five carpels. They are mostly herbs or shrubby plants, with stems usually branched from the base. The flowerless stems are crowded with leaves, which are alternate, seldom opposite, fleshy, terete or flat, and entire. The flowers are commonly yellow, sometimes white or blue, and are arrayed in cymes. The species of

Sedum are inhabitants of the temperate and warmer parts of the earth, and are mostly found in dry, barren, rocky, or arid situations where nothing else will grow. Their roots appear to serve only the purpose of holding them in the ground, whilst their leaves are so constructed that they absorb moisture from the air, and prevent its being again evaporated. It is thus that they are fitted for the situations which they occupy. G. Don, in Miller's 'Dictionary,' enumerates 110 species of this genus. Many of them are British, and a number of the foreign species are cultivated in our gardens. We shall describe a few as examples of the genus.

Sedum Rhodiola, Common Rose-root, or Rhodiola: leaves flat, oblong, serrated at the apex, glabrous, glaucous; root tuberous; stems single; flowers with four petals, eight anthers, and diœcious from abortion. It is a native of mountainous districts of the middle of Europe, of Siberia, and North America. In Great Britain it is found on mountains in the north of England, Scotland, and Wales. It is a glaucous plant with yellow flowers. The root, when dried, has a sweet taste and smell, and hence its common name. The leaves have been used as a cataplasm in headache, and the root has been supposed to possess antiscorbutic qualities. In Greenland it is eaten as a salad. This and some allied species constituted the genus Rhodiola, but the difference between them and Sedum does not justify the separation.

Sedum Telephium, Orpine, or Tuberous Stonecrop: leaves oblong or oval, attenuated at the base, flat, toothed, glabrous; stems erect; cymes corymbose, terminal; stamens equal in number with the petals. It is found on rocks, walls, and dry stony places in most parts of Europe: in Great Britain it is met with on the borders of fields, in hedges and bushy places, on a gravelly or chalky soil. Several varieties have been described, and sometimes as species. The most frequent is one with purple flowers, *S. T. purpureum*. The leaves of this plant are sometimes eaten as a salad; and in former times the roots were in request as a remedy in hæmorrhoids and other diseases.

Sedum Anacampseros, Anacampseros, or Evergreen Orpine: leaves wedge-shaped, obtuse, entire, nearly sessile, alternate, flat, smooth; stems decumbent; flowers corymbose. It is a native of rocks on the higher mountains of Piedmont, Savoy, Switzerland, &c. It is often cultivated in gardens. It is a trailing plant, with beautiful purple flowers. It was also formerly used in medicine.

Sedum acre, Acrid Stonecrop: stems rather creeping; branches erect; leaves ovate, sessile, suberect, alternate, glabrous; flowers sessile, on a trifid cyme; petals lanceolate, acuminated. It is one of the most common of the genus, and is found on walls, roofs of houses, rocks, and dry places, all over Europe. When chewed in the mouth, it has a hot biting taste; hence it is frequently called Wall-pepper. When applied to the skin, it produces vesication; and, taken internally, it causes vomiting. It was formerly much used as a remedy in those skin diseases which are vulgarly called scorbutic, but it is not often used now in this country.

Sedum album, White Stonecrop: branches perennial, rooting; leaves club-shaped, green, flattish, glabrous; cymes branched, terminal, subcorymbose; petals bluntish. The flowers are cymose and white. It is a native of Europe, in dry meadows, on walls and rocks. It is rare in England. With many of the more common stonecrops, this species has been used in medicine, and also eaten cooked, or as a salad.

In the cultivation of the species of Sedum, they will be found to succeed best on rock-work, for which their habit especially adapts them. The perennial species may be readily increased by cuttings. Those which are annual can be raised by merely sowing the seed in the situations where they are to grow. Those which require a greenhouse may be sown in pots filled with sandy loam and brick rubbish, which should be well drained. Cuttings should be allowed to dry a few days before planting, in order to prevent rotting.

SEED, in Botany, is that part of a plant which contains, within several coverings, the embryo or young plant, and is itself covered over with the various parts of the pericarp or fruit. The seed in its young state is called the ovule [OVULE], which is found in the interior of the ovary, or germen, at a very early period of its growth. When the ovules are first seen, they are like little warty excrescences on the inside of the ovarium, composed of delicate cellular tissue. As they increase in size they elongate, and may then be divided into two parts, a central portion, consisting of cellular tissue, called the *nucleus*, and an external covering consisting of two membranes, the outer one of which is called *primine* and the inner one *secundine*. At one end the two membranes are open, forming a hole called the *foramen*, from which the nucleus projects more or less in the early stages of its growth. As the ovule increases in size, the foramen is almost closed, and in the matured seed it is called the *micropyle*. The base of the ovule is attached to a membrane of the ovarium called the placenta, and as the ovule increases in size the portion of its tissues that connects it with the ovary becomes, relatively to the ovule, small and cord-like, and hence has been called the *funiculus* or *umbilical cord*. The point where this cord unites with the ovule becomes in the seed the *hilum*, and it is at this point also that a number of spiral vessels and ducts are observed to pass to the base of the seed, which has been called the *chalaza*. In the progress of the growth of the ovule the nucleus increases in size, and becomes hollow inside, forming a little shut sac, which forms a kind of third membrane, called *tercine*. In the interior of this sac another is formed, which, as it contains or forms a part of the embryo or young plant, is called the *sac of the embryo*. Whilst growing, the parts do not always maintain the same relations to each other that we have described, and from this circumstance Mirbel has proposed a classification of ovules. When the ovule has grown regularly with the hilum and chalaza at the base and the foramen at the apex, it is called a *straight* ovule, or *orthotropous*. Although this appears to be the normal mode of growth, it is not the most frequent It is seen in the walnut. If in the course of growth the ovule is bent round, so that the foramen is brought near to its base, where the hilum and chalaza exist, it is called a *curved* ovule, or *campylotropous*. This is seen in the Brassicaceæ, Papilionaceæ, and Caryophyllaceæ. When one part of the ovule grows faster than the other, the nucleus loses its relative position,—its point is in this instance directed towards the base, and the foramen is found near the hilum, and the base of the nucleus becomes situate where its apex originally was, and it carries to this point the chalaza, which is continued from the cord by means of a set of vessels called the *raphè*. This forms a third class of ovules, called *contorted* ovules, or *anatropous*. It is seen in Liliaceæ, Rosaceæ, Ranunculaceæ, &c. Mirbel maintains that all ovules are originally straight, but Link doubts this. (Link, *Grundlehren der Kräuterkunde*, theil ii., p. 281.)

The position of the ovulé in relation to the ovary is a point of some importance in systematic botany. When it arises up from the base of the ovarium, it is called *erect;* when it originates a little above the base, *ascending;* when it hangs from the apex of the cavity, *pendulous;* when it hangs from any point below the very apex, *suspended*.

Their number is also a point of value, and when there are only few and easily counted, they are said to be *definite*. When their number is too great to be counted, they are called *indefinite*.

Such is the state of the young seed up to the time of the influence of the pollen upon the stigma. Soon after this action takes place a minute vesicle makes its appearance on the summit of the inner sac of the nucleus. This vesicle increases in size, and is developed into three parts, a descending portion, called the *radicle*, and which always points to the foramen; an ascending portion, the *plumule;* and lateral or enveloping portions, the *cotyledons:* the whole constituting the *embryo* or young plant.

Whilst the embryo is growing, the membranes which immediately surround it increase in size, and frequently become the seat of the deposition of a large quantity of amylaceous matter called *albumen*, which is deposited for the purpose of supplying the young plant with nutriment during its growth. The albumen however is not always deposited around the embryo, but in many cases is deposited in the cotyledons of the embryo itself, where it performs the same functions as when deposited in the tercine, or sac of the embryo. The former takes place in Ranunculaceæ, Papaveraceæ, and all that group of plants named by Lindley Albuminosæ, whilst the latter is seen in Leguminaceæ and other orders.

When the embryo is fully grown, the ovule has no further need of connection with the placenta, the funiculus or cord therefore dries up, and the scar which is left on the seed at its point of union with it is the hilum or eye; and when this is fully formed, and the embryo is capable of independent growth, the ovule becomes a seed. Sometimes the umbilical cord, instead of disappearing, increases in size, forming a membrane which entirely envelopes the seed which is called an *aril*. One of the most remarkable instances of its existence is in the nutmeg, around which a thick aril is formed, which forms the mace of the shops. It is also well seen in the Euomymus, or common spindle-tree, where it forms a beautiful orange-coloured mantle around the seed. It also exists in the passion-flower Its uses are unknown.

The external coverings of the seed, which are called primine and secundine in the ovule, are called the *testa*, *perisperm*, or *spermoderm*, and are nothing more than a hardened state of the ovular membranes. Whatever may be the number of these coverings in the ovule, they are seldom discernible in the seed. In the walnut however two integuments can be plainly seen, one brown and tough, the other light and filmy; also in the almond and some other seeds. In most instances the testa of the seed is perfectly smooth, but in others it is covered over with hair and other appendages. The cotton that is so extensively used for the manufacture of clothing is the production of the outer covering of the seeds of the cotton-plant. The oleander is supplied with hairs at a particular part of the plant, that facilitate the moving of the seed from place to place through the air. In some instances the seeds have broad membranous expansions of the testa, called *wings*, by which means they fly from one spot to another, as in the Bignonia. Many seeds are beautifully marked with veins running in all directions; others have minute elevations and depressions, presenting a remarkable regularity and beauty of structure.

When the seed is stripped of its testa, it presents either the albumen surrounding the embryo, or the embryo itself. When the albumen is present, it varies much in character, being of a horny, oily, fleshy, or mealy consistence. These differences depend on the nature of the peculiar secretions which are mixed with fecula, or starch, in the albumen. There is a peculiar form of the albumen, which is called *ruminated*, and which takes place in consequence of the abstraction of certain parts by absorption and their not being again filled up. This is the case with the nutmeg.

There is sometimes found in seeds an organ between the albumen and embryo, which is the innermost membrane, in a state of induration and increased in size; it occurs in all the species of the ginger tribe, and also in Nymphæa lutea, the yellow water-lily. It is called the *vitellus*.

The embryo is the most internal of all the parts of a seed. It consists, as before stated, of the radicle, plumule, and cotyledons, to which some add the *cauliculus*, or neck, which is only the point at which the radicle and plumule meet. The *direction* which the embryo takes varies much in different orders and genera of plants. Its directions are divided by botanists into *absolute* and *relative*. The absolute directions are explained by the terms straight, cuvate, falcate, uncinate, coiled up, folded up, spiral, bent at right angles, and serpentine. Terms have been devised also to express the relative positions of the embryo; but it is much more general for botanists to use the terms which we have referred to in speaking of the form of the ovule, and therefore we shall not explain these. For further information on the structure and functions of the embryo see COTYLEDON and GERMINATION.

The seed-like fruits of Lamiaceæ, Boraginaceæ, Graminaceæ, and Cyperaceæ were supposed by Linnæus and his followers to be *naked seeds*. But as these have been discovered to possess a pericarpial covering, it was thought that naked seeds could not exist. This opinion however has been shown by Brown to be incorrect, as he has demonstrated that the seeds of Coniferæ and Cycadaceæ are from their youngest state destitute of pericarp, and receive impregnation through their integuments, without the intervention of style, stigma, or stigmatic surface.

SEETZEN, ULRICH JASPAR, was born on the 30th of January, 1767, at Sophiengroden near Jever. His father was in good circumstances, and gave his son an excellent education, which was commenced at Jever, and completed in the university of Göttingen, where Seetzen from 1785-88 studied medicine, the natural sciences, and especially agriculture and political economy. Here he became acquainted with Alex. von Humboldt and Link, with whom he conceived the plan of travelling into distant countries which were then little known. Seetzen chose Asia and Africa as the fields of his enterprise, and was encouraged in his design by Heyne, Gatterer, Eichhorn, and Blumenbach. After the completion of his studies, he returned to Jever, and made several journeys through Germany and Holland. He however never lost sight of the great object of his life, and studied with great care what had then been written upon Asia and Africa. After he had made all the preparations which private study enabled him to make, he applied to Blumenbach for his advice and support. This great naturalist recommended Seetzen to Baron von Zach, who, though at first not favourably disposed towards the extensive plans of Seetzen, soon altered his opinion, and not only instructed the young man in astronomy, but induced the Duke of Gotha to provide Seetzen with the necessary instruments for making astronomical observations, and afterwards also to grant him an annual sum for the prosecution of his objects. It was also resolved that a museum should be formed at Gotha, and the duke entrusted Seetzen with considerable sums to purchase any interesting objects connected with the arts, religion, and literature of the countries through which he was about to travel. On the 13th of June, 1802, Seetzen set out from Jever, accompanied by a surgeon who had been educated at Göttingen at the expense of Seetzen himself. The proposed subjects of his inquiry in Asia and Africa were natural history, statistics, agriculture, commerce, the arts, mathematical, physical, and antient geography, and archæology; in fact, everything that might contribute to an accurate knowledge of the countries. Seetzen stopped for a short time at Vienna, to learn the art of drawing plans and maps; and thence he went, by way of Bucharest and across the Balkan to Constantinople, where he arrived on the 12th of December. After a stay of six months, which were spent in various preparations, he crossed over into Asia Minor, and travelled by land to Smyrna. Here his companion was taken ill, and he was obliged to leave him behind. Seetzen continued his journey to Haleb with a caravan, and arrived there towards the end of 1803, and stayed for nearly fifteen months, which he devoted to the study of Arabic. From Haleb he proceeded to Damascus, through Syria and Palestine, as far as the deserts of Arabia, and got much new information, and made valuable collections. In 1805, he returned to Damascus; and, dressed in the costume of a Turk, he made excursions into Libanus and Antilibanus. The year after, he began his travels in the country east of Hermon, the Jordan, and the Dead Sea. His journeys in these districts were made under the greatest privations and dangers; but they were amply rewarded by the discovery of the ruins of several antient towns, the site of which had till then been unknown to Europeans. He also penetrated farther south along the eastern shore of the Dead Sea, and he proceeded around the southern shore to Jerusalem. From this place he travelled to Joppa, and thence by sea to Acre, where he remained till the end of the year 1806. We now lose sight of him for some months, as the documents belonging to this period are missing; but in March, 1807, we find him again at Jerusalem, from which place he travelled to Hebron, Horeb, Sinai, then back towards the north, and across the isthmus of Suez to Cairo, where he remained for two years. Here he purchased for the museum of Gotha a collection of 1574 MSS., 3536 archæological subjects, and collected a great many specimens in mineralogy, botany, and zoology. In 1808 he visited the province of Faioum, and examined the pyramids, the catacombs near Saccara, and the great lake of Birket-el-Karun. About this time he adopted, at least externally, the Mohammedan religion, in order to gain the confidence of the Egyptians and the Arabs, and to be able to visit those places in Arabia to which Mussulmen alone have access. He then attempted to proceed to Acaba, but was obliged to return to Suez. Soon afterwards however he travelled by sea to Yambo and Jidda, and thence to Mecca and Medina. In the two last places he made a great many drawings and plans. In March, 1810, he set out for Mocha. A letter, dated Nov. 17, 1810, and addressed to Mr. Lindenau of Gotha, was the last account that he himself sent to Europe. In 1815, Von Hammer of Vienna was informed by Mr. Buckingham, in a letter written at Mocha, that Seetzen had suddenly died in 1811, in the neighbourhood of Taes, while he was on his way to the Imam of Sana to recover his luggage, &c., which had been seized at Mocha, and that it was generally believed that the unfortunate traveller was poisoned by the command of the Imam. A report which was afterwards brought over to this country from Bombay, agreed in the main points with that of Mr Buckingham.

The diary of Seetzen's journeys, and his maps, plans, and drawings, were for some time supposed to be lost, but nearly the whole has been recovered, and is now in the hands of Professor Kruse of Dorpat. As the editing of the immense mass of materials would be too much for one man, it has been divided into three sections, each of which is entrusted to a competent person. Kruse has undertaken the part belonging to antient geography; Senkoroski, all that relates to Arabia; and Brandis, the astronomical part, together with mathematical geography. It is intended to supply, in the form of commentaries, that which Seetzen himself might probably have added to his notes and sketches. Nothing has yet been published, so far as we are aware.

A full account of the life and travels of Seetzen is given in Brockhaus's *Conversations-Lexikon*.

SE'EZ. [ORNE.]

SEFA'TIANS, a sect of Mohammedans, who hold the opposite opinion to the Motazelites, with respect to the eternal attributes of God, which they affirmed, making no distinction between the 'essential attributes' and 'those of operation;' hence they were called Sefatians, that is, 'attributists,' from *sefát*, a word meaning in Arabic 'qualification, attribute.' At first their doctrines were similar to those of other Mohammedans, but in the course of time they introduced another species of 'declarative attributes,' or such as were necessarily used in historical narration, as the hands, the eyes, &c., which they did not attempt to explain, but contented themselves with saying they were in the Law. At length, by introducing various interpretations of these 'declarative attributes,' they divided into several schools or sects, as the Asharians, or the followers of Abú-l-haran Al-ashari, who allowed the attributes of God to be distinct from his essence, yet so as to preclude any compassion between Him and his creatures; the Mushabbehites, or Assimilators, who admitted a resemblance between God and his creatures, supposing Him a figure composed of members or parts, either spiritual or corporal; the Keramians, or followers of Mohammed Ibn Kerâm, also called Mugassemiun, or Corporalists, who not only admitted a resemblance between God and his creatures, but declared Him to be corporeal; the Jabarians, so called from *jabr*, which signifies 'necessity, compulsion,' because they maintained that man is 'inevitably constrained' to act as he does (the last were subdivided into Pure Jabarians and Middle Jabarians, owing to some slight divergence of opinions which arose among them); the Murgians, from *raja*, 'to expect,' who maintain that the judgment of every true believer who has been guilty of a sin will be deferred till the resurrection, and that disobedience with faith cannot hurt. There are still the disciples of Mukátel and Basher, named Thaubanians, who held opinions nearly similar to those of the Murgians. (Sale's *Koran*, Preliminary Discourse, p. 164, *et seq.*)

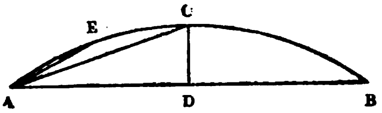
SEFFAVEAN DYNASTY. [PERSIA—*History*.]

SEFI DYNASTY. [PERSIA—*History*.]

SEGELMESA. [MAROCCO.]

SEGESTAN. [SEISTAN.]

SEGMENT (part cut off), a term which, in its general sense, needs no explanation. It is, in mensuration, most frequently applied to the part cut off from a circle by a chord, and the measurement of this segment of a circle is the only point for which reference is likely to be made to the word. Let AB be the segment of a circle, and C and D the middle points of its arc and chord. The segment ACB is easily expressed by the angle which the arc subtends at the centre: if this angle (measured in theoretical units [ANGLE]) be θ, and the radius r, the number of square units in the segment is



$$\frac{r^2}{2}(\theta - \sin.\theta).$$

But when a segment is actually to be measured in practice, it usually happens that the radius is not given, and the circle is too large to measure it conveniently. In that case the middle point C must be found, and AB and AC must be measured, as also CD. This being done, the length of the arc AB can be found with great exactness from the formula 'one-third of the excess of eight times AC over AB, or $\frac{1}{3}(8\,AC - AB)$. This formula errs only about one foot out of 80 (always giving the arc a little too small) in a whole semicircle, and the error diminishes nearly as the fourth power of the arc; thus at half a semicircle the error is about one foot out of $2^4 \times 80$, or 1280 feet; at one-third of a semicircle it is only about one foot out of $3^4 \times 80$, or 6480 feet, and so on. Another formula of the same sort, but so close to the truth that no measurements could ever be taken in practice sufficiently exact to make its accuracy appreciable, is the following:—find E the middle point of AC, and measure AE; then the arc is very nearly (but a little less than)

$$\frac{AB + 256\,AE - 40\,AC}{45}.$$

The error here is less than one foot out of 390 on the whole circle, and diminishes with the sixth power of the arc.

Taking the arc from one or other of these methods, the area of the segment is then to be found as follows:—Determine R, the radius, from $AC^2 \div 2\,CD$, and compute

$$\frac{R \times \text{Arc} - AB\,(R - CD)}{2},$$

which gives the area required. This formula may be reduced to

$$\frac{\frac{1}{3}\,AC^2\,(2\,AC + AD) - AD^3}{CD}.$$

Thus (to take an instance of Bonnycastle's) if $AD = 12$, $AC = 13$, whence $CD = 5$ (all feet), we have for the area of the segment

$$\frac{\frac{1}{3} \times 169 \times 38 - 1728}{5} = 82{\cdot}533 \text{ square feet.}$$

Another approximate rule is (giving somewhat too little

$$\frac{CD\,(12\,AD + 8\,AC)}{15},$$

which is more exact than the preceding. The error is only one per cent. when the segment is a semicircle, and it diminishes with the seventh power of the subtended angle nearly.

It answers well enough for rough purposes, and particularly when the segment is small, to consider the arc of the circle as being part of a parabola, and to take two-thirds of the rectangle under AB and CD for the area.

SE'GNERI, PA'OLO, born in 1624, at Nettuno in the Campagna of Rome, studied at Rome under the Jesuits, and afterwards entered that Order. He applied himself more particularly to sacred oratory, and became a distinguished preacher. He formed a style of his own, avoiding both the dryness of his predecessors and the turgidity of his contemporaries, and he is one of the few really eloquent preachers that Italy has produced. (Maury, *Essai sur l'Eloquence de la Chaire.*) Segneri's 'Quaresimale,' or series of sermons for Lent, is still read with pleasure and profit. The author is rather too fond of figures and antithesis; at times he indulges too much in profane and even mythological erudition, in doing which he conformed to the vitiated taste of his age, which is known as that of the Seicentisti, but he is one of the purest writers of that age, and his language has been approved by the Crusca Academy. Segneri was an earnest and truly Christian preacher. In that vocation he visited almost every corner of Italy, and he always won the attention and affection of his audience. He composed also 'Laudi,' or prayers in verse, of an easy and popular style, to be sung before and after his sermons.

Pope Innocent XII. chose Segneri for his own preacher, as well as of the College of Cardinals, in which office he continued three years, until 1694, when he died at Rome. He was succeeded by father Casini, who nearly equalled him in eloquence, and surpassed him in the boldness and freedom with which he spoke truth, however unwelcome it might be to men in power, which however did not prevent pope Clement XI. from making him a cardinal.

Segneri composed, besides his sermons, several pious tracts, such as 'Il Cristiano Istruito,' which contains many excellent precepts for living a Christian life.

(Corniani, *Secoli della Litteratura Italiana;* Maffei, *Vita del Segneri.*)

SEGNI, BERNARDO, born at Florence about the end of the fifteenth century, studied the law at Padua, but afterwards proceeded to Aquila in the kingdom of Naples, where he followed the profession of a merchant. On his return to Florence after the fall of the republic, he courted the new sovereigns of the house of Medici, and found favour with duke Cosmo I., who employed him in several missions and other affairs of state. Cosmo employed him also in translating the works of Aristotle from the Greek into Italian. His translations of the Rhetoric, Ethic, Politic, and the Treatise on the Soul, are the only parts that have been published. Segni also busied himself in writing a history of his own times and country: 'Storie Fiorentine dall' anno 1527 all' anno 1555,' which he kept secret in his lifetime. In this history he speaks with the freedom of a conscientious historian, and as such he is placed among the best writers of Italy. The first part of Segni's history refers to the same period as the latter part of that of Guicciardini, both embracing the important event of the fall of the Florentine republic, with this difference, that Guicciardini's is a general history of Italy, and Segni's a particular history of his native Florence. No less than three other Florentine contemporary historians have treated the same period, namely, Varchi, who wrote, in a prolix style, 'Storia Fiorentina,' from the year 1527 to 1538; Nardi, who wrote 'Istorie della Citta di Firenze,' from 1494 to 1531; and Nerli, in his general history, or rather chronicle, of Florence, 'Commentarij de' Fatti Civili occorsi in Firenze dall' anno 1215 all' anno 1537.' Segni however went farther than any of them, by continuing his narrative till the year 1555, thus embracing not only the period of the profligate sway of Alessandro de' Medici, included in the histories of Varchi and Nerli, but the subsequent and more important reign of his successor, duke Cosmo I., who was the real founder of the Tuscan dynasty, and who, by the subjugation of Siena, the last of the three great Tuscan republics, united the whole of Tuscany into one principality. Segni died in 1559.

There have been two other writers of the same family: Pietro Segni, who translated and commented on the work of Demetrius Phalereus 'On Elocution;' and Agnolo Segni, who wrote a valuable treatise, 'Della Imitazione Poetica.'

SEGO is the capital of Bambarra, a country situated in that part of Africa which is called Soodan. The town stands on both sides of the river Joliba, near 13° N. lat. and 5° W. long. Mungo Park, to whom we are indebted for all the information that we possess respecting this town, states that it properly consists of four distinct towns, two on the northern bank of the river, called Sego Korro and Sego Boo, and two on the southern bank, called Sego Soo Korro and Sego See Korro. They are all surrounded with high mud-walls; the houses are built of clay, of a square form with flat roofs; some of them have two stories, and many of them are whitewashed. Besides these buildings there are many Moorish mosques, and the streets, though narrow, are broad enough for every useful purpose in a country where wheel-carriages are entirely unknown. Park thought that this town might contain altogether about 30,000 inhabitants. The king of Bambarra constantly resides at Sego See Korro. At several places there are canoes belonging to the king for conveying people over the river. 'The view of this extensive city,' says Park, 'the numerous canoes upon the river, the crowded population, and the cultivated state of the surrounding country, formed altogether a prospect of civilization and magnificence which I little expected to find in the bosom of Africa.' As Sego is situated on a river, which is navigable for a great distance upwards and downwards, between countries of which one is rich in gold and the other in salt, which latter is a great object of trade in the interior of Africa, it may be supposed that Sego carries on a considerable commerce, which is also proved by the numerous canoes that ascend and descend the river; but we have no particular information on this point. (Mungo Park's *Travels in the Interior Districts of Africa.*)

SEGORBE (*Segobriga Edetanorum*), a town of Spain, in the province of Valencia, is situated in a fertile valley, on the banks of the river of the same name, which there receives the waters of a stream called Murviedro. It is the see of a bishop, suffragan to the archbishop of Valencia. The cathedral, which is a fine Gothic building, contained many fine paintings by Ribalta and other masters of the Valencian school, founded by Juan de Juanes, most of which however were either carried off or lost during the Peninsular War. About one mile from the town is the celebrated Carthusian monastery of Val de Christo, founded and richly endowed by the Infante Don Martin, son of Peter IV., king of Aragon. Segorbe was taken from the Moors in 1245, by James I. of Aragon, surnamed the Conqueror. It then became the capital of a considerable district, which was erected into a duchy. Its actual population is computed at 8000 inhabitants, whose chief occupation is the farming of the lands in the neighbourhood, which are exceedingly fertile, and yield all sorts of grain and fruits. I is about fifty miles from Valencia, the capital; in 39° 54′ N lat. and 27′ E. long.

SEGO'VIA, a province of Spain, situated between those of Madrid and Valladolid. It has an area of 3650 square miles, with a population of about 200,000. The capital, from which the province takes its name, is built on a rocky eminence, between two deep valleys, one of which is watered by the river Eresma, and the other by a rapid stream. It is surrounded with a thick wall, built by the Moors, and strengthened at intervals with turrets. The streets are narrow and crooked, as in most other antient Spanish towns. The cathedral, built at the beginning of the sixteenth century, by the celebrated Rodrigo Gil de Ontañon, on the model of the great church of Salamanca, is a mixture of the Gothic style and that of the *renaissance*. It consists of three naves measuring 380 Spanish feet by 180. The interior is magnificently decorated; but, as in most cathedrals of Spain, the general effect is spoiled by the choir being placed in the middle of the central nave. The tower attached to it rises to the height of 330 feet. The windows of stained glass are greatly admired. The principal altar is decorated with the finest Granadan marble, and one of the chapels contains beautiful wood-carvings by the celebrated sculptor Juan de Juni. The Alcazar, or palace of the former Moorish governors, is a very remarkable building. It stands on the crest of the rock, on the declivity of which the city is built, and commands a delightful prospect over the plain. Though often modified and repaired by the early kings of Castile, who not unfrequently resided in it, as well as by Philip II., who added considerably to its outer works, it still preserves much of its original character, and contains several apartments decorated as in the time of the Moors. The great hall, which is ornamented with mosaic and arabesque work, contains the statues in wood of all the kings of Asturias, Leon, and Castile, from the eighth to the sixteenth century. Under the monarchs of the house of Austria, the Alcazar was converted into a state prison, where several people of distinction were confined at various times, and as such it has been admirably described by the celebrated author of 'Gil Blas.' Its present destination is a college for young cadets. The church of Santa Cruz, which owes its foundation to Ferdinand and Isabella, the convent of San Francisco, and the small church of 'El Parral,' which contains the marble tombs of the family of Villena, are well worth the attention of travellers. The Royal Mint, which is supposed to be one of the most antient places of coinage in the kingdom, is a very fine stone building. In former times, under the early kings of Castile, every description of money was coined at this mint, but at present it is confined to the coinage of copper money. Segovia was taken from the Moors about the year 1078, by Alfonso VI., shortly before the reduction of Toledo.

Segovia appears to have been a town of some importance under the Romans. Pliny (iii. 3) places it in the Conventus of Clunia, among the Arevaci; Antoninus, on the road from Saragossa to Merida. It contains several remains of the Roman period, such as statues, inscriptions, &c.; but the most remarkable object of antiquity is the famous aqueduct attributed to Trajan, and which the singular situation of the town, built as it is upon two hills separated by an intervening valley, rendered necessary. It begins about fifty paces from the town, extending first in a southern direction, and then to the west. Its length is 2400 Spanish feet. Its greatest height, in the spot called 'Plaza del Azobejo,' near the foot of the antient walls, is 104 feet; and in that part it consists of a double row of arches, built of large stones without mortar. Those of the lower range, forty-two in number, are sixty-five feet high, and fifteen feet wide. The upper arches, of which there are nineteen, are 27 feet high. With the exception of a few arches which crumbled down during the reign of Ferdinand and Isabella, and were immediately rebuilt at their expense, the remainder of the aqueduct may be said to be in the same state in which the Romans left it. There are two histories of Segovia: one by Lorenzo Calvete, under the title, 'Historia del Glorioso San Frutos, Patron de la Ciudad de

Segovia,' Valladolid, 1610; the other, which is more esteemed, by Diego de Colmenares, Segovia, 1637, fol.

Coin of Segovia. British Museum.

SEGUIER, PIERRE, was one of an antient and distinguished French family which, in the space of three centuries (1460 to 1789), is recorded to have had no less than sixty-eight of its members raised to the highest legal dignities of France. Pierre Seguier, one of the most eminent of them, was born at Paris in 1504. He began life as an advocate, and, after filling various high offices, was raised in 1564 to the rank of *président à mortier*, the highest grade but one in the Parisian parliament. In that capacity the parliament, having refused to register an edict for the establishment of the Inquisition, deputed him to lay their remonstrances before the king, Henri II.; and he had the distinguished honour of preventing, by the boldness and force of his arguments, the introduction of that odious tribunal into France. His speech on this occasion has been preserved. (Garnier, *Continuation of Velly*, vol. 27.) He resigned his office of president in favour of his second son Pierre, two years before his death, which happened in 1580; and it is remarkable that every one of his sons, six in number, filled some high legal office. Antoine, as well as Pierre, was *président à mortier*, and both of them enjoyed the special confidence of Henri IV.

SEGUIER, PIERRE, born at Paris, May 28, 1588, was the son of Jean, sixth son of the above Pierre Seguier, lieutenant-civil of Paris, a steady friend, like his brothers above noticed, of Henri IV., and a valuable public officer. Pierre Seguier, like his grandfather, rose through various offices to the rank of *président à mortier* in 1633, and that of chancellor in 1635. Having rendered important services to Anne of Austria during the ascendency of Richelieu, at the risk of incurring that minister's vengeance, he obtained Anne's full confidence; and, during her regency, rose to as high power and influence as a subject could well attain. At the breaking out of the war of the Fronde, he escaped narrowly with his life, in a resolute attempt to pass the barricades to the usual discharge of his official functions; and in the sequel of those disturbances, the seals of office were for a time taken from him. He was replaced in 1656, and continued chancellor till his death, January 28, 1672, maintaining through life the honour of his family as an independent, able, and enlightened magistrate. He was also a lover and encourager of art, and a man of elegant and accomplished mind. He was one of the originators, and president, with the title of protector, of the Académie Française, which, during thirty years, held its sittings at his hotel.

SEGUIER, ANTOINE LOUIS, of the same family, being descended from a brother of the first-named Pierre Seguier, was born at Paris, Dec. 1, 1726, and owed (1748) to the regard of Louis XV. to his name and family his first step in the law, namely, the office of king's advocate in the court of the Châtelet. In 1755 he rose to be advocate-general in the parliament of Paris, which office he held till the dissolution of that body in 1790, except that he resigned it in 1771, in consequence of the exile, and returned to it in 1774, on the return of the parliament. In forensic eloquence he is reputed a worthy successor to D'Aguesseau and other distinguished men of his predecessors; and his literary acquirements were first-rate. In the Revolution, he was offered and refused the post of mayor of Paris; and he lived retired until the appearance of an attack, entitled 'Seguier treated as he Deserves,' on which he took the alarm and emigrated. After sojourning in several places, he fixed his abode at Tournai, but died of apoplexy, January 25, 1792, leaving an unsullied character for integrity, and a high reputation as a judge, a lawyer, and a statesman. Several of his professional speeches and some of his writings are extant, but in no collected form.

SEGUIER, JEAN FRANÇOIS, of another branch of the same family, was born at Nismes, Nov. 25, 1703, and devoted himself early to the study of antiquities. Having formed a close friendship with the learned Scipio Maffei, during his visit to Nismes in 1732, he accompanied him in his travels, and resided with him till his death in 1755. Seguier then returned to his native place, and applied himself to the illustration of its splendid Roman remains. He displayed much ingenuity in deciphering, from the holes in the stones to which metal letters had been attached, the inscription formerly existing on the temple called La Maison Carrée, which he conceived to have been erected in honour of Caius and Lucius, the sons of Agrippa and grandsons of Augustus. Later researches have shaken this opinion. [NÎMES.] Great part of his life was occupied, in concert with Maffei, in forming a collection of all known antient inscriptions: their work however was never published in a complete form. Seguier continued to labour on this subject to the end of his life, and left ready for the press a bulky manuscript, now in the king's library at Paris, which has never been printed. (*Inscriptionum Antiquarum Index absolutissimus*, &c.) He died of apoplexy, Sept. 1, 1784, leaving his library and valuable museum of medals, natural history, &c. to the academy of Nismes, on the dissolution of which the collection was made over to the public library of that place.

SEGUR, HENRI-FRANÇOIS, COMTE DE, son of the Marquis de Segur, was born in 1689, and died in 1751. His life was passed in active service, chiefly in Spain, Italy, Bohemia, Germany, and Flanders, first as colonel and afterwards as lieutenant-general in the French army.

SEGUR, PHILIPPE-HENRI, MARQUIS DE, son of the Comte Henri-François, was born Jan. 20, 1724. He distinguished himself, when very young, in the wars of Italy and Bohemia, especially at the siege of Prague: at the battle of Rocoux a musket-ball entered his breast, passed through to the back, and had to be extracted by the spine; at the battle of Laufeld, in leading his regiment to a charge after it had been three times repulsed, his arm was shattered in such a manner that it was necessary to amputate it. By two successive and rapid promotions he was made maréchal-de-camp and lieutenant-general. At Clostercamp he was pierced in the neck by a bayonet, received three sabre-wounds on the head, and was made prisoner. At the termination of the war he was appointed inspector-general of the infantry. In 1780 Louis XVI. called him to his councils as minister-of-war, and in 1783 raised him to the dignity of maréchal de France. He was war-minister during seven years, in the course of which he introduced many ameliorations into the army, in discipline, in expenditure, in the personal comfort of the soldiers, and in the management of the military hospitals. He afterwards lived in retirement till he was arrested by order of the Convention, in 1790; his furniture was sold by public auction; and at the age of seventy, infirm, mutilated with many wounds, deprived of an arm, and afflicted with the gout, he was thrown into the prison of La Force. He was deprived of his military pensions, as well as of his titles and his orders. Fortunately he had no property to stimulate the tyrants of the Revolution further, and his life was spared. Bonaparte, when first consul, set him at liberty, treated him with marked respect, and granted him a pension of 4000 francs. He died at Paris, Oct. 8, 1801, in his seventy-eighth year. His character is thus summed up by his son:—'When in power, he was guilty of no injustice; when oppressed by his country, he did not cease to love it. He was a good husband, a good father, a good general, a brave soldier, a just and wise minister, and an excellent citizen.'

SEGUR, LOUIS-PHILIPPE, COMTE DE, eldest son of the Maréchal de Segur, was born in Paris, December 10, 1753. He chose the army as a profession, and at an early age was made colonel of a regiment of dragoons. He was one of the three first Frenchmen of high rank who offered their services to the American deputies in the cause of American independence, the other two being the Marquis de la Fayette and the Vicomte de Noailles, but they were formally prohibited by the French ministry from leaving France. Though narrowly watched, La Fayette escaped, and reached America; Noailles obtained leave to go there about two years afterwards, but Segur was not permitted to leave France till May, 1782. He entered the Delaware in September, 1782, narrowly escaped being taken by the English, and with much difficulty reached the camp of the French general Rochambeau, under whom he fought till the termination of the American war. He then returned to France, which he reached in June, 1783. In the latter part of 1784 he was appointed ambassador to Russia, and arrived at St. Petersburg March 19, 1785; he was treated by the empress Catharine II. with especial favour, accompanied her in the great progress which she made from St. Petersburg to the Crimea in 1787, and retained her confidence as long as he remained at her court. He left St. Petersburg October 11, 1789, on his return to Paris.

In 1790 he was sent as ambassador to the court of Frederic of Prussia. Having returned to France, he was twice arrested by the revolutionists in 1793, but obtained his freedom by his prompt eloquence. He then retired into the country, and was obliged to have recourse to his pen for the means of subsistence. In 1798 he published his 'Théâtre de l'Hermitage;' in 1800, his 'Histoire des Principaux Evénémens du Regne de Frédéric-Guillaume II., Roi de Prusse,' 3 vols. 8vo., Paris; and in 1801, his 'Decade Historique, ou Tableau Politique de l'Europe depuis 1786 jusqu'à 1796,' 3 vols. 8vo., Paris. In 1803 he was chosen a member of the Académie Française, and about the same time was appointed grand-maître de cérémonies to Bonaparte. After the Restoration he became a member of the Chamber of Peers. In 1819 he published his 'Contes Moraux et Politiques,' 2 vols. 12mo., Paris; in 1821, his 'Histoire Universelle, Ancienne et Moderne,' 10 vols. 8vo., Paris; in 1822, his 'Pensées, Maximes, et Reflexions,' 18mo., Paris; in 1823 his 'Galérie Morale et Politique,' 3 vols. 8vo., Paris. In 1824 appeared his 'Œuvres Complètes,' 30 vols. 8vo., Paris, which in 1828 were reprinted and augmented to 36 vols. His 'Mémoires, Souvenirs, et Anecdotes,' were published in 1826, 3 vols. 8vo., Paris, an extremely amusing and instructive work, which includes three interesting periods of the Comte de Segur's life—the latter part of the reign of Louis XV. and the early part of that of Louis XVI., his voyage to America and the short time which he remained there, and the five years during which he was ambassador at the court of St. Petersburg, when the work terminates. A second part was promised, which was to include the following part of his life, but we believe it was never published. His death occurred in July, 1830.

Philippe-Paul, Comte de Segur, his son, born Nov 4, 1780, was one of Bonaparte's favourite generals; he accompanied him in the disastrous Russian campaign, of which he has written the history, 'Histoire de Napoléon et de la Grande Armée en 1812,' 2 vols. 8vo., Paris, 1825, which has passed through numerous editions. He is also the author of several other works.

SEGUR, JOSEPH-ALEXANDRE, Vicomte de, the second son of the Maréchal de Segur, and brother of the Comte Louis-Philippe, was born at Paris in 1756. He entered the army, and rose to the grade of maréchal-de-camp, but he was more fond of pleasure than of war, and attached himself chiefly to the drama. He wrote 'Contes, Fables, Chansons, et Vers,' 8vo., Paris, 1801; 'Œuvres Diverses,' 8vo., Paris, 1819; 'Les Femmes, leur Condition et Influence dans l'Ordre Social,' 2 vols. 8vo.; 4 vols. 12mo., Paris, 1820; 'Romances et Chansons,' 18mo., Paris, 1820; besides a great number of comedies, vaudevilles, and operas, several of which are yet popular. He died July 27, 1805, at Bagnères.

SEICIRCUS. [Muscicapidæ, vol. xvi., p. 12.]

SEIGNORAGE. [Currency, p. 235.]

SEIGNORY. [Tenure.]

SEIKS. [Sikhs.]

SEINE, a river of France, rising in the central parts of that country, and flowing into La Manche, or the English Channel.

The basin of the Seine is bounded on the south-east by the Côte d'Or and the heights of Langres, which unite the Cévennes with the Vosges; on the east and north-east by a range of hills running from these to the heights of Ardennes and by the heights of Ardennes; and on the north by another range, which extends from the heights of Ardennes, and terminates in Cape La Hève near Le Hâvre; on the south-west and west it is bounded by the range of high grounds which, with little interruption, connects the Côte d'Or with the mountains of Bretagne, and which is known in one part of its course as the heights of Morvan, and in others as the forest of Orléans and the hills of Beauce; and by a branch proceeding north from these to the coast of the English Channel, dividing the valley of the Toucques from that of the Rille. This basin is estimated by Lichtenstein (Malte-Brun, *Geog. Universelle*, 3rd edit., tom. iii., p. 32) at 3436 square French leagues, equal to 26,279 square English miles.

The Seine rises in the heights of Langres, on the south-eastern boundary of the basin, near the town of Chanceaux in the department of Côte d'Or, and flows north-west past Chatillon-sur-Seine, Bar-sur-Seine, Troyes, Romilly, Montereau, Melun, Corbeil, Paris, Mantes, Elbœuf, Rouen, and Le Hâvre, just below which it falls into the sea: its whole course is estimated by Malte-Brun at 470 miles. Its source is 1426 feet above the level of the sea; at Troyes it is 331 feet above the same level; at the junction of the Loing between Montereau and Melun, 184 feet; at Corbeil, 147 feet; and at Rouen, 111 feet. Its principal affluents on the right bank, in the order in which they join, are the Aube, the Marne, the Oise, and the Epte; and on the left bank, the Yonne, the Loing, the Eure, and the Rille. Of these the Marne is the longest, and is estimated by Malte-Brun at 268 miles. Next to it in length are the Oise (taking its affluent the Aisne as the principal stream) and the Yonne. The Seine and its tributaries abound in fish; the sturgeon, the salmon, the sole, the shad, the eel, the smelt, and other fish are caught in it.

The navigation commences at Méry, about nine miles above the junction of the Aube; but the stream is used for floating timber from a point much higher up. In the early part of the last century the navigation extended as far as Troyes; but owing to the giving way of the works by which the navigation was kept up, the river between Méry and Troyes ceased to be navigable. In 1805 new works were ordered by Bonaparte, in order to restore the navigation as far as Troyes; but these works were suspended on his abdication in 1814. In 1825 authority was given to renew them, and to continue them up to Chatillon, above Troyes, to which point there is evidence that the river was navigable for several centuries. The works under this last authority have been begun; we are not aware that they are completed. Of the affluents of the Seine, the Aube is navigable from Arcis-sur-Aube in the department of Aube; the Yonne, from Auxerre in the department of Yonne; the Loing, so far as it is connected with the Loing Canal; the Marne, from St. Dizier in the department of Haute Marne; the Oise, from Chauny in the department of Aisne; the Eure, from Pacy in the department of Eure; and the Rille, from Pont Audemer in the department of Eure. The Andelle, a small river which joins the Seine on the right bank a little higher up than the Eure, is navigable for about a mile; and the Courtavant, or Villenoxe, a small stream which joins it just above Joigny in the department of Aube, has been made navigable for small craft from Villenoxe. The Ourcq, a feeder of the Marne, is navigable from above La Ferté Milon in the department of Aisne; the Grand Morin, another feeder of the Marne, from above Crécy in the department of Seine et Marne; and the Aisne, a feeder of the Oise, from Château Porcien in the department of Ardennes. The navigation of the Seine and its tributaries is facilitated by the canals of Ourcq, St. Denis, and St. Martin, which connect the Ourcq with the Seine at Paris and at St. Denis, and by some short cuts; it is connected with that of the Saône and Rhône by the Canal de Bourgogne, which connects the Yonne, between Auxerre and Joigny, with the Saône at St. Jean de Losne; and with that of the Loire by the Loing Canal, which connects the Seine with the two canals of Orléans and Briare, of which the former joins the Loire just above Orléans, the latter at Briare. The canal of St. Quentin, of which the canals Crozat and of La Fère are parts, connects the Oise at Chauny with the Escaut or Schelde at Cambray in the department of Nord, and with the canal and navigation of the Somme. The canal of Ardennes is to connect the Aisne at Château Porcien with the Bar, a feeder of the Meuse; the canal of Nevernais is to connect the Yonne near Corbigny in the department of Nièvre, to which place it is designed to make it navigable, with the Loire at Decize in the same department; and another canal is to connect the Oise, by means of the canal of St. Quentin, with the Sambre: but these three canals are, we believe, unfinished.

The Seine has a generally slow current; and its sinuosities, especially below Paris, are very great, and tend to render the navigation exceedingly tedious. The boats which are used between Rouen and Paris, the distance between which towns by the road does not exceed 76 miles, usually take eight or ten days to descend the stream, and fourteen to sixteen to ascend it. The largest boats carry vast burdens; they are from 150 to 180 feet long, 25 to 30 feet wide, and draw 6 feet water. Steam-boats require two days for the descent and four for the ascent; and between Paris and Le Hâvre, four or five for the descent, and seven or eight for the ascent. The lowest bridge over the river is at Rouen, to which place vessels of 250 to 300 tons can ascend: the shifting sands at the mouth of the river, and the shoals in its bed, impede the ascent of larger vessels. The facilities afforded by this river for the supply of various articles for the market at Paris are of great importance: corn, flour, wine, hay, wool, hemp, hides, fire-wood, timber for building, coal, sandstone, millstones, and iron are brought down from the districts above the capital; while corn, flour, wine, cider, butter, fish-oil, flax, hemp, wool, pitch, resin, drugs, colonial produce, and manufactured goods are carried up from places below the city.

The scenery in the upper part of the river is tame and monotonous; but from Paris to Rouen, and still more from Rouen to the sea, it presents a more interesting appearance. The Seine is not subject to great overflows.

The official statement of the navigation of the Seine and its affluents is as follows:—

	Miles.		Miles.
Seine	346	Oise	98
Aube	21	Aisne, affluent of the Oise	70
Yonne	74	Andelle	1
Marne	215	Eure	53
Ourcq, affluent of the Marne	22	Rille	17
Grand Morin, affluent of the Marne	8	Total	925

The navigation of the Loing, and of the Villenoxe or Courtavant, is not given here, they being considered as canals rather than rivers.

SEINE, one of the departments of France. It is of compact form, nearly circular, and is surrounded by the department of Seine et Oise. Its diameter varies from 13 to 17 miles; and its area is estimated at 184 square miles, which is about two-thirds of the area of Middlesex, the English county with which, from its metropolitan character, it may be most appropriately compared. The population in 1831 was 935,108, in 1836 it was 1,106,891, showing an increase in five years of 171,783, or about 18·5 per cent., and giving nearly 6016 persons to a square mile. In amount of population it exceeds every other department of France; and, with the exception of that of Nord (1,026,407 inhabitants), very far exceeds them; indeed in density of population it exceeds our own Middlesex in the proportion of 5 to 4, but in amount of population falls short of it. Paris is the chief town.

The surface of the department is tolerably level; some heights, as those of Montmartre and Chaumont on the north side of Paris, rise to the height of 270 or 300 feet above the valley of the Seine. Mont Valerien in the west of the department, the highest hill in the neighbourhood, does not exceed 446 feet, which is about the height of Shooter's Hill, near London.

The department is entirely occupied by the tertiary formations enclosed within the chalk basin of Paris. These formations include limestone, gypsum, and marl. They yield excellent building-stone, of which there are immense quarries in the plain of Montrouge, and excellent plaster. A considerable extend of ground in the southern part of Paris, near the Luxembourg Palace, has been excavated in the process of quarrying for building-stone, and it is in part of these excavations that the celebrated catacombs have been formed. There are mineral waters at Auteuil and Passy; the latter, which are chalybeate, and valued for their astringent and tonic qualities, are the only ones which are frequented.

The department belongs altogether to the basin of the Seine. That river enters it on the south-east, and has a very winding course, partly in the department, partly on the border, from above Choisy to below Nanterre, of nearly 40 miles. The Marne enters the department on the east side, and has a winding course of 15 miles before it joins the Seine. Both these rivers are navigable throughout. The canal of the Ourcq enters the department on the north-east side, and runs about 6 miles to the basin of La Villette, just outside the wall of Paris on the north-east side. From this basin the canals of St. Denis and St. Martin communicate with the Seine; the first near the town of St. Denis, the second in the heart of Paris. The little canal of St. Maur, or of Marie Thérèse, shortens the navigation of the Marne above Charenton, by avoiding one of its longest reaches. The length of the inland navigation of the department is thus given in the official statements·—

		Miles.	Miles.
Rivers—	Seine	36	
	Marne	15	
		—	51
Canals—	Ourcq	6	
	St. Denis	4	
	St. Martin	3	
	St. Maur	1	
		—	14
			—
			65

The number of Routes Royales, or government roads, on Jan. 1, 1837, was fifteen, having an aggregate length of 77 miles, viz. 46 miles in repair, and 31 miles out of repair. These roads run from Paris in all directions: the principal are the great northern road through St. Denis to Boulogne and Calais, on the one hand, and to Rouen and Le Hâvre on the other; the north-eastern road by Le Bourget to Soissons, Laon, and so into Belgium; the eastern road by Bondy to Châlons, Metz, Nancy, and Strasbourg; the south-eastern road by Charenton to Auxerre, Lyon, and Marseille; the southern road through Villejuif to Nevers, Moulins, and Clermont; another southern road to Orléans, Châteauroux, and Limoges; the south-western road by Sèvres to Versailles, and thence on the one hand to Tours and Bordeaux, and on the other to Nantes, Rennes, and Brest; and the north-eastern road to Caen, Rouen, and Le Hâvre, by St. Germain-en-Laye. The aggregate length of the departmental roads was 153 miles; viz. 120 in good repair, 26 out of repair, and 7 unfinished. The bye-roads have a length of about 250 miles.

The department may be estimated to contain in round numbers 120,000 acres, of which about 73,000, considerably more than half, are under the plough, while only about 4000 acres are laid down in grass. In this preponderance of arable land, the environs of Paris present a remarkable contrast to those of London, The average production of grain in the department is thus given in Dupin's *Forces Productives, &c. de la France*, Paris, 1827:—

	Hectolitres.	Eng. Quarters.
Wheat	88,476	30,427
Rye and Maslin	79,122	27,210
Barley	28,686	9,865
Potatoes	240,000	82,536
Oats	189,715	65,243

It is remarkable that the quantity of corn produced in the department, when its limited area is taken into account, is very far above the average of the departments in every species of grain which is cultivated in it; and in potatoes it exceeds the average of the departments, even without taking its limited area into the account. Buckwheat and maize are not grown. The productiveness of the department, which is by no means distinguished by natural fertility, is to be ascribed to the stimulus resulting from the proximity of the markets of the capital, and the facility which so large a city affords of getting manure. A great quantity of vegetables are grown, especially in the plain of St. Denis, north of Paris, which presents the appearance of a vast kitchen-garden.

About 9000 acres of ground are occupied in gardens or orchards, and about 7000 in vineyards. Montreuil, two or three miles east of Paris, is celebrated for its peaches; Grand Charonne, close to Paris on the east, for its grapes; and Fontenay, four miles south-west of Paris, for its strawberries and roses, which latter are grown for the apothecary and the perfumer, and give to the place its designation of Fontenay aux Roses. Nanterre, in the north-west of the department, is also celebrated for the growth of the same flower. Vitry-sur-Seine, on the left bank of the Seine, above Paris, is surrounded with nursery-grounds for rearing fruit-trees and ornamental trees.

The quantity of wine made is, for the area of the department, very considerable, but the quality is wretched; that of Surenne or Suresnes, west of Paris, once in high repute, has become, through inattention, proverbially bad. The woods occupy above 3000 acres. The principal are those of Vincennes, east of Paris, and of Boulogne, west of the same city. These are crossed by roads in various directions, and afford agreeable and much frequented walks to the Parisians.

The number of horses in the department was reported by M. Dupin (*Forces Productives*, &c.) in 1827 at 40,000, a number far above the average of the departments, and especially so when considered with relation to the area, but below the average when compared with the population. The number of horned cattle, as reported by the same authority, was above 12,000, more than three-fourths of which were cows, from whose milk the capital was partly supplied. A number of she-asses are also kept for their milk. The number of sheep is considerable. Among them are included English and Saxon breeds, which have been naturalized for the sake of their wool, and some Nubian rams. There are also some Thibet goats.

The department, exclusive of the city of Paris, is divided into two arrondissements; that of St. Denis on the north, and that of Sceaux on the south. Paris forms a third division [Paris], so that the arrangement of the department is as follows:—

Arrondissements or other Divisions.	Situation.	Area in Square Miles.	Communes.	Cantons.	Population in 1831.	Population in 1836.
Paris	Central	13	1		774,338	909,126
St. Denis	N.	78	37	4	87,282	110,057
Sceaux	S.	93	43	4	73,488	87,708
		184	81	8	935,108	1,106,891

In the arrondissement of St. Denis are the towns of St. Denis, population in 1831, 9686; in 1836, 9332 [Denis, St.]; Le Bourget; Neuilly, population 3168 town, 5602 whole commune; Boulogne; and Nanterre, population 2397 town, 2511 whole commune; to which may be added the villages of Clichy-la-Garenne, population 3035 village, 3109 whole commune; Aubervilliers, population 2187 village, 2230 whole commune; and Pantin, population 1830 village, 1881 whole commune. Some others, as Passy, Montmartre, La Chapelle, La Villette, and Belleville, are so close to Paris as to be properly suburbs of it. [Paris, vol. xvii., p. 256.] Neuilly is on the Seine, about two miles north-west from Paris. There is a beautiful stone bridge here, finished A.D. 1772, over the Seine, about 800 feet long, with five arches, each of 128 feet span, and formed by segments of a circle of 160 feet radius. The houses are generally modern and well built. Among them are the villa of Saint Foix, built by the Count d'Argenson in 1755, and now belonging to the king of the French; that of Saint Jacques, once the residence of the Princess Borghèse; and the château of Bagatelle, built by Charles X. when a young man. A number of laundresses reside at Neuilly, and there are manufactures of earthern stoves and chemicals, distilleries, a refining-house for oil, and a steam flour-mill. There was some fighting here in 1815, on the approach of the English and Prussians to Paris. Boulogne has some neat country-houses. It gives name to the Wood of Boulogne, between the village and Paris. Sealing-wax is made here. Nanterre is near the Seine, two or three miles beyond Neuilly. It was burned by the English in 1346, and taken by them again in the war under Henry V. There are some traces of the antient fortifications of the place. In 1815 there was some fighting here between the French and the Prussians. There are two churches, one very antient, and several pleasant country-houses. There are manufactures of glue, purified neatsfoot-oil, 'animal black,' and chemical productions. There are tile-yards, plaster-quarries, and kilns, and a slaughter-house for pigs for the supply of the capital. A considerable quantity of pork, salt and fresh, is sold. Clichy-la-Garenne, on the Seine just below Neuilly, has several manufacturing establishments for ceruse, sal-ammoniac, glue, catgut, printing and other paper, card-board, small shot, lead pipe, and sheet lead. Aubervilliers, near the canal of St. Denis, was much injured in the skirmishing between the French and the allies in 1815. The front and steeple of the church were built in the reign of Henri II. There is a refining-house for sugar in the village, and there are numerous market-gardens round. Pantin, on the canal of the Ourcq, was the scene of a desperate struggle in 1814, when the allies marched upon Paris. The village stands in a plain, and comprises a number of well-built country-houses. There are manufactories for cotton and woollen yarn, in which steam-power is employed; gypsum is quarried, and there are lime-kilns. The chief trade is in corn, flour, wine, brandy, vinegar, and plaster of Paris. The village of Autueil, on the bank of the Seine, in the commune of Neuilly, has been a favourite spot with literary men. Boileau, Molière, La Fontaine, Franklin, Helvetius, and Condorcet resided here.

In the arrondissement of Sceaux are—Sceaux, population in 1836, 1670; Antony, Bourg-la-Reine, Villejuif, and Gentilly, population 1596 town, 8616 whole commune; all south-west or south of Paris; Choisy-le-Roi, population 3017 town, 3075 whole commune, on the Seine; Charenton, population 1925 town, 1991 whole commune, on the Marne [Charenton]; and Vincennes or La Pissotte, population 2551 town, or 2884 whole commune; and Montreuil, population 3239 town, 3338 whole commune, east of Paris. Vaugirard is virtually a suburb of Paris. [Paris.] To these may be added the villages of Vitry, population 2161 village, 2197 whole commune, near Villejuif; Areueil, population 1679 village, 1816 whole commune, between Bourg-la-Reine and Gentilly; and Alfort. [Alfort.] Sceaux had before the Revolution a noble mansion and park belonging to the duke of Maine, who assembled here the literati of Paris, among them Voltaire and Fontenelle, and after him to the duke of Penthièvre. During the Revolution it was sold, and demolished by the purchaser; and the extensive park, of more than 800 acres, broken up for agricultural purposes. The garden of the menagerie, which was purchased by some private individuals and thrown open as a pleasure-ground to the public, still remains. The town is pleasantly situated, and has a number of good houses. The church was built by the great Colbert. The new burial-ground of the town contains the tombs of Florian and of Cailhava, a comic dramatist. Earthenware and glue are made, and there are two large weekly cattle-markets for the supply of Paris. There is one yearly fair. Antony is a neat town of about 1100 or 1200 inhabitants, on the slope of a hill rising from the bank of the Bièvre, which joins the Seine at Paris. There are a washing-place for wool, a bleaching-house for wax, and a manufactory of wax candles. Freestone is quarried near the town. There is a weekly market and a yearly fair. Bourg-la-Reine is also on the Bièvre: earthenware is manufactured here, and a considerable trade in cattle carried on: there are some handsome country-houses. Villejuif is on an eminence, and is one of the prettiest places round Paris. Oilcloth and soap are made, and building-stone, millstones, and excellent gypsum are quarried. Trade is carried on in corn, hay, wine, &c. Gentilly, distinguished as Le Grand Gentilly, is also on the Bièvre. There are manufactories of mineral acids, of linen handkerchiefs, and of soap; and bleach-grounds for linen. The village of Le Petit Gentilly, in the same commune as the preceding, is a suburb of Paris. The hospital of the Bicêtre [Bicetre] is in the commune of Gentilly. Choisy-le-Roi is in a pleasant situation: a wooden bridge has been built within the last few years over the Seine. The church was built by Louis XV., who had a favourite residence here. Soap, morocco-leather, oilcloth, chemicals, and earthenware are manufactured; and there are a distillery of acetous and pyroligneous acid, sugar-houses, and a glass-house for flint and common glass. Trade is carried on in wine, vinegar, wood, and coal. Vincennes is adjacent to the Wood of Vincennes. The castle of Vincennes is an antient fortress; the walls form a large and regular parallelogram surrounded with ditches and strengthened by eight square towers besides the donjon. The donjon, also square and very lofty, with towers at the angles, stands in the middle of the west side of the fortress. The castle of Vincennes has undergone great alterations, and its antient features have been intermingled with modern structures. La Sainte Chapelle is a fine Gothic building commenced by Charles V., and restored after the return of the Bourbons. It contains the monument of the Duke d'Enghien, who was shot at Vincennes, in the ditch of the castle, by order of Napoleon. This fortress is used as a military post, an artillery-school, depôt of artillery, and a state prison. The castle was saved from the allies in 1815, by the firmness of the governor, General Daumenil, who threatened, if reduced to extremity, to blow it up. The chief trade of Vincennes is in sheep and wool. Montreuil, distinguished from other places of the same name as Montreuil-sous-Bois, is about a mile north-north-east from Vincennes, on a fertile hill. There is a mansion with a fine park, and there are a number of country-houses. Leather, porcelain, and beehives are made, and peaches and pears of superior quality are grown. The gardens of this place are unrivalled in the department. Plaster is quarried in the neighbourhood. Vitry has numerous country-houses and nursery-grounds, and there are plaster-pits. The village is near the left bank of the Seine. Arcueil has the remains of a Roman aqueduct, built in the fourth century to conduct water to the palace of Lutetia, now Paris: it is from the arches of this monument that the place gets its name. It has some pleasant country-houses, a Gothic church, and an aqueduct, constructed in 1618, nearly in the line of the more antient one. Freestone is quarried; and there are nursery-grounds and a washing-place for wool.

The population, where not otherwise specified, is that of the commune, and from the census of 1831.

The department constitutes the diocese of the archbishop of Paris. It is in the jurisdiction of the Cour Royale of Paris and of the Académie Universitaire of that city; and in the first military division, of which the head-quarters are at Paris. It returns fourteen members to the Chamber of Deputies. In respect of education it is one of the most advanced of the French departments; of every hundred young men enrolled in the military census for 1828-29, seventy-one could read and write; the average of France being just above thirty-nine. The historical events connected with the department are chiefly noticed elsewhere. [St. Denis; Paris.] It was included in the territories of the Parisii, a Celtic people, and in the Roman province of Lugdunensis Quarta, or Senonia: in the middle ages it formed part of the province and military government of Ile de France.

SEINE INFE'RIEURE, a department of France, bounded on the north and north-west by the British Channel; on the south-west by the department of Calvados, from which it is separated by the mouth of the Seine; on the south by the department of Eure, from which also it is in some places separated by the Seine; on the south-east by the department of Oise; and on the north-east by that of Somme. Its form approximates to a triangle, of which the base is formed by a line facing the east, extending from Le Tréport, in the neighbourhood of Eu, to the neighbourhood of Gournay; and the vertex by Cape La Hève near Le Hâvre. The length of a line drawn between the extremities of the base is about 48 miles; the length of one drawn from Le Tréport to Cape La Hève, about 70 miles; and from the neighbourhood of Gournay to Cape La Hève, about 73 miles. The area of the department is estimated at 2334 square miles, being a trifle under the average area (2380 square miles) of the French departments, and rather less than the united areas (2377 square miles) of the English counties of Hants and Berks. The population, in 1831, was 693,683; in 1836, 720,525, showing an increase in five years of 26,842, or nearly 4 per cent., and giving 303 inhabitants to a square mile. In amount and density of population it exceeds the average of the French departments (390,010 inhabitants, or 164 to a square mile) in the proportion of 11 to 6, or nearly 2 to 1: it far exceeds in amount of population the two counties with which in area we have compared it, taken together; and exceeds all the English counties, taken singly, except Lancashire, Yorkshire, and Middlesex; and all the French departments, except those of Seine and Nord. Rouen, the capital, is 65 miles in a direct line north-west of Paris, or 76 miles by the road through Pontoise, Magny, St. Clair, and Ecouis.

The department is almost entirely included in the district occupied by the cretaceous formations which form the chalk basin of Paris. The coast has a rounded outline, presenting no remarkable headland except Cape La Hève; it is lined nearly throughout by chalk cliffs, broken at intervals by the openings through which the rivers fall into the sea: the only harbours along the coast are formed by these openings. The cliffs vary in height from 150 to 700 feet, which elevation they attain near Fécamp. (Dawson Turner, *Tour in Normandy.*) None of the hills are very lofty: the principal are a remote branch from the Ardennes, which cross the department from the east side to Cape la Hève, which forms their termination, and separate the waters which flow into the Seine from those which flow into the English Channel; they consist of chalk. Marl abounds in several places, and sand, which is used in the manufacture of glass. Brick-clay, pipe-clay, and clay suited for sugar-refiners, for making crucibles, and for earthenware, and even for fine porcelain, are procured; limestone and sandstone are also obtained, and there is marble of various kinds, but in small quantity. A small quantity of peat is obtained, and iron-stone is said to have been formerly procured near Forges-les-Eaux, on the east side of the department, between Neufchâtel and Gournay. There are mineral waters at Forges-les-Eaux, Aumâle, Gournay, and Rouen.

The department, south of the range of hills mentioned above, belongs to the basin of the Seine, which first touches the department on the south side, and has the remainder of its course, which may be estimated at 100 miles (the official statement is 97 miles), navigable throughout, upon or within the boundary of the department. It winds very much in this part of its course, as may be estimated from the statement that the distance from its first touching the department to its mouth is only about 48 or 49 miles in a straight line. The principal feeders of the Seine are the Epte and the Andelle, of which two only the sources and the upper part of their course belong to this department, the Cailly, the Austreberte or Sainte-Austreberte, the Bolbec, and the Lézarde, all very small. We have enumerated them in the order in which they join the Seine; they all fall into it on the right bank. Of the streams which flow into the Channel, the principal are the Bresle, or Brêle, which bounds the department on the east side, the Yères, the Arques, which receives the Béthune and the Eaulne, the Seye or Scie, the Saanne or Saane, and the Durdan or Durdent. We have enumerated these in their order from east to west. The length of the Bresle, which is the most considerable of them, may be estimated at 35 miles. The Seine is the only navigable river in the department, and there are no navigable canals. A railroad from Paris to Le Hâvre is in course of construction, and will form, with the London and Southampton (or South-Western) Railway, a ready communication between Paris and London.

The number of Routes Royales, or government roads, on 1st Jan., 1837, was twelve, having an aggregate length of 355 miles, viz. 181 in repair, 171 out of repair, and 3 unfinished. The principal road is that from Paris by Rouen to Le Hâvre. It enters the department on the south-east side, and runs to Rouen, and from thence by Yvetot, Valliquerville, Bolbec, and Harfleur to Le Hâvre. The road from Paris to Rouen, by St. Germain, Poissy, Mantes, Vernon, and Pont de l'Arche, enters the department more towards the west than the former road, which it joins just before entering Rouen. The road from Paris to Dieppe enters the department on the south-east, near Gournay, and runs north-westward through Forges-les-Eaux, les Grandes Ventes, and Grand Torcy. Roads from Rouen run one northward to Dieppe; one north-eastward to Neufchâtel, beyond which it divides into two branches, one by Blangy to Abbeville, department of Somme, the other by Aumale and Poix to Ameins, department of Somme; another eastward to Gournay, and thence to Beauvais, department of Oise; and another southward across the Seine to La Bouille, where it divides, one branch leading to Pont Andemer, the other to Bernay, both in the department of Eure. A branch from the road between Rouen and Le Hâvre leads to Fécamp; and another from Le Hâvre leads along the coast by Harfleur, Fécamp, St. Vallery-en-Caux, Veulles, Dieppe, and Criel to Eu, whence it turns inland to Abbeville. The departmental roads had, at the same time, an aggregate length of 238 miles, viz. 136 in repair, 7 out of repair, and 95 unfinished. The by-roads had an aggregate length of about 17,000 miles.

The climate is cold and moist, especially along the coast and on the eastern side of the department. The soil is varied, but generally fertile. The area of the department may be estimated in round numbers at 1,500,000 acres, of which about 950,000 acres, or nearly two-thirds, are under the plough. Agriculture, though on the whole flourishing, has by no means attained the degree of perfection of which it is susceptible. The mode of cultivation in the peninsula of Caux, formed by the Seine and the English Channel, which now constitutes the arrondissement of Le Hâvre, is much like that of French Flanders. The farmer is distinguished by his neatness, by the comfortable furniture of his house, the plantations of oaks, elms, beeches, and pines round his homestead, and the neatness and productiveness of his garden, enclosed by a live hedge. The rotation of crops is usually triennial, and the fallow of the third year has been generally superseded by a crop of trefoil, flax, peas, vetches, rape, &c. The manures employed are dung, marl, gypsum, brought from the neighbourhood of Paris; the last is employed for the artificial grasses and for orchards. Threshing-machines have been partially introduced; but, generally speaking, the implements of agriculture have undergone little improvement during the last forty years.

The produce of the department in corn is very considerable. In wheat it exceeds the average produce of the departments of France in the proportion of five to two; in barley, rye, maslin (wheat and rye mixed), and in potatoes, the produce falls short of the average. Scarcely any buckwheat and not any maize is grown. Peas, beans, vetches, lentils, turnips, rape, cole, and flax are cultivated. In oats the produce is not one-fourth of the average; a considerable quantity of this grain is brought in from the adjacent department of Calvados. The principal corn districts are in the centre of the department. The eastern side has a greater proportion of pasture; the cultivation of the oleaginous seeds, rape, cole, &c., characterises the coast, and the banks of the Seine are altogether less productive than the other parts, although possessed of much picturesque beauty.

The meadows and grass-lands occupy about 70,000 acres, and the heaths and open pastures about 45,000 acres. The grass-lands are chiefly in the valleys and along the banks of the rivers. The number of horses is very great, exceeding the average of the departments in the proportion of eight to three; they are the only animals employed in agriculture. They are good for draught and other labour; but the race of the horses of Caux, once much valued as carriage horses and for mounting dragoons and heavy cavalry, is extinct. In the number of cows this department also far exceeds most others, but the number of oxen is comparatively small. The cows reared in the department, especially those of Caux, are inferior to those of the departments of Calvados and of La Manche; many are brought from these departments to the rich pastures along the eastern side of this department. The number of sheep is considerable. Since the commencement of the present century a great change in the breed has taken place. The native sheep have to a considerable extent been replaced by mixed breeds, some of them English, which give a tolerably fine wool. The merinos, which had been naturalised, have been so much neglected as to have almost become extinct; and Dupin, writing in 1827, complains that the low price of wool, and the unequal manner in which the local duties on the article were levied, had led the farmer to neglect the fleece for the sake of the carcass. Goats are not common, but those of Tibet have been tried with success. Swine and poultry are common; the pullets of the district of Caux and the ducks of Rouen are in high repute.

There are no vineyards in the department, but the quantity of orchard and garden ground is 150,000 acres. The apple and pear are the fruits chiefly cultivated; the cider and perry made from these constitute the principal drink of the common people. The walnut is grown in the eastern parts of the department.

The woodlands occupy about 170,000 acres. There are few extensive woods, but innumerable small plantations round the farm-houses and in the hedge-rows, which serve to supply the wants of the farmer. Turf is the fuel employed by many, and it is also used by some manufacturers; but these chiefly employ pit-coal, of which a large quantity is imported. The oak, the beech, and the hornbeam are the trees chiefly grown; but the ash, the elm, the birch, the fir, the aspen, the maple, the chesnut, the wild cherry, and the lime-tree are also common.

The department is divided into five arrondissements, as follows:—

Name.	Situation.	Area, Sq.M.	Cantons.	Communes.	Population. 1831.	Population. 1836.
Rouen	S.	502	15	155	225,996	238,805
Dieppe	N.	448	8	168	109,978	112,427
Le Hâvre	W	341	9	121	134,755	142,292
Yvetot	N.W	447	10	169	138,429	142,680
Neufchâtel	E. & S.E.	596	8	144	84,525	84,321
		2334	50	757	693,683	720,525

In the arrondissement of Rouen are—Rouen, population in 1831, 88,086; in 1836, 92,083 [ROUEN]; Darnetal, population 5572 [DARNETAL]; and Duclair, on or near the right bank of the Seine; Elbœuf, population 9951 town, or 10,258 whole commune [ELBŒUF]; and La Bouillé, on the left bank of the same river; Ry, near the Andelle; Cailly, Fontaine, and Montville, on the Cailly; Clères, on a small stream flowing into the Cailly; Pavilly, on the Sainte Austreberte; and Buchy, in the part of the arrondissement remote from the Seine, near the centre of the department. Duclair or Ducler is a small place, consisting of a single row of houses, immediately under a chalk cliff which here overlooks the Seine, and in which there are some excavated habitations for the poorer classes. The river, which here winds very much, is of great breadth; the opposite land is a low marshy flat. The parish church is of Norman architecture; a considerable quantity of painted glass yet remains in the windows. There are lime-kilns. Three fairs are held in the year for cattle, horses, leather, hardwares, and furniture. La Bouillé is at the foot of a steep hill, and is a great thoroughfare: passage-boats run three times a day to and from Rouen. There are some excavations in a neighbouring quarry remarkable for their stalactites and for the great extent of their passages. Ry has manufactures of saltpetre, and a considerable trade in corn and cattle. At Montville cotton is spun and woven. Clères has paper and cotton mills, moved by the little stream (called the Bapaume) which falls into the Cailly: there is one yearly fair. Pavilly has manufactures of soft soap, linen, paper, and cotton-yarn; and the townsmen carry on trade in grain, linen, flax, and cattle and poultry. There are four yearly fairs. The population may probably be estimated at 2000. Saltpetre is made at Buchy, and trade is carried on in wool, iron, and cattle: there are two yearly fairs. There are several large villages: as Deville, population 3185; Marommes, population 2411; and Malaunay, all on the Cailly; St. Martin du Vivier, and others near Rouen, the inhabitants of which are engaged in the cotton manufacture, of which Rouen is the centre.

In the arrondissement of Dieppe are—Dieppe, population in 1831, 16,016; in 1836, 16,820 [DIEPPE], at the mouth of the Arques; Arques [ARQUES], Grand Torcy, and Bellencombre, on the same river; Les Grandes Ventes, between the Arques and the Bethune; Envermeu, on the Eaulne; Criel, on the Yères; Eu, population 3356 town, 3543 whole commune [EU]; and Le Tréport, population 2061 town, 2267 whole commune, on the Bresle; St. Victor, Auffay, and Longueville, on or near the Seye or Scie; Anglesqueville or Englesqueville, on the Saane or Saanne, and Bacqueville or Basqueville, population 1550 town, 2685 whole commune, on a stream flowing into it; and Toste and Bosclehard or Bosclar, in the central part of the department. Le Tréport was once of greater importance, but it suffered much both in the wars with the English and in the religious contests of the sixteenth century. It is now a small fishing town, the inhabitants of which are engaged in the herring and mackerel fisheries. A few small vessels, chiefly from England and Sweden, enter the port (which, from the accumulation of sand, is not accessible to large ships), and import and take away merchandise to the value of about 70,000 fr., or nearly 3000*l.* per annum. Some vessels were formerly fitted out for the cod fishery, but this has been given up. Soap and locks are manufactured, and linseed oil expressed. The inhabitants of Auffay trade in corn and hides. Longueville has the ruins of a priory, founded and partly built A.D. 1084, and antiently of great opulence. Toste or Tôtes has a prison. There are many country-seats round the town. The inhabitants have three fairs in the year: a great number of sheep are sold. At the village of St. Nicholas d'Aliermont (population 1805), near Dieppe, is an extensive manufactory of clock-movements, which gives employment to 300 work-people.

In the arrondissement of Le Hâvre are—Le Hâvre, or more fully Le Hâvre de Grace, population in 1836, 25,618; with its suburb Ingouville, population in 1831, 2507 town, 5666 whole commune [HAVRE, LE]; and Harfleur, on the right bank of the Seine, close to its mouth; Montivilliers, population 1988 town, 3828 whole commune, on the Lézarde, which joins the Seine at Harfleur; St. Romain, between the Lézarde and the Bolbec; Bolbec, population 7063 town, 9630 whole commune [BOLBEC]; and Lillebonne, on the Bolbec; Fécamp, population 8867 town, 9123 whole commune, near the sea [FECAMP]; and Château-et-Marché, Criquetot-l'Esneval, Goderville, Breauté, and Benarville, in the more inland part of the arrondissement. Harfleur, antiently written Hareflot, Hareflou, and Harfleux, was in the middle ages an important harbour and place of strength; the Portuguese and Spaniards obtained, about the close of the thirteenth and the commencement of the fourteenth centuries, a complete exemption from duties; and a similar privilege was soon after granted to the Lombards. The Spaniards brought wool for the clothiers of the neighbouring town of Montivilliers. In its prosperity Harfleur was attacked, and, after a vigorous defence, taken by the English under Henry V. (A.D. 1415), who expelled the inhabitants and re-peopled the town with English. It was gallantly retaken (A.D. 1433) by the surrounding peasantry; taken again by the English (A.D. 1440), and finally wrested from them about ten years afterwards by Charles VII. of France. Notwithstanding these disasters, it recovered its prosperity; but the revocation of the Edict of Nantes finally ruined it. There are many remains of the antient walls and gates. The former harbour is now dry, but small boats come up the Lézarde to the town when the tide is in. There is a beautiful Gothic church, the elegant tower of which is crowned by pinnacles at the angles, and by an octagonal spire connected with the pinnacles by flying buttresses. There is also an hospital. The townsmen manufacture earthenware and refine sugar; and they are actively engaged in fishing. There are four yearly fairs for cattle. Montivilliers had in the middle ages a wealthy nunnery, of which the church remains. The tower is of Norman architecture of the eleventh century; the rest of the building is of various dates, but handsome as a whole. The town is neat and beautifully situated in the valley of the Lézarde: there are, besides the above-mentioned church, a Protestant church, a high school, an hospital, and a small theatre. The townsmen, who were eminent in the fourteenth century for the manufacture of woollen cloth, carry on the same manufacture now, and they also make lace, cotton-yarn, leather, and paper; there are bleach-grounds for linen and a refining-house for sugar; trade is carried on in groceries and hardwares. There are two yearly fairs. Lillebonne was the Juliobona of the Romans, the chief town of the Caleti. Several Roman roads met here. A great number of Roman antiquities have been found at Lillebonne, and new researches are continually increasing the number; among the most important are the remains of a theatre, an aqueduct, and several tombs, besides medals, statues, and other antiquities. The dukes of Normandie had a castle here, the ruins of which are worthy of notice from their extent. An old circular tower, probably the keep, is said to have been built by William the Conqueror, and to have been the place where he assembled his barons to determine on the invasion of England: the wall of this tower is full ten feet thick. The town, though presenting in some points of view a picturesque appearance, is really a wretched place. The townsmen manufacture cotton-yarn, calico, and leather, and trade in cloth, groceries, hardwares, and cattle: there are two yearly fairs. The population of the commune may be estimated at from 1800 to 2000. Criquetot-l'Esneval and Goderville participate in the cotton manufacture, which gave employment, in 1827 (Dupin, *Forces Productives*, &c.), to between 600 and 700 persons in and around these two places.

In the arrondissement of Yvetot are—Yvetot, population in 1831, 7737 town, 9021 whole commune; in 1836, 9213 [Yvetot]; Valliquerville, Fauville-en-Caux, Valmont, Ourville, Doudeville, population 3172; Bouretout, Fontaine-le-Dun, St. Laurent-en-Caux, Lindeboeuf, Ouville, Yerville, and Les Baons, in the central part of the arrondissement; St. Valery, or St. Vallery-en-Caux, population 5104 town, 5328 whole commune; and Veulles, or Veules, population 1530, on the sea; Grainville, Cany, and Vittefleur, on the Durdan; and Caudebec, population 2782 town, 2832 whole commune, on the right bank of the Seine; and Mailleray, or La Mailleraye, on the left bank. Valliquerville, or Valliquierville, has a church with a very lofty tower: the inhabitants are engaged in the cotton manufacture. Valmont has some share in the manufacture of cotton-yarn and goods; linen is manufactured at Ourville and at Ouville; at Doudeville are several yearly fairs for cattle and mercery; and at Fontaine-le-Dun four fairs for cattle, linens, muslins, and other cotton goods. St. Valery-en-Caux is pleasantly situated, and has a small but safe harbour, much improved by some works carried on of late years. The mackerel, herring, and other fishery is carried on with great activity; of the herrings, some are cured; others, with the rest of the fish, are sent to Paris. The Newfoundland cod fishery employs some of the vessels belonging to the port. There is a good deal of business done in linens and cotton goods; and Baltic and Norway timber for shipping is imported. Soda is manufactured. At Grainville, distinguished by the epithet La Teinturière, there is an hospital. There are three fairs for horses and cattle. Caudebec was antiently the capital of the district of Caux, and was frequently taken and retaken in the English wars of the fifteenth and the religious wars of the sixteenth centuries. The prosperity of the place was much affected by the revocation of the Edict of Nantes. It is in a very picturesque situation, on the side of a steep hill rising from the Seine, which is here nearly a mile broad. Some of the houses are built on terraces on the side of the hill, and have hanging gardens. The church is a beautiful Gothic structure, with a lofty spire, and a richly sculptured portal: and there are an hospital and public gardens. The town is surrounded by a wall flanked with towers and strengthened with ditches. The manufactures of the place are cotton-yarn, printed calicoes, and other cotton goods, hats, leather, starch, refined sugar, vinegar, and soap; there are bleach-grounds and dye-houses. There are good quays along the banks of the Seine, and the vessels which run between Rouen and Le Hâvre procure biscuit and other provisions at Caudebec. The place is the mart of the surrounding country, and considerable trade is carried on in corn, for which there is a good weekly market, cattle, poultry, feathers, brandy, cider, slate, iron, coal, deals, &c. There are three yearly fairs.

In the arrondissement of Neufchâtel are—Neufchâtel, population in 1831, 2998 town, 3430 whole commune; in 1836, 3463; Bures and Gaillefontaine, on the Bethune; St. Saëns, population 1624 town, 2330 whole commune, on the Arques; Loudinières, on the Eaulne; Faucarmont and Grancourt or Grandcourt, on the Yères; Blangy and Aumâle, population 1798 town, 1980 whole commune, on the Brêle; Forges-les-Eaux, and Gournay, population 2591 town, 3030 whole commune, on or near the Epte; and Argueil, near the Andelle. Neufchâtel, distinguished as Neufchâtel-en-Bray, is on the slope of a hill near the right bank of the Bethune, in a hilly and woodland country affording good pasturage. The town is not well built; it has an hospital and a prison. It was formerly capital of the district of Bray, and was repeatedly taken by the English or by the contending parties in the civil strifes of France. There was a castle built by Henry I. of England. Neufchâtel has one or two subordinate courts of justice, a public library, and an agricultural society. The townsmen manufacture woollen hose (but this branch of industry has much declined), hats, and cotton goods: there are brew-houses, glass-houses, dye-houses, and tan-yards. Trade is carried on in flour, butter, and in the little cream-cheeses of the district, called Neufchâtel cheeses. There are limestone quarries near Gaillefontaine; and trade is carried on in salt butter, cattle, and mercery: there are numerous fairs. St. Saëns has manufactures of linen, glass, leather of various kinds, and glue; there are twelve yearly fairs; trade is carried on in corn, wood, cattle, and hides. At Blangy a great deal of cider is made, and many horses are sold. Aumâle is built on the slope of a hill; it was, during the war of the League, the scene of a battle between the Royalist cavalry under Henri IV. and the united forces of the Spaniards and Leaguers under the dukes of Parma and Mayenne, in which Henri was wounded. Woollen cloth, serge, and earthenware are made in the town. There are mineral springs. Forges-les-Eaux is on a hill which rises above a pleasant valley. The place is well known for its mineral waters, which are aperient, tonic, and diuretic; there are gardens, pleasure-grounds, and other attractions for those who resort to take the waters. Some manufactures of linen, sulphate of iron, and especially earthenware and coarse pottery, are carried on. Considerable business is done in corn; there are two fairs in the year, and a great market or fair monthly. Peat is dug near the town. Gournay is thought to have originated prior to the settlement of the Normans; it was on a causeway across the morass which here separated the Bellovaci from the Caleti. During the existence of the duchy of Normandie, it was of importance as a frontier town towards the domains of the French king. It is a small clean town, on the banks of the Epte, surrounded with a pleasant boulevard. The houses, which are of wood and clay, are of mean appearance. The church was built at various periods, between the end of the eleventh and the thirteenth centuries, and the architecture varies with the date of erection; the interior is of Norman architecture, but in the west front the pointed arch is used. There is a handsome fountain in the town, also an hospital or almshouse. Linen, porcelain, leather, and candles are made in the town, and glass in the neighbourhood. Considerable trade is carried on in butter (which is in high repute, and of which a great quantity is sent to Paris), cattle, and mercers' goods; there are a considerable weekly market for pigs and three yearly fairs for provisions and general goods. There are some mineral waters near the town. Gournay has a public library of 1000 volumes.

The population, where not otherwise described, is that of the whole commune, and from the census of 1831.

The department constitutes the diocese of Rouen: and is under the jurisdiction of the Cour Royale and of the Académie Universitaire of that city. It is included in the fourteenth military division, of which the head-quarters are at Rouen. It sends eleven members to the Chamber of Deputies.

In respect of education it is somewhat above the average of France; of the young men enrolled in the military census of 1828-29, 43 in every hundred could read and write; the average of France being a little above 39.

The department occupies an important place among the manufacturing departments of France. The cotton manufacture, of which Rouen is the centre, is the staple. A large quantity of cotton-yarn is spun, but it is not of the finest quality; and, generally, the manufactures of the department are calculated for the middling and poorer classes. Rouen produces checked and striped calicoes, classed with similar articles under the general title of 'Rouenneries;' at Bolbec are made calicoes and linen and cotton handkerchiefs. The weavers are dispersed through the department, and the material is given out to them by the manufacturers, through the intervention of an intermediate class, called 'factors.' Such at least was the system when Dupin published his *Forces Productives*, &c., 1827. Nankeen is manufactured at Darnétal, and a variety of mixed fabrics, linen and cotton, at Rouen. Dyeing is actively carried on in and round Rouen. Woollen cloth is manufactured at Darnétal, and especially at Elbœuf; wool is dyed at Rouen and Elbœuf. Serge is manufactured at Aumâle. The woollens of the department are sent into the interior of France, to Paris, Limoges, Lyon, and Bordeaux; and are exported to Italy, Germany, and the Levant.

In the earliest historical period, the department was comprehended in the territories of two nations, the Caleti, or Caletes, and Veliocasses, or Velocasses, both enumerated by Cæsar among the Belgic nations confederated against him (Cæs., *De Bell. Gall.*, lib. ii., c. 4); but they were afterwards transferred by Augustus to the province of Celtica, or Lugdunensis, upon the subdivision of which they were comprehended in Lugdunensis Secunda. The names of these nations are variously written. Cæsar speaks of the Caleti, or in some copies Caletes; Pliny, of the Galleti; Strabo, of the Καλέτοι, and in one place, probably by a transcriber's error, of the Υαδέτοι; Ptolemy calls them Καλῆται. Cæsar speaks of the Velocasses, or Vellocasses, and in one place (*De Bell. Gall.*, lib. vii., c. 75), of the Bellocassi; Pliny, of the Vellocasses; and Ptolemy, of the 'Ουενελιοκάσιοι. The chief town of the Caleti was Juliobona ('Ιουλιόβονα, Ptol.), now Lillebonne; to which we may add the Carocotinum and Lotum of the Antonine Itinerary, the former at or near Harfleur, the latter at or near Caudebec; and the Gravinum of the Peutinger Table, which may perhaps be Grainville in the arrondissement of Yvetot. The chief town of the Veliocasses was Rotomagus, the 'Ρωτόμαγος, or according to some MSS. 'Ρατόμαγος, of Ptolemy; the Rattumagus of the Peutinger Table; and the Rothomagus of the Notitia Imperii. Ammianus Marcellinus writes the name in the plural Rotomagi. It is the modern Rouen. Sanson had fixed the Uggade of the Antonine Itinerary at Elbœuf; but D'Anville, with better reason, fixes it at Pont de l'Arche, in the adjacent department of Eure.

In the middle ages this department was the nucleus of the duchy of Normandie. [NORMANDIE.] It included the whole or part of the districts of Bray, Caux, and Roumois. It is rich in the antiquities of the middle ages, in ecclesiastical and castellated buildings, or in their remains. The cathedral and several of the churches at Rouen, the churches of St. Jacques at Dieppe, of Arques, of La Trinité and St. Etienne at Fécamp, of Montivilliers and of Harfleur, of Ducler, Moulineaux (now in ruins), Pavilly, and Yainville, all near Rouen, and of Gournay, are interesting specimens of architecture of various styles from the massive Norman to the richness of the decorated English, if we may apply this latter name to foreign structures.

Among the most interesting ruins are those of the abbey of Jumièges, in a small peninsula formed by the winding of the Seine just below Rouen. It was a Benedictine abbey, originally founded in the middle of the seventh century; very shortly after the foundation, the establishment comprehended nine hundred monks, and fifteen hundred attendants and dependants. The abbey was destroyed by the Northmen in their inroads; but was restored by Guillaume (William), duke of Normandie, surnamed Longue-Epée, son and successor of Rollo; and continued to prosper down to a late period, though not without the intervention of some disasters, especially during the English wars of Henry V. and Henry VI., and the Huguenot wars of the sixteenth century. The present building was erected at various epochs. The western front of the abbey church is yet standing: it is of a simple character, and consists of two towers surmounted by spires, and a gable between them. The towers are square at the base, and octagonal in the upper part. The arches of the doors and windows are partly round, partly pointed. Of the central tower only a fragment remains. The nave is tolerably entire; but the choir and Lady-chapel, as well as the cloisters, are nearly demolished; and the work of demolition is still going on by the occasional removal of the stones for building. There are the remains of a second church, that of St. Pierre, also belonging to the abbey. The abbey-church of St. Georges Bocherville near Rouen is tolerably entire, 'and it is certainly at once the most genuine and the most magnificent specimen of the circular style now existing in Upper Normandy.' (Dawson Turner's *Letters from Normandy.*) The west front is flanked with towers: its general characteristic is simplicity, but there is a richly ornamented doorway. The church is adorned with a variety of sculpture, some of which is of the most grotesque character. The monastic buildings are occupied as a manufactory. The chapter-house which stands between them and the church is in a very dilapidated condition; but it is worthy of examination from the curious sculpture with which it is decorated.

There are the remains of antient castles at Rouen and Dieppe, and especially at Arques near Dieppe.

SEINE ET MARNE, a department of France, bounded on the north by the department of the Oise, on the north-east by that of Aisne, on the east by those of Marne and Aube, on the south-east by that of Yonne, on the south by that of Loiret, and on the west by that of Seine et Oise. Its form is irregular: the greatest length is from north-north-east, near the river Ourcq, to south-south-west, near Beaumont-en-Gâtinais, 74 miles; its greatest breadth is from the neighbourhood of Brie-Comte-Robert to the neighbourhood of Villenoxe in the department of Aube, 45 or 46 miles. The area is estimated at 2181 square miles, being rather below the average of the French departments, and about equal to the conjoint areas of the English counties of Gloucester and Warwick. The population in 1831 was 323,893; in 1836 it was 325,881, showing an increase in five years of 1988, or about 0·6 per cent., and giving 149 inhabitants to a square mile. Both in amount and density of population it is below the average of the French departments; and below either of the English counties with which we have compared it. Melun, the capital, is 24 miles in a direct line south-east of the barriers of Paris, or 28 miles by the road through Charenton, Villeneuve St. Georges, and Lieursaint.

There are no mountains in the department, nor any hills of considerable elevation; the highest are in the southern part. The surface is generally undulating. The south-east part is occupied by the formations of the cretaceous group; the rest by the tertiary formations of the Paris basin. The mineral treasures of the department are unimportant; it yields neither coal nor iron, nor are there any iron-works. Good building-stone is quarried, especially near Château-Landon, in the valley of the Loing, near the southern border of the department, and sandstone fitted for pavement in the neighbourhood of Fontainebleau, on the Seine, and of Coulommiers, on the Grand Morin. The best millstones in Europe are dug at La Ferté-sous-Jouarre, on the Marne, and good alabaster is quarried. Peat is dug at Claye, between Meaux and Paris, and at Crouy-sur-Ourcq, on the northern border of the department; and sand, which is valuable for making flint-glass, is procured near Fontainebleau. There are mineral waters at Provins.

The department is included in the basin of the Seine, which river crosses it from east to west, forming a crescent, convex towards the south, and passing by Bray, Montereau, and Melun: it is navigable throughout. The Marne also crosses the department from east to west, not far from the northern boundary; its channel is very winding, and navigable throughout; it passes La Ferté-sous-Jouarre, Meaux, and Lagny; its junction with the Seine is not in this department. The Yonne has a small part of its course in this department, just above its junction with the Seine, which takes place on the left bank of the latter river, at Montereau: it is navigable in all that part which belongs to the department. The Loing crosses the southern boundary near Château Landon, and flows northward past Nemours and Moret, into the Seine, which it joins on the left bank; above 20 miles of its course belong to this department, but it is not navigable, except in those places where it forms part of the line of the Loing canal. The Suzein, the Bez, and the Lunain, feeders of the Loing, have part of their course in this department. The Yéres rises in the department, and flows westward past Rosoy and Chalines into the adjacent department of Seine et Oise, where it joins the Seine: it receives the Yvron. The Essonne, another feeder of the Seine, just touches the south-west border. The Marne receives the Petit Morin and the Grand Morin on left bank, and the Ourcq on the right bank; only a part of the course of these rivers belongs to this department. The Ourcq and the Grand Morin are navigable; the former throughout that part of its course which belongs to this department, and the latter from above Crécy. The Grand Morin receives the Aubetin. In the central part of the department are a number of pools, none of them of great size, but abounding in fish.

There are two canals in the departments, that of Loing, which follows the valley of the Loing (sometimes being carried along the bed of the river), and unites the Loire with the Seine; and that of Ourcq, which follows the valleys, first of the Ourcq and then of the Marne, to the village of Annet, between Meaux and Lagny, and then leaves the valley of the Marne to take another direction to Paris. It opens a communication between the Ourcq and Paris, and is especially designed to supply the capital with water. The official statement of the inland navigation of the department is as follows:—

Rivers.—	Seine		
	Yonne	10	
	Marne	62	
	Ourcq	13	
	Grand Morin	9	
		—	161
Canals —	Loing	22	
	Ourcq	41	
		—	63
			224

What is called the Cornillon canal is a short cut, less than half a mile long, intended to avoid a bend in the Marne near Meaux.

There were in the department, on January 1, 1837, ten Routes Royales, or government roads, having an aggregate length of 320 miles, viz. 242 miles in good repair, and 78 out of repair. The principal roads are those from Paris to Lyon by Nevers and by Auxerre; that to Bâle by Troyes, Chaumont, and Vesoul; those to Strasbourg by Châlons-sur-Marne and Nancy, by Coulommiers, and by Montmirail; and that to Mons by Soissons and Laon. The road to Lyon by Nevers enters the department on the west side, and runs south-east by Fontainebleau and Nemours into the department of Loiret; the road by Auxerre enters the department also on the west side, not far from the other, and runs by Melun and Montereau into the department of Yonne. The Bâle road enters the department near Brie-Comte-Robert, and runs by Nangis and Provins into the department of Aube. The Strasbourg road, through Châlons-sur-Marne, crosses the northern part of the department through Meaux and La Ferté-sous-Jouarre; that through Coulommiers runs just to the southward of the Châlons road, through Lagny, Crécy, Coulommiers, and La Ferté-Gaucher; and the road through Montmirail branches off from the Châlons road at La Ferté-sous-Jouarre: the Mons road just crosses the north-west corner of the department through Dammartin. Roads lead from Melun on one side to Fontainebleau, and thence to Orléans in the department of Loiret; and on the other side to Chaulmes, Meaux, and into the Mons road at Villers-Coterets; and a road from Fontainebleau runs by Moret into the Auxerre and Lyon road just beyond Montereau.

The departmental roads had at the same period an aggregate length of 352 miles, viz. 297 miles in good repair, 46 out of repair, and 9 miles unfinished. The bye-roads had an aggregate length of about 10,000 miles. The department is provided with the means of communication, both by land and water, far better than most of the departments.

The surface of the department may be estimated at 1,400,000 acres, of which nearly 920,000, or about two-thirds, are under the plough. The quantity of wheat grown is more than twice the average quantity produced in the other departments. The produce in barley also is double the average of the whole kingdom. In rye and maslin (wheat and rye mixed) the quantity falls below the average of the departments, and the deficiency in oats is still greater. In potatoes, too, the crop is comparatively small, and buckwheat and maize are not grown at all. So great however is the preponderance of the wheat crop, that the department is enabled to export from one-fourth to one-third of its harvests; the greater part of what is exported is sent to Paris. Hemp and flax are also cultivated.

The quantity of meadow and grass land is above 80,000 acres; and there are about 23,000 acres of heath or common, or other uninclosed pasturage. A great number of horses are kept, and hardly anything but horses are employed in agriculture. The number of horned cattle is considerable; but it is a dairy rather than a grazing country. In the number of cows it far exceeds the average of the departments; in the number of oxen it falls very far below them. The cheese known as the Brie cheese is in high repute; more than 3,200,000 kilogrammes, or 64,000 cwts., are sold in the market of Meaux in the course of the year. The number of sheep is very great, especially of merinos and cross-breeds. The number of native sheep, though tolerably great, does not exceed the average of the other departments. The quantity of wool produced exceeds the average produce of the departments in the proportion of nearly three to one; it is employed by the manufacturers in the departments of Eure, Oise, Aisne, and Marne. Many of the English long-woolled breeds of sheep have been introduced.

The vineyards occupy 45,000 acres, which is below the average extent of the vineyards in the departments, but the quantity of wine produced is very great, far exceeding the average. It is however, generally speaking, of very inferior quality. The best wines are the red and white wines of Les Vallées. The gardens and orchards occupy above 16,000 acres. Some cider is made in the arrondissement of Melun. The woods occupy about 200,000 acres, of which 40,000 are included in the forest of Fontainebleau, which occupies a poor yet picturesque district. The oak timber of this forest is very good, and it abounds in game.

The department is divided into five arrondissements, as follows:—

Name.	Situation.	Area in Square Miles.	Cantons.	Communes.	Population.	
					1831.	1836.
Melun	W.	390	6	105	57,697	57,821
Fontainebleau	S.	521	7	104	69,953	71,974
Meaux	N.	463	7	161	93,417	90,965
Coulommiers	N.E.	355	4	80	53,363	54,104
Provins	E.	452	5	106	49,463	51,017
		2181	29	556	323,893	325,881

In the arrondissement of Melun are—Melun (population in 1831, 6604 town, 6623 whole commune; in 1836, 6846), on the Seine [MELUN]; Chaulmes, and Brie-Comte-Robert, population 2658 town, 2762 whole commune, on or near the Yères; and Tournan, population 1607 town, 1827 whole commune, between the Yères and the Marne. Chaulmes is surrounded by pleasant country-houses, and has a population of from 1500 to 2000. There are three yearly fairs. Brie-Comte-Robert derives its distinctive epithet from Robert, Count of Dreux, brother of Louis VII., and lord of the town. Robert, son of this Count, built the castle of Brie, of which the ruins remain. This castle was in the middle ages the object of frequent attack. It was stormed by the English in 1430, and retaken by treachery, A.D. 1434. It was taken by the insurgent nobles in the revolt of La Praguerie against Charles VII., and retaken soon after by the king, A.D. 1440. It was again taken in the troubles of the Fronde, in the minority of Louis XIV. The remains of the castle consist of the walls, forming a quadrangular enclosure, with round towers at the angles, and towers, round or square, in the middle of three of the sides. The tower in the centre of the northern face is a gate-tower in good preservation, about 100 feet high; the tower on the south side, which has been like it, is now in ruins. There is an elegant church of Gothic architecture; the portal is a restoration of later date. There is also an hospital, almost as antient as the church. The town is pleasantly situated, and has a considerable weekly market. There are brick-yards and tile-yards, tan-yards and curriers' shops. Considerable trade is carried on in corn, quills, and Brie cheese. Tournan is a pleasant town, with two fine mansions and parks, and several country-houses in the environs. Trade is carried on in cattle, corn, flour, and wool.

In the arrondissement of Fontainebleau are—Fontainebleau (population in 1831, 8104 town, 8122 whole commune; in 1836, 8021 commune), near the left bank of the Seine [FONTAINEBLEAU]; Nemours, population 3839; and Moret, population 1673, on the Loing; Château-Landon, near the Suzain; Beaumont, in the south-west corner of the department, between the Essonne and the Suzain; Egreville, between the Bez and the Lunain; and Montereau-Fault-Yonne, population 4048 town, 4153 whole commune, at the junction of the Seine and the Yonne. Nemours was taken by the English in the fifteenth century, and retaken, A.D. 1437, by the French. It was the scene of many disorders in the religious troubles of the sixteenth century. The town lies in a pleasant valley on the river Loing. From its low situation it is subject to inundations. It is walled, and has four suburbs; the streets are well laid out, and the houses well built. The antient castle of the dukes of Nemours is yet standing, flanked by four towers, and surrounded by a ditch. In front of the castle is a square of some extent. The banks of the Loing canal, which passes near the town, and of the river, afford some pleasant walks. There is a handsome bridge over the river, built after the design of the architect Peyronnet, and another bridge over the canal. The parish church, formerly the conventual church of the Augustinian friary of St. Jean, is a large and handsome building, with a fine steeple; but it yields in antiquity to the church of St. Pierre in one of the suburbs. There is an hospital attended by the Sisters of Charity, with a handsome entrance. There are several tan-yards and hat manufactories, tan-mills, flour-mills, a brick and tile-yard, lime-kilns, marble-works, and a brewery. Vinegar is made, and trade is carried on in corn, flour, wine, cheese, wood, iron, coal, &c. There are two considerable weekly markets and five yearly fairs. There is a public library of 10,000 volumes deposited in the castle. Moret is surrounded by a dilapidated wall with three gates: there is one suburb. Moret has a ruined castle, which belonged to the great Sully, and a tolerably handsome Gothic church, at the dedication of which St. Thomas-à-Becket officiated. The streets are straight and clean, and the houses tolerably well built. There are several flour-mills and some tan-mills; and trade is carried on in horses, cattle, wine of middling quality, corn, flour, potatoes, wood, and paving-stones. The Loing canal passes close by the town. Moret was taken by the English and Burgundians, under Henry V. and Philippe, duke of Bourgogne, A.D. 1420, and retaken by the French, A.D. 1430. Château-Landon is situated on a hill. There are quarries in the neighbourhood of hard stone susceptible of a polish like marble. Spanish white is made in the town, and trade is carried on in corn and wine. There are a weekly market and five yearly fairs. It was taken by the English in 1436, and retaken the following year. Egreville has a castle rebuilt in the reign of François I. There are some tile-works, and the neighbourhood produces wine, wood, and especially corn. Montereau-Fault-Yonne, or Faut-Yonne, is on the site of an antient town called in the Roman times Condate. It afterwards obtained the name of Monasteriolum, or 'the Little Monastery,' from a religious establishment which formed the nucleus of the modern town; from this name that of Montereau is derived. Montereau has acquired historical celebrity from being the scene, in A.D. 1419, of the assassination of Jean sans Peur, duke of Burgogne or Burgundy. [BOURGOGNE.] The town and a strong castle which had been built here, were taken, A.D. 1420, by the English under Henry V., assisted by Philippe, duke of Bourgogne, son of Jean; it was retaken by the French, A.D. 1438. In the civil wars of the sixteenth century it was repeatedly taken and retaken. On February 18, 1814, a body of allied troops (Würtembergers) were defeated here by Napoleon. The town is pleasantly situated partly on the left bank of the Seine and Yonne, partly on the tongue of land between the two rivers, over each of which, at their junction, there is a stone bridge, and partly on the right bank of the Seine. There are a collegiate church of considerable antiquity, a modern town-hall, and an hospital. The houses are tolerably well built, and there is a pleasant public walk by the Yonne. Earthenware, tiles and other pottery, and leather are manufactured; and trade is carried on in corn, flour, and firewood, for the supply of Paris. There is a well attended weekly market, held in the spacious market-place, for corn and cattle, and there are two yearly fairs. Potters'-clay is dug near the town.

In the arrondissement of Meaux are—Meaux, population in 1831, 8481 town, 8537 whole commune; in 1836, 7809 commune [MEAUX]; La Ferté-sous-Jouarre, population 2777 town, 3927 whole commune; and Lagny, population 1865 town, 1869 whole commune, all on the Marne; Crécy, on the Grand Morin; and Dammartin, population 1684 town, 1712 whole commune; and Crouy, between the Marne and the northern boundary of the department. La Ferté-sous-Jouarre is pleasantly situated in the valley of the Marne, in which river there is a small island close to the town. Round the town are a number of country seats and houses, and near it, on the right bank of the Marne, is the castle of Barre, flanked with towers, and commanding a beautiful prospect. There is an hospital. The chief trade is in the excellent millstones which are quarried near the town, and which are esteemed the best in Europe. For the iron-work, *i.e.* the tires or bands of these, about fifty tons of iron are required yearly. Woolcombers' cards, leather, iron, woollen yarn, tiles, and pottery are made; and boats are built for the navigation of the river. There are lime and plaster kilns and nursery-grounds near the town. Trade is carried on in corn, wood, and charcoal, for the supply of Paris; and in cattle, sheep, and wool. There are four yearly fairs, one of them a large sheep-fair. La Ferté-sous-Jouarre was one of the chief seats of Protestantism: it suffered much in the wars of the League. Lagny was antiently celebrated for a Benedictine abbey, founded in the seventh century by St. Furcy, a Scotchman, and which, after being pillaged by the Normans in the ninth century, was restored by Herbert, count of Champagne. Lagny was taken and burnt in 1358 by the English, in the wars of Edward III. It was besieged by them in A.D. 1431, and again in A.D. 1432, under the regent Bedford, but without success, though the town was much injured. Some disturbances having occurred in the reign of François I., the town was occupied by a body of troops under the Maréchal de Lorges, who committed such devastations that his name was long held in detestation. The town is pleasantly situated on the left bank of the Marne, over which there is a bridge, amid vine-covered hills and green pastures. There are a handsome fountain, an hospital, and an institution for the relief of the poor. There is a workshop for cutting the alabaster procured in the department, and there are several flour-mills. Considerable trade is carried on in corn, flour, wood, hemp, cattle, and Brie cheese: there are a weekly market and four yearly fairs. Crécy was, in the middle ages, a fortress of some importance. Its castle, of which there are some remains, belonged to the counts of Champagne and Brie, and was one of the strongest in the neighbourhood. The town was defended by walls flanked by ninety-nine towers, of which there are some remains. It is pleasantly situated on the Grand Morin, which is here divided into several channels. It has a bridge over the river, and an hospital. Laces, hats, and chamois and other leather are manufactured; there are some tan-mills; and considerable trade is carried on in corn and other agricultural produce and cattle. There are three well frequented yearly fairs. Dammartin is on the slope of a hill which commands an extensive prospect. There are some pleasant walks, occupying the site of the former castle of the counts of Dammartin, the ruins of which furnished bricks for building many of the houses of the town. There is a Gothic church, built by Antoine de Chabannes, lord of Dammartin and minister of Charles VII. He is buried in the choir. There is an hospital. Lace is made here, and trade is carried on in corn, wine, and cattle. There are four yearly fairs, at one of which, held on Whit-Monday, it is estimated that 30,000 sheep, chiefly merinos, are sold. Crouy is in a pleasant valley near the left bank of the Ourcq, and has a large market-place with a tolerably good market-house. It has a weekly market and three yearly fairs; trade is carried on in corn, hemp, cattle, and poultry. The neighbourhood has a number of country-houses: one tower of the antient castle of Crouy is yet standing, and is used as a prison.

In the arrondissement of Coulommiers are—Coulommiers, population in 1831, 2645 town, 3335 whole commune; in 1836, 3573 commune; and La Ferté-Gaucher, population 1553 town, 1930 whole commune, on the Grand Morin; Rebais, between the Grand Morin and the Petit Morin; Choisy, between the Grand Morin and the Aubetin; and Rosoy, on the Yères. Coulommiers received a charter of municipal enfranchisement in 1231, from Thibaut IV., count of Champagne: it suffered much in the civil dissensions which preceded and accompanied the English wars under Henry V. and Henry VI., but revived on the restoration of peace. In the early part of the seventeenth century, the duchess of Longueville, who held the lordship of Coulommiers, built a castle, and a Capuchin monastery adjacent to it, in an island formed by the Grand Morin: the ruins of the castle and the elegant church of the monastery yet remain. There is an hospital. There are many tan-yards and tan-mills. Coulommiers has a weekly market and two yearly fairs; much business is done, especially for the supply of Paris with corn, flour, cheese, wool, leather, and melons, which last are considered very good. Coulommiers has a subordinate court of justice; and there are many schools for young people of both sexes, the town being recommended by its healthy and agreeable situation. La Ferté-Gaucher is agreeably situated; it has an hospital of antient foundation. Serge and paper are manufactured; there are tan-yards, a tan-mill, and in the neighbourhood tile-yards and lime-kilns; there are a weekly market and four yearly fairs. Rebais was antiently celebrated for an abbey which, in the middle ages, was remarkable for riches and splendour: it was suppressed at the Revolution, and the buildings destroyed; there are some ruins of them and of a house in which the abbot resided. There is also an antient hospital. Gaiters are made here, and trade is carried on in mustard, wool, cattle, and especially in corn; there are nursery-grounds and brick-yards and tile-yards round the town. Rebais has a weekly market and five yearly fairs. Choisy had antiently an establishment of Cluniac monks, whose monastery is yet standing: the town was a place of strength; there are some remains of the walls and ditches. Tiles are made here, and there are two yearly fairs. Rosoy or Rosay, sometimes written Rozoy or Rozay, is a walled town; the walls are flanked with towers, and planted with fine trees. It has a parish church remarkable for the rich and delicate architecture of the interior, and an hospital established in a former convent of Dominican friars. Seed-oil and vinegar are made, and there are three yearly fairs.

In the arrondissement of Provins are—Provins, population in 1831, 5665; in 1836, 6007; Nangis, population 1963; Donnemarie and Chalautre, between the Seine, the Yères, and the Aubetin; Jouy-le-Châtel, near the Yères; and Bray, population 1992, on the Seine. Provins is a town of considerable antiquity; some writers contend for its being the Agedincum of Cæsar (see *Dissertatio de Urbe Agedinco*, subjoined to the first volume of Cæsar, in Lemaire's *Bibliotheca Classica Latina*, Paris, 1819); but Dulaure affirms that Provins is not mentioned before the year 802, and stoutly denies its identity with Agedincum, in which we are inclined to agree with him. In the middle ages this was one of the principal manufacturing and trading towns in France; the chief manufactures were of woollen cloth (in which, in the thirteenth century, 3000 weavers and as many wool-carders and fullers are said to have been employed) and leather. Three very large fairs, whose aggregate duration was more than four months, were held. Foreign merchants, who resorted to these fairs, had their halls, named after the province or country from which they came; and some old mansions in Provins yet retain these names. The cruelties and exactions of the king of France (Philippe le Hardi) and of the earl of Lancaster, who had married the heiress of Champagne and Brie, and was lord of the town, ruined the prosperity of Provins, which was still further injured by assaults and captures in the civil and English wars of the fifteenth century, and in the war of the League in the sixteenth. Provins occupies an extensive area, part of which consists of gardens, vineyards, and even fields; and is divided into two parts, the Upper Town on the west side, surrounded by walls, of which the greater part are standing; and the Lower Town on the north-east, east, and south-east, also surrounded by walls, except where it is adjacent to the Upper Town. These walls, which have breaches in several places, are very thick; they are, in the greater part of their circuit, accompanied by a deep ditch and by a boulevard or planted walk; that part of the boulevard which belongs to the Lower Town is inside the walls, and the small part which belongs to the Upper Town is outside. Two small streams, the Vouzie and the Durtein (which joins the Vouzie), pass through the town. The Upper Town is inhabited only by a few persons of the poorer class: the streets are narrow and winding, and the houses ill built and decayed from age. There are several remarkable ruins, among which are those of the old fort, the citadel, the old castle, La Grange-aux-dîmes, Le Pinacle, the chapel of St. Thibaut, and the church of Notre-Dame-du-Château; and especially of the Great tower, called also the King's tower, Cæsar's tower, and recently the tower of St. Quiriace, from the saint to whom an adjacent church is dedicated. This tower stands on the highest ground in the town, and is further elevated by an artificial mound 16 feet high. On this mound is raised a circular terrace or platform, supported by a strong wall, and from this platform rises the tower, which is square, with smaller round towers at the angles; these round towers rise above the walls, and are crowned with conical roofs. From the centre of the square tower rises a smaller octagonal tower connected by flying buttresses with the towers at the angles, and crowned, like them, with a high peaked roof. The whole building is above 120 feet high. The church of St. Quiriace, now the parish church of the Upper Town, is remarkable for its size and the beauty of its architecture: the choir has the same dimensions as that of the cathedral of Notre Dame at Paris. It was begun in the twelfth century, but has never been completed. The Upper Town is further remarkable for the spacious and lofty vaulted cellars which are found under some of the houses: some have a second cellar below the first; others have wells or tanks supplied by springs, and are often connected with each other by long subterranean passages. The palace of the counts of Champagne, near the church of St. Quiriace, is now occupied by the college. The Lower Town, which is well laid out and well built, contains two churches, the parish church of Sainte Croix, and the succursale, or chapel-of-ease, of St. Ayeul or Ayoul; the general hospital for the aged, and for orphans and foundlings, which occupies the ex-nunnery of St. Catherine, belonging to the Cordelier nuns, or nuns of St. Clare; and the cavalry barracks. Besides these buildings Provins has a civil and military hospital, a school of mutual instruction, a large corn-market, and several fountains. It has also a society of agriculture, sciences, and arts; and a subordinate court of justice: the public library, which consisted of 10,000 volumes, was destroyed by fire, A.D. 1821. The manufactures are druggets and linsey-woolsey, earthenware, and conserve of roses. The Provins roses, from which the conserve is made, were brought from the East in the thirteenth century by Thibaut, count of Champagne, on his return from the crusade. Provins has also a brewery, tan-mills, tan-yards, tile-yards, lime-kilns, and about sixty flour-mills. The chief articles of trade are corn and flour for the supply of Paris, wool and leather, and roses for use in medicine and perfumery. A canal was begun in 1780, to communicate with the Seine at Bray, but it remains unfinished. There are chalybeate waters, diuretic and purgative, tolerably well frequented in the season. There is a weekly market and there are five yearly fairs. Nangis is pleasantly situated in a bottom. It has a Gothic church of solid architecture; and two towers, the remains of the antient castle of the marquises of Nangis: the park attached to the castle still remains. Leather is made; and a considerable trade carried on in wool, cattle of every kind, corn, Brie cheese, butter, eggs, poultry, fruit, pulse, and other agricultural produce, for the supply of Paris. There are two yearly fairs and a considerable weekly market. Donnemarie is pleasantly situated; it has tan-yards, tile-yards, lime-kilns, and two considerable yearly fairs. Jouy-le-Châtel has the ruined donjon or keep of its antient castle. Bray, distinguished as Bray-sur-Seine, is on the left bank of the Seine, over which there is a stone bridge. It has two yearly fairs; and trade is carried on in corn, hay, cattle, and fish.

The population, when not otherwise described, is that of the commune, and from the census of 1831.

This department constitutes the diocese of Meaux, the bishop of which is a suffragan of the archbishop of Paris. It is included in the jurisdiction of the Cour Royale and of the Académie Universitaire of Paris: and is in the first military division, the head-quarters of which are in the same city. It returns five members to the Chamber of Deputies. In respect of education it is decidedly above the average of the departments: of the young men enrolled in the military census of 1828-29, 54 in every 100, could read and write, the average of the departments being a little more than 39.

In the most antient historical period, this part of France was included in the territories of the Senones, the Parisii, the Meldi, and perhaps the Silvanectes. The last nation probably belonged to the great Belgic stock; the others were Celts. The Parisii inhabited the north-western side of the department; the Meldi, whose name Ptolemy writes Μελδαι, the north-eastern; and the Silvanectes, if indeed they extended into this department, just the north-western extremity about Dammartin. The name of this last people is variously written. The orthography we have given is that of the Notitia Provinciarum Galliae: in the Notitia Dignitatum per Gallias, the name is applied to the chief town in the form Silvanectae. They appear to be the same people as the Ulmanetes of Pliny, and the Σουβάνεκτοι or Σουμάνεκτοι of Ptolemy. The southern half of the department belonged to the Senones. The Silvanectes were included in the province of Belgica Secunda; the other nations in that of Lugdunensis Quarta, or Senonia.

The principal Gallic or Roman towns were Jatinum, or, in the Peutinger Table, Fixtuinum, capital of the Meldi, or Meldæ, whose name it subsequently took; whence is derived its modern designation of Meaux. The Calagum and Riobe of the Peutinger Table were probably both in the territory of the Meldi, and may be identified with the village of Chailly near Coulommiers, and Orbi between Nangis and Jouy-le-Châtel. In the territories of the Senones were Melodunum, or Metiosedum (Cæsar writes the name apparently both ways), the Mecletum or perhaps Methetum of the Antonine Itinerary, and the Meteglum of the Peutinger Table, on an island of the Seine opposite Melun; and Condate, now Montereau-Faut-Yonne.

In the middle ages this part of France was included partly in the Ile de France, partly in Champagne. The eastern parts, which belonged to Champagne, were included in the district of Brie Champenoise; the western parts, which belonged to the Ile de France, were included in the district of Goelle, which belonged to the Ile de France properly so called; and in the districts of Brie Française and Gatinais Français. It was the scene of warfare during the long struggle to expel the English in the time of Charles VII.; and many of the towns were taken and retaken in the course of the contest.

SEINE ET OISE, a department of France, bounded on the north by the department of Oise, on the east by that of Seine et Marne, on the south by that of Loiret, on the west by that of Eure et Loir, and on the north-west by that of Eure. The department of Seine is entirely enclosed by this department. The form of the department of Seine et Oise is compact: the greatest length is from the banks of the Epte below St. Clair, in the north-west, to the junction of the three departments, Loiret, Seine et Oise, and Seine et Marne, on the south-east, 70 miles; the greatest breadth at right angles to the length is from the junction of the three departments of Oise, Seine et Oise, and Seine et Marne, on the north-east, to the western border of the department, between Houdan and Epernon, 52 miles. The area of the department is estimated at 2169 square miles, being under the average area of the departments of France, and rather greater than the conjoint areas of the English counties of Wilts and Berks. The population in 1831 was 448,180; in 1836 it was 449,582, showing an increase in five years of only 1402, or less than 0·3 per cent., and giving 207 inhabitants to a square mile. Both in amount and density of population it is considerably above the average of France, and also superior to the English counties with which we have compared it. Versailles, the chief town, is 11 miles west-south-west of Paris through Sèvres.

The surface is undulating, but none of the hills are of sufficient height or importance to claim particular notice. A narrow strip along the western border is occupied by the formations of the cretaceous group; and the rest of the department by the tertiary formations of the chalk basin of Paris. Its mineral productions are not important; there is neither iron nor any other metal, nor coal: excellent freestone for building, lithographic stones, sandstone for paving, gypsum, chalk, marl in tolerable quantity, potters'-clay, both for porcelain and common earthenware, and peat are dug There are mineral waters at Enghien-les-Bains, in the valley of Montmorency, 12 or 13 miles north of Paris, well frequented in the season; and at Montlignon, in the same neighbourhood: those of Montlignon are chalybeate; those of Enghien are sulphurous.

The whole department belongs to the basin of the Seine, which river enters the department on the east side, not far from Corbeil, and flows through it in a north-western direction, but with many remarkable bends, until it finally quits it below the junction of the Epte. All the course of the river between these points does not however belong to this department, but part of it belongs to that of Seine, which, as already observed, is enclosed by this. The Marne has a small part of its course in the eastern part of this department; and the Oise flows for some miles through the northern part, from above Beaumont-sur-Oise to its junction with the Seine. These are the principal rivers; and all three of them are navigable throughout that part of their course which belongs to this department. Of smaller streams, the Yères and the Epte flow into the Seine on the right bank, and the Essonne and the Orge on the left: in the western part of the department, the Vesgre flows into the Eure, a tributary of the Seine, no part of whose course belongs to this department.

The only navigable canal is the Ourcq Canal, which crosses the east side of the department, from the department of Seine et Marne to that of Seine. The canal parallel to the Oise will have part of its course in this department; and a canal from Pontoise to Paris has been projected. The Maintenon Canal was intended to bring the waters of the Eure to Versailles, but has never been finished. The official statement of the inland navigation of the department is as follows:—

Rivers.	Miles.	
Seine	87	
Marne	6	
Oise	26	
	—	119
Canal.		
Ourcq		6
		125

There were, on Jan. 1, 1837, twenty-six Routes Royales, or government roads, having an aggregate length of 447 miles, viz. 353 miles in good repair, 85 miles out of repair, and 9 miles unfinished. The principal are those from Paris, by Beaumont-sur-Oise, to Beauvais and Calais; from Paris, by Luzarches, to Clermont and Amiens; from Paris to Laon and Mons, with a branch by Louvres to Peronne and Cambray; from Paris to Châlons-sur-Marne and Strasbourg; from Paris to Dijon and Geneva; from Paris, by Villeneuve St. Georges, to Auxerre and Lyon, and by Corbeil to Moulins and Lyon (of all which roads only a small portion is in this department); from Paris, by Montlhéry, Arpajon, Etréchy, Etampes, and Angerville, to Orleans and the south of France; from Paris, by Versailles and Rambouillet, to Chartres, Tours, and the south-west of France; a second road to Chartres, by Rochefort, St. Arnould, and Ablis; and a road by Versailles and Houdan to Alençon and the west of France; and roads from Paris, by St. Germain, Poissy, Meulan, and Mantes, to Evreux and Caen; and by Pontoise on one hand to Rouen, and on the other to Dieppe The departmental roads had at the same time an aggregate length of 413 miles, viz. 346 miles in good repair, 63 miles out of repair, and 4 miles unfinished. The bye-roads had an aggregate length of about 9000 miles.

The climate is temperate and healthy; the soil, generally speaking, sandy, and by no means fertile by nature, but rendered productive by the facility which Paris presents of obtaining manure, and by the stimulus given to cultivation by the proximity of so ready a market as the capital. The area of the department may be estimated in round numbers at 1,400,000 acres, of which about 920,000 acres, or about two-thirds, are under the plough. The principal grain cultivated is wheat, in which, as well as in barley, the produce is double the average produce of the departments: in rye and maslin (wheat and rye mixed) the produce is above the average; but in oats it falls very considerably below the average. Very few potatoes and but little buckwheat are grown; and of maize scarcely any. Pulse of every kind and hemp are cultivated.

The meadow and grass lands amount to 50,000 acres, and there are about 25,000 acres of heath or open pasture. The number of horses is very considerable; they are employed in almost all agricultural labours. The ass is common. The number of cows is very great, more than double the average number in other departments; their milk contributes to supply Paris: the number of oxen and of bulls is small. Sheep are very numerous; even in the number of those of the indigenous breeds the department is above the average; and in the number of merinos and cross-breeds it is very far above it. It was at Rambouillet, in this department, that the merino was first naturalised in France; and the flocks of that neighbourhood are still daily contributing to the improvement of the breed of sheep throughout France. The long-wooled English sheep have also been naturalised, and have been propagated to a considerable extent.

The vineyards occupy about 40,000 acres: they are exceedingly productive, but the wine is for the most part of inferior quality. The red wines grown at Andrésy, on the right bank of the Seine, just below the junction of the Oise, round Mantes, and at Athis, on the Seine, above the junction of the Yères, are considered pretty good: that of Argenteuil, which was once in high repute, has degenerated: the white wine of Mignaux, near Lonjumeau, is also tolerably good. The gardens and orchards occupy 19,000 acres. The apple and pear are cultivated in the north-western corner of the department, where the vine does not thrive, to produce the cider and perry which form the common drink of the inhabitants. The cherries of Montmorency and Vi-aines near Poissy, the figs of Argenteuil and Carrières, both on the right bank of the Seine, the gooseberries of Garches near St. Cloud, and the strawberries of Montlhéry, are much esteemed.

Poultry is not very abundant; and game, once plentiful, has become rare. Bees are kept in considerable number in some places. The streams and pools abound with fish, especially the trout, eel, carp, pike, and perch; the tench, barbel, roach, gudgeon, and bleak are taken, the last for its scales, which are used in the manufacture of false pearls. Cantharides, or Spanish flies, and leeches, are obtained in some places, and form an article of trade.

The department is divided into six arrondissements, as follows:—

Name.	Situation.	Area in Sq. Miles.	Cantons.	Communes.	Population in 1831.	1836.
Versailles	Central	328	10	114	130,741	133,551
Mantes	N.W.	339	5	127	60,785	60,290
Rambouillet	W.	513	5	119	66,116	66,514
Corbeil	E.	248	4	94	56,753	56,738
Pontoise	N.E.	431	7	164	92,577	91,427
Etampes	S.	310	4	69	41,208	41,062
		2169	35	687	448,180	449,582

A later account gives the number of cantons (districts, each under a justice of the peace) at 36: we know not in which arrondissement the addition has been made.

In the arrondissement of Versailles are—Versailles (pop. in 1831, 28,477; in 1836, 29,209), on the great western road Versailles]; Argenteuil, pop. 4542 [Argenteuil]; and Meulan, pop. 1850, on the right bank of the Seine: and Meudon, pop. 1775 town, 3026 whole commune; Sèvres, pop. 3973; St. Cloud, pop. 1935 [Cloud, St.]; Marly; Ruel, pop. 3417; St. Germain-en-Laye, pop. 10,671 [Germain, St.]; and Poissy, pop. 2850, on or near the left bank. Meulan was frequently contested in the wars of the English in France, and in the civil strife of the Armagnacs and Bourguignons. A fort built on an island of the Seine opposite the town was vainly besieged by the Duke of Mayenne in the wars of the League. The town is partly on the right bank of the river, on a rising ground, partly in the small island on which the fort stood, from which are two bridges to the opposite banks: it is tolerably well built, and has a parish church; another church, now desecrated and used as a corn-market; and an antient hospital. Woolcombers' cards, woollen yarn and cloth, leather, hosiery, and chemical productions are manufactured; there are many flour-mills; and trade is carried on in cattle, corn, leather, mercery, and hardwares. There are two yearly fairs. Stone is quarried in the neighbourhood. Meudon was celebrated for an antient château, occupied at different times by the Cardinal of Guise, and by Louvois, minister of Louis XIV. In the early period of the Revolution it was devoted to the trial of improvements in the construction of artillery; and having been much injured by the works carried on, was demolished in 1804. A second palace, built in the reign of Louis XIV. by the second Dauphin, his grandson, was made an imperial residence by Napoléon, and is yet standing: it commands an extensive prospect. There are several country-houses at Meudon, and a glass-house and a pottery in Lower Meudon, on the banks of the river. Rabelais was appointed curé, or parish priest, of Meudon, but never discharged the duties. Sèvres consists chiefly of one very long street, on the road from Paris to Versailles; the houses are generally well built. There is an antient Gothic church. The royal porcelain manufactory occupies an immense building: it comprehends a collection of specimens of foreign porcelain, and of the raw materials of which they are made; of all the varieties of French porcelain, earthenware, and pottery, with the raw materials of these; and a third collection of specimens of works produced in the manufactory itself, chronologically arranged. Porcelain-clay is dug in the neighbourhood. Articles of enamel, chemical products, earthenware, and Cashmere shawls are made at Sèvres; and there are a tan-yard, a brewery, and a refining-house for oil. Considerable trade in wine and other articles is carried on. There is a bridge over the Seine. There was some sharp fighting between the French and Prussians here in 1815. Marly had formerly a royal palace and gardens, now destroyed: it is remarkable for its forcing-pump and aqueduct for the conveyance of water to Versailles: the pump raises the water to the height of above 500 feet. Ruel contains the palace of Malmaison, the residence of the empress Josephine before and after her divorce. She died here in 1814, and the palace was pillaged by the allies in 1815. Josephine's tomb is in the church of Ruel. There are also here a palace built by Cardinal Richelieu, and extensive barracks. The early kings of the Capet family had a palace at Poissy, and St. Louis was baptized, if not born, in that town. It suffered in the wars of the English; and in 1561 a celebrated conference, 'the Colloquy of Poissy,' was held there between some of the Catholic clergy and some of the Reformed with Theodore Beza at their head. The town is old and ill built, with narrow, crooked, dirty streets, and a large but irregular market-place: there is a very long narrow bridge over the channels and islands of the Seine. Some parts of the old town-wall are yet standing. The parish church is a fine Gothic building of considerable antiquity. The font in which St. Louis was baptized is preserved in a chapel, the painted windows of which represent his birth. There are an antient hospital at Poissy, and a house of correction, in which the prisoners are kept to hard labour. The manufacture of soda, soap, and muriatic acid; tallow-melting, grinding corn, and the making of light hats of whalebone and osier, are carried on: there are three weekly markets, one a great cattle-market for the supply of Paris; and there is some trade in corn. The village of St. Cyr, near Versailles, has a military school. [Cyr, St.]

In the arrondissement of Mantes are—Mantes, pop. in 1831, 4148; in 1836, 3818; Limay, and Roche-Guyon, on the Seine; St. Clair, on the Epte; Magny, on the road from Paris to Rouen; and Houdan, pop. 1839, on that from Paris to Alençon. Mantes was, in the infancy of the French monarchy, one of its bulwarks towards Normandie. It was taken and burned, A.D. 1087, by Guillaume or William the Conqueror, who died from a hurt received here. It suffered repeatedly in the English wars in the fourteenth and fifteenth centuries; and had some share in the troubles of the Fronde in the seventeenth. The town is well situated on the left bank of the Seine, and communicates by two handsome stone bridges (connecting the banks of the river with an intervening islet) with the village or town of Limay on the opposite bank, which, though a separate commune, may be regarded as a suburb of Mantes, the population of which it raises to between 5000 and 6000. The houses are well built, and the streets are adorned by four fountains. There are pleasant walks, some on the banks of the Seine. The church is a fine Gothic building, with two lofty towers; and there are an antient tower, which is the remain of an old church of St. Maclou; two hospitals, one for the sick, the other for the aged; and a public library of 4000 volumes. Saltpetre, leather, especially excellent calfskin, coarse linens and hosiery, are made: there are numerous tan and flour mills, and trade is carried on in wine, leather, and corn. There are six yearly fairs. La Roche-Guyon is on the right bank of the river, and is commanded by a precipitous rock or cliff surmounted by an antient tower. Immediately at the foot of the cliff is a castle or mansion, partly antient, partly modern, communicating with the town by a subterraneous staircase cut in the rock. St. Clair, distinguished as St. Clair-sur-Epte, is the place where Charles the Simple signed the treaty surrendering Normandie to Rollo the Northman. [NORMANDIE.] It has the remains of a baronial castle, a hermitage (said to have been the residence and place of martyrdom of St. Clair in the ninth century), the fountain of which is much resorted to for the cure of sore eyes. Magny is in the valley of the Aubette, a small stream flowing into the Epte; it is well built, and there are some pleasant country-houses around. There are an old parish church and an hospital. Hosiery and leather are manufactured; and trade in cattle, corn, and hides is carried on. There are two yearly fairs and a weekly market. Houdan, at the confluence of two small streams which join the Eure, has an antient church, an old tower of unknown origin and singular form, and a great trade in corn, calves, poultry, and wool. There are a weekly market and three considerable yearly cattle-fairs.

In the arrondissement of Rambouillet are—Rambouillet pop. in 1831, 2522 town, 3147 whole commune; in 1836, 3006 for the commune; on the road from Paris to Chartres; Montfort L'Amaury, pop. 1817, between the road to Chartres and that to Alençon; St. Leger, on the Vesgre, which joins the Eure; Limours, Rochefort, St. Arnould, and Ablis, on the second road to Chartres; and Chevreuse, pop. 1507, between the two roads from Paris to Chartres; and Dourdan, pop. 2393 town, 2555 whole commune, on the Orge, a small feeder of the Seine. Rambouillet has a royal château, partly built of brick, and of the time of Henri IV., partly of older date, especially a round tower in which François I. died: the park and gardens were laid out by Le Nôtre. There is a large wood stocked with game. It was at Rambouillet that Charles X. attempted to rally his troops after 'the three days' at Paris (in 1830), but the advance of the Parisians compelled him to withdraw. There is a royal sheepfold, established by Louis XVI., who also established a model farm. It was here that the merino sheep was first naturalized. Sheep-farming, and especially the breeding of merinos, is pursued by several persons. There are a town-hall, built by Louis XVI., and an hospital. Sandstone is quarried in the neighbourhood; and there are two weekly corn-markets, one of them very considerable, and three yearly fairs, one especially for wool. Montfort-l'Amaury is tolerably well built, on the slope and at the foot of a small hill, the summit of which is crowned by the ruins of an old castle. The parish church is a large Gothic building with stained glass windows: there is an hospital. Trade is carried on in corn, cheese, fruit, cattle, and horses: there are four yearly fairs. At Limours pottery is made, millstones are quarried, and trade in corn is carried on: there are two yearly fairs. The church is large and well built: there was formerly a mansion, which belonged to Diana de Poitiers, to Cardinal Richelieu, and to Gaston, duke of Orléans, brother of Louis XIII. Rochefort has the remains of an antient fortress. Cotton yarn is spun here. At St. Arnould or Arnoult, sometimes distinguished as St. Arnoult-en-Yvelines, cotton-spinning and weaving are carried on, and there are bleach-grounds. Some remains of the antient fortifications of the town still exist. Ablis has two yearly fairs for cattle, mercery, and hardwares. Chevreuse has tan-yards; a considerable trade in corn, cattle, and wool is carried on; and there is a considerable tile and brick-yard near the town. Four yearly fairs are held. There are some ruins of an old castle. The town suffered much in the civil and English wars of the fifteenth century. Dourdan was formerly a place of strength: it retains the ruins of a very antient castle, lately occupied as a house of correction; and there is an antient church, with a central tower remarkable for its height, and two other towers at the west end. Silk stockings, coarse woollens, cotton-yarn and cotton goods, and beer are made; and trade is carried on in corn, wool, and woollen cloth. La Bruyère was born near Dourdan. Dourdan has a house of correction.

In the arrondissement of Corbeil are—Corbeil, pop. in 1831, 3708; in 1836, 3690; at the confluence of the Essonne with the Seine; Villeneuve St. Georges, at the junction of the Yères with the Seine; and Lonjumeau, pop. 2038 town, 2308 whole commune; Montlhéry, pop. 1547 town, 1566 whole commune; and Arpajon, pop. 2165, on the road from Paris to Orléans. Corbeil was a place of some importance in the earlier periods of the French monarchy; Abelard resided and taught here for a short time. It was repeatedly attacked in the English and domestic wars of the fourteenth, fifteenth, and sixteenth centuries. The town is divided into two parts by the river Seine; Vieux or Old Corbeil, on the right bank, is the smaller part, and is regarded as a suburb of the more important part, Neuf or New Corbeil, on the left bank; the two are united by a good stone bridge. There is another stone bridge over the Essonne, which here joins the Seine. There are several churches, an hospital, a prison, a theatre, a corn-market, and a flour-magazine. There are one or two government offices, and an agricultural society. Cotton-yarn, printed calicoes, paper, leather, glue, refined sugar, and pipes or hoses for engines, woven in flax and hemp without seam, are made. The chief trade is in corn and flour for the supply of Paris, cattle, and horses. There are more than forty flour-mills on the Essonne. There are two weekly markets and one yearly fair. Villeneuve St. Georges is built on the summit and slope of a pleasant hill. There are a sugar-refining-house, a tile-yard, an oil-store, and wine-stores. Lonjumeau, or Longjumeau, has some large tan-yards, and a considerable trade in corn, flour, wine, fruit, pulse, hides, and cattle. There are four yearly fairs. Montlhéry is memorable for the battle fought near it (A.D. 1465) between Louis XI. and Charles le Temeraire, count of Charolais, afterwards duke of Bourgogne, then at the head of the 'Ligue du Bien Public.' [BOURGOGNE.] The town is built on the slope of a hill, of which the summit is occupied by an antient tower, the donjon of a former castle. There are also an antient town-hall and hospital. Trade is carried on in cattle, and there are four yearly fairs. Arpajon has tan-yards and breweries; and carries on trade in corn, flour, pulse, calves, pigs, poultry, and butter: it has a large weekly market and three yearly fairs.

In the arrondissement of Pontoise are—Pontoise, population in 1831, 4979 town, 5458 whole commune; in 1836, 5408 commune; and Beaumont, population 1892 [BEAUMONT], on the Oise; Marines, on the road from Paris to Dieppe; Montmorency, between the Dieppe and Calais roads; Luzarches, on the Calais road; and Louvres, and Gonesse, population 2147, one upon and the other near the road to Cambray. Pontoise existed in the Roman times, but is little noticed until the ninth century, when a castle was built to check the incursions of the Northmen or Normans. It was repeatedly taken and re-taken in the English wars of the fifteenth century; and was taken by Henri III. and Henri of Navarre in the war of the League. Louis XIV. withdrew to Pontoise during the troubles of the Fronde. The town is built partly on the summit and side, partly at the base of a hill on the right bank of the Oise, over which there is a narrow inconvenient bridge built in the sixteenth century. The streets are generally narrow and winding; those in the lower part of the town are well paved; those which communicate between the upper and lower part are so steep as to require steps in some parts to relieve the difficulty of the ascent. There are two churches, St. Maclou and Notre Dame, standing in large irregular open spaces planted with trees: that of St. Maclou is an antient Gothic church, crowned with a lofty tower. There are some remains of the old town-wall, and of the tower of the antient church of St. Martin. There is an hospital recently built on the banks of the river; and there are a high school, a public library, an agricultural society, a theatre, a school of mutual instruction, and several private schools. Steel ornaments, clocks and watches, mineral acids and other chemical preparations, starch, cotton-yarn, and leather are manufactured; and trade is carried on in corn and flour for the supply of Paris, gypsum, and cattle. There is a copper-foundry. Pontoise has some judicial or fiscal government offices. There are a number of corn-mills on the Oise or on the Viosne, a small stream which here joins the Oise. There are three yearly fairs. Marines has tile and brick yards and plaster-kilns: there are two yearly fairs. Trade is carried on in cattle. Montmorency is on a hill commanding the picturesque and beautiful valley of Montmorency. The streets are steep, but there are some good houses. The market-place is large but irregular, with a market-house in the middle. The parish church is a Gothic building of the sixteenth century. Near the town is the Hermitage, a small house, celebrated as the retreat of Rousseau, and of the musical composer Grétry, who died here in 1813, and is buried in a tomb in the garden. In the valley near the lake of Montmorency are the mineral waters of Enghien, population 1789, which are similar in their character and properties to the waters of Barrèges in the Pyrenees. They are much frequented in the season, which lasts from June to September. There are excellent bathing-rooms; and in the neighbourhood are pleasant walks. The park of St. Gratien is connected with the bathing-rooms. Common lace and embroidery are made at Montmorency, and trade is carried on in fruit of every kind, especially chesnuts and excellent cherries. There is a considerable weekly market. Luzarches has an antient abbey, now converted into a country-house, and an hospital. Metal buttons and lace are manufactured; and trade is carried on in corn and cattle. There are two yearly fairs. Louvres is built partly on the slope of a hill, partly in a valley. Lace and ratafia are made; trade is carried on in cattle; and there are three yearly fairs. Gonesse, or Gonnesse, was the birth-place of PHILIPPE II., AUGUSTE. It has a parish church and an hospital. Fringes, cotton-yarn, linens, and braid are made; and there are bleach-grounds for linen: considerable trade is carried on in corn, hay, horses, and cattle: there are two yearly fairs.

In the arrondissement of Etampes are—Etampes, population in 1831, 8109; in 1836, 7896 [ETAMPES], on the Juine, a feeder of the Essonne; Estrechy and Angerville, on the road from Paris to Orléans; La Ferté-Aleps, on the Essonne, and Milly, population 1881 town, 1941 whole commune. At Estrechy, or Etrechy, a considerable trade in horses is carried on. Angerville has a brewery; stockings are manufactured; and trade carried on in corn, cattle, and wool. There are two yearly fairs. La Ferté Aleps, or Alais, is pleasantly situated, and was antiently a place of strength. Cotton-yarn is spun, and trade in horses and cattle is carried on. There are sandstone-quarries near the town. Milly is pleasantly situated, and has a church, an hospital, a market-house, and the ruins of an antient Gothic castle, which stood several sieges in the wars with the English during the reign of Charles VII. Trade is carried on in corn and cattle: there are four yearly fairs, at which much business is done in agricultural produce, especially grain.

The population given above, when not otherwise described, is that of the commune, from the census of 1831.

The department constitutes the diocese of Versailles, and is under the jurisdiction of the Cour Royale and of the Académie Universitaire of Paris: it is in the first military division, the head-quarters of which are at Paris. It sends seven members to the Chamber of Deputies. In respect of education it is considerably in advance of the average of the departments: of the young men enrolled in the military census of 1828-29, 56 in every 100 could read and write; the number in the average of the departments being about 39 in the 100.

In the earliest historical period this part of France was included in the territories of the Parisii, who dwelt in the central and eastern part; the Veliocasses, or Velocasses, in the northern part; the Carnutes in the western; and the Senones in the southern. Some small portions along the northern boundary may have belonged to the Bellovaci and Silvanectes; a small portion of the north-western corner may have belonged to the Aulerci Eburovices, and another small portion of the southern border to the Aureliani. The Parisii, the Carnutes, the Senones, and the Aureliani were included in the Roman province of Lugdunensis Quarta, or Senonia: the Veliocasses and Aulerci Eburovices, in that of Lugdunensis Secunda; the Bellovaci and Silvanectes, who, as well as the Veliocasses, were of Belgic stock, were comprehended in Belgica Secunda. Briva Isarae and Petromantalum or Petrumviaco, both apparently towns of the Veliocasses, and mentioned in the Antonine Itinerary and the Peutinger Table, are identified by D'Anville, the first with Pontoise, and the second with Magny or some position near it. Diodurus, in the territory of the Carnutes, mentioned in the Antonine Itinerary, was probably near Montfort l'Amaury; and Salioclita, in the territory of the Senones, mentioned in the same authority, was probably at Saclas on the Juine, above Etampes.

In the middle ages this territory was included in the provinces of Ile de France and Orléanais.

SEISIN is a term properly applied to estates of freehold only, so that a man is said to be *seised* of an estate of inheritance or for life, and to be *possessed* of a chattel interest, such as a term of years. This distinction does not appear to have existed in the time of Bracton; at least he uses the two words as identical in meaning ('possessio sive seisina multiplex est,' lib. ii., fol. 38).

The seisin of the tenant of a freehold is the legal possession of the land. It is actual seisin, called seisin in deed, when he has corporeal possession of the land, or, as Bracton expresses it, 'corporalis rei detentio: corporis et animi cum iuris adminiculo concurrente.' It is seisin in law when lands have descended to a person, but he has not yet actually entered into possession of them, and no person has usurped the possession. When an estate of inheritance is divided into several estates, as for instance an estate for life, and a remainder or reversion in fee, the tenant in possession has the actual seisin of the lands; but the persons in remainder or reversion have also seisin of their respective estates. The seisin of a rent which issues out of lands is quite distinct from the seisin of the lands; and therefore a disseisin of the estate in the land is not a disseisin of the rent.

The word seisin is also applied to the services due from the tenant to the lord. When the lord has received the tenant's oath of fealty, he has obtained seisin of all his services.

Seisin in deed is obtained by actually entering into lands, and an entry into part in the name of the whole is sufficient; by the receipt of rents or profits; and by the actual entry of a lessee to whom the lands are demised by a person who is entitled to but has not obtained actual possession.

A disseisin supposes a prior seisin in another, and a seisin by the disseisor which terminates such prior seisin. To constitute a disseisin, it was necessary that the disseisor should not have a right of entry; that the disseisee should not voluntarily give up his seisin, and that the disseisor should make himself the tenant of the land; or in other words, should put himself, with respect to the lord, in the same situation as the person disseised. 'But,' it is well remarked (Co. Litt., 266 *b*, Butler's note), 'how this substitution was effected, it is difficult, perhaps impossible, now to discover. From what we know of the feudal law, it does not appear how a disseisin could be effected without the consent or connivance of the lord; yet we find the relationship of lord and tenant remained after the disseisin. Thus after the disseisin the lord might release the rent and services to the disseisee; might avow upon him; and if he died, his heir within age, the lord was entitled to the wardship of the heir.' But the doctrine of disseisin is in many respects very obscure, and at present of little practical importance.

SEISTAN, called also *Segestan*, is a province, or rather a country, situated in the eastern part of the table-land of Iran, and enclosed within the boundaries of the kingdom of Afghanistan. There is some difference between authors who have written on this part of Afghanistan, respecting the extent of country to which this name is to be given. Captain Conolly limits it to the low and flat country which surrounds the Lake of Seistan, and states that its length may be estimated at 100 miles and its breadth at 60; so that it would be equal in extent to Yorkshire. Kinneir and Elphinstone extend it over the whole plain which stretches from the foot of the Mountains of Hazaureh, or the Paropamisus of the antients, southward to the desert and mountains of Beloochistan. Taken in this more comprehensive signification, Seistan comprehends the countries between 30° and 32° 30′ N. lat., and between 61° and 65° E. long., a space the area of which considerably exceeds 36,000 square miles, and is nearly as large as the state of Kentucky.

On the north of Seistan is the extensive mountain-region known to the antients under the name of Paropamisus, and called by modern geographers the Mountains of Hazaureh and Eimack, from the name of two tribes which occupy the most elevated part of it. These mountains, though of great elevation in the centre and along their northern declivity, sink much lower as they approach the Plain of Seistan, and their most southern branches terminate in hills along the caravan road which leads from Girishk on the banks of the Helmund (32° N. lat.) to Furrah on the Furrah-rood (32° 30′). This road constitutes the natural boundary of Seistan on the north. On the east is the Plain of Kandahar, which may be considered as the eastern prolongation of that of Seistan, though it constitutes a different political division, and is excluded from this notice. On the south is the Desert of Beloochistan. [BELOOCHISTAN.] The western boundary is formed by a chain of hills, which Pottinger describes as narrow, though at intervals very lofty; but Conolly says that it is broad and lofty, which seems nearer the truth, as in some places it takes two days to cross it. This chain of rocks appears to extend across the table-land of Iran nearly south and north, from the Surhud in Southern Kohistan to the vicinity of Ghorian west of Herat, and between 60° and 61° E. long. It divides the eastern and smaller plains of Iran from the more extensive deserts which lie west of it. [PERSIA.]

Physical Geography.—The Plain of Seistan, with the adjacent valleys and the Plain of Kandahar and its dependencies, constitutes a closed basin. Not a drop of water which descends on it ever reaches the sea· and this constitutes its peculiar character. The surface sinks from the south and the north, and the lowest part of it is indicated by the course of the river Helmund, from Killah Beest to its entrance into the Lake of Seistan. The southern part of the plain is a desert, large tracts of which are level and without vegetation, the soil consisting of a loose sand which immediately absorbs all moisture. In other places there are numerous sand-hills, the intervals between which are covered either with sand or with gravel. In those parts there are bushes at the base of the mountains, and in some tracts a scanty grass is met with. In a few places the soil is impregnated with salt. No permanent river drains this desert; and the Helmund, which runs along its northern boundary, does not receive any supply from the north, not even during the rains: but wells and tanks are met with at distances not exceeding 24 miles. The country is inhabited by some tribes of Beloochees, who wander about with their herds.

The country on the north of the Helmund does not slope regularly to the south. From the mountains of Hazaureh it descends in terraces, until it reaches the vale of the Helmund and the basin of the Lake of Seistan, which latter is the lowest terrace, in which consequently all the waters that descend into the plain and the surrounding mountains are collected. The whole of this tract approaches to the nature of a desert. The surface is in some parts, especially towards the banks of the Helmund, covered with sand, which however generally forms a firm soil; but it usually consists of a hard earth, mixed with rocks and low hills: the soil, except in the bottoms of the rivers, is of very indifferent quality. Scarcely a tree is found in the whole region, but the plains are covered with low bushes. A few patches occur even at a distance from the rivers, which are cultivated, and, with the exception of some large tracts, these plains supply herbage and water during the great part of the year to the numerous herds of camels and sheep of some tribes of the Dóoranees. There are permanent villages among the cultivated lands, but by far the greater part of the inhabitants are scattered over the face of the country in tents. These observations however do not apply to the vales along the rivers, which, according to the vague statements of travellers, seem to be depressed from 200 to 300 feet and more below the general level of the plain. As the mountains of Hazaureh are covered with snow for several months, they give origin to several rivers, which in the season when the snow melts become deep and rapid streams, and run southward either to the Helmund, or fall into the Lake of Seistan. The water of these rivers is used to irrigate the bottoms of the river valleys, and thus a portion of this region is fitted for cultivation, and produces abundant crops.

The Hamoon and the Plain surrounding it, or Proper Seistan.—The Lake of Seistan is called by the natives the Hamoon, a name which designates a plain covered by a sheet of water. It bears also the distinctive name of the Lake of Koh-i-Khwajeh, from a hill which is surrounded by the lake, and which is not far from its eastern banks. The lake extends (between 61° and 62° E. long. and 31° and 32° N. lat.) about 70 miles from south-south-west to north-north-east, and has an average breadth of eighteen miles, except towards its northern extremity, where it widens to more than 30 miles. In these wider parts of the lake there formerly existed a separate lake, called Dúk-i-Teer, which was divided from the Hamoon by an isthmus of moderate width, but about 10 or 12 years ago the Helmund changed its course, and instead of carrying its waters to the great lake, it sent them to the Dúk-i-Teer, and the isthmus was carried away by the waters, so that the two lakes are now only one. The most appropriate appellation of the Hamoon is the classical name of Aria Palus; for it is in reality almost a marsh. It has rarely a depth of more than from three to four feet, and is almost entirely covered with reeds and rushes. The Dúk-i-Teer is a large sheet of water thickly studded with reed-topped islands, its depth averaging about four feet, and having a very muddy bottom. The reeds are tall and close together, but one may walk through them without difficulty. Along its northern banks the water is not so deep, and the reeds are not in patches, but cover the whole surface. In the old Hamoon, on the contrary, the reeds are in most places thick and stiff with age, and stand so close together in clumps, that quadrupeds are unable to force their way through them. Here and there patches of blue water appear between the reeds, but it is only towards the south-west that there is a large sheet of water clear of rushes and reeds. The water of the Hamoon is salt, but not equally so in all parts, the intensity varying according to the depth, the nature of the soil on which it rests, and the proximity to the mouths of the rivers: still it is generally used.

The level country which surrounds the Hamoon may be called the Plain of Seistan Proper. On the west it extends to no great distance from the banks of the lake, and seems to be sterile, a circumstance to be accounted for by the vicinity of the chain of hills which unites the mountains of Beloochistan with those of Hazaureh, and by the fact that only one torrent originating on it falls into the lake. But on the north and east it stretches to the distance of 20 or 30 miles, and to the south-east and south 50 miles and more. It is entirely composed of flats, with the exception of one hill, and in its whole extent not a stone is found, except a few rounded pebbles in the beds of the rivers. The soil is either the light earth of the desert, or the still lighter alluvial deposit of the rivers. There is hardly a tree, and not one of any size in this country. The soil is very fertile wherever it can be watered; but the waters which are brought down by the rivers are not sufficient to irrigate perhaps one-fourth of the plain, and thus probably three-fourths of it are not cultivated. As however, even in those parts which at present are a mere waste, the ruins of large towns are found, it is supposed, that at some remote period and under an enlightened government the waters of the rivers were carried over a much greater extent of country than at present, when the canals and embankments are neglected. This may be true to some extent. But as the soil is incapable of offering the slightest resistance to the large body of water which is discharged into the plain at certain times of the year with great violence, it is very probable that the Helmund may have often changed its course. The last change, which occurred only 10 or 12 years ago, makes this supposition very probable. Some hundred years since the river may have discharged the greater part of its waters into the southern extremity of the lake, at which time it fertilised the country round the antient town of Zirreh, from which the lake is frequently called by geographers the Lake of Zirreh. The very extensive ruins of that city are stated to be about 10 miles from the southern extremity of the lake.

Rivers.—All the rivers which originate on the southern and western slope of the mountains that surround the Plain of Seistan on the north and east, fall into the Hamoon. They partake of the nature of mountain torrents, at one time of the year rushing down with great violence, almost black with mud, and at others being either quite dry, or flowing in a clear, languid, and shallow stream. The largest of these rivers are the Helmund, the Khash-rood, the Furrah-rood, and the Adrascund.

The Helmund (the Etymander of the antients) rises nearly in the centre of the mountain-region of Hazaureh, at no great distance from Cabool, to the west of that town. Its general course through the mountain-region is to the south-west, and it leaves it after a course of about 200 miles, some distance above Girishk. In the plain it continues in the same direction to its confluence with the Arghandd-ab river, which enters it just below Killah Beest. From this place it turns gradually more to the west, until it flows due west; but in approaching the meridian of the Dúk-i-Teer, it turns north-north-west, and soon enters the Plain of Seistan Proper. The greater part of its course within this plain is in one channel; but when it is about fifteen miles from the lake, it divides into several arms near Khwajeh Ahmed. The greatest volume of water was formerly in the arm which ran westward to the old Hamoon, and divided before it joined the lake into many smaller channels, which circumstance rendered it possible to irrigate a great extent of country. At present, the largest volume of water runs down to the Dúk-i-Teer in a northern direction; and although there is still some water in the antient channels available for irrigation, it is feared that their beds will soon be filled up by the mud which the river brings down in the wet season: in which case the populous and well cultivated country about the towns of Dushtuck, Boorji, Chuling, and Sekoba will be abandoned, and cultivation will be entirely shifted to the southern banks of the Dúk-i-Teer. This river, in the dry season, is never without a plentiful supply of water; during the swell, it comes down with astonishing rapidity, and is, according to the statement of Captain Conolly, equal in size to the Jumna. Its course probably exceeds 400 miles.

The Khash-rood is erroneously laid down in our maps, as it does not join the Helmund, but falls into the Dúk-i-Teer, at no great distance from the new mouth of that river. This river rises in the lower declivity of the mountains of Hazaureh, and flows within their range south-east. It enters the plain near Dilaram, and then runs south-west to its embouchure. Before 1810 it did not enter the Dúk-i-Teer; but on approaching the lake, it spread its waters over a low tract called, from a species of marshy grass (aishk) which abounded there, Aishkineik; but this tract now constitutes a part of the Dúk-i-Teer. The course of the Khash-rood exceeds 100 miles, but in summer it is nearly dry.

The Furrah-rood, which falls into the north-eastern extremity of the old Hamoon, rises likewise in the lower declivities of the mountains of Hazaureh, towards the western extremity of the mountain-region, and its course is mostly to the south-west and south. It passes a little to the north of the fort of Furrah, and runs close under Laush, about 20 miles south of which it enters the lake. Its course exceeds 100 miles. This river is nearly dry for the greater part of the year; water is however confined in many places by bunds or natural hollows, and is always to be found by digging a few feet into the bed, which is the case with most of the rivers of this part of Asia. During the spring it is a broad and rapid river, but not half the size of the Helmund.

The Adrascund falls into the Hamoon, about twelve miles west of the Furrah-rood, and is about the same size. The greater part of the course of this river was unknown a few years ago. It is the same river which waters the Plain of Herat, through which it runs from east to west, rising a considerable distance east of that town. In that part it is called Herat-rood. It afterwards turns to the south-east, and crosses the high-road from Kandahar to Herat, about fifty miles south of the last-mentioned town. After flowing east by south through the Plain of Subzawer, which is enclosed by some low ranges connected with the mountains of Hazaureh, it sweeps round to the west, but gradually turns to the south, in which direction it enters the Hamoon.

Among the smaller rivers the Ibrahim Jooi must be mentioned. It drains a part of the country between the Khash-rood and the Furrah-rood, and probably runs less than fifty miles. It terminates in a marsh seventy or eighty miles north-east of the Dúk-i-Teer, which during the greater part of the year is dry.

The Vale of the Helmund.—As soon as the Helmund has left the hills, and particularly below Girishk, the bottom is generally from four to five miles wide. The bed is converted into a sort of pavement by the stones rolled down from the mountains. The stream now keeps close to the left bank, above which rise, with a steep ascent, the vast mounds which constitute the edge of the desert. The high bank on the right is formed likewise by steep cliffs, which are hollowed and indurated by the action of the water. The space between this bank and the modern channel of the river, of which the average breadth is rather more than two miles, is called Gurmsir (the hot country). It is a rich tract, well cultivated, and full of orchards, in which the mulberry-tree is very plentiful.

The Vales of the Khash-rood and Furrah-rood are of less extent, and we are very imperfectly acquainted with their productive powers. Captain Conolly in his map has inserted the names of a considerable number of places in the vale of the Khash-rood. between the lake and the town of Khash, and on that of the Furrah-rood as far as Furrah, and even at some distance farther north, from which we must conclude that the vales of these two rivers, in the lower part of their course, possess a considerable degree of fertility, and are tolerably populous. We cannot suppose that these places are small. as the country on both sides of the rivers is traversed by the wild hordes of the Beloochees, against which the inhabitants must be able to defend themselves.

The Vale of the Adrascund seems to be less favourable to cultivation. Where the river leaves the mountain-region it runs in a narrow valley called Jaya, then passes through Anardureh, or the Valley of Pomegranates, after which it enters a tract, which from its extreme barrenness is called Tug-i-Noomed, or the Waste of Despair. Towards its mouth the valley grows wider, and admits of cultivation to some extent.

Climate.—Our information respecting the climate of Seistan is very scanty. The heat in summer is more oppressive than at Kandahar. For nearly half the year a strong steady wind blows from the snowy mountains which lie to the north. This wind, which is called the Bad-i-sud-o-bist-roz, or the wind of 120 days, is confined to a breadth of about 80 miles, between the range of hills west of the Hamoon and the town of Khash, and this circumstance is explained by considering the extent of the desert plain of of Beloochistan, which between 61° and 64° E. long. reaches far to the south between the two projecting mountain masses of the mountains of Beloochistan. During the prevalence of this wind the days are very hot, but the nights are generally cold. It affects the eyes of the inhabitants, particularly by the dust which it raises, and which is mixed with particles of salt. During the three months of the winter the weather is very pleasant, and similar to that in the north-west part of Hindustan. Snow has been known to fall in Seistan, but it is a rare and remarkable occurrence. The climate however is generally unfavourable to human life, which is mainly to be attributed to the immense quantity of stagnant water, especially in the vicinity of the Hamoon.

Productions.—Wheat is raised to a great amount; rice is not so extensively cultivated, except in some parts of the Gurmsir. Some coarser grains, as bajra, are grown in many parts. Cotton is an important article of cultivation: the plant is not half the height of the Indian one, but it bears a large pod. Tobacco is raised to a small extent, and is of bad quality. The water-melons are singularly large. They are raised in enormous quantities on the margin of the Hamoon. There are neither artificial grasses, vegetables, nor flowers. The largest tree in the Plain of Seistan Proper is a prickly pomegranate, The shores of the lake are lined with tamarisks, which however are only bushes, and rarely attain a large size. The Gurmsir is well stocked with mulberry-trees.

There is hardly a horse in the country. The mortality which prevails among them is generally attributed to the irritation produced by the flies, with which the country swarms at certain seasons. Of more than 5000 horses brought some years ago to Seistan in a military expedition, not one is said to have been alive six months afterwards The few horses which are kept for state are tended with the greatest care in dark stables, from which they only come out on important occasions, except during the winter. Camels are numerous in the Gurmsir, and in the desert south-east of Seistan Proper, but are not numerous in the last-mentioned country. Sheep and goats constitute the principal wealth of the pastoral tribes which inhabit the deserts. The sheep are remarkable for their tails, which are a foot broad, and entirely composed of fat. Mules and asses are numerous, and thrive well. The cattle are of good size, and much valued in the neighbouring countries. People send their cows from a distance to pasture on the reeds of the Hamoon, which soon bring them into condition, but a cow thus fattened does not yield the same quantity of milk as the Kandahar cow, which feeds on the artificial grasses. Three or four hundred Seistan cows are exported annually to Kandahar, Persia, and other neighbouring countries. The more common wild animals are wolves, which will attack cows and even men, jackals, hyenas, porcupines, hedgehogs, kangaroo-rats, and others. The skins of the otters are exported to Bokhara, where they fetch a high price. The marshy and rocky parts of the Hamoon shelter innumerable wild hogs, which are very destructive to the fields. They are hunted with dogs, which are large, strong, bold animals, resembling the Bhil dog of Hindustan, and are regularly trained to hunt. When the waters are rising in the spring, herds of thirty and forty wild hogs are to be seen swimming one behind the other from island to island. Wild asses and deer abound in the desert which lies between the Hamoon and the hills west of it. In these hills leopards are met with, and in the deserts north of the Helmund there are antelopes. There are also hawks, some of which are trained for hawking. The water-fowl are in incredible numbers during the time of the inundation. Geese, ducks, and teal are domesticated. Fish are plentiful in the rivers as well as in the Hamoon, but there are few varieties of them. In the rivers only two species, a carp and a silurus, are taken, and in the Hamoon one or two more. Besides the flies, the mosquitoes are very troublesome during the hot season. The poorest villager is obliged to make a small room of coarse open cloth, to protect himself and his family after sun-set against the hosts of mosquitoes.

Common salt is the only mineral which abounds in Seistan. It is found in patches in various parts of the desert. That of Peer-i-Rizre in the Gurmsir is celebrated for its whiteness. Saltpetre may be obtained in numerous places. The plain of Furrah is a saltpetre marsh.

Inhabitants.—The country north of the Helmund and the Gurmsir are inhabited by tribes of the Dóoranees [AFGHANISTAN], but in some parts of the desert it seems that the Beloochees have settled. Elphinstone states that the original inhabitants of Seistan Proper are Tanjiks; but that two considerable tribes called Shekrukee and Surbundee, which have emigrated from Persian Irak, have settled in the delta of the Helmund, and that in late times a tribe of Beloochees had fixed its residence in the east part of that country. In the map of Captain Conolly the Serbundis occupy the country along the eastern banks of the old Hamoon, and at a still greater distance are settled the Shakorhis and the Nahroois. He has not marked the position of the Tanjiks, and it would therefore appear that the Nahroois represent the Tanjiks of Elphinstone. These three tribes, according to Elphinstone, exactly resemble the Persians. The tribes of the Beloochees, which are settled on both sides of the Helmund as far as Seistan Proper, and also occupy the southern banks of the Dúk-i-Teer, where the principal branch of the river now traverses the country, are called by Conolly the Towkee-Beloochees. They formerly lived in tents, and subsisted by pasturage and pillage; but they have now applied themselves with industry and success to husbandry, and have adopted the dress and manners of the other tribes of Seistan.

Places.—As there are several tracts of considerable extent, as Seistan Proper and the vales of the rivers, which are tolerably populous, it is probable that there are several towns of some importance. On this point however we are much less informed than about the physical geography of the country. Captain Christie, who visited Seistan Proper in 1810, discovered the town of Dooshak, which by Captain Conolly is called Dushtuck. It contains about 2000 houses, and is built on the ruins of a much larger place, which is called Jellalabad. This town, according to Conolly, is the capital of the Shakorhis. The capital of the Nahroois is called Boorji, and the country of the Serbundis contains two considerable places, Chuling and Sekoha, which, to judge from the expressions of Captain Conolly, are rather large and well-built towns. In the vale of the Furrah-rood two considerable places are named, Laush and Furrah. Of the former we know nothing; but Furrah is stated to be a very large walled town, with some commerce. The most important places in the vale of the Khash-rood seem to be Kuddeh and Khash. We find no place of importance mentioned in the vale of the Helmund.

Government.—Seistan, as a province of the kingdom of Afghanistan, is governed by a haukim, who collects the revenue and commands the militia, and a sirdar, who commands the regular troops. Their authority is considerable in the populous districts, where the power of the heads of the tribes is not great; but among the Beloochees and other nomadic tribes their influence is not great, and their orders are not executed unless supported by these chiefs.

Seistan constituted a great part of the province Aria of the Persian empire; but as none of the great thoroughfares of Asia traverse this part, we are very little acquainted with the state in which it was at that time. No European traveller visited this country before 1788, when George Forster, in his 'Journey from Bengal to England,' in passing along the road leading from Kandahar to Herat, travelled along its northern boundary. In 1810 Captain Christie traversed it from south to north, departing from Nooshky in Beloochistan, and passing through the lower vale of the Helmund to Furrah and Herat. The few observations which he was able to make in a rapid journey, and under rather unfavourable circumstances, and which are inserted in Pottinger's 'Travels in Beloochistan and Sinde,' and in Kinneir's 'Geographical Memoir of the Persian Empire,' were the only authentic information that we possessed on Seistan up to a very recent date. Elphinstone, in his 'Account of the Kingdom of Caubul,' had made some addition to our knowledge of Seistan; but it was collected from the mouths of the natives, and is now proved to be partly incorrect. In 1839 the British army entered Afghanistan to support the Shah Shudsha, and in the two years which have elapsed since that time our geographical knowledge of Afghanistan has received very valuable addition. Among these is Captain Edward Conolly's 'Sketch of the Physical Geography of Seistan,' which is found in the 'Journal of the Asiatic Society of Bengal,' Sept. 1840. This short essay gives quite a different view of the Lake of Seistan and the surrounding countries. The author promises to publish a larger work on that country.

SEISU'RA, the name assigned by Mr. Vigors and Dr. Horsfield to a genus of birds with the following

Generic Character.—Bill lengthened, much depressed, with an elevated straight culmen, compressed near the tip. Wings long, first quill spurious, fourth and fifth longest. Tail lengthened, the sides rounded. Feet moderate, slender, resembling those of *Muscipeta*. Inner toe shortest; outer toe connected to the middle at the base. Gape with short bristles. Australia. (Sw.)

Example, *Seisura volitans*.

Description.—Black above, white below; head black with metallic reflections; quills yellow.

This is the *Turdus volitans* of Latham; *Dishwasher* of the colonists of New South Wales. It is constantly in motion, displaying its tail and uttering a sound analogous to that made by sharpening an instrument on a whetstone. It is fond of perching on fallen trees, where the colonists are clearing the ground, or on the roofs of houses [MUSCICAPIDÆ, vol. xvi., p. 12.]

SEIU'RUS. [SYLVIADÆ.]

SEJA'NUS, LU'CIUS AE'LIUS, a native of Vulsinii, in Etruria, was the son of Seius Strabo, a Roman knight. (Tacit., *Ann.*, iv. 1.) He first attached himself to the interests of Caius Cæsar, the grandson of Augustus, but afterwards gained the favour of Tiberius, who shortly after his accession appointed him to the command of the Prætorian troops, in conjunction with his father, who had held the command under Augustus. He continued to increase in power and influence till the whole administration of the state was eventually committed to him. Tiberius sent him with his son Drusus, in order to suppress the insurrection of the legions in Pannonia (Tacit., *Ann.*, i. 24, &c.); and when his father, Seius Strabo, received the government of Egypt, Sejanus obtained the sole command of the Prætorian troops. These troops, which had previously been quartered in different parts of the city, he collected into one camp, and used every effort to gain over to his interests. He also secured the support of the leading members of the senate; and as his influence increased, so did his ambition, and he resolved to secure, if possible, the imperial power. Drusus, the son of Tiberius, and the children of Germanicus, stood however in his way. He first determined to remove Drusus, against whom he had a personal hatred on account of a blow which he had received from him; and in order to accomplish his purpose, he seduced Livia, the wife of Drusus, and then holding out to her the prospect of marriage and his own accession to the Imperial power, he induced her to consent to the murder of her husband, who was shortly afterwards removed by poison. (Tacit., *Ann.*, iv. 3, 8; Dion Cass., lvii. 22; Suet., *Tib.*, 62.)

Sejanus was anxious to marry the widow of Drusus, but he was strongly dissuaded from it by Tiberius. He now began to fear lest Tiberius should suspect his designs, and accordingly he persuaded the emperor, who was fond of ease, to retire from the city, and to leave the management of public affairs in his hands. Tiberius first withdrew to Campania, and afterwards to the island of Capreæ. Sejanus, now released from any restraint, acted in the most arbitrary and oppressive manner. He procured the death of Agrippina, the widow of Germanicus, and also of her two sons Nero and Drusus, and nothing now seemed to stand in the way of his wishes, when the suspicions of Tiberius became at length aroused, and he resolved upon the death of his favourite. Tiberius was obliged however to proceed with caution. At a meeting of the senate, which Sejanus was induced to attend, he was arrested by Nervius Sertorius Macro, to whom Tiberius had entrusted the tribunicial power, and was the same day condemned to death. His body was exposed to the fury of the people, and his children and many of his relations and friends were also put to death. (Dion Cass., lviii. 6-19; Tacit., *Ann.*, v. 6, &c.; Suet., *Tib.*, 65.)

SELAGINA'CEÆ, a small natural order of monopetalous Exogens, belonging to Lindley's Nucamentose group. It has a tubular calyx; a more or less irregular corolla, four usually didynamous stamens; one-celled anthers; a superior very minute ovary; a two-celled fruit, with solitary seeds. The principal character of this small order is its one-celled anthers, which separates them from Verbenaceæ, with which they were formerly placed. The order contains six genera, all of which are natives of the Cape of Good Hope. They are herbaceous plants or small shrubs, with alternate leaves, sessile spiked flowers, and large bracts. Their properties are unknown.

SELBY. [Yorkshire.]

SELDEN, JOHN, was born December 16, 1584, at Salvington, near Worthing in Sussex. His mother, Margaret, was the daughter of a knightly family of the name of Baker, in Kent, whom her husband, John Selden, known by the name of the 'Minstrel,' obtained in marriage by means of some proficiency he had in music. Their son began his education at the free grammar-school at Chichester, and at the age of fourteen entered at Hart or Hert Hall, in Oxford, a foundation since merged in the present Magdalen Hall in that University. When about nineteen he was admitted a member of Clifford's Inn, and in 1604 removed to the Inner Temple. By nature unfit, or by accident unable, to apply himself to the more active business of his profession, he devoted this time of his life to the study of history and antiquities, both civil and legal, to the acquirement of languages, and the study of logic and of moral philosophy, with an application which was eventually rewarded by the honour of being considered one of the most learned writers of his age. At twenty-two years of age, he wrote his first published treatise, the 'Analecton Anglo-Britannicon,' a work which surprised his friends, and gave him an immediate reputation. This was followed by other works, and in 1614 appeared his treatise upon 'Titles of Honour,' a book then and ever since regarded as one of authority. In 1618 he was summoned before the High Commission Court for publishing the 'History of Tithes,' wherein he allows the legal but denies the divine right of the clergy to the receiving of tithes. In the early ages of Christianity, tithes were, in imitation of the Jewish law, a source of church revenue, and were originally paid to the bishop, and not for the maintenance of a resident clergy; and it was not till later, when the people began to question this right, that Charlemagne first gave a legal confirmation to these ecclesiastical claims. By denying then the divine right, the reason for the legal injunction is abandoned, and the payment of tithes becomes a mere tax. Selden apologised in words which did not express a recantation of opinions, but regret for having disturbed the church and offended the court. He was considered the instigator of the remonstrance on the subsequent protestation of the House of Commons, which that House made in 1621, wherein, under Selden's advice, though not then himself a member, it asserted its right to offer advice to the crown, and claimed the liberty of the subject. The king, in consequence of whose speech at the opening of the parliament these memorable declarations were made, erased them from the Journals of the House with his own hand, and dissolved the parliament. Selden was committed to prison, from which, through the interest of the bishop of Winchester, he was released in five weeks.

He first appeared in the House of Commons as member for Lancaster, for which place he was returned in the parliament which assembled in 1623, the last parliament of James I.; and in 1625, on the accession of Charles, in the 'parliamentum vanum,' which assembled at Oxford, he sat for Great Bedwin. In the former of these years he gave a strong instance of independence or self-will, for which there seems no reason, for on being chosen reader of Lyon's Inn, he refused to perform the office. The register of the Inner Temple contains an order passed in consequence by that Society, that there should be a 'ne recipiatur' entered upon his name; that he be fined, and be for ever disabled to be called to the bench. This order was repealed in 1624.

Charles soon summoned a second parliament on the speedy dissolution of the first, and Selden was again returned for Bedwin. The impeachment of the duke of Buckingham was at once determined on by the new parliament, and Selden was one of the members appointed to prepare the articles, and was named a manager of the prosecution. From this it appears that he had zealously joined the party in opposition to the court, and, though thus implicated, he escaped the fate of Digges and Elliot, who were employed in the same capacity, and were thrown into prison accordingly. Another dissolution in 1626 stopped the proceedings against the duke, but a forced loan which Charles was driven to have recourse to in the assumed exercise of his prerogative, called Selden, though not in the habit of appearing at the bar, to defend in the Court of King's Bench Sir Edward Hampden, who had by warrant of the council been imprisoned with four others for refusing to pay his portion of the loan. They were brought up by writ of Habeas Corpus, but Selden and his fellow-counsel were unsuccessful in their endeavours to obtain the discharge of the prisoners, who were all remanded on the judgment of Hyde. In Charles's third parliament, which met in 1628, Selden was returned member for Ludgershall; and on the proceedings against the duke of Buckingham being renewed, he demanded that judgment should be given against the duke upon the impeachment of the former parliament. He took an active part in the discussions which now occupied the House of Commons on the levying of tonnage and poundage, and in the drawing up of the Petition of Rights, to which Charles gave his consent in 1628. Court influence still protected Buckingham, and the conflict between the king and his Commons might have begun earlier if immediately after the prorogation the duke had not fallen by the hand of Felton.

During this recess Selden devoted himself to literary pursuits. At the request of Sir Robert Colton, he transcribed the Greek inscriptions in the collection of antient marbles which the earl of Arundel had received from the East, and they were published by the name of 'Marmora Arundeliana.' [Arundel Marbles.]

Parliament re-assembled in January, 1629, and Selden appeared still more to have inclined to the discontented party. During the continuance of the late prorogation the goods of several merchants had been seized by the crown to satisfy the duty, among which were those of one Rolles, a member of the House. The Speaker, on an early day after the meeting of parliament, being desired to put the question that the seizure of these goods was a breach of privilege, declared 'he durst not, for that the king had commanded to the contrary.' Selden instantly rose, and in strong words expostulated with the Speaker, whom he considered bound to obey the commands of the Commons. The House adjourned in a state of great excitement, and on its meeting again, and the Speaker still refusing, two members held him in his chair; Hobart locked the door of the House; and Elliot and Stroud moved the question. The Speaker again declining to obey, a short remonstrance against the levying of tonnage and poundage was immediately framed; at Selden's desire it was read by the clerk, and passed by acclamation rather than by vote. The king, exasperated with his faithful Commons, the following day dissolved the parliament, and Selden, with some others concerned in the late proceedings, which were deemed seditious, was committed to the Tower. After remaining there eight months, and for some time denied the use of books, or allowed to write, he was brought up by Habeas Corpus to the King's Bench, and on refusing to give security for his good behaviour, though his discharge was offered him on that condition, his confinement was continued in the King's Bench prison, though with less rigour. This appears from the fact that he was appointed by the students of the inns of court to prepare a mask* which they were anxious to represent before the royal family, to show their disapprobation of Prynne's 'Histrio-mastix.' In 1634 he consented to give bail, and he was suffered to go at large.

A petition to the king, to whom it appears that Selden was less obnoxious than the others of his own party, either through admiration of his learning, or from conviction that his natural love of ease and retirement, which Clarendon speaks of, would make him less likely to proceed to violent measures, obtained for him, through the interest of Laud, his entire liberation. Soon after he appears to have approached the court party, and to have gained even the personal favour of Charles, to whom he dedicated the well-known treatise, 'Mare Clausum.'

---

* There is a very amusing account of this mask, quoted by Maitland, in his 'Hist. of London.' It left Ely Place in grand procession, and went down Chancery Lane to Whitehall, where the king saw it.

In the great case of ship-money we find no mention of Selden; and as his knowledge and learning would have made him a valuable counsel in Hampden's behalf, it is probable that he either declined to defend, or that Hampden's party thought it not prudent to request his aid on account of his recent approaches to the court party. From this time his behaviour may be thought somewhat inconsistent, unless we consider his conduct in the Long Parliament, which assembled in 1640, and to which he was unanimously returned a member by the University of Oxford, rather as that of a retained advocate. He sat on the committees of the lower house, which undertook the proceedings against Strafford, though he was not one of the managers before the House of Lords, and his name also was enrolled as 'one of the enemies of justice,' a title given to those who favoured the earl. Though the friend of Laud, by whom he was desired to write many of his works, he was nominated by the House to frame the articles of impeachment against the archbishop. He made no opposition to the resolutions which ultimately caused the exclusion of the bishops from the house of peers. Afterwards we find him agreeing to a protestation that the House of Commons should maintain the Protestant religion according to the doctrines of the English church, and defend the authority, privileges, and person of the king. He also appears to have offered no opposition to the illegal proceedings of this parliament in the affair of Sir John Hotham; but as he did not expressly favour them, the court continued to regard him as their friend, until the quarrel of the king with his Commons arose about the militia, when Selden spoke against the commission of array which Charles had been driven to resort to on being deprived of all authority over his own army. Lord Falkland, by the king's desire, wrote a friendly letter to Selden, asking his reasons for the strong opinion which he gave in this question. In his answer Selden still urged the illegality of the commission, but at the same time he inveighed against the ordinance for the militia, which the parliament had declared as being 'without any shadow of law or pretence of precedent, and most destructive to the government of the kingdom.' He further declared his intention of speaking against this ordinance, and he did his utmost to obtain the rescinding of it, though without success.; Charles about this time becoming displeased with the wavering conduct of the Lord Keeper Littleton, inclined to take from him the great seal, and give it either to Banks or to Selden. He did not doubt the affection of the latter to his person, yet knowing that he was in years, and preferred ease to any preferment, and private studies to public business, he abandoned the idea; indeed throughout his whole life Selden was devoted to retirement and to literary pursuits, and it is not easy to decide to which party he most inclined; it is probable that he was respected by the king, who knew his honesty. His last public acts of any importance were the discussions in which he took part in the Assembly of Divines at Westminster, to which he was appointed one of the lay members, and where he is said to have perplexed his ecclesiastical antagonists by the depth of his learning and the variety of his knowledge. In 1643 he took the Covenant, and in the same year the parliament made him chief keeper of the rolls and records in the Tower. In 1645 he was one of the twelve commoners appointed to be commissioners of the Admiralty; and he was chosen to succeed Dr. Eden as master of Trinity Hall, Cambridge, an honour which he declined. In the following year the parliament, sensible of his services, voted him the sum of 5000*l*. 'Though some there are that say that he refused and could not out of conscience take it, and add that his mind was as great as his learning, full of generosity and harbouring nothing that seemed base' (Wood's *Athenæ*); and though these latter acts are proof of his adherence to the popular party, yet he continued to be much esteemed by many of the royalists, and Charles, even if he had the will, was by this time deprived of the power to retaliate. Selden had great influence in the House of Commons, and he frequently used it for the best purposes. He procured the restitution of the endowment of the Arabic professorship in Oxford, which had been seized on the attainder of Laud, by whom it was founded; and he succeeded in preserving the library of Archbishop Usher from dispersion. He remained in parliament after the execution of the king, though it does not appear what his conduct or opinions were in that transaction. He withdrew from public affairs as much as possible, and declined to write an answer to the 'Eikon Basilike,' at the request of Cromwell. Selden died November 30, 1654, at the Carmelite or White Friars, the house of Elizabeth, countess dowager of Kent, whose estates he had latterly managed. He had lived with the countess for some time, and it was reported that he had been married to her. He was buried in the Temple Church, where a monument was erected to him. He bequeathed his very valuable collection of books to his executors, of whom one was Sir Matthew Hale, to be placed in some convenient library or college. His original intention was to give it to the University of Oxford, but having taken offence at the authorities of the Bodleian for requesting a bond of restitution from him on an occasion of his desiring to borrow one of their MSS., he struck the bequest from his will. Hale and his co-executors however, considering themselves executors 'of his will, and not of his passion,' sent the books, about 8000 volumes, to Oxford, where a noble room was allotted for their reception. It is said the executors first offered them to the society of the Inner Temple, but the society, neglecting to provide a proper place for them, lost the valuable gift.

Selden was a diligent student, and his literary labours only ended with his life. In the treatise entitled 'Mare Clausum,' published in 1635, he maintains the right of England to exclude the fishermen of Holland from the seas, which she asserted to be her own, in answer to the treatise of Grotius, entitled 'Mare Liberum,' which denied the right. The controversy arose from a dispute between the British and the Dutch concerning the herring fishery on the British coast Selden maintained that a dominion over any part of the sea may be acquired. This work greatly raised his reputation at court, where his arguments were considered conclusive. In 1640 appeared his great work, 'De Jure Naturali et Gentium, juxta Disciplinam Ebræorum.' 'The object of the author,' says Hallam, 'was to trace the opinions of the Jews on the law of nature and nations, or of moral obligation, as distinct from the Mosaic law; the former being a law to which they held all mankind to be bound. This theme had been of course untouched by the Greek and Roman philosophers, nor was much to be found upon it in modern writers. His purpose is therefore rather historical than argumentative; but he seems so generally to adopt the Jewish theory of natural law, that we may consider him the disciple of the Rabbis as much as their historian.' (Hallam's 'Literature of Europe,' vol. iii., p. 334.) He published also 'A Brief Discourse concerning the Power of Peers and Commons;' 'Privileges of the Baronage of England;' an edition of the 'Origines' of Eutychius; 'De Anno Civili et Calendario Judaico,' &c.

As a learned lawyer Selden holds a high rank. His 'Dissertation on Fleta,' which, like most of his other works, is written in Latin, shows him to have been thoroughly acquainted with the origin of our own law, and its gradual development under the influence of the civil law. Some few errors have been detected in this valuable essay, but it is an evidence of learning and research of which there have been few similar instances among English lawyers since his time. To say that Selden wrote Latin with ease and sufficient correctness and elegance is no great praise, considering the age in which he lived. Whitelocke, his biographer, Wilkins, Baxter, and Clarendon, all bear testimony to the excellence of his character and his learning. Clarendon, who was his intimate friend, says, 'Mr. Selden was a person whom no character can flatter or transmit in any expressions equal to his merit and virtue.'

Wood says of him: 'After he had continued there (the Temple) a sedulous student for some time, he did by the help of a strong body and a vast memory not only run through the whole body of the law, but became a prodigy in most parts of learning, especially in those which were not common or little frequented or regarded by the generality of students of his time. So that in few years his name was wonderfully advanced not only at home but in foreign countries, and was usually styled the great Dictator of learning of the English nation. . . He was a great philologist, antiquary, herald, linguist, statesman, and what not.' (Wood's *Athenæ*.)

There was an apparent indecision and variableness in Selden's public conduct, which makes it difficult to determine what his political principles really were. The most favourable and perhaps the most correct judgment is, that he was sincerely opposed to the arbitrary measures of the crown, and equally unwilling to go all lengths with the parliaments.

Selden was very intimate with Ben Jonson, who addressed a poetical epistle to him, in which he styles his friend 'monarch in letters.' Selden's name has been made familiar to many persons by a small volume, entitled 'Table-Talk.' 'This valuable little collection of acute and learned remarks was first published in 1689, thirty-five years after Selden's death, in a quarto pamphlet of sixty pages, with the title of "Table-Talk; being the Discourses of John Selden, Esq., or his sense of various matters of weight and high consequence, relating especially to Religion and State." In the dedication, his amanuensis, Richard Milward, by whom it had been compiled, states that he had had the opportunity of hearing Selden's discourse for twenty years together, and that of what is here collected "the sense and notion is wholly his, and most of the words." Milward seems to have been a person of judgment, for there is very little in what he has preserved that has not a real value.' ('Library of Anecdote—Book of Table-Talk,' vol. i.) It must be admitted that Selden's 'Table-Talk' contains many just remarks on matters moral and political, expressed in a forcible manner; but though they are not wanting in originality, they can hardly be said to be marked by depth, and many of them are rather characteristic of a man of the world than of a retired student. It seems probable, from the circumstance of the publication, that some part of the collection is not genuine.

SELECT VESTRY. [VESTRY.]

SELEFKEH. [SELEUCEIA.]

SELE'NE (Σελήνη), the Moon, was worshipped as a goddess by the antient Greeks. She is generally represented as the sister of Helios, or the Sun; sometimes as his daughter, and occasionally as his wife, and the mother of the four Seasons. She was believed to drive her chariot through the heaven during the night. (Hom., *Hymn.*, xxxii. 7.) Her chariot is usually represented in antient works of art drawn by two horses, whereas that of Apollo was drawn by four. (*Dictionary of Greek and Roman Antiquities*, p. 310, London, 1840.)

In course of time the attributes of Selene were given to Artemis, and the latter was represented as the goddess of the moon; but these deities were originally distinct. Among the Romans Diana appears to have been originally the goddess of the moon, the word *Diana* containing the same root as *dies*, and meaning originally the goddess of light. When it became the fashion to identify Artemis and Diana, the attributes of each were given to the other; and thus Artemis was represented as the moon, and Diana as the goddess of hunting. [ARTEMIS; DIANA.]

SELENITE. [CALCIUM.]

SELE'NIUM, a nonmetallic, solid, elementary body, discovered in 1818 by Berzelius in the iron pyrites of Fahlun: the sulphur procured from this was used at Gripsholm in the manufacture of sulphuric acid, and in it a deposit was formed of a red colour, which, on account of the peculiar odour that it emitted, was supposed, though erroneously, to contain tellurium, the origin of which name for this metal suggested that of *selenium*, from Σελήνη, the moon, for the new substance. The discoverer considers it as a metal, but it is not generally classed with the metals.

This substance has been found hitherto only in small quantity; it occurs in the pyrites of Anglesey, and probably in that of many other places: sulphuret of selenium has been detected among the volcanic products of the Lipari Isles; and in the Harz it has been met with, combined with lead, silver, and some other metals.

Magnus proposes to extract selenium from the native sulphuret by treating it with binoxide of manganese, by the oxygen of which the sulphur is converted into sulphurous acid; this escapes in the gaseous form, while the selenium either sublimes in its pure state or as selenious acid.

The properties of selenium are, that it is solid, has a metallic lustre, and the appearance of lead when in mass; but when reduced to powder, it has a deep brown colour. It is inodorous and insipid, moderately hard, may be readily scratched with a knife, is brittle as glass, and easily reduced to powder. Its fracture is conchoidal, and perfectly metallic. Its specific gravity varies from 4·30 to 4·32, on account of the cavities which it frequently contains. It is a bad conductor of heat, and a nonconductor of electricity. It softens at 212°, and may be drawn out into fine threads, which are transparent, and of a red colour by transmitted light. When heated rather higher, it become fluid, and boils at 650°, emitting a vapour, which is inodorous, and of a deep yellow colour; this in close vessels condenses in dark globules of a metallic lustre, or of a cinnabar-red colour, according as the space in which it collects is small or large. Water does not dissolve selenium; it is however soluble in the fat oils and melted wax, but not in the volatile oils.

Oxygen and Selenium combine in three different proportions, forming oxide of selenium, selenious acid, and selenic acid.

Oxide of Selenium may be formed by heating the selenium in a limited quantity of atmospheric air, and by washing the product to separate the selenious acid formed with it. Its properties are, that it emits a very strong smell resembling that of decayed horse-radish, so that 1-50th of a grain is sufficient when burnt to scent a room of considerable size, and this is a characteristic property of selenium. Oxide of selenium is gaseous, colourless, very slightly soluble in water, and quite devoid of acid properties.

It consists of—

One equivalent of oxygen . .	8
One equivalent of selenium .	40
	—
Equivalent . .	48

Selenious Acid may be prepared by passing a current of oxygen gas over heated selenium; but it is more conveniently obtained by digesting selenium in nitric acid or nitro-hydrochloric acid till dissolved, and then evaporating the solution to dryness.

The properties of this acid are, that it is colourless, and when strongly heated sublimes, and condenses unchanged in the form of acicular crystals, which possess distinctly-marked acid properties. It attracts moisture from the air, and is consequently very soluble in water; a hot saturated solution yields crystals on cooling; it is also soluble in alcohol, and has when heated an acrid odour. It forms salts with bases, which are called *Selenites*.

Many substances which have strong affinity for oxygen decompose selenious acid; this is the case with sulphurous acid and phosphorous acid, and when the former is added to a solution of selenious acid, a red powder is precipitated, which is pure selenium, and sulphuric acid is at the same time formed. An alkaline sulphate produces a similar effect; hydrosulphuric acid is also decomposed by and decomposes selenious acid, and a yellow compound is formed and precipitated, which is sulphuret of selenium.

Selenious acid is constituted of—

Two equivalents of oxygen . .	16
One equivalent of selenium .	40
	—
Equivalent . .	56

Selenic Acid may be prepared by fusing selenium, a seleniuret, or selenite, with nitrate of soda. The seleniate of soda obtained, when it has been purified, is to be decomposed by nitrate of lead, and the insoluble seleniate of lead precipitated is to be decomposed by a current of hydrosulphuric acid, which throws down the lead as a sulphuret, and the selenic acid remains in solution, with some excess of hydrosulphuric acid, which is to be expelled by ebullition.

Selenic acid is liquid, colourless, inodorous, of an oleaginous consistence, and very caustic; it attracts moisture from the air, and always retains about 12·4 per cent. of water, which cannot be expelled without decomposing the acid. It may be heated to 536° without decomposition, but at 554° it is rapidly converted into oxygen and selenious acid. When concentrated at a temperature of 329°, its specific gravity is 2·524, and it gradually increases up to the temperature of 545°, when it becomes 2·625. When mixed with water, much heat is evolved. Its salts are called *Seleniates*. Zinc and iron are dissolved by this acid with the evolution of hydrogen gas, and copper with the formation of selenious acid.

It is composed of—

Three equivalents of oxygen .	24
One equivalent of selenium .	40
	—
Equivalent . .	64

Azote and Selenium.—No compound of these is known

Hydrogen and Selenium unite to form hydroselenic acid or seleniuretted hydrogen. It is easily obtained by the action of diluted sulphuric acid upon seleniuret of potassium, or of iron and some other metals. This gas is colourless, has a disagreeable odour, and so powerfully irritates the membrane lining the nose as to excite symptoms of catarrh and destroy the sense of smelling for some hours. Water readily dissolves this gas: the solution is at first colourless, but after a time it acquires a reddish hue; it gives a brown stain to the skin, and reddens litmus paper, as other acids do. When exposed to the atmosphere it is decomposed, its hydrogen being absorbed by oxygen, and the selenium is deposited. It decomposes the solutions of many metallic salts, seleniurets of the metals being precipitated.

It consists of—

One equivalent of hydrogen .	1
One equivalent of selenium .	40
Equivalent . .	41

Chlorine and Selenium combine when the gas is passed over the selenium; heat is evolved, and a brown chloride is obtained, which is liquid; it is heavier than water, not very volatile, and by the action of water is eventually decomposed, and resolved into selenious and hydrochloric acids.

It is composed of—

Two equivalents of chlorine .	72
One equivalent of selenium .	40
Equivalent . .	112

This bichloride may be converted into a terchloride by exposure to excess of chlorine. It is a white solid compound which is volatilized when heated, and condenses in small crystals. It is decomposed by water.

Sulphur and Selenium.—A definite compound of these is formed by passing hydrosulphuric acid gas into a solution of selenious acid; the fluid assumes a yellow colour, becomes turbid, and a precipitate is formed, though but slowly, unless a little hydrochloric acid be added. When exposed to heat the sulphuret of selenium becomes red and viscid, and at high temperatures may be distilled without decomposing.

It is a bisulphuret, composed of—

One equivalent of sulphur .	16
One equivalent of selenium .	40
Equivalent . .	56

Phosphorus and Selenium combine when the selenium is dropped in melted phosphorus; it is a red substance, but it does not appear that any definite compound of these bodies has yet been analyzed.

Selenium forms seleniurets with most of the metals, and the seleniuret of lead is one of the most abundant of the native compounds which occurs in the Harz. [LEAD.]

The characteristic properties of selenium are those of tinging the flame of the blowpipe of a light blue colour, and emitting an acrid vapour, when heated in the air, which has the peculiar smell of decayed horse-raddish.

SELEUCI'A. [SELEUCEIA.]

SELEUCEIA (Σελεύκεια), a town of Assyria, on the western bank of the Tigris, and a few miles to the south of the modern Bagdad, was built by Seleucus Nicator, in the form of an eagle with extended wings. (Plin., vi. 30.) It became, at the expense of Babylon, the most important city in the East, but declined in population after the foundation of Ctesiphon by the Parthians, on the eastern bank of the Tigris. It contained, in the time of Pliny, 600,000 inhabitants. A republican institution was given to it by Seleucus, which it retained under the Parthians. (Tacit., *Ann.*, vi. 42.) It was burnt by the Romans in the expedition of Trajan into the East. (Dion Cass., lxviii. 30), and again by Lucius Verus, the colleague of Aurelius, at which time it contained 500,000 inhabitants. (Dion Cass., lxxi. 2; Eutrop., viii. 5.) It was also taken by Severus (Dion Cass., lxxv. 9), from which time it seems to have been almost abandoned by its inhabitants. Julian found it completely deserted. (Amm. Marcell., xxiv. 5.)

Rich, who visited the ruins of Seleuceia in 1812, says that they are directly opposite those of Ctesiphon, and not to the north of the latter, as is generally stated. According to his account there is an enclosure, of which one side is formed by the river, but the others are walled round. A great part of the western wall is destroyed; but the northern and the southern walls still remain. In the area are some heaps of ruins; but the greatest quantity are outside the limits of the enclosure to the westward, where they extended to a very great distance. (*Residence in Koordistan*, &c., vol. ii., p. 405.)

There were several other cities called Seleuceia, one of which was about five miles north of the mouth of the river Orontes in Syria. The remains of this Seleuceia are at a place now called Souadieh.

SELEU'CIDÆ, a Greek dynasty in Asia, founded, after the death of Alexander the Great, by Seleucus, the son of Antiochus. His father was one of the generals of Philip, and he himself accompanied Alexander in his Asiatic campaigns, in which he so distinguished himself as to be ranked among his greatest generals. On the division of the empire at the death of that prince, Seleucus was entrusted with the important command of the body of cavalry called the Companions, which had been before held by Hephæstion and Perdiccas; and he was also, according to Justin, made commander of the camp. The satrapy of Babylon was bestowed upon him in the new partition, after the death of Perdiccas (321 B.C.). In the war which followed, he took the part of Antigonus against Eumenes. After the death of the latter (315 B.C.), he received Antigonus into his territory with great appearance of friendship; but taking offence at the tone of superiority which his guest assumed, and dreading his power, he fled to Egypt, and joined Ptolemy Soter, Lysimachus, and Cassander in a league against him.

The defeat of Demetrius at the battle of Gaza enabled Seleucus to recover Babylon with a very small force. From this period, 312 B.C., commences the æra of the Seleucidæ. Shortly afterwards he obtained possession of Media, in consequence of his victory over Nicanor, the satrap appointed by Antigonus over this province, whom he is said to have killed with his own hand. After the sea-fight, 306 B.C., in which Demetrius defeated Ptolemy, Seleucus, following the example of the three other great monarchs, assumed the diadem and the title of king. Extending his dominions partly by force and partly by conciliation, he conquered Bactria, and probably most of the provinces enumerated by Appian (*Syriaca*, 55), which Diodorus calls the Upper Satrapies; and is said, in consequence of these victories, to have assumed the title of Nicator. Making an expedition against Sandrocottus, an Indian king, he was induced to form an alliance with him, strengthened by which he returned with a large army to the war with Antigonus, which was finally concluded by the battle of Ipsus, 301 B.C. In the division of territory which followed, Seleucus obtained for his share Syria and the inland part of Phrygia, and he made further accessions till he acquired Cappadocia, Seleucis, and, according to Appian (*Syriaca*), all the provinces conquered by Alexander between Phrygia and the Indus. Having now leisure to promote civilization, he planted many cities, the most celebrated of which were Antioch in Syria and Seleuceia near Babylon: in peopling these he gave great privileges to the Jews. In consequence of the close alliance between Ptolemy and Lysimachus, Seleucus took in marriage Stratonice, the daughter of Demetrius Poliorcetes; but wishing him to give up Cilicia and Sidon, and finding him unwilling to accede to his demands, he soon engaged in a war with him, which was terminated in the defeat of Demetrius, who was taken prisoner, 286 B.C., and died after three years' captivity. Before this marriage, Seleucus, by a former wife, Apama, the daughter of Artabazus, had had a son Antiochus, who conceived a strong passion for his mother-in-law Stratonice, to gratify which Seleucus resigned her, making over to him at the same time the majority of the seventy-two satrapies comprised in his great empire, and reserving for himself those only to the west of the Euphrates. At the close of his reign, he made war upon Lysimachus, and, upon his defeat and death, conceived the design of conquering Macedonia. Passing over to Europe for this purpose, he was treacherously killed by Ptolemy Ceraunus, whom he had received with great kindness on his flight from Egypt. This was B.C. 280, in his eighty-second year. The character of Seleucus is much praised by antient historians. His military talents are generally admitted, and he was not deficient in the virtues of civilization. A liberal spirit is shown in his treatment of Demetrius after he fell into his hands, and in other anecdotes recorded of him. The prudence of the later measures of his reign, the division of his empire and his expedition into Macedonia, may be doubted. He was possessed of great personal strength and courage.

The following list contains the successors of Seleucus, with the dates of their accessions, and a short notice of those who bore his name:—

2. Antiochus Soter.

3. Antiochus Theus, B.C. 261.

4. Seleucus Callinicus succeeded his father Antiochus Theus, B.C. 246. The empire was at this time much weakened by the defection of Bactria and Parthia, and the wars of the Antiochi with Ptolemy Philadelphus. Immediately on the accession of Seleucus, his mother, jealous of any rival candidates for the throne, contrived the death of Berenice, the Egyptian wife of the late king, and of her son. To avenge his sister's death, Ptolemy Euergetes invaded the dominions of Seleucus, and passing the Euphrates, overran them as far as Bactria. Seleucus, being hard pressed in this war, called in the aid of his brother Antiochus Hierax, promising him all the provinces of his empire in the lesser Asia. Strengthened by an alliance with some of the cities in Asia Minor (his treaty with Smyrna is still preserved among the Arundelian Marbles), he attempted to conclude a peace with Ptolemy, but which was broken off by his ambitious brother Hierax, who, supported by the king of Egypt and some of the Gaulish mercenaries, maintained himself for a long time against Seleucus; and being at length defeated, fled to Ptolemy, and perished in Egypt.

5. In the latter part of his reign, Seleucus seems to have made two expeditions against Parthia, in the latter of which he was taken prisoner by Arsaces, and it does not appear that he was ever released from his captivity. He died of a fall from his horse, and was succeeded by his son Seleucus Ceraunus, B.C. 226, a weak prince, who was cut off by a conspiracy in his own army while on his march to attack Attalus, king of Pergamus, who had seized the greater part of Asia Minor, B.C. 223.

6. Antiochus Magnus, brother to the late king.

7. Seleucus Philopator, B.C. 187, son of Antiochus, succeeded to an impoverished kingdom, and reigning feebly for twelve years, was murdered by Heliodorus.

8. Antiochus Epiphanes, his brother, B.C. 175.

9. Antiochus Eupator, 164.

10. Demetrius Soter, 162.

11. Alexander Bala, a usurper, 150.

12. Demetrius Nicator, 146.

13. Antiochus Sidetes, 137 to 128.

14. Seleucus, son of Demetrius Nicator, put to death by his own mother immediately on his accession.

15. Antiochus Grypus, B.C. 125.

16. Antiochus Cyzicenus, B.C. 112 to 95; after the first eighteen months of his reign, jointly with Grypus, till the death of the latter, B.C. 96.

17. Seleucus VI., and last of the name, surnamed Epiphanes Nicator, the son of Antiochus Grypus, driven by Antiochus Eusebes into Cilicia, was there besieged in Mopsuestia, and killed, B.C. 95.

18. Antiochus Eusebes.

19. Philippus.

20. Antiochus.

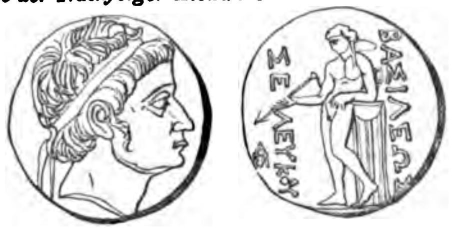
21. Tigranes, king of Armenia till B.C. 69.

22. Antiochus Asiaticus, expelled by Pompey, B.C. 65; end of the dynasty of the Seleucidæ.

With few exceptions, the kings of this race were weak and depraved, enfeebled by the vices of their age and country, or not less by the decaying state of their empire. The decline of this monarchy, commencing from the latter years of the reign of its first founder, was accelerated by the maritime and commercial superiority of Egypt owing to the possession of Cyprus, Cilicia, and Tyre, by the formation of the independent kingdoms of Bactria and Parthia, and the growth of the power of the kings of Pergamus. After the defeat of Antiochus Magnus by the Romans, the Seleucidæ could only maintain a hopeless struggle with hostile neighbours and disaffected subjects. How far the destinies of the Eastern world might have been changed, had Seleucus made the Euphrates the boundary of his empire, and abandoned his western conquests, is a question not undeserving consideration.

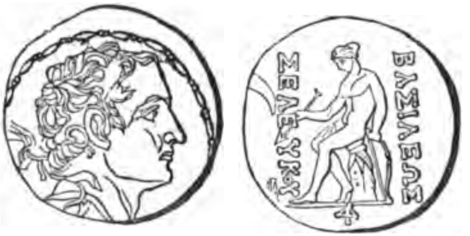
The coins of this dynasty are very numerous. Those of Seleucus Nicator are distinguished from the rest by their exact resemblance in type, style, and weight to those of Alexander the Great. The young head of Hercules in the lion's skin, Jupiter Ætophorus seated, the head of Pallas on the obverse, and of Victory holding out a wreath on the reverse, are copied, with the name of Seleucus instead of Alexander: there are others with a horned head of Seleucus, said to refer to his extraordinary effort of strength in holding a bull by the horns; and we are told by Appian (*Syriaca*), that his statues, in consequence, were represented horned. We also find the anchor as a type, which probably refers to a prodigy at his birth, recorded by the same author, and prophetic of his future destiny.

On the coins of the later Seleucidæ we have as a very general type Apollo, either standing or seated on the cortina, holding in one hand an arrow, in the other a bow strung. Other types are winged heads, probably relating to Perseus, the great ancestor of the Macedonians; the elephant and the prow of a vessel, in reference to the naval and military forces of the empire. All the kings bearing the name of Seleucus struck coins, with the exception of the fifth; and we may remark the long and pompous title of the last of these monarchs, ΣΕΛΕΥΚΟΥ ΕΠΙΦΑΝΟΥΣ ΝΙΚΑΤΟΡΟΣ, as contrasted with the falling fortunes of the dynasty, and with the simple inscription on the coins of the founder, ΒΑΣΙΛΕΩΣ ΣΕΛΕΥΚΟΥ. The scattered history of the Seleucidæ has been collected from Justin, Appian, Diodorus, Polybius, and others, by the authors of the 'Universal History;' Vaillant, 'Historia Seleucidarum;' Fröhlich, 'Annales Regum Syriæ;' Clinton, 'Fasti Hellenici,' iii.; and Droysen, *Geschichte der Nachfolger Alexanders*.



British Museum. Silver.

Head of Seleucus II., with the diadem. Apollo standing leaning on a tripod, in his right hand an arrow; the inscription ΒΑΣΙΛΕΩΣ ΣΕΛΕΥΚΟΥ, and monogram.



British Museum. Silver.

Head of Seleucus IV., with the diadem, and the inscription ΒΑΣΙΛΕΩΣ ΣΕΛΕΥΚΟΥ: Apollo seated naked on the cortina, in his right hand an arrow, in the left a bow strung; below, the monogram.

SELEUCUS. [SELEUCIDÆ.]

SELGE. [PISIDIA.]

SELIM I., emperor of the Turks, was the son of Bayezid or Bayacet II. He was born under the reign of his grandfather Mohammed II., in 1467. Being governor of Trebizonde in 1511, he revolted against his father, and marched to Constantinople. Though he was defeated, and obliged to seek his safety in flight, the janissaries and the spáhis being in his favour, his father Bajazet was compelled to resign the throne to him, and he was accordingly proclaimed on the 23rd of May, 1512. Selim was then about forty-six years of age. His first step after his accession was to march against his eldest brother Ahmed, who was at the head of some troops in Asia. He defeated and put him to death, as well as another brother named Korkúd, and several of his nephews. Selim next invaded the dominions of Shah Ismaïl, king of Persia, who had espoused the cause of his brother Ahmed; he defeated him in a pitched battle, and took Tabriz, the capital of Persia (Sept. 1514). After annexing Diyar-bekr to his empire, and recovering Bosnia, which had been occupied by the Hungarians, Selim, in 1517, turned his arms against Kansú-al-Ghauri, sultan of Egypt, whom he defeated and slew at Merj-Dabik, close to Aleppo (Aug. 24, 1516). Taking the route of Hamah, Hemts (the antient Emesa), and Damascus, which cities made no resistance, and submitted to him, Selim marched his army into Egypt. Close to Cairo he was opposed by Tumán Bey, whom the Mamlúks had chosen for commander after the death of Kansú; but in the battle that ensued that prince was defeated and slain, and the dynasty to which he belonged completely overthrown. Master of Syria and Egypt, Selim returned to Constantinople, where he made a vow not to lay down his arms until he had subdued the whole of Persia. Death however prevented the execution of his project. As he was journeying from Constantinople to Adrianople, he was attacked by a disease which terminated in his death at Ogrash-Koi, a village of Thrace, on the 22nd of September 1520. Selim was one of the most able and vigorous of the Othoman sovereigns. He made greater additions than any of his predecessors to the Turkish empire. His eminent qualities were however stained by his excessive cruelty, of which he gave remarkable instances during his reign. He was succeeded by his son Suleyman, surnamed 'the Great.'

SELIM II., emperor of the Turks, succeeded his father Suleyman in 1566. The principal events of his reign were the suppression of a formidable rebellion in Yemen (1568-70), the taking of Tunis and La Goleta from the Spaniards, and the conquest of Cyprus, which after a vigorous resistance was taken from the Venetians in 1571. In the same year was fought the celebrated naval battle of Lepanto, by which the Turkish navy was almost annihilated. [Lepanto.]

Notwithstanding this splendid success, the Venetians, in 1574, were obliged to make peace with the Turks upon very disadvantageous terms. During the remainder of Selim's reign, the affairs of the Othoman empire were very prosperous. Selim died on Sept. 12, 1574, and was succeeded by his eldest son Murád.

SELINUNTINE MARBLES. [Sculpture.]

SELJUKIDES, or SELJUCIANS, a dynasty originally Tartar, and descended from a captain named Seljuk; they settled first in Transoxiana, whence they made their way into Khorassan; and afterwards, under the name of the Iranian, Kermanian, and Rumi dynasties, governed great part of the south of Asia.

The oriental account of the origin of this family, as far as can be gathered from somewhat conflicting statements, is as follows:—Seljuk was the son of Dekak, one of the bravest and most trusted officers of Bigú, chief or khan of the Kipchak Tartars, who inhabited the plain north of the Caspian. This prince, expecting from Seljuk the valour and fidelity of his father, brought him up from his boyhood, and found all his expectations fulfilled in him; but the growing influence of the favourite, and some insolence towards his master, provoked the latter to banish him from his territories; and Seljuk in consequence settled in the neighbourhood of Samarkhand and Bokhara, where he laid the foundation of a small state. He also embraced Mohammedanism, and is said to have been killed, at the age of 107, in a skirmish with the pagan Tartars on the frontiers of the Mohammedan empire. Seljuk left three, or, according to others, four sons; but the most influential members of his family were his two grandsons, Mohammed or Togrul Beg, and Daoud or Giafar Beg, who sent their uncle Israel to make terms of alliance with Mahmoud of Ghizni, the then ruler of Khorassan. Mahmoud is said to have questioned Israel on the resources of his family; and to have received for answer, in the quaint style of the East, that if Israel were to send to his camp one of two arrows which he carried in his hand, fifty thousand horsemen would be despatched to his orders; on sending the other arrow, fifty thousand more; and that if he despatched the bow, it would be answered by sending to him two hundred thousand horsemen: information which so startled Mahmoud, that he confined the ambassador till his death in one of the castles of Khorassan. Oriental historians differ as to the passage of the Seljuk family into Khorassan, some of them placing this event under the reign of Mahmoud, and others under that of his son Massoud. It appears certain however that Abu Taleb Mohammed Roeneddin (the pillar of the true religion), named also Togrul Beg, or, as the Greeks have corrupted it, Tangralopex, was crowned at Nishapour, A.H. 429 (A.D. 1038), being the first of the Iranian dynasty of the Seljukides. The conquest of Nishapour was followed by that of Herat and Meru, and shortly after of nearly the whole of Khorassan. The whole of his reign of twenty-six years was occupied in wars with the sultans of the Gasnevide dynasty, and in successive conquests of the provinces of Persia; and on his death, and that of his brother Jafar Beg, the whole conquests of the two devolved upon the son of the latter, Alp Arslan, who during the life of his father and uncle had distinguished himself for his bravery and generalship.

Alp Arslan, signifying the courageous lion, is the Turkish surname of this prince, whose original surname was Israel, and who received, on his embracing Mohammedanism, the name of Azzoddin, or strength of religion, from the khalif Kaim Bimrillah. The beginning of his reign was chiefly occupied with the suppression of revolts which were raised in various parts of the empire; and many singular stories are told of the uniform and almost miraculous good fortune which attended him. In A.D. 1070 he signally defeated the Greeks at Akhlat, a city near Lake Van; and in 1071 again encountered a larger army of this nation, commanded by the emperor Romanus Diogenes in person, completely routed his army, and took the emperor himself prisoner. The generosity with which Alp Arslan restored to liberty his illustrious captive, is a frequent theme of praise with the oriental writers, who are fond of adducing this conqueror as an example of bravery, generosity, and the instability of greatness. Alp Arslan, after many important conquests in Georgia, set out on his long-projected expedition for the conquest of Turkestan, and in this he ended his life. Incensed at the obstinate defence of a fortress which he had taken, he bitterly reproached the governor of it, and ordered him to be cruelly put to death. The captive, taking a concealed knife from his boot, rushed upon the sultan; the latter, confiding in his own strength and unerring archery, bade his guards leave to him the punishment of the rebel; the arrow of the unrivalled bowman for this once missed its aim, and Alp Arslan received a mortal wound. He died a few hours after, in the tenth year of his reign (A.D. 1073), confessing with his dying breath the presumption which had been the cause of his fate.

Malek Shah, surnamed Moezzeddin Abulfatah, son of Alp Arslan, succeeded his father in A.D. 1073, and in the beginning of his reign defeated his two uncles who had rebelled against him; one of these he afterwards poisoned in prison, as he found that his own troops were growing mutinous in the idea of making the captive their leader. In 1075, Aftis, one of the generals of Malek Shah, took Damascus, and subdued the greater part of Syria, but was unsuccessful in an attempt to possess himself of Egypt. Malek Shah himself reduced Mawarannahr (the country beyond the Jinun) in A.D. 1078, and two years afterwards made preparations to invade the dominions of Ibrahim, the ninth Gaznevide sultan. This intention however he was prevailed upon to relinquish, and he received in marriage the daughter of Ibrahim. In 1090 the successes of the Batanians, or Assassins, made Malek Shah send them an embassy, requiring obedience in a somewhat threatening tone; but the singular proof which the ambassador received of the devotion that these men bore their master (three of them having slain themselves successively at his command), induced the sultan to suspend his proceedings against them. Shortly after, the vizir Nizam-al-Mulk, who had been disgraced a little time before, was murdered by an emissary of this fraternity. Malek Shah died at Bagdad in 1092, leaving behind him the reputation of being the greatest of the Seljukian princes.

Barkiarok, the elder son of Malek Shah, was the virtual successor of his father, though the latter had left his kingdom to his younger son Mahmud, then only six years old, under the guardianship of his widow Turkhan Khatan. The queen-regent fixed herself in Ispahan, where she was besieged by Barkiarok; but fearing a revolt of the citizens, she consented to divide the government with her stepson, taking for Mahmud the province of Ispahan and its dependencies, while she left to Barkiarok the rest of his father's dominions. The death of the infant prince shortly after however devolved the separated province again upon Barkiarok. His next opponent was his uncle Tajaddowlet Tatash, governor of all Syria, who was defeated and slain in A.D. 1095; and this revolt was followed three years after by that of Mohammed, younger brother of Barkiarok, who, by the mutiny of the troops of the latter, gained possession of Irak without striking a blow. From this date till A.D. 1104 the brothers were engaged in perpetual skirmishes, which were ended by a treaty in the year last-mentioned, giving to Mohammed Syria, Mesopotamia, Mousul, Azerbijan, Armenia, and Georgia, and leaving Barkiarok in possession of the rest. He died however in the year when this treaty was concluded, appointing as his successor his son Malek Shah. During this reign the Crusaders entered Syria.

Mohammed, the brother of the late king, was too powerful to permit the succession of an infant prince; and on the death of his brother he marched to Bagdad, where he was invested with the sovereignty. He conquered part of India, and refused an immense ransom for an idol, which he ordered to be placed as the threshold of a magnificent college built at Ispahan, that the feet of the faithful might perpetually trample on it. He died A.D. 1117, appointing his son Mahmud Abulcassem his successor.

Sanjar however, brother of the late king, who had held the government of Khorassan under him and his predecessor during twenty years, took advantage of his power to claim the succession, leaving to Mahmud the province of Irak. In 1127 died Kothboddin, the Kharesm Shah, or king of Karazm. This dominion, originally dependent upon the office of chief cupbearer, to which the revenues of Kharezm were annexed, had grown into a virtual sovereignty, and though Kothboddin and his son Atsiz had actually performed alternately the office by which they held their land, the latter harassed the sultan Sanjar with perpetual hostilities, and is generally considered as the first actual sovereign of a dynasty which eventually overturned that of the Iranian Seljuks. In 1153, Sanjar, after gaining a signal victory over the sultan of Gaur, was taken prisoner by the Turkmans, whom he had attempted to chastise for nonpayment of their tribute, and detained by them for four years. He escaped by a stratagem, but died the year after his restoration to liberty, of grief, it is said, at the ravages committed by the Turkmans during his captivity. He died in 1157, after a reign of forty years. He was succeeded by Mahmud, the son of his sister, who governed for five years in Khorassan, after which he was defeated and deprived of his sight by a rebel, who shared with the sultan of Kharezm the province of Khorassan, and thus put an end to the Seljukian dominion there. Between Sanjar however and Mahmud, the Eastern historians count three Seljukian sultans.

Mahmud Abulcassem, already mentioned as sultan of Irak, and his two successors in that dignity,

Togrul and

Massoud. The reigns of these sultans, the last of whom died before the close of Sanjar's reign, are chiefly remarkable for their dissensions with the khalifs of Bagdad, and for the establishment of a new dynasty, that of the Atabegs of Irak. With the death of Massoud, in A.D. 1152, ended the domination of the Seljuks in Irak. Of his successors,

Malek Shah II., who is variously represented as the grandson or great-grandson of Malek Shah I.,

Mohammed II., brother of Malek Shah, and

Suleyman Shah, son of Mohammed I., and

Malek Arslan, his nephew, little is recorded but their mutual dissensions and alternate depositions one of the other. The last-named of these died in A.D. 1175, and was succeeded by

Togrul II., the last sultan of this dynasty, reigned 18 years, perpetually insulted and harassed by the Atabegs of Bagdad, and was at last slain in a contest with them in 1193.

The Seljuks of *Kerman*, or *Karamania*, beginning their empire with this province, extended it afterwards to Fars, Mekran, part of Segestan and Zabulistan, and perhaps part of India. The first of this line was

Kaderd, nephew of Togrul Beg, who appointed him governor of Kerman, A.D. 1041. He was poisoned in 1072, by his nephew Malek Shah I., who had taken him prisoner in an attempt to invade his dominions. He left his dominions to his son

Soltan Shah, who was permitted by the conqueror of his father to assume the government of them. He died A.D. 1074, or, according to other authorities, in 1084. The remaining princes of this dynasty are—

Turan Shah, died 1095.

Iran Shah, his son, slain by his subjects for his cruelty, A.D. 1100.

Arslan Shah, nephew of the last mentioned, reigned in peace 42 years, leaving his crown, A.D. 1141, to his son

Mohammed, who died A.D. 1156.

Togrol Shah, son of Mohammed, died 1167, leaving three sons,

Arslan Shah,

Baharam Shah, and

Turan Shah, who reigned alternately as each could wrest the kingdom from the others, until Turan Shah left the kingdom to

Mohammed Shah, from whom it was taken by Malek Dinar, who conquered Kerman in 1187, thus terminating this dynasty.

The Seljuks of Rum (a name somewhat loosely applied to the dominions of the Greek emperors in Asia, but here including Asia Minor and part of the rest of what is now Turkey in Asia) take their origin from Kotolmish, nephew and general of Togrul Beg, who being sent by his uncle against the Greeks, and failing in his enterprise, rebelled from fear of his sovereign's displeasure. After long hostilities, which outlasted the life of Togrul Beg, his successor Alp Arslan concluded a treaty with Kotolmish, in which it was agreed that the latter and his heirs should hold all the territory he could take from the Greeks, and that the sultan should furnish him with assistance for that purpose. In consequence of this arrangement, Kotolmish and his sons gained possession of Persarmenia, Lycaonia, Cappadocia, and Bithynia; these conquests were left to

Suleyman, one of the five sons of Kotolmish, who is considered to have begun his reign as the first Seljuk sultan of Rum, A.D. 1087. There is however some discrepancy between Oriental and Greek historians as to the source of Suleyman's power, the latter deriving it from an independent grant made to him by Alp Arslan, and not from his father Kotolmish. Suleyman took Nice and Antioch, but was slain in 1085, under the walls of Aleppo, by the governor of Damascus, Tajoddowlat, having been engaged during the greater part of his reign in assisting one competitor for the Greek throne against another, and in taking advantage of their quarrels for his own aggrandizement. After an interregnum of nine years, he was succeeded by his son

Kilij Arslan, of whom little is recorded by the Oriental historians, and who is mentioned by the Greeks only in connection with their own history. He repaired Nice, and fixed his government there, but was driven from it by the Greeks and Norman crusaders. After a reign troubled by perpetual assaults of the two powers just mentioned, he was drowned in an action against the general of Mohammed, sultan of Irak, after taking possession of Mosul at the invitation of the inhabitants. The Greek writers introduce after him a sultan not mentioned by the Oriental historians, whom they call

Saysan, who, they say, after suffering several defeats from the Greeks, made with them a treaty greatly to the advantage of the latter, but was treacherously blinded and afterwards murdered, A.D. 1116, by

Masoud, his brother, who reigned till A.D. 1152, when he was succeeded by his son

Kilij Arslan II., an active and prudent prince, who dispossessed his two brothers of their share of the kingdom left by his father, availed himself of the friendship or folly of the emperor Manuel to procure supplies of money for raising soldiers, and in a contest with Manuel, originating in the building of two forts by the latter, he defeated the emperor in a sanguinary battle, and obtained as an article of peace the destruction of the forts. This treaty, being only partially fulfilled on the emperor's side, gave occasion to fresh hostilities, in the course of which Manuel died, and which ended in the aggrandizement of Kilij Arslan. In his old age, having divided his kingdom among his sons, he was treated by them with great unkindness; and Kothboddin, to whom Iconium had fallen, with the possession of which the succession to the empire was usually connected, imprisoned his father. The latter however contrived to make his escape, and was reinstated in his kingdom by his son Kai Khosrou. In consequence of this, Kai Khosrou was invested with the government of Iconium, which had been taken by him from his brother; and he succeeded his father in the kingdom. At the death of the latter, A.D. 1192,

Kai Khosrou, surnamed Gaiathoddin, obtained several successes in the beginning of his reign against the emperor Alexis; but in 1198 he was dispossessed by his brother

Rokneddin, who, taking advantage of the death of his brother Kothboddin, seized not only upon his dominions, but also on those of his other brothers. He died A.D. 1203, leaving his son

Kilij Arslan III., a minor, from whom however the throne was wrested almost immediately on his accession by his uncle the deposed sultan Kai Khosrou, who thus recovered his lost dignity. He reigned after this, says the Oriental history, with great power and dignity: he was afterwards concerned in the disputes of the pretenders to the Greek empire, and in one of these he perished in a personal encounter with Lascaris, one of the competitors. He left two sons,

Azzoddin Kai Kaus, who died after a reign of a year A.D. 1219, and

Alaoddin Kaikobad, who succeeded his brother. He is the Aladdin of the writers on the Crusades; and was one of the greatest princes of this dynasty. He extended the dominions of his family in the East, and governed with extraordinary prudence and firmness. He died in 1236. His son

Gaiathoddin Kai Khosrou II. was a voluptuous and uxorious prince, during whose reign the dominions of his house became tributary to the Mogols. He died A.D. 1244. His son

Azzoddin succeeded him, and being required by Oktay, the khan of the Mogols, to come to do him homage, he sent his brother Roknoddin in his stead. The result of this was, that when a Tartar lieutenant or viceroy was sent into Rum, it was with the commission to put Roknoddin in the place of his brother. A division was afterwards effected, Azzoddin receiving the Western and Roknoddin the Eastern provinces. Azzoddin however was again deposed, and Roknoddin, whom he had attempted to murder, was placed in his room by the Tartars. On this occasion Azzoddin fled to the Greek emperor (A.D. 1261), who for some time amused him with promises; but at length Azzoddin, perceiving or fearing the emperor's intention to make him prisoner, intrigued to bring the Tartars upon the emperor, and thus escaped. After this his name does not appear again in history. Of the remaining sultans,

Kai Khosrou III., son of Roknoddin, slain A.D. 1283;

Gaiathoddin Massoud II., son of Azzoddin Kai Kaus, who died A.D. 1288; and

Kai Kobad, the nephew of Massoud, who was put to death A.D. 1300, little is on record beyond the dates annexed to their names. From the time of Gaiathoddin Kai Khosrou, the Seljuk sultans had been in fact mere pageants under the actual government of the Mogols, who summoned them to do the most servile homage, deposed and set them up, and even put them to death at their pleasure. Out of the wrecks of this empire arose that of the Othmans, or Turks, founded by Othman, a Seljuk captain. (D'Herbelot; *Mod. Univer. History*; &c.)

SELKIRK, ALEXANDER, was born at Largo, on the coast of Fife, in 1676, and bred to the sea. Having engaged in the half-piratical half-exploring voyages in the American seas, into which the spirit of adventure then led so many of our countrymen, he quarrelled with his captain, one Straddling, by whom he was set on shore on the uninhabited island of Juan Fernandez, with a few books, his nautical instruments, a knife, boiler, axe, gun, powder and ball, for his whole equipment, in September, 1704. After four years and four months' residence, he was taken off by two English vessels, commanded by Capt. Woodro Rogers, in February, 1709, in the account of whose voyage we find the following passage:—'At first the terror and loneliness of the place sunk deeply on his spirits; but in time he became inured to it, and got the better of his melancholy. He had erected two huts, one of which served him for a kitchen, the other for a dining-room and bed-chamber; they were made of pimento wood, which supplied him also with fire and candle, burning very clear, and yielding a most refreshing fragrant smell: the roof was of long grass, and his wainscoting the skins of goats, near five hundred whereof he had killed during his residence here, and caught above five hundred more, which he marked on the ears, and then set at liberty. When his ammunition was exhausted, he caught them by running; and so practised was he in that exercise, that the swiftest goat on the island was scarcely a match for him. On his being first abandoned here, he relished his food, which was boiled goat's flesh and crawfish, but indifferently, for want of salt; however, in time he got the better of the nicety of his palate, and was well enough pleased with the seasoning of the pimento fruit. When his clothes were worn out, he made himself a covering of goat-skin, joined together with thongs which he had cut with his knife, and which he run through holes made with a nail instead of a needle: he had a piece of linen by him, of which he had made a sort of shirt, and this was sewn in the same manner. He had no shoes left in a month's time: his feet, having been so long bare, were now become quite callous; and he was some time on board before he could wear a shoe. The rats at first plagued him very much, growing so bold as to gnaw his feet and clothes while he slept: however, he soon taught them to keep at greater distance, with the assistance of some cats that had been left ashore by the ships; of these and a few kids he made pets, and used to divert himself by teaching them a thousand tricks.' He had one narrow escape, having fallen over a precipice while in the act of catching a goat: on recovering his senses, he found the animal dead under him. Thirty years after, the first goat shot by Anson's crew was found to be marked as above described. After his knife was worn out, he managed to forge others from old iron hoops. He had some difficulty in returning to the use of speech, and in reconciling himself to the ship's provisions and to spirits. Rogers made him his mate, and he returned to England in 1711. It is said that he gave his papers to Defoe, who stole from them the story of 'Robinson Crusoe;' but the above extract, which on that account we have given at full length, shows that whatever communications may have passed between Defoe and Selkirk, the former can have borrowed little beyond the mere idea of a man being left alone on a desert isle, there being scarcely anything common to the adventures of the real and the fictitious solitary. (*Voyage of Capt. Rogers*, in *Collect. of Voyages*, 12mo., Lond., 1756; Chalmers, *Biog.*)

SELKIRK. [SELKIRKSHIRE.]

SELKIRKSHIRE, an inland county of Scotland, bounded on the north by Edinburghshire, on the east and south-east by Roxburghshire, on the south and south-west by Dumfriesshire, and on the west and north-west by Peeblesshire. A small detached part of the county lies just beyond the eastern boundary, entirely surrounded by Roxburghshire. The form of the county is very irregular; the greatest length is from south-south-west to north-north-east, from Whin Fell at the source of the Ettrick, on the border of Dumfriesshire, to the source of the Cadon, on the border of Edinburghshire, 28 or 29 miles; the greatest breadth at right angles to the length, from Houndlosshope heights on the borders of Peeblesshire to the banks of the Borthwick Water, near Roberton Kirk on the border of Roxburghshire, 17 miles. The area is stated by MacCulloch (*Statist. Account of British Empire*) at 264½ square miles, viz. 263 square miles of land and 1½ mile of lochs. The population in 1801 was 5070; in 1811, 5889; in 1821, 6637; and in 1831, 6833; showing an increase in the last 10 years of 196, or about 3 per cent., and giving only 26 inhabitants to a square mile. Of the thirty-two Scottish counties (Ross and Cromarty being taken together) it is the twenty-fifth in size, the lowest in amount of population, and the twenty-ninth in density of population. Selkirk, the chief town, is on the south-east bank of the Ettrick, 31 miles in a direct line south-south-east of Edinburgh, or 36 miles by the road through Middleton.

Surface; Geology; Hydrography; Communications.—The whole county is hilly, but especially the southern and western parts, which are the highest, the direction of the principal streams being from south-west to north-east. The hills vary in height from a few hundred feet to two thousand.

We give the following table, compiled partly from Playfair's 'Description of Scotland' (P) and MacCulloch's 'Statistical Account of the British Empire' (M), but chiefly from the *New Statistical Account of Scotland* (SA). There is probably no part of the county much less than 300 feet above the level of the sea.

In the northern part of the county, north of the Tweed.

	Feet.
Windlestraw Law . . .	2295 (P)
Meigle Hill near Galashiels .	1480 (SA)

Between the Tweed and the Yarrow.

	Feet.
Peat Law	1964 (SA)
Three Brethren Cairn . .	1978 (SA)
Hainingshaw, or Hangingshaw Law	1780 (P) 1980 (SA)*
Minchmoor	1877 (P) 2280 (SA)*
Blackhouse, or Black Hoe Heights, on the western border of the county	2370 (P, M, and SA)*

Between the Yarrow and the Ettrick.

	Feet.
Ward Law	1900 (P) 1986†(SA)

Between the Ettrick and the Borthwick Water.

	Feet.
Ettrick Pen	2220 (P) 2200 (SA)†
Old Ettrick Hill . . .	1860 (SA)†
Shaw's Hill	1212 (SA)*

---

* These heights, it is said in the 'New Statistical Account,' are from Ainslie's Map of the county, but that their accuracy is doubtful.

† These heights are said to be probably less than the actual elevation.

The best idea that can be formed of the mountains of this parish (county) may be gathered from what they appear once to have been, namely, one large high bed of greywacke and clay-slate, now cut by the larger streams into long-shaped divisions, and cross-cut by the smaller streams to a less depth, and into smaller and rounded divisions.' ('General Remarks on the County of Selkirk,' by the Rev. N. Paterson, minister of Galashiels, in the *New Statistical Account of Scotland.*) The hills are generally ridge-shaped and rounded on the tops, having acclivities of from 10° to 30°. The projecting ridges on one side of a valley usually have a corresponding recess on the opposite side. The west and south-west sides of the transverse or smaller valleys are generally the steeper. The strata for the most part dip to the north-east, but with various degrees of inclination. At New House Lynns, 7 miles above Selkirk, the rocks which form the bank of the Ettrick rise to a surprising height perpendicularly; both here and at Newark on the Yarrow the strata are remarkably curved.

On the western side of the county, toward Peeblesshire, extensive strata of porphyry are found alternating with thin strata of slate and granite.

None of the more useful minerals, coal, lime, or sandstone, are found, at least in quantity and condition such as to be available for economic purposes; attempts have been made to find coal, but without success. (*New Statist. Account,* 'Galashiels Parish.') Shell-marl occurs abundantly near Galashiels, and was extensively used for manure, until superseded by the introduction of lime from other counties; granite and whinstone are abundant.

Selkirkshire is comprehended in the basin of the Tweed. The Tweed itself crosses the county in the northern part, from west to east, quitting it just at the junction of the Gala, which may be regarded as the lowest spot of the county, 280 feet above the level of the sea; about 10 or 12 miles of the course of the Tweed belong to Selkirkshire. The Ettrick may be regarded as especially the county river; it gave to the district the name by which it was formerly known, of Ettrick Forest. It rises in the south-west corner, and flows in a tolerably direct course north-east till it joins the Tweed on its right bank, on the border of the county a little above Abbotsford; its course may be estimated at from 28 to 30 miles. The Yarrow rises on the western border, and has its course nearly parallel to the Ettrick, until it reaches Yarrow ford, where it turns to the south-east and joins the Ettrick a little above Selkirk; its course may be estimated at about 20 miles, including the lochs of the Lowes and St. Mary's, through which it flows. The Gala, which has the greater part of its course in Edinburghshire, and the Cadon, belong to the northern part of the county; they flow south-east, and join the Tweed on the left or north bank; the Gala on the border of the county, the Cadon a little above it.

The principal lochs are those of the Lowes and St. Mary, separated from each other by a very narrow neck of land. They are both expansions of the Yarrow, which enters the loch of the Lowes at its upper end and quits that of St. Mary at its lower end. The former is a mile long, a quarter of a mile broad, and about seventy feet in depth; that of St. Mary is three miles long, half a mile broad, and from eighty to ninety feet deep. They are at an elevation of 560 feet above the level of the sea. This loch is beautifully described by Sir W. Scott, in 'Marmion,' introduction to Canto ii.

The lochs are stored with pike, perch, eels, trout, and minnows; the rivers with salmon, trout, eels, barbels, and other fish.

The principal road in the county is the mail-road from London by Carlisle to Edinburgh; it enters the county near Selkirk and passes through Selkirk and Galashiels. A branch from this road parts from it at Selkirk, and passing by Yair Bridge, reunites with the mail-road at Crosslee, nine miles north of Selkirk. A road from Glasgow to Kelso and Berwick crosses the county, following the valley of the Tweed. The late Lord Napier did much for the improvement of the roads, especially in Ettrick parish.

Agriculture.—'The arable land of the county lies on an elevation of from 280 to 800 feet, none of it therefore is the best as to climate. . . . . . Wheat abounds in the lower districts, and has been raised, at the height of 700 feet, to what would be called a good crop in the Lothians; and, considerably higher, near to the head of Ettrick, oats, turnips, barley, and clover hay thrive in regular rotation.' (*New Statist. Account.*) In Selkirk parish the soil is light and dry, and the harvest comparatively early. The rotation is usually of five years, but where manure can be easily procured, it is sometimes reduced to four, but this has been followed by injurious consequences. The quantity of land constantly or occasionally under tillage is however very small, and the dampness of the climate renders the county altogether more appropriate for pasturage.

The cattle are chiefly of the Teeswater breed, or rather are a mongrel kind of the short-horned varieties. A considerable number are reared yearly. Many Highland cattle are also grazed on the hills, where they consume the coarse pasturage which the sheep will not touch. The black-faced sheep which had long been reared in the county was gradually superseded toward the close of the last century by the introduction of the Cheviot; but since then the black-faced have been again introduced on exposed mossy lands, where they are found to thrive best. Some Leicesters have been also introduced. The black-faced sheep have been crossed with the Cheviots and with the Leicesters; and on some of the farms, where the pasturage is best, the Cheviots have been crossed with the Leicesters.

Both in agriculture and pasturage great improvement has been made in the last half-century. The houses of the tenants have been for the most part rebuilt in better situations and in better style.

There are between 2000 and 3000 acres of wood and underwood: Scotch firs were formerly the favourite trees; but now, where the ground is dry, oak, ash, elm, beech, and plane are grown; with alder, birch, larch, spruce, and Scotch fir to shelter them when young. The indigenous wood is chiefly oak, cut down periodically for the bark, ash, elder, birch, elm, hazel, hawthorn, mountain ash, &c.

Divisions, Towns, &c.—The county contains nine parishes, or parts of parishes, as follows:—

		1831.		
Parish.	Situation.	Inhabited houses.	Families.	Population.
Ashkirk	S.E.	38	41	192
Ettrick	S. and S.W.	88	89	530
Galashiels	N.E.	199	270	1364
Innerleithen	N.	10	10	64
Peebles	W.			
Roberton	S.E.	55	60	306
Selkirk	E.	435	637	2833
Stow	N.E.	53	57	323
Yarrow	W. & Central	216	227	1221
		1094	1391	6833

Of these parishes, only two, Etterick or Ettrick and Yarrow, are wholly included in the county; Galashiels and Selkirk have each a small portion in Roxburghshire, and Ashkirk and Roberton belong chiefly to that county; Innerleithen or Inverleithen and Peebles belong chiefly to Peeblesshire; and Stow is mostly in Edinburghshire.

Selkirk town is on the right or south-eastern bank of the Ettrick, on the mail-road from London by Carlisle to Edinburgh. In the middle ages Selkirk was a town of some importance, as appears from its furnishing 80 men to the army of James IV. Of these only four or five returned from the fatal battle of Flodden, but they brought away an English flag, still preserved in the town. The bravery of the townsmen is thought to be contrasted with the supposed cowardice or treachery of Lord Home, in the following rhyme (of later date however than the conflict), given by Sir Walter Scott, in his 'Minstrelsy of the Scottish Border:'—

'Up wi' the sutors of Selkirk,
And down wi' the Earl of Hume;
And up wi' a' the bra' lads
That sew the single-soled shoon.'

The townsmen are here termed sutors, that is, shoemakers, because they were at that time the principal class of artizans. Some of the municipal customs still observed indicate the superior importance of the members of 'the gentle craft,' and the word sutor is still used as an equivalent for 'burgess.' In the rebellion of 1745, above 2000 pairs of shoes were supplied by the townsmen, upon requisition, to the rebel army; and even to the present time the shoemakers are said to be more numerous than other handicraftsmen. Selkirk was burnt by the English in revenge for the gallantry of the townsmen at Flodden, but in what year is doubtful, the charters granted by James V. record the great injuries the town had suffered. (Scott's *Minstrelsy of the Scottish Border*.) In the civil war of Charles I., Montrose was quartered here with his cavalry, amounting to about 1000, while the rest of his army, 1200 or 1500 strong, encamped at Philiphaugh, about a mile west of the town. Here he was surprised and routed by the Covenanters, under David Lesly, A.D. 1645. This event has been commemorated in border song. ('The Battle of Philiphaugh,' in Sir W. Scott's *Minstrelsy*, *&c.*)

Selkirk has one principal street, expanding in one part into a triangular market-place, with a conspicuous public well in the centre. The town has much improved in modern times, and contains some good houses. The parish church, a large building, erected nearly a century ago, is in the town; and there are a Secession meeting-house and a town-hall with a spire 110 feet high. There is a bridge over the Ettrick, near the town. The population of the town, in 1831, was 1880. There are good flour-mills close to the town, some stocking-looms, and a fulling-mill, which employ a few hands, and a small tan-yard. The jealous restrictions on trade imposed by the burgesses are considered to have greatly injured the prosperity of the place. (*New Stat. Acct. of Scotland*, Sept., 1833.) There are a weekly market and five yearly fairs. There is a post-office, and the town has coach communication daily with Edinburgh. Selkirk was a burgh of antient foundation, but the earliest existing charter is of James V., A.D. 1535; the council consists of a provost, two bailies, a treasurer, and twenty-nine councillors. There are the usual burgh-courts, but the business done in them is trifling. There is neither separate police nor nightly watch; the only criminal officers are the burgh officers and constables ordinary and special. There is a small prison for the burgh and county. There are five incorporated trades. The burgh was formerly united with Peebles, Lanark, and Linlithgow in sending a member to Parliament; but by the Scottish Reform Act the burgh was, for parliamentary purposes, disfranchised, and united with the county. There were, in 1833, seven day-schools in the parish, viz. the parochial school, the burgh school, two others endowed, and three unendowed; and two Sabbath-evening schools, superintended by the clergymen, established and seceding. There were also a savings'-bank, a parochial library, two subscription libraries, and a reading-room supplied with newspapers and periodicals. There are a friendly, a missionary, and a temperance society.

Galashiels is on the right or south-west bank of the Gala, just above its junction with the Tweed, about six miles north-east of Selkirk. There is a bridge over the Gala, just above the town, which it connects with the village of Buckholmside. The town extends into the parish of Melrose, and contained, in 1831, a population of 2209, of whom 1130 were in Galashiels, and 1079 in Melrose parish. The town consists chiefly of one long street, with some bye-lanes and scattered clusters of houses, usually built of stone, and slated. The church, erected in 1813, is a 'semi-gothic' building, of considerable but inadequate size; and there are three dissenting chapels, one Seceders, one Baptist, and one Independent. The chief manufacture is that of woollens, for which there were, in 1831, ten large factories. At that time it was estimated that 21,000 stones of home-grown wool, 24lbs. to the stone, and 500 stones of Australian wool, were consumed. Nearly half of this was manufactured into yarns, flannels, blankets, shawls, and plaids; the other half into narrow cloth, and 'crumb cloth,' or carpeting, of grey or mixed colours. These branches of industry employed about 200 to 220 men, nearly 50 women, and 80 children. There were a bark-mill, and manufactories of machinery, but the town was not well furnished with shops. The market has fallen into disuse, and the fairs are ill attended. The Carlisle and Edinburgh mail now passes through the town, and there is abundant other coach communication with Edinburgh daily. Part of the town is included in the burgh of barony of Galashiels, governed by a baron bailie. There were, in 1833, five day-schools in Galashiels parish, viz. the parochial school, a subscription school, and a private school in the town, two private schools in the country, and a Sunday school conducted by the secession minister. There were also two subscription libraries, a reading-room, a savings'-bank for this and the adjacent parishes, and a friendly society.

Ecclesiastical Arrangements.—The parishes of Ashkirk, Ettrick, Galashiels, Roberton, Selkirk, and Yarrow are in the presbytery of Selkirk; those of Innerleithen (or Innerleithen), and Peebles in the presbytery of Peebles and that of Stow in the presbytery of Lauder. The presbyteries of Selkirk and Lauder are in the synod of Merse and Teviotdale; and the presbytery of Peebles in the synod of Lothian and Tweedale.

History and Antiquities.—This part of Scotland appears to have belonged originally to the Gadeni, and in the period which succeeded the retreat of the Romans was overrun by the Anglo-Saxons of Northumbria. It appears to have been at this early period a forest, and to have had few if any settled inhabitants. With the exception of the Catrail, a remarkable entrenchment, consisting of a ditch, with a bank on each side, extending 28 miles through the county, there are very few British or Roman remains; no Druidical monuments, no cairns, or scarcely any, and no hill forts, except a few near the south-eastern border, with a square Roman camp, in Roberton parish, in the midst of them; and the traces of two camps and of a Roman road in Galashiels parish. After the cession of the southern part of Scotland by the Anglo-Saxon princes, the Scottish kings had a residence at Selkirk, antiently written Selechyrche, and perhaps Seleschirche. The period of its establishment as a shire is doubtful; it was probably before the death of Alexander III., but the first recorded sheriff was Alexander Synton, A.D. 1292. At a subsequent period the possession of the shire was disputed by the English and Scots. It belonged, in the latter half of the fourteenth and the former half of the fifteenth century, to the Douglases; in 1503 the hereditary sheriffdom was granted to Murray of Falahill, whose descendants held it, though not without interruption, till the abolition of hereditary jurisdictions in 1748. Several castles were erected in this county: there was one at Selkirk in existence early in the twelfth century, and occasionally used as a royal residence, and another castle near it, called Oldwark (old work), of both which there are now no remains. The ruins of Oakwood and Newark (that is, new work, as distinguished from the old work), both near Selkirk, are yet standing. It is in Newark that Sir W. Scott represents the duchess of Buccleugh as listening to 'the lay of the last minstrel.'

The exertions of James V. for securing the quiet of the border were so far successful that he was enabled to keep a flock of 10,000 sheep in Ettrick Forest in this county, to the great advantage of his exchequer, though Sir Ralph Sadler, the ambassador of Henry VIII., remonstrated against such 'mean' methods of increasing his revenues.

Dr. John Rutherford, professor of physic at Edinburgh, Alexander Cunningham, an historian of some note, and Mungo Park, the African traveller, were natives of this county. Sir Walter Scott was connected with it by his holding the office of sheriff, and by his residence at Ashiesteel, or Ashestiel, in Yarrow parish, where he produced his 'Marmion' and 'Lady of the Lake.' James Hogg was also long resident in Yarrow parish, and appears to have derived from that residence his usual designation of the 'Ettrick Shepherd.'

(*New Statistical Account of Scotland;* Chalmers's *Caledonia; Introductions and Notes to Sir W. Scott's Poetical Works*, *&c.*)

SELTER WATER. [WATERS, MINERAL.]

SELTZ. [RHIN, BAS.]

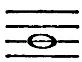
SELUM. [HINDUSTAN.]

SEMAPHORE. [TELEGRAPH.]

SEMECARPUS, a very small and entirely Indian genus of the natural family Terebinthaceæ, of which the name is derived from *semeion* (σημεῖον), a mark, and *carpos* (καρπός), fruit, from the remarkable property possessed by the juice of the fruit, whence it is commonly called *marking-nut*. The genus is characterised by having polygamous flowers; calyx 5-cleft; petals 5, oblong, sessile; stamens 5; disk urceolar; ovary free, sessile, girded by a tumid ring. Styles 3; stigmas obtuse, emarginate. Nut compressed, heart-shaped, seated on a depressed thickened torus. Pericarp hard and thick, containing between the inner and outer layers cells full of a corrosive resinous juice. *S. Anacardium*, the officinal Anacardium, or that which is more particularly called marking-nut, is the best known, and by some it is considered the only species of the genus, and the others merely as varieties; but *S. cuneifolium*, though resembling it a good deal, yet differing in habit, is very probably a distinct species, indigenous in the valleys of the Himalayan Mountains as far as 30° N. lat. Its fruit possesses the same properties, and is used as a substitute for the former species

S. Anacardium has long been known for the corrosive resinous juice contained in the nut. This juice is at first of a pale milk colour, but when the fruit is perfectly ripe it is of pure black colour and very acrid, and in both respects resembles that of several other plants of the same family, as in the cashew-nut species of Rhus and some of the varnish-trees. The juice is employed in medicine by the natives of India and to mark all kinds of cotton-cloth. The colour is improved and fixed by a mixture of quicklime and water. This juice is soluble neither in water nor alcohol, unless it be previously alcalized, when the fluid becomes of a black colour. It unites perfectly with oils. The wood of the tree is not considered of any use, both on account of its softness and because the acrid juice renders it dangerous to cut down and work upon. The fleshy receptacles on which the seeds rest are roasted in the ashes and eaten by the natives, and are said to taste like roasted apples, though previous to the application of heat they are astringent and acrid. The vapours which rise during the roasting are deleterious. By boiling the nut, an oil is prepared which acts as a blister when undiluted. In smaller quantities it acts as an irritant and produces an eruption on the skin. A statement has been made of considerable difficulty having been experienced respecting the nature and origin of an eruption with which several men were simultaneously attacked in one of the European regiments in India. The circumstance was easily explained when it was discovered that the linen of the men had been marked with the juice of the marking-nut. The green nuts well pounded into a pulp make good birdlime. The bark is astringent, and gives various shades of a brown dye. A soft tasteless brownish-coloured gum exudes from the bark.

SEMIBREVE, a character in music, sometimes nearly circular in form, but more commonly elliptical. Ex.:



This is adopted as the measure-note in music; the other five characters that indicate duration, as minim, crotchet, &c., being considered as proportional parts of it.

SEMICIRCULAR CANALS. [Ear.]

SEMICOLON. [Punctuation.]

SEMILUNAR VALVES. [Heart.]

SEMI-PELAGIANS. [Pelagianism.]

SEMIPHYLLIDIANS, the third division of Lamarck's Gastropods, consisting of those whose branchiæ are placed under the border of the mantle and disposed in a longitudinal series on the right side of the body alone. The Semiphyllidians respire water only. The two genera placed by Lamarck under this division are *Pleurobranchus* and *Umbrella*.

The Inferobranchiata of Cuvier consisted of the genera *Phyllidia* and *Diphyllidia* only; but M. Rang arranges under that order the *Semiphyllidians* as well as the *Phyllidians*, and the following is his definition of the *Inferobranchiata*:—

Animal furnished with a foot for creeping, always very large; branchiæ in the form of a long succession of foliations, at the lower part of the body between the projecting border of the mantle and that of the foot, either all round the body or on the right of it only*; the organs of generation always on the same individual; one or two pairs of tentacles.

Sometimes a *shell* either internal or external.

M. Rang thus defines his second family of the *Inferobranchiata* —

Animal with the branchiæ on the right side only (with the exception of the genus *Ancylus*, which is sinister).

Sometimes a shell, either internal or external, and in the last case set on the back (recouvrante).

Under the Semiphyllidians M. Rang arranges the following genera:—*Ancylus*, *Pleurobranchæa*, *Pleurobranchus*, *Umbrella*, *Spiricella*, and *Siphonaria*.

Ancylus. (Geoffroy.)

Generic Character.—Animal oval, conical, slightly recurved backwards; mantle not ample, not covering the head, and delicate upon the borders; head very large, furnished with two tentacles, which are stout, cylindrical, contractile, with eyes at their internal base, and approximated at their external side by a foliaceous appendage; mouth below, with some appearances of labial appendages on each side; foot elliptical, large; branchiæ in a sort of cavity in the middle of the right side, between the foot and the mantle; vent at the left side.

Shell delicate, covering the animal, nearly symmetrical, obliquely conical backwards, the base oval, more or less elongated, the apex pointed, but not marginal, and rather inclined to the right. (Rang.)

M. Rang observes that this genus has been candied about from one family to another, and perhaps would be so still, notwithstanding what is known of the animal. However this may be, he adds, it can no longer be classed with the other genera of Mollusks with which it lives in fresh-water, because it is branchiferous, and they, on the contrary, are pulmoniferous. In the meantime, M. Rang places it in the family of Semiphyllidians, to which the disposition of its branchiæ seems to call it, remarking at the same time, that instead of having them on the right side like *Pleurobranchus*, it has them on the left; but he thinks this character of small importance, as the animal appears to be sinistrorsal.

Locality and Habits of the Genus.—Fresh-water; springs and streams; they creep on stones and aquatic plants. M. Rang states that he had never seen them respire air naturally.

Lamarck placed *Ancylus* at the end of his Calyptraceans [Calyptræidæ] next to *Crepidula*. M. Deshayes, in the last edition of the *Animaux sans Vertèbres*, observes, that among the genera of Mollusks actually known, that of *Ancylus* is, without doubt, one of the most difficult to arrange correctly in the system. This, he remarks, would at first sight appear singular, especially as many are living in the fresh waters, and nothing would appear easier than to study the animal; but the difficulty lay in the small size of the species and the obstacle thus opposed to anatomical investigation. Those zoologists who adhered strictly to the Linnean system, confounded the genus with the *Patellæ*. [Cervicobranchiata.] Draparnaud was of opinion that it belonged to the *Scutibranchians*, and that the animal was furnished with a pectinated branchia upon the neck or in the cervical cavity, proper for respiring water. Férussac observing that they came sometimes to the surface, thought that they did so for the purpose of respiring air, and placed them among the *aquatic pulmonifera*. M. de Blainville included them in the same family as the *Haliotides* [Haliotis], acknowledging, at the same time, that it is very uncertain that this would turn out to be the definitive arrangement.

The Rev. Lansdown Guilding having an opportunity of studying species of some size in the island of St. Vincent, has figured and described two in the 'Zoological Journal,' vol. iii. He places them under the family Patelladæ, but with a mark of doubt, remarking that their smallness is an obstacle to the accurate use of the scalpel. Still his descriptions and figures are highly valuable, and we proceed to lay them before our readers:—

Animal unisexual, entirely covered by the shell; body soft, subdiaphanous; head distinct; cheeks rounded; mouth below, large; neck elongated, free; tentacles two, subulate, retractile; foot short; abdomen affixed; eyes under the base of the transparent tentacles; penis exserted at the roots of the left tentacle; anus at the left side; branch of the branchiæ small, near the anus and foramen of the side; mantle very ample, free, very thin, extended over the whole cavity (cavitatem totam lambens); the margin continuous and simple.

Progression.—Slow.

Young ovate, affixed to leaves by three pairs (per paria tria) under a common, rounded, gelatinous skin.

Shell patelliform, thin, obliquely conical; apex subacute, inflected posteriorly to the right; aperture oval; the margin simple and expanded.

With regard to the generation stated with a query by Mr. Guilding, M. Deshayes remarks that the *Ancyli* appear to be diœcious, that is to say, that each individual has equally the male and female organs.

Mr. Swainson (*Malacology*) places *Ancylus* with the River Snails, *Limnacinæ*, his fifth subfamily of *Helicidæ*.

M. Deshayes in his tables makes the number of species four living and three fossil (tertiary). In the last edition of Lamarck, he observes that the number of species known is greater than Lamarck supposes (3). He adds that Férussac makes the number of species, recent and fossil, 16, the amount of the latter being very small; and M. Deshayes adds his belief that many of them ought to be suppressed, but that they will be replaced by those recently brought home by voyagers. The number given in the last edition of Lamarck is five recent and one fossil; but *Ancylus obliquus*, Brod., and *Ancylus flosus*, Conrad (*Zool. Proc.*, 1832; Müller, *Synopsis*, 1836), do not appear among them.

---

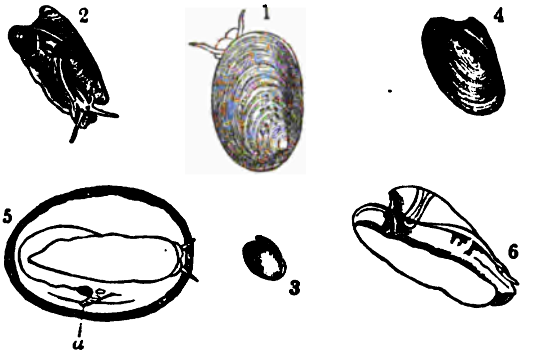
* M. Rang excepts *Ancylus*, which, being sinister, the branchiæ in this single instance are situated to the left only.

Examples.—*Ancylus irroratus* and *Ancylus radiatus*.

Description of Ancylus irroratus.—Pale-yellowish, obscurely sprinkled with black; front and abdomen reddish; eyes black; sole of the foot spotless and pallid.

Shell.—Concentrically plaited, subdiaphanous; epidermis black-green sprinkled with black; apex subobtuse, posterior; aperture roundish-elliptical; length three lines.

Locality.—Plentiful in the ditches of the island of St. Vincent, closely adhering to dried leaves by excluding the air.

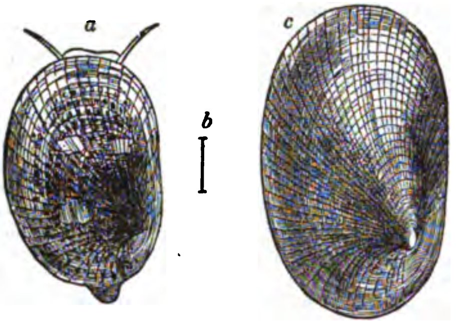


Ancylus irroratus. 1, Animal creeping, magnified; 2, Animal reversed; 3, 4, Shell; 5, Figure of the foot; *a*, branchiæ in situ; 6, Animal with the shell taken off.

Ancylus radiatus.—Yellowish, sprinkled with black, with three or four great pale spots on the back; face reddish; abdomen obscure.

Shell oval-elliptical, glassy, diaphanous, concentrically sub-plaited, radially striated, epidermis evanescent.

Locality.—Found with the preceding.



Ancylus radiatus.

a, animal creeping, magnified; *b*, nat. length of the shell; *c*, shell magnified. (Guilding.)

Fossil Ancyli.

The geological localities assigned by M. Deshayes to the three fossil species noticed in his tables are Paris (2) and London (1), Eocene Period of Lyell. *A. elegans* is noted as a species found in more than one tertiary formation; and Auvergne and Cantal are mentioned under the head of 'Various Localities.' The locality of *Ancylus depressus*, Desh., the fossil species recorded in the last edition of Lamarck, is the neighbourhood of Versailles (the *meulières*).

Pleurobranchæa. (Meckel.)

Generic Character.—*Animal* oval, elongated, flat below, convex above, pointed behind: no trace of a mantle, only a slight long and narrow expansion of the skin at the middle of the right side. Head very large, with the mouth at the extremity of a proboscis. Two pairs of auriform tentacles, the anterior ones at the extremity of a muscular, transverse, frontal band; the posterior ones rather farther backward, and very much separated from each other. Foot very large, more extended behind than before; a single branchia fixed at the right side, and entirely exposed. Termination of the organs of generation in a common tubercle, in front of the branchiæ; the anus above these, and in the middle of their length. (Rang, after De Blainville.)

M. Rang observes that this genus is closely approximated to *Pleurobranchus;* for it only differs from it in the absence of the mantle, the disposition of the tentacles, and the place occupied by the anus, which is more forward than in *Pleurobranchus*, and he is of opinion that both might form one division, adding, that M. de Blainville thinks that it is the *Pleurobranchus Balearicus* of Delaroche, and the type of the genus *Cyanogaster* of Rudolphi.

Example, *Pleurobranchæa Meckeli*, *Pleurobranchidium Meckeli*, Blainv.

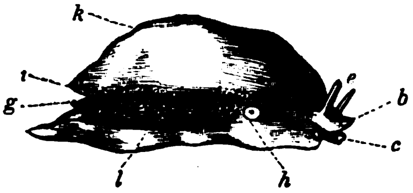
Pleurobranchæa Meckeli.

Pleurobranchus. (Cuv.)

Generic Character.—*Animal* oblong, fleshy, convex above with a very large and overspreading mantle. Foot large, equally outspreading, and thus leaving a wide canal all round the body. Head distinct, furnished with a veil uniting on each side with the borders of the foot, and with two tubular tentacles, which are split anteriorly; mouth at the extremity of a proboscis; branchiæ composed of a double row of lamellæ, forming a plume on the posterior right side, between the mantle and the foot. Anus carried by a small tube behind the branchiæ. Organs of generation in front.

Shell.—Sometimes a rudimentary membranous shell, with a tolerably distinct apex, hidden in the thickness of the mantle.

Such is the definition of M. Rang, who includes **Berthella** under the genus.



Pleurobranchus, side view.

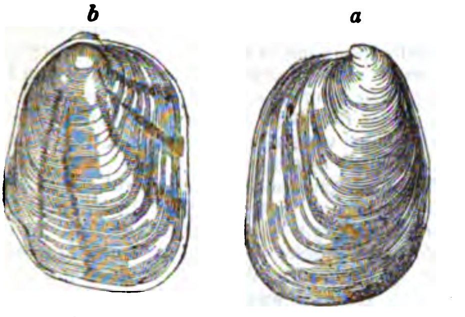
b, veil; *c*, mouth at the extremity of a proboscis; *e*, tentacles; *g*, branchia; *h*, orifice of the organs of generation; *i*, position of the anus; *k*, mantle *l*, foot. (Rang.)

In the first edition of Lamarck, but one species, *Pleurobranchus Peronii*, is noticed. M. Rang remarks that the species are numerous, but that very few of them have been described. In the last edition of the *Animaux sans Vertèbres*, the number of recent species recorded is seven. No fossils are noticed.

Pleurobranchus reticulatus, seen from above. (Guérin.)

Locality and Habits.—*Pleurobranchi* have been found at depths varying from the surface to 30 fathoms on rocky coasts, stones, and sea-weeds.

Example, *Pleurobranchus reticulatus*. This species is not noticed in the last edition of Lamarck.



Shell of Pleurobranchus membranaceus.
a, external view; *b*, internal view.

Fossil Pleurobranchi.

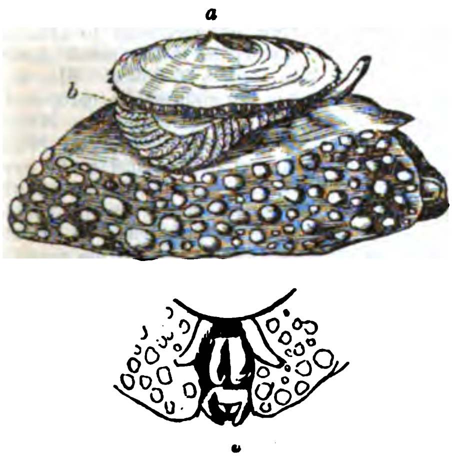
Grauwacke of the Taunus? *Geol. Trans.*, 2nd series vol. ii., pl. xxxiii.? Mr. G. B. Sowerby (*Genera*) remarks that there are no fossils which can be referred with certainty to this genus.

Umbrella (Lam.; Gastroplax, Blainv.).

Generic Character.—Animal oblong, very much depressed, convex above, very flat and fleshy below. Mantle not much extended. Head not distinct; mouth situated at the bottom of a narrow and deep notch in front of the foot, which has thick edges, and is raised all round: four tentacles; two superior, truncated, slit, and lamellose as it were internally; two smaller, in form of pediculated crests, on each side of the mouth. Foot very large, spreading out on all sides, smooth and flat. Branchiæ foliaceous, disposed in a *cordon* all along the right side, and reaching even a little to the left in passing by the front. Anus in the form of a small tube behind the branchiæ. Organs of generation very much approximated, situated to the right and forwards.

Shell external, calcareous, very much depressed, nearly entirely flat, irregularly circular, slightly convex above and concave below; apex excentric, conical, and slightly inflected; concentrically striated and radiated; edge trenchant, fixed to the dorsal part, which it covers. (Rang.)

M. de Blainville described this genus in the 'Bulletin Philosophique' (1819), and in the 'Dictionnaire des Sciences Naturelles,' from a specimen in the British Museum, which had the shell attached under the foot, probably by artifice, as he observes. In his 'Malacologie' (1825) he notices the error into which he had been led. Lamarck was startled at this strange anomaly, and expressed his disbelief that such could have been the actual position of the shell (*Animaux sans Vertèbres*, 1819), adding, that he had been assured by M. Matthieu, who had seen the animal alive at the Isle of France, that the shell was really dorsal. M. Rang's description was taken from a specimen deposited by M. Reynaud in the Museum of Nat. Hist. at Paris; but it had lost its shell. M. Deshayes, in the last edition of Lamarck (1836), remarks that he never comprehended nor adopted the opinion of M. de Blainville, on which he comments with some freedom and vivacity; adding, that his own observations, made on the Mediterranean species, having the shell still in its place, and those of Delle Chiaije, had for ever destroyed that opinion.



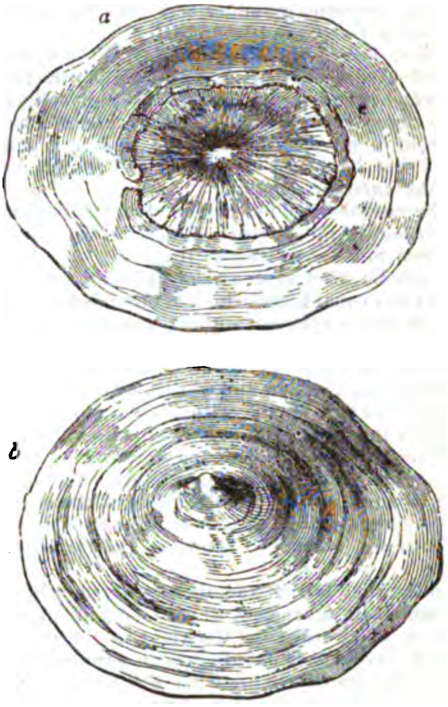
Umbrella Mediterranea, with the shell in the proper position.
a, shell; *b*, gills; *c*, head, viewed from above. (Philippi.)

Locality and Habits.—Littoral: depth, &c. much the same as in *Pleurobranchus*.

Two species only appear to be known, *Umbrella Indica* and *Umbrella Mediterranea*.

Umbrella Mediterranea.

Description.—Umbrella with a flattened shell; the disk of the lower surface not radiated.



Shell of Umbrella Indica.
a, inside; *b*, outside.

Mr. Swainson places *Umbrella*, *Pleurobranchus*, and *Pleurobranchæna* (Pleurobranchæa), under the *Pleurobranchinæ*, his fifth subfamily of the *Tectibranchia* (*Sea-Slugs*), his fifth tribe of Gastropods, according to the 'Arrangement' at the end of his *Malacology*.

Spiricella. (Rang.—Fossil only.)

Generic Character.—Animal unknown.

Shell very much flattened, elongated, bent (arquée), with sharp edges; apex spiral, sinistrorsal, horizontal, situated backwards and to the left, open on the lower surface; an indistinct impression, but appearing to occupy the posterior part of the shell, where it shows itself nearly parallel to the border.

M. Rang established this genus in the 'Bulletin of the Linnean Society of Bordeaux' (1828), for a small shell found by M. Charles des Moulins in the Faluns of Mérignac. Upon close examination, observes M. Rang, it presents strong relations with Pileopsis (vol. xviii., p. 156); nevertheless he had removed it to a considerable distance from that genus, because it presents truly distinct characters, such as having the borders of its aperture extremely dilated, so as to form a vast oblong surface, which serves as a base; and having the apex turned horizontally, and not entirely posterior; besides that it appears to him to have belonged to a much larger mollusk, which had secreted it for the protection of a single part of its body, the branchiæ for example.

The only species known to M. Rang is *Spiricella Unguiculus*.

Siphonaria. (Sowerby.)

Generic Character.—*Animal* oval, subdepressed; the head subdivided into two equal lobes, without tentacles, or apparent eyes.* Borders of the mantle crenilated. A branchia in form of a square membrane, in the sinus formed at the right, between the foot and the mantle.

---

* See post, M. Quoy's description.

Shell patelloïd, elliptical, with the apex well marked, slightly to the left and posterior; a sort of canal or gutter on the right side; muscular impression of a horse-shoe shape, the right lobe divided into two by the canal. (Blainv.)

M. de Blainville remarks that although Adanson has placed this animal among the *Patellæ* (Lepas), it is evident that it ought to be a genus of the order MONOPLEUROBRANCHIATA; the divisions of the head being doubtless the tentacular auricles: and he refers it without doubt to those species of *Patellæ* on which Mr. G. B. Sowerby established his genus *Siphonoria*. M. de Blainville arranges that genus accordingly under his *Patelloidea*, between *Umbrella* and *Tylodina*.

M. Rang, who gives M. de Blainville's description in his 'Manuel,' observes that he does not know the animal of *Siphonaria*, but he remarks that he has seen young *Patellæ* with the character of *Siphonariæ*, the traces of which they preserve in a more advanced age; and it is only provisionally that he adopts the genus and assigns it a place among the *Inferobranchiata*.

But the most detailed description of the animal is given in the *Zoology of the Astrolabe* (Quoy and Gaimard), principally from *Siphonaria Diemensis*.

The cephalic hood is described as being very large, divided into two equal lobes, which are rounded and provided above with sessile eyes, but without any appearance of tentacles. The mouth is below, and the foot is oval and separated from the head by a transverse furrow. The animal pours out a viscous and whitish humour at pleasure; it is overspread by a mantle with a continuous border, but exposing on the right a tongue which raises itself in form of a sucker to close the common aperture of respiration and depuration; a little in front of this is the aperture of the female organ, and at the right side of the head is that of the male organ at the point where the tentacle would be if one existed. These two apertures are to be seen with difficulty.

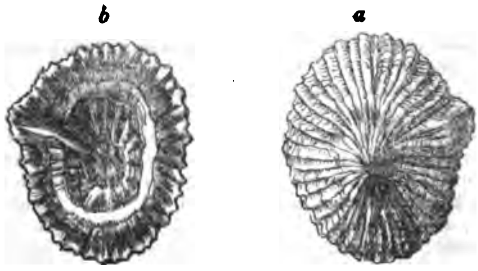
When the shell is removed, there are seen a horse-shoe-shaped muscle of attachment which is not interrupted except for a small space on the right at the place of the siphon; a very delicate mantle which permits the observer to see a rather transverse branchia, a little in the form of S; at its termination to the left in contact with the circular muscle, the heart surrounded by a viscous organ; and more backward, the rectum leaning upon the uterus. The branchial cavity is long transversely, but of small width from behind forwards. Its aperture is round. The buccal mass is large, rounded, bilobated, provided backwards with a small bladder as in the slug, and with a lingual riband with transverse denticles; two rather considerable salivary glands open into the œsophagus. The stomach which follows is but little distinguished from the œsophagus; the intestine makes a circumvolution in the liver, and is forthwith directed to the right: the rectum, which is always more narrowed, contrary to the usual structure in the greater part of the mollusks, goes along the side of the branchia, and opens upon the border of the pulmonary tongue. The liver has at least four lobes: they are difficult to separate, and partially embrace the intestine. Entirely behind and a little to the right, the ovary is affixed to one of the lobes of the liver; its twisted oviduct goes under the uterus, which has a bagpipe form, and the neck of which opens a little in front of the branchial sucker. On this viscus, a little turned upon itself, is applied the canal of the bladder proper to many of the pulmoniferous mollusks, the use of which is unknown. It is believed that its aperture is blended with that of the uterus. Above the digestive viscera and near the head is the testicle, a rounded mass, with a long deferent conduit folded back upon itself, communicating with a rather long intromittent organ recurved into a hook, having a retractor muscle, and proceeding to the place of its exit at the side of the right lobe of the head; the exciting organ did not appear to the describers to exist in all the species, or at least it was so small that they could not recognise it in the middle of that mass of viscera heaped one over the other. The brain, placed behind the œsophagus, is formed of two very distant ganglia, united by an upper cord; the lower, completing the circle, escaped the observer; from it passed a number of cords fo) the head, two among them, very distinct, go to the eyes; others are directed backwards for the viscera, the foot, &c.

M. de Blainville had previously found in the plates of the great work on Egypt the figure of an animal of *Siphonaria*, but, as it was unaccompanied by description, it had escaped the notice of most naturalists. M. Deshayes states, that having been long struck by the non-symmetry of the shells belonging to this genus, and having remarked the particula. characters which distinguish them from the patellæ, he had formed, ever since 1825, in his collection, a small group for those species; but Mr. G. B. Sowerby was the zoologist who, in his *Genera*, established this genus, now universally adopted.

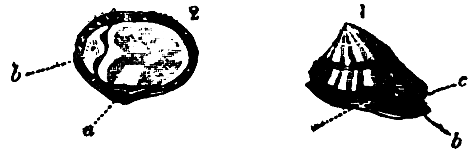
Mr. Swainson makes *Siphonaria* a subgenus of *Patella*, arranging it in his third tribe, 'Scutibranchia, *The Limpets*.' (*Malacology*.)

Locality and Habits.—Littoral: depth, &c. much the same as in *Pleurobranchus* and *Umbrella*. Brazil, the West Indies, Senegal, and Tristan d'Acunha. (Sowerby.)

M. Deshayes, in his tables, makes the number of living species of *Siphonaria* twenty-one, and that of the fossil species (tertiary) three. In the last edition of Lamarck the number of living species recorded is nineteen.



Shell of Siphonaria Sipho.
a, outside; *b*, inside.

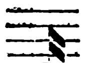


Small species of Siphonaria, with the animal in the shell. 1, Lateral view 2, Ventral view. *a*, breathing aperture; *b*, head; *c*, mantle.

FOSSIL SIPHONARIÆ.

The number of fossil species (tertiary) stated in the tables of M. Deshayes is, as we have seen, three. The sole locality given is Sicily, for one species only. In the last edition of Lamarck the number of fossil species recorded is two, both from Dax.

SEMIQUAVER, a musical character, formed of a crotchet with two hooks added at the extremity of the stem, and is in duration $\frac{1}{16}$ of a semibreve. Ex.:



SEMI'RAMIS, a queen of Assyria, who, according to some, reigned about 2000, or, according to others, about 1250 B.C. Her whole history, as it has come down to us, is scarcely anything but a mass of fables. She is said to have been the daughter of the goddess Derceto, and of extraordinary beauty and wisdom. (Diod., ii. 4.) She became the wife of Onnes, who served in the army of Ninus, first king of Assyria, and followed her husband in the expedition of the king against Bactra. Semiramis showed the king how he might gain possession of the town. He followed her advice, and was victorious, and, being no less charmed with her beauty than with her judgment, he made her his wife, whereupon her former husband, in despair, put an end to his life. (Diod., ii. 6.) After a reign of fifty-two years, Ninus died, or, according to others, he was murdered by his own wife Semiramis (Aelian, *Var. Hist.*, vii. 1), and left a son Ninyas. According to some writers Semiramis took possession of the throne by the right of succession; according to others, she assumed the dress and appearance of her son Ninyas, and deceived her subjects, in this disguise, until she had accomplished such wonderful deeds that she thought it superfluous to conceal herself. She is said to have built Babylon and to have adorned it with the most extraordinary splendour, and all this in a very short time. She also built several other towns on the Euphrates and Tigris, to promote commerce among her subjects. (Diod., ii. 7-11.) On the main road in her dominions she erected an obelisk, 130 feet high, and laid out a magnificent park near Mount Bagistanum, in Media, and at the foot of the mountain she caused to be cut on the face of the rock her own figure and those of a hundred of her attendants, with Assyrian inscriptions. She is moreover said to have formed a large lake to receive the overflowing of the Euphrates, to have laid out several other parks near the town of Chaunn, to have embellished Ecbatana, to have provided that town with water from Mount Orontes, and to have out a high road through Mount Zarcaeum. All these things were done at her command, while she was traversing her own dominions with a numerous army. She left monuments of her greatness and power in every place that she visited. (Diod., ii. 14; Zonar., *Lex.*, ii. 1637.) From Persia she turned to the west, and conquered the greater part of Libya and Æthiopia. She also made war against an Indian king, Stabrobates, with a great army and a fleet on the river Indus. (Diod., ii. 16, &c.) Semiramis was at first successful, and numerous towns submitted to her, but at last she was wounded by the king, and entirely defeated in battle. According to some traditions she escaped to her own country, with scarcely the third part of her army; according to others, she fell in the battle; and a third tradition states that soon after her return she was murdered by her own son Ninyas. Some also believed that she had suddenly disappeared from the earth, and returned to heaven. (Diod., ii. 20.)

It is obvious that the history of the achievements of Semiramis is monstrously exaggerated in these traditions. With the exception of her name and the fact that she and her husband were the founders of the Assyrian monarchy, there is scarcely anything historical in them. It is not probable that the Assyrian empire at this early period extended much farther west than the Euphrates.

Herodotus (i. 184) mentions Semiramis as a queen of Babylon, and says that she dammed in the river, which before that time overflowed the country. But according to his calculation she must have lived about two centuries before Cyrus, and we must therefore either suppose that he is strangely mistaken in his chronology, or that he is speaking of a later queen of the name of Semiramis. (J. Scaliger, *Ad Chron. Euseb.* A. DLXXXIII.)

Remains of very antient buildings, with inscriptions in cuneiform characters, which are said to relate to the history of Semiramis, are found at Wan, which is called by the Armenians 'the City of Semiramis.' These ruins and inscriptions were examined, in 1827, by Schulz of Giessen.

SEMITONE, an interval in music, whose ratio is 16 : 15, as c c♯.

SEMLER, J. S. [RATIONALISM.]

SEMLIN is a fortified town in Slavonia, in the Peterwardin district of the military frontier. It is situated in 44° 50′ N. lat. and 20° 30′ E. long., on the right bank of the Danube at its confluence with the Save, on the declivity of a mountain opposite to the Turkish fortress of Belgrade, from which it is separated by the Save. It consists of the inner town and the suburb Franzensthal, and has 9300 inhabitants (according to Jenny, 12,000), among whom are a few Jews. In the inner town there are some good streets with stone houses, but on the whole it is by no means a pleasant place. There are one Roman Catholic church, four Roman Catholic chapels, two Greek churches, one synagogue, a German, a Greek, and an Illyrian school, an hospital, and a German theatre. Semlin is the seat of a Greek protopapas, and the residence of the Austrian commander of the district. Semlin has been chiefly remarkable as being the main point of communication between the Austrian and Turkish dominions, and containing the greatest quarantine establishment on the Austrian frontier. This establishment consists of a great quadrangle surrounded with a wall twelve feet high, in a meadow between Semlin and Belgrade, containing stone houses and large warehouses. At the east end of the town is the great market-place, where two rows of palisades separate the dealers, to prevent any hazardous communication. The transit trade is very important; the exports to Turkey, Bohemia, and Moravia are woollen cloths, porcelain, and glass; the imports from Turkey are cotton-yarn, Morocco leather, hareskins, lambskins, honey, and meerschaum pipes. The inhabitants are chiefly Servians, who settled there when Belgrade fell into the hands of the Turks in 1739, and the Servian language is generally spoken; the German however is nearly as general.

P.S. Since the above was written we learn from Vienna that the quarantine establishment between Servia, Moldavia, and Wallachia, and the other Turkish provinces, having been proved by several years' experience to be perfectly efficient, the quarantine between those three principalities and Austria is to be abolished, or at least much relaxed in strictness.

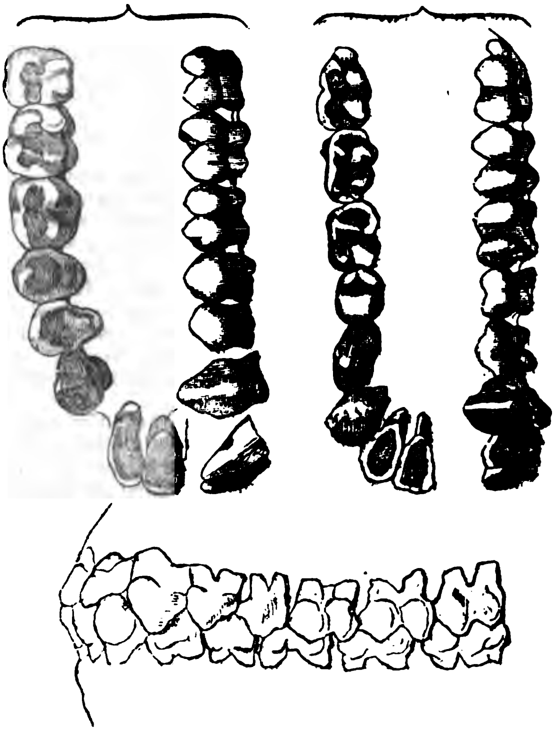
SEMNOON. [PERSIA.]

SEMNOPITHE'CUS. M. F. Cuvier's name for a genus of Monkeys.

Generic Character,—Canines much longer than the incisors. Head round; facial angle more open than that of the orang's; face flat. Limbs very long in proportion to the body; anterior thumbs very short. Cheek-pouches small or null. Callosities. Tail very long and slender.

Dental formula:—

$$\text{Incisors}, \frac{4}{4}; \text{ canines}, \frac{1-1}{1-1}; \text{ molars}, \frac{5-5}{5-5} = 32.$$



Teeth of Semnopithecus. (F. Cuv.)

M. F. Cuvier observes that the canines are often much larger than the rest of the teeth, and consequently than they are here represented. This is exemplified in the case of *Semnopithecus Maurus*.

We have often had occasion to notice the value of comparative anatomy, not only as a physiological guide, but as a zoological test in the discrimination of genera. Mr. Ogilby, in the first volume of his interesting *Natural History of Monkeys, Opossums, and Lemurs** (we anxiously look for the second), well observes, that up to the time of the observations which we are about to cite, the title of the genus to the rank of a natural and scientific group rested upon a very insecure foundation; 'but,' adds Mr. Ogilby, 'the beautiful observations in question at once established it upon the basis of important and influential characters, and fully entitle it to the rank which it occupies among the natural genera of the quadrumanous family.'

Professor Otto had observed, in the dissection of *Semnopithecus leucoprymnus* (*Cercopithecus leucoprymnus*, Otto), that the stomach was of extraordinary capacity,† and he referred it, with a mark of doubt, to the genus *Cercopithecus*, under which title it appears in the *Manuel* of M. Lesson.

In 1833 the dissection of two species from the collection of the Zoological Society of London (*Semnopitheci Entellus* and *fascicularis*) enabled Professor Owen to lay before that Society the valuable paper published in the first volume of the *Zoological Transactions.*

---

* 12mo., London, 1838.

† 'Nova Acta Academ'æ Curiosorum,' vol.

Professor Owen remarks that the genus *Semnopithecus*, which in the system of Cuvier ranks only fifth in the descending scale from man, is of late formation, and not entirely the result of newly discovered materials. On the contrary, several species were for a long time ranked with the *Guenons*, in which the stomach is of the usual simple construction; and the Professor does not omit to notice how slight is the essential zoological character—an additional tubercle on the last molar of the lower jaw—which distinguishes genera presenting such wide differences in the most important of their vital organs.

The larger of the two stomachs which formed the subjects of Professor Owen's examination was taken from a full-grown female *Entellus Monkey* (*Semnopithecus Entellus*, F. Cuv.) which measured from the end of the nose to the root of the tail 1 foot 8 inches. The admeasurements of the stomach, distended and dried, were—

	Ft.	In.	Lin.
Length along the greater curvature beginning at the left extremity . .	2	7	0
Length along the lesser curvature . .	1	0	0
Greatest circumference, a little to the right of the cardia	1	0	6
Smallest circumference (at about two inches from the *pylorus*) . . .	0	3	8

Professor Owen states that this stomach may be regarded as consisting of three divisions:—1st, a cardiac pouch, with smooth and simple *parietes*, slightly bifid at the extremity; 2nd, a middle very wide and sacculated portion; and 3rd, a narrow elongated canal, sacculated at its commencement, and of simple structure towards its termination. The latter division, from its greater vascularity, and the more abundant distribution of the nerves of the eighth pair upon it, is regarded by the Professor as the true digestive stomach. The preceding divisions appeared to him to be preparatory receptacles or reservoirs.

The *œsophagus* was found to enter into the left or cardiac division, which is separated from the middle division by a well-marked constriction. The diameter of this aperture of communication, when the stomach was forcibly dilated, did not exceed two inches; so that it seems to Professor Owen highly probable that when no distending force operates upon this part, the circular fibres which surround the constriction may, by the act of contraction, render the separation complete, and thus render the cardiac pouch a distinct cavity. A similar tendency to a separation of the cardiac from the pyloric moiety of the stomach has been observed to exist, in a greater or less degree, in stomachs of a much more simple structure, as in those of man and the Carnivora. It is probably the possession of this power in a greater degree, continues the Professor, that enables some men to regurgitate at will a small portion of the contents of the stomach, or to ruminate. [Ruminants, vol. xx., p. 223.] Such an action, he observes, is therefore still more likely to take place, occasionally at least, in animals which possess the complicated stomach of the *Semnopitheci*; and there is, he remarks, a provision in these stomachs for the passage of ruminated food, or such as is of a fluid or easily digestible nature, directly into the second or sacculated division. A ridge was continued along the pyloric side of the cardiac orifice obliquely to the fold in the middle division, which was situated beyond the constriction; a second ridge was continued from the right side of the *cardia* into the lower part of the *septum* that separates the cardiac from the middle compartment; and, consequently, between these ridges a shallow canal was continued from the œsophagus to the middle division of the stomach. Professor Owen observes, that supposing the circular fibres which form the two ridges to contract simultaneously with those forming the constriction above, the communication between the œsophagus and middle division of the stomach would in such case be cut off; but, on the other hand, if those fibres were relaxed, the food, and especially liquid food, would pass along the oblique canal directly into the middle compartment. Longitudinal fibres were continued from the œsophagus upon the cardiac division; but they gradually converged towards its left extremity, and there began to be collected into the narrow band which traversed nearly the whole of the greater curvature of the stomach. The extremity of the cardiac division was thus slightly indented, reminding the observer of the similar but more marked division of the same part of the stomach in the *Kangaroo*, which in other respects bears a strong resemblance to that of the *Semnopithecus*. The length of the cardiac division was three inches, and its greatest diameter three inches and four lines. The second or middle compartment of the stomach was composed of a double series of *sacculi* of different sizes, puckered up upon the longitudinal band above mentioned. Some of these *sacculi* were three inches in diameter, others one inch. They were formed principally at the expense of the anterior *parietes* of the stomach, and were eleven in number. The *septa* by which they were divided from each other were of a semilunar form, and projected into the cavity of the stomach to the extent of half an inch, and a few to that of an inch. The length of this part of the stomach in a straight line was 5½ inches, and its greatest diameter 5 inches. The third or pyloric division of the stomach commenced a little to the right of the œsophagus, where the second longitudinal band began. It was a narrow and almost cylindrical canal, gradually diminishing in diameter to the *pylorus*, bent in a sigmoïd form, and terminating by making a complete turn upon itself. It was only this part of the stomach which was puckered up on the two bands above-described. The *sacculi* thus formed were however by no means so large or so completely separated from each other as in the preceding division; and they became gradually less distinct to within 5 inches of the *pylorus*, where they ceased altogether. A similar gradual disappearance of the *sacculi* was observable in the stomach of the *Kangaroo*. The whole length of this division, taken midway between the two curvatures, was 1 foot 6 inches; its greatest diameter was 2 inches, and its smallest 1 inch. Professor Owen guards against the inference that, in considering this stomach as being made up of three principal divisions, he is to be understood as supposing them to be equally distinct with the different cavities of a ruminant or cetaceous stomach. They were not characterized by any essential difference of structure, for none of them possessed a cuticular lining. The three divisions were however sufficiently obvious to justify their separate consideration for the facility of the description of so complicated an organ.

In another species (*Semnopithecus fascicularis*, the *Croo* of Sumatra, and *S. comatus*, Desm.) examined by Mr. Owen, the stomach presented precisely the same structure as the preceding. Its dimensions however were not quite so large in proportion to the size of the animal. The individual examined was younger than the *Entellus* whose stomach is above described.

Professor Owen remarks, that in consequence of the disproportionate size of the stomach in these animals, some differences are met with in the disposition of the other viscera of the abdominal cavity. The liver, instead of crossing the epigastric to the left hypochondriac region, extends downwards from the right hypochondriac to the right lumbar region, the whole of the opposite side of the abdomen, with the epigastric region being occupied by the enormous stomach. The liver is proportionately smaller in *Semnopithecus* than in *Cercopithecus* or *Macacus*. The spleen is of a more triangular shape, and is attached to the *omentum* continued from the left side of the stomach. The *pancreas*, on the contrary, is proportionately larger than in those genera. Both the biliary and pancreatic secretions enter the duodenum together, about three inches from the *pylorus*: were it not for the insertion of these ducts, Mr. Owen observes that one might almost suppose that what has been regarded as the true stomach was a portion of the intestinal canal.

The Professor further remarks, that with so complicated a stomach, it might also be expected that the intestines would not be so long as in those *Monkeys* which have a simple stomach; this however, he observes, is not the case, the small intestines being longer in proportion to the body in *Semnopithecus* than in either *Cercopithecus* or *Macacus*, the ratio being respectively as 8 to 1, 6½ to 1, and 4 to 1. Professor Owen points out that in this respect the latter genus evidently manifests its closer approximation to the carnivorous type. As in all the preceding animals the intestines were prepared for admeasurement in the same manner, Professor Owen believes that the relative proportions may be relied on, and he mentions this because the admeasurements given by M. Otto, of the *Semnopithecus leuco-*

prymnus, would lead to the conclusion that the intestinal canal was much shorter.

'What then,' asks Professor Owen, 'are the natural habits and food of this genus? Will future observers of these *Slow Monkeys*, as M. F. Cuvier denominates them, be able to ascertain that their natural food is more strictly vegetable than that of the *Cercopitheci*, &c.? And that, like the *Sloths* of the New Continent, so remarkable for their complex stomachs, they also crop the tender shoots and leaves of the trees in which they habitually reside? *Cercopitheci* and *Macaci* are provided by nature with receptacles (the cheek-pouches) for storing away ill-gotten food, hastily plucked from the cultivated grounds which they invade, and which they are thus enabled to carry off in sufficient quantity, and masticate and prepare for digestion in a place of safety. The complicated stomachs of the timid *Ruminants* are adapted to a similar end, allowing them to accumulate their requisite quantity of herbage from exposed pastures, which they then carry off to more secure situations, and remasticate at leisure. Now, in the *Semnopitheci* it is remarkable that the cheek-pouches are very small, or are wanting altogether. I have often fed the *Entellus Monkey* with nuts, and have observed that while his more fortunate neighbours the *Green Monkey* (*Cercopithecus Sabæus*, Geoff.) and *Chinese bonnetted Monkey* (*Macacus Sinicus*, Lacép.) were stowing them quickly away by the dozen into their cheek-pouches, he could not cram more than two in the same situation, and was equally averse to swallowing anything but the kernel. In this case the complicated stomach did not serve him as a substitute; but I think it very probable that it may compensate for the want of cheek-pouches when he is in a situation to collect together a quantity of soft fruits or herbs. In the gardens of the Society the *Semnopitheci* which have been there exhibited are fed exactly in the same manner as the other *Monkeys;* and the keepers have not observed anything like rumination in them. In both the species which I have dissected where illness and gradual decay preceded death, the stomachs were almost empty.' (1833.)

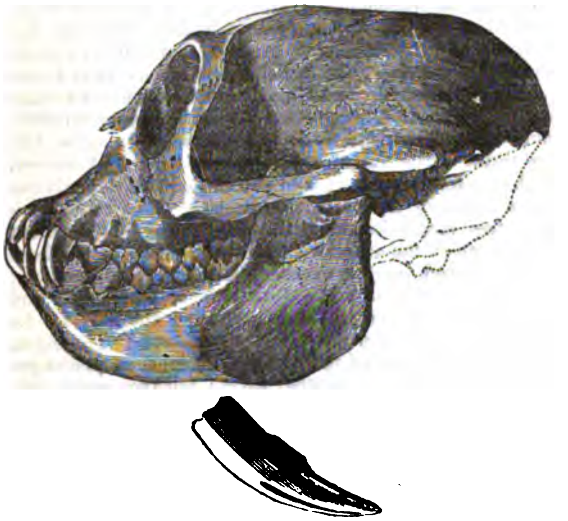
Mr. Ogilby refers to the observation previously made by Wurmb, in his description of the *Kahau*, remarking that Wurmb does not indeed enter into any particulars with regard to the complications, but that his expressions, 'that the stomach of the *Kahau* was of unusually large size, and of a very irregular form,' can apply only to the appearance since detected as generally characteristic of this organ in the *Semnopitheci*. This observation, he adds, had been lately confirmed by Mr. Martin, in a description of the stomach of the Kahau. The latter, whose paper will be found in the *Proceedings of the Zoological Society* (1837), also refers to Wurmb's short notice, and fully describes the complicated stomach as well as the intestines, of which the small were 18 feet in length, and the large 6 feet 2 inches. [NASALIS.] M. Ogilby further observes that the same structure of stomach has been since shown to exist in *Semnopithecus Maurus*, in the Douc (*S. Nemæus*), and in *S. cucullatus;* so that we are now certain of its being common to seven species of the genus, and may conclude with every probability that it extends to all the others. He alludes to the bezoars reported by many travellers to exist in the stomachs and intestines of the Asiatic monkeys, as confirmatory of Professor Owen's views, and adds that the bezoars produced by the monkeys of the Malay peninsula, and which can scarcely belong to a genus different from the *Semnopitheci*, are described as being smaller, rounder, and more powerful in their qualities than those obtained from ruminating animals. 'It is certain at least,' continues Mr. Ogilby, 'that they are more highly prized by Eastern nations, and the fact of their production, taken in connection with the complicated form of the stomach, in two groups of mammals, in other respects so widely separated from one another, offers a curious and interesting analogy between the semnopithecs and ruminants, and an additional argument in favour of the supposition advanced by Professor Owen.' Mr. Ogilby further remarks that the teeth of the *Semnopitheci* present analogous modifications to those which have been above described as characteristic of their stomachs. The number of the teeth, as well as their composition, are indeed, he observes, the same as in all the *Simiæ*, but their form, he adds, differs considerably from that of the other monkeys, and, like so many other details of their structure, approximates them more nearly to the gibbons. 'In the cercopithecs and baboons,' says Mr. Ogilby in continuation, 'the molar or cheek teeth are extremely tuberculous, and present a number of mammilated points, which are scarcely ever worn down by the effects of detrition; whilst, on the contrary, these same teeth in the semnopithecs become triturated at an early period, so as to present a hollow cavity in the centre. This betokens a corresponding motion in the jaws in the act of mastication, that is to say, a longitudinal grinding motion from front to rear, during the continuance of which the teeth rub against and wear one another down. Now such a motion is clearly unnecessary to an animal which lives upon nuts or soft pulpy fruits, which require only to be bruised by opening and shutting the mouth alternately, and not ground by rolling the jaws upon one another; its existence therefore in the semnopithecs seems to betoken some peculiarities in the regimen of these animals, with which we are at present unacquainted, more especially when taken in conjunction with the modifications already noticed as existing in the stomach and bowels; and it is hoped that this curious and interesting subject will attract the attention of some of our numerous countrymen resident in India, many of whom are well qualified to investigate it, and who have already enriched the zoology of that country with many valuable observations.'

The other zoological characters of this genus are thus graphically given by the same author, in the same work: 'The extremities of the semnopithecs are of great length, compared with the dimensions of the body. This is another instance in which the semnopithecs resemble the gibbons, as well as in the slender and elongated form of the body itself; but there is this remarkable distinction, that, whilst the anterior pair of extremities in the gibbons is beyond all proportion longer than the posterior, the proportions are reversed in the semnopithecs, and it is the posterior extremities which exceed the anterior in length. Still the disproportion is by no means so great as that which exists in the gibbons, nor does it in the slightest degree impede the quadruped motion of the animals, when they are forced to resort to that mode of progression; but it becomes an additional evidence, particularly when taken in conjunction with other traits, of the superior development of the abdominal over the pectoral members, and the consequent degradation of the animals in the scale of existence. This evidence is still further strengthened by the very limited development of the thumb on the anterior extremities, which, as has been already observed, scarcely exceeds the tuberculous form, and enters but slightly into the functions of prehension and manipulation: thus, as it were, preparing the way for its entire disappearance in the colobs. [COLOBUS.] The organ consists nevertheless of the ordinary number of phalanges of which it is composed in other cases; but they are greatly abridged in their dimensions, both as regards thickness and length, and form a remarkable contrast to the rather immoderate development which marks the rest of the members. The tails likewise are much longer in the semnopithecs than in any of the ordinary monkeys. Though slender however, they possess a very considerable degree of muscular power, and enter as a very important constituent into the motions and progression of the animals. When at rest and unemployed, they are allowed to hang down perpendicularly, and, from their great length, which considerably exceeds that of the animal's body, have a very droll effect, which is heightened by the natural apathy and imperturbable gravity of the creatures themselves. This, when unemployed, is their natural position. They exhibit the very picture of sadness and melancholy, and appear as if perfectly regardless of everything that passes around them; but when roused or excited, they are nevertheless capable of the most surprising exertions, and astonish the spectator by a rapidity, variety, and precision of movements, which could scarcely be anticipated from creatures apparently so apathetic in mind and delicate in body. They are in reality far from meriting the name of Slow monkeys, which some zoologists have given them; their slowness is exhibited in disposition rather than in action, and is an attribute of character rather than of structure. When young they are readily domesticated; but being less petulant, curious, and restless than the cercopithecs and baboons, are supposed to exhibit less intelligence, though their mental qualities, as well as their physical structure, closely assimilate them to the real apes: the old males become morose, sullen, and mischievous.'

From the anatomical details above noticed it appears that so far from there being any ground for separating the *Kahau* [NASALIS] and the *Douc* [PYGATHRIX] from the genus *Sem* *nopithecus*, the organization of those species shows that they undoubtedly belong to it. Mr. Ogilby, in the work above quoted, differs from the views of Dr. Horsfield and Mr. Vigors regarding *Nasalis recurvus*, and gives his reasons for coming to the conclusion that the distinction is really sexual instead of specific. Buffon, Geoffroy, St. Hilaire, and Lesson thought that the Douc had no callosities, and so it is stated in the article PYGATHRIX; but it has callosities, though they are diminutive, and the mistake probably arose from the early descriptions being taken from imperfect skins. M. Rey, the captain of a French merchant-ship, who penetrated some distance into the interior of Cochin-China, gives a description of an encounter with this species. His visit must have been a terrible one for the poor *Doucs*, a hundred of which were killed by his party before they reached the place where they breakfasted. He succeeded with great difficulty in procuring living specimens to carry to France. The more the victims dropped, the more their companions gathered round them, endeavouring to carry off the killed as well as the wounded into the woods. The three young ones that were captured held so fast round the bodies of their dams, that it required no small effort to detach them. M. Rey describes the Douc as greatly resembling the orang-utan in its stature and inoffensive manners, and as inhabiting the mountains and the loftiest tree-tops, feeding on fruit; and observes that the similarity of this creature to man is very mortifying. Some of the males measured, when standing upright, above four feet four inches in height. They were known in the country by the name of *Venan*, or men of the woods.

We now proceed to lay before our readers illustrations of this genus.

Semnopithecus Maurus.



Skull and canine tooth of Semnopithecus Maurus (Horsf.).

Description.—Dr. Horsfield describes this species as being on the whole of a stouter make than *S. melalophos*, and as having more robust extremities. One of the specimens in the museum at the India House measures 2 feet 3 inches from the tip of the nose to the root of the tail. The face is regularly circumscribed by hairs, which are long, and closely applied to the head; the forehead, which is gradually sloping, is entirely concealed by them. The general facial character is a flatness above, and a protrusion of the maxillæ; but the appearance of the face differs greatly in old and young subjects. The maxillæ become extended as the animal advances in age, and in young subjects the facial angle is proportionally greater. The orbits of the eyes are rather prominent, and the bones of the nose short. The nose consists of an angular ridge, which is considerably elevated between the eyes, and terminates, without any fleshy protuberance, by a membrane which is gradually attenuated below, and on each side of which the nostrils are placed. From the termination of the nose to the mouth a considerable space intervenes: the lips are small and thin. The chin is short and small; a circle of grey hairs encloses the mouth in the adult animal; and on the chin the hairs have a disposition downward, so as to exhibit the appearance of a beard. The upper part of the face is nearly naked; a few straggling stiff hairs are scattered on the cheeks and the upper lip, and on the more prominent part of the nose an interrupted series is observed. Irides of the eyes dark brown. Ears concealed from view by the long hairs which cover the lateral parts of the head; they are margined, and both in form and disposition of external parts closely resemble those of man. The neck is short and considerably contracted. The trunk is of great length, broad and robust about the shoulders and the breast, and gradually of smaller dimensions towards the loins. Buttocks with very large rough callosities. Mammæ of the adult female lengthened and cylindrical. Tail as long as the body and head taken together: in some individuals, and particularly in young subjects, it exceeds those parts in length: it is cylindrical for the greatest portion of its length; the base tapers gradually, and the tip is thickened and terminated by a close tuft of long hairs of an ovate form.

Colour of Adult.—Intensely black, except the breast, the abdomen, the inner side of the extremities, and the root of the tail, which are grey. On the crown of the head the black hairs are slightly tipped with grey; and as age advances the grey portion becomes more extensive, and also shows itself on the upper parts of the body; but the extremities externally, and the tail, even in the oldest subjects, retain their blackness. The hairs are remarkably long, delicate, soft, and silky.

Colour of Young.—Immediately after birth, of a fulvous or reddish colour; with advancing age, a grey discolouration first appears on the hands, the forehead, and the tip of the tail; from these parts it gradually extends to the neck, the shoulders, and the flanks, assuming from time to time a darker hue, until the coat of the animal is jet black above and grey beneath. (Horsf.)

This is the *Budeng* of the Javanese; *Lutung itam* 'Maure' of the Malays and Europeans; *Letong* of the natives of Sumatra.

Semnopithecus Maurus: adult and young. (Horsf.)

Dr. Horsfield states that the *Budeng*, or black species, is much more abundant than the red species, or *Lutung* of the Javanese (*Semnopithecus Pyrrhus*); but the latter, both on account of its variety and comparative beauty, is a favourite among the natives. 'Whenever an individual is obtained,' says Dr. Horsfield, 'care is taken to domesticate it, and it is treated with kindness and attention. The Budeng, on the contrary, is neglected and despised. It requires much patience in any degree to improve the natural sullenness of its temper. In confinement it remains during many months grave and morose; and as it contributes nothing to the amusement of the natives, it is rarely found in the villages or about the dwellings. This does not arise from any aversion on the part of the Javanese to the monkey race: the most common species of the Island, the Cercocebus Aygula of Geoffroy, the Egret Monkey of Pennant, is very generally domesticated; and a favourite custom of the natives is to associate it with the horse. In every stable, from that of a prince to that of a mantry, or chief of a village, one of these monkeys is found; but I never observed the *Budeng* thus distinguished.'

Food; Habits; Utility to Man.—'The *Semnopithecus Maurus*,' continues the author last quoted, 'is found in abundance in the extensive forests of Java; it forms its dwellings on trees, and associates in numerous societies. Troops, consisting of more than fifty individuals, are often found together. In meeting them in the forests it is prudent to observe them at a distance. They emit loud screams on the approach of man, and by the violent bustle and commotion excited by their movements, branches of decaying trees are not unfrequently detached, and precipitated on the spectators. They are often chased by the natives for the purpose of obtaining their fur; in these pursuits, which are generally ordered and attended by the chiefs, the animals are attacked with cudgels and stones, and cruelly destroyed in great numbers. The skins are prepared by a simple process which the natives have acquired from the Europeans, and they conduct it at present with great skill. It affords a fur of a jet black colour, covered with long silky hairs, which is usefully employed, both by the natives and Europeans, in preparing riding equipages and military decorations. The Budeng, during its young state, feeds on tender leaves of plants and trees; and when adult, on wild fruits of every description, which are found in great abundance in the forests which it inhabits.' (*Zoological Researches in Java.*)

Semnopithecus melalophos.

Description.—Brilliant yellow-red above, whitish below; a tuft of black hairs on the forehead in form of a bandeau; face blue.

This is the *Simpai* of the Malays; and in this species the great length of body and slenderness of the extremities so characteristic of the *Semnopitheci* are manifested in the highest degree.

Locality.—The forests of Sumatra.

Semnopithecus melalophos.

Semnopithecus Entellus.

Description.—Young remarkable for the disproportionate length of the extremities, the deliberate air of its movements, and the tranquillity of its eye and physiognomy generally. Face and hands black; body and limbs light grey or straw-colour; hair surrounding the face and forming a projecting bandeau over the eyebrows; a peaked beard directed outwards beneath the chin. The colour always darker on the loins and along the spine, and becoming deeper as the animal advances in age, till finally the fur, becoming mixed with numerous black hairs, is of a rusty brown. The body at the same time becomes more developed and muscular, and the animal, when at its full size, is four feet and a half from the extremity of the muzzle to the origin of the tail, which is considerably longer than the body, of the same colour, and ends in a tuft of hair rather longer and darker than the general hue.

Localities.—Bengal; the Himalayan Mountains; Nepaul; Bootan.

This is the *Hoonuman* (*Houlman* of M. Duvaucel) of the Hindus; *Lungar* of the Hill tribes; and is the monkey which is so remarkably interwoven with the religion of the country where it is found. M. Duvaucel has given an interesting account of the careful watch which the Bengalees kept over him to prevent his killing this sacred animal, holding a high place among the thirty millions of Indian gods, and to save himself from dying within the year, which, according to popular belief, is sure to be the fate of one who puts an Entellus monkey to death. He was harangued by the Hindus upon the danger of injuring animals which were no other than princes and heroes under the operation of the metempsychosis. Unmoved by their eloquence, and eager to possess a specimen, he levelled and brought down a 'princess.' But the acquisition was dearly bought. The ill-fated creature had a young one on her back, and, though shot through the heart, the mother exhausted her remains of life in throwing it into the branches of a neighbouring tree;—then fell and expired at the feet of M. Duvaucel. It is but just to add that he mourned over the deed he had done.

Our limits will not admit of our going further into the interesting connection of this animal with the Hindu mythology. The reader will find much information on this head collected in Mr. Ogilby's book above referred to. M. F. Cuvier has a very characteristic figure of this species in his great work.

FOSSIL SEMNOPITHECI.

Captain Cautley, in a letter to Dr. Royle, dated Saharumpore, 18th November, 1836, permitted the announcement of a fact which had long been known to the latter, of the finding of the remains of a quadrumanous animal in the Sewaliks or sub-Himalayan range of mountains (tertiary), to the Geological Society of London. An astragalus was first found, but latterly a nearly perfect head with one side of the molars and one orbit nearly complete. It is added that the animal must have been much larger than any existing monkey, and allied to Cuvier's Cynocephaline group. This was communicated to the Society on the 3rd May, 1837. On the 14th June, in the same year, a paper was read 'On the remains of a Fossil Monkey from the tertiary strata of the Sewalik Hills in the north of Hindoostan; by Captain P. T. Cautley, F.G.S., Bengal Artillery; and H. Falconer, M.D., Bengal Medical Service.' The authors commence their paper with some general observations on the differences in habit in various animals, which prevent the remains of some being so frequently preserved as those of others in a fossil state, and they adduce as instances birds and quadrumanous animals. So speedily are the remains of these carried away by the hyæna, the chacal, and wolf, the scavengers of torrid regions, that in India the traces of casualties are so seldom seen, even where monkeys occupy in large societies the groves of mango-trees round villages, that the simple Hindu believes that they bury their dead in the night. The authors were early led to anticipate the finding of some quadrumanous animals among the Sewalik fossils, and, several months from the date of their communication then before the Society, obtained an astragalus of the right leg, which they minutely describe, and compare with that of the recent *Semnopithecus Entellus*, which, though certainly belonging to a distinct species, it closely resembles both in size and general form, as was exemplified in the specimen sent with the fossil astragalus. This was completely mineralized, having a sp. gr. of about 2·8, and appearing to be impregnated with hydrate of iron. Although only a solitary bone of the foot, the relations of structure are so fixed that the identity of this fossil is as certain as if the entire skeleton had been found. But the authors deferred making the announcement, in the hopes of soon finding specimens of the cranium and teeth; these, they add, have been discovered by Messrs. Baker and Durand of the Bengal Engineers, who have obtained a considerable portion of the face, and the whole series of molars of one side of a quadrumanous animal belonging to a much larger species than theirs. (*Geol. Proc.*, vol. ii., 1837-1838.)

SEMPERVIV'UM ('always living,' from *semper* and *vivo*, on account of their tenacity of life), a genus of plants belonging to the natural order Crassulaceæ. This genus is known by possessing a calyx 6- to 12-parted, and occasionally even 20-parted; petals 6 to 12 in number, seldom 20, more or less united at the base; 12 to 24 stamens or more, grown together at the base; scales at the base of the carpels, which are follicular, and equal in number to the petals. The genus is composed mostly of herbs, some of which are stemless, and have young plants growing from the axils. Others are caulescent, without young plants, or they may be shrubby and fleshy. The leaves are usually revolute, and their branches of cymose flowers are disposed in corymbs or panicles. Their flowers are white, yellow, or purple. The species of Sempervivum, like the family to which they belong, have most of them thick fleshy leaves and small roots, and are adapted for growing in rocky, dry, barren places. The arrangement of their leaves is frequently very elegant, and many of the species are cultivated in our greenhouses and gardens. Some are used in the arts and medicine.

Sempervivum glutinosum, Clammy House-leek: stem frutescent; leaves wedge-shaped, viscid, rather scattered, fringed with cartilaginous ciliæ; petals 8 to 10. It is a native of Madeira It has loose panicles of golden yellow flowers, with a stem about two feet high. The fishermen of Madeira are in the habit of using this species to rub their nets, which are however previously steeped in an alkaline solution of some kind. They are said to endure as long as if they were tanned.

S. tectorum, Common House-leek: leaves ciliated; offsets spreading; petals 5 to 9, spreading; scales of flowers wedge-shaped, caruncalate. It was originally a native of alpine and sub-alpine regions of central Europe, but it has now found its way to the tops of old walls and the thatched and tiled roofs of the houses of nearly all the countries of Europe. This species is remarkable for the change its structure undergoes by cultivation. In all the wild examples the flowers possess two rows of stamens and one row of carpels; but in the cultivated examples, one or both rows of stamens are constantly converted into carpels. This was pointed out by Mohl, in 1836, and gave him an opportunity of describing the true nature of the morphosis that takes place in the formation of stamens and pistils. The common house-leek is used, both internally and externally, as a popular remedy for many diseases. Its juice has been given in chronic discharges from the mucous membranes. When mixed with cream, it is applied to burns, and is also said to cure corns. Its general growth on the roofs of houses seems to have arisen from the belief that it had the power of averting the influence of lightning from buildings. On this account it is also sometimes called thunder-plant. Probably the order given by Charlemagne, that it should be planted on all buildings, originated in this belief. It is known by many other names than that of house-leek, as Jupiter's-eye, bullock's-eye, and Jupiter's-beard.

About thirty-six species of this genus are described. Those known in greenhouses are chiefly brought from the Canary Islands. In cultivating them, a mixture of sand, loam, and brick-rubbish is the best soil for them; and care should be taken not to give them much water when not in flower. The hardy kinds may be grown on rock-work, old walls, roofs, &c., and may be conveniently propagated by offsets, which they produce in abundance.

SEMUR-EN-AUXOIS. [Côte d'Or.]

SEMUR-EN-BRIONNAIS. [Saône et Loire.]

SENAC, JEAN, was born at Lombez in 1693, and obtained the diploma of Doctor of Medicine at Rheims. He was appointed first physician to the king in 1752, and was a member of the Royal Academy of Sciences of Paris. He died in 1770. The present reputation of Senac is due to his great work on the structure of the heart, its action, and its diseases, which was first published at Paris in 1749, in two quarto volumes, and was afterwards re-edited by Portal, and translated into English and other languages. At the time of its publication, this work was justly regarded as the best anatomical monograph ever written in France; and although recent investigations have detected in it numerous errors, and have deprived it of much of its intrinsic value, it will always remain an admirable monument of the learning and the industry of its author. The other writings of Senac are unimportant; a complete list of them may be found in Haller's 'Bibliotheca Anatomica,' t. ii., p. 159.

SENA'CIA, a small genus of plants of the natural family of Pittosporeæ, named in honour of Jean Senac, a French physician. The species are natives of the West Indies, Mauritius, and of the Himalayas. The genus is characterised by its small 5-toothed calyx. Petals 5. Stamens 5 hypogynous. Younger capsules berry-formed, afterwards 2-valved, half 2-celled. Seeds 4 to 8. The species form smooth-branched shrubs, with feather-veined entire leaves, and terminal corymbs of white flowers. This genus closely resembles Celastrus, but the hypogynous insertion of the stamens is a distinguishing character. The wood of Senacia undulata (the Celestrus undulatus of Lamarck), a native of the Mauritius, is well known and esteemed for its hardness. It is thence called *bois de joli cœur* by the French.

SENA'N, a Sabian physician, astronomer, and mathematician, whose names, as given at full length by Ibn Abi Osaibia (*Oioún al-Ambá fi Tabacát al-Atebbá*, 'Fontes Relationum de Classibus Medicorum,' cap. 10, sec. 4), are *Abou Saíd Senán Ben Thábet Ben Corrah*. He was born at Harran in Mesopotamia, and his father, his brother, and his son were among the most celebrated physicians of their time. [Thabet.] He was physician in ordinary to Moctader and Cáher, the eighteenth and nineteenth of the Abbasside khalifs of Bagdad, who reigned from A.H. 295 to A.H. 322 (A.D. 908-934). By the former of these princes he was advanced to the dignity of the *Rais alai 'l-Atebbá*, 'chief of the physicians,' or 'archiater.' He was also appointed public examiner, A.H. 319 (A.D. 931), and the khalif, in consequence of an ignorant practitioner's having killed one of his patients, ordered that no one for the future should be allowed to practise as a physician, until he had been licensed to do so by Senán.[*] (*Arab. Philosoph. Biblioth.*, apud Casiri, 'Biblioth. Arabico-Hisp. Escur.,' tom. i., p. 437-9.) The anonymous author of this work 'relates,' as Gibbon says, 'a pleasant tale of an ignorant but harmless practitioner,' who presented himself before Senán for a licence to practise; which anecdote is told also with additional circumstances by Abul-Faraj, 'Chron. Syr.,' p. 187; and 'Hist. Dynast.,' p. 197. The khalif Cáher showed his favour to him by wishing him to embrace Islám. This he refused for some time, but was at last terrified by threats into compliance. As however the khalif still continued to behave with great severity towards him, and at the same time transferred his favour to another physician, Isa Ben Yusuf, he fled to Khorasán; he afterwards returned to Bagdad, and died A.H. 331 (A.D. 942). The titles of several of his works are preserved in Casiri (*loco cit.*), relating chiefly to astronomy and geometry. Like his father Thabet, he appears to have written also several works relating to the religious doctrines, rites, and ceremonies of the Sabians; from which, if they could be recovered, we might expect much fuller and more accurate information respecting this curious people than we possess at present.

SENA'TUS, according to the etymological meaning of the word, is 'an assembly of elders,' and this is the sense which the Roman writers attach to the earliest senate of Rome. The number of senators in the Greek republics, as well as at Rome, always bore a certain relation to the number of tribes of which the state was composed. Hence, as long as Attica was divided into four tribes, the number of senators was 400; and when Cleisthenes divided the country into ten tribes, he increased the number of senators to 500. As long as Rome only comprehended one tribe, the Latins of the city on the Palatine, their senate consisted of only 100 members. After the accession of a second tribe, the number of senators was raised to 200; and when a third tribe was united with them, the number of senators was increased to 300. [Rome, p. 105.] Each of the three Roman tribes was divided into ten curiæ, and each curia into ten gentes, and the same number of decuries, containing, according to Göttling, parts of several gentes, and made for purposes of representation. At the head of each gens there was a decurio, who, according to Niebuhr, by virtue of this office was a senator, or a representative of his gens in the senate. But Walter (*Gesch. des Röm. Rechts*, p. 23) justly observes that the age of a decurio, who was at the same time a military officer, and consequently must always have been a young man and able to bear arms, does not appear to be consistent with the age and duties of a senator. It is much more probable that each decury elected from its own body one by whom it was represented in the senate. Each curia was thus represented by ten senators, who were called a 'decuria senatorum' (Liv., i. 7). At the head of this decuria senatorum was a curio, and the ten heads of the decuries, when the senate consisted of only 100 members, or ten decuries, were the 'decem primi,' from among whom the king chose one as princeps senatus. It appears that when the Ramnes and Tities became united, and the senate consisted of twenty decuries, the ten decuries of the Ramnes with their decem primi still retained for a time a kind of superiority over the Tities. (Dionys. Hal., ii., p. 111; Plut., *Num.*, 3.) The senators representing the Ramnes gave their votes first, and the princeps senatus was chosen from among them alone. But the first two tribes must soon have been placed on a footing of equality, so that some of the decem primi, as well as the princeps senatus, might belong to either of the tribes. (Dionys., *l. c.*) After the union of the third tribe, the senators representing the first two are supposed by Niebuhr to be the 'patres majorum gentium,' and those representing the third to be the 'patres minorum gentium.' Göttling (*Gesch. d. Röm. Staatsv.*, p. 227) on the other hand considers the 'patres minorum gentium' to have been the noble plebeians whom Tarquinius Priscus admitted into the three old tribes, and who, in consequence of this, became eligible to the senate. (Cic., *De Rep.*, ii. 20.) The patres minorum gentium had at first, as Niebuhr (ii., p. 114) supposes, no right to speak in the senate, but merely voted by *going over* to either party; and he therefore conceives that they were the 'senatores pedarii.' (Gellius, iii. 18; Dionys., vii., p. 453.) This name of senatores pedarii might in subsequent times, when all the senators had equal rights, be applied to all senators indiscriminately, as it was their general custom to vote by discessio, or a division. All writers agree that Tarquinius Priscus raised the number of senators to 300, but the manner in which this was effected is stated differently. Cicero (*l. c.*) says that the king doubled the existing number of senators (which would accordingly have been 150), while others (Liv., i. 35; Dionys., iii., p. 199) state that he merely added 100 senators to the existing number of 200. Niebuhr (i., p. 401) ingeniously reconciles these two statements by the supposition that before the time of Tarquinius Priscus some of the gentes of the first two tribes had become extinct, though it does not follow that the number of the extinct gentes amounted exactly to fifty. But if, as we have supposed, the senators were not elected by each gens, but by a decuria, Niebuhr's supposition must fall to the ground, as it cannot be conceived how decuries could become extinct, as they might be formed in such a manner that one large gens would comprehend several decuries, while smaller ones united in forming one decury, and thus were always able to make up a certain number of decuries. The statement of Cicero appears to rest upon a misconception. (Göttling, p. 228.) Servius Tullius did not introduce any change in the composition of the senate, but in the reign of the last king, Tarquinius Superbus, the number of senators is said to have become greatly diminished, as many of them were put to death, and others were sent into exile. These vacancies however were filled up immediately after the establishment of the republic by electing into the senate the principal plebeians of the equestrian order. Livy (ii. 1) ascribes this completion to L. Junius Brutus; Dionysius (v., p. 287), Plutarch (*Popl.*, 11), and Festus (*s. v.* 'qui patres'), to Valerius Publicola. The number of these new plebeian senators is said to have been 164, but this is utterly incompatible with the subsequent history of Rome. The new plebeian senators were called Conscripti, in contradistinction to the patrician senators, or patres; hence the mode of addressing the whole senate 'patres conscripti,' that is, 'patres et conscripti.' The word patres, although in later times used to designate senators in general, was originally another name for patricians. (Liv., ii. 1; Fest., *s. v.* 'adlecti;' Niebuhr, i., p. 327, &c.) The number of 300 senators henceforth remained unaltered for several centuries. C. Gracchus was the first who attempted an alteration. Livy (*Epit.*, lib. 60) says that he wished to increase the senate by adding 600 equites, but this seems a mistake, and the reading is probably corrupt. Plutarch (*C. Gracch.*, 5, &c.) says that he added 300 equites to the 300 senators, and transferred to this body the Judicia (publica). All the other writers who mention these events (see the passages in Göttling, p. 237, note 3) do not allude to an increase in the number of senators, but merely state that he transferred the Judicia to the equites. A similar attempt was made by the tribune Livius Drusus. (Appian, *Civil.*, i. 35.) Sulla added 300 equites to the senate, and thus increased its number to 600. [SULLA.] Four hundred senators were after this time present in a case when many were absent. (Cic. *ad Att.*, i. 14.) J. Cæsar increased the number of senators to 900, and elected men of the lowest rank into the senate. (Dion Cass., liii. 47.) This mode of filling up vacancies or increasing the number of senators with freedmen and common soldiers was continued after the death of Cæsar, and at one time there were more than 1000 senators. (Suet., *Aug.*, 35.) Augustus again reduced the number to 600. (Dion Cass., liv. 14.) Respecting the number of senators during the empire, we possess no direct information. During the latter period of the empire the number of senators appears to have become greatly diminished.

---

[*] The number of persons in Bagdad who underwent this examination is said to have amounted to eight hundred and thirty.

The senators were from the earliest times elected for life. Their name indicates that originally they were men of advanced age, but the exact age at which a man might become a senator during the kingly period is not mentioned. During the latter centuries of the republic however the age seems to have been fixed by some Lex Annalis, as the ætas senatoria is frequently mentioned. But as a quæstor after the year of his office might be made a senator, and as the legitimate age for the quæstorship was twenty-five years, we have reason to believe that a person who had attained the age of twenty-six might be elected a senator. It might however be inferred from Polybius (vi. 17) that this was not the case till a person had completed his twenty-seventh year. As regards the election of persons into the senate during the kingly period, Livy (i. 8) and Festus (*s. v.* 'Præteriti Senatores') state that it was a privilege of the kings. Dionysius (ii., p. 85), though he involves himself in difficulties by supposing that the three tribes were already united when the senate consisted of only 100 members, is undoubtedly right in stating that the senators were not appointed by the kings. (Niebuhr, i., p. 338.) The senators were elected by the decuries, and thus were rea. representatives of the curies, or a select body of the populus. The plebeians, who were afterwards admitted into the senate by Tarquinius Priscus, and after the banishment of the kings, must either have been incorporated with the patrician gentes, or their number must have been very small, for the first instance of a plebeian senator at Rome is Sp. Maelius, in 439 B.C.; and a second is P. Licinius Calvus, in 400 B.C., although the latter may have held the office of quæstor, and so have got admission into the senate. Niebuhr (i., p. 527, &c.) thinks that long before the institution of the censorship there must have been a time when the senators were chosen by the curies, and not by the subdivisions of the curies, and that each curia elected ten senators. He founds this supposition upon the Lex ovinia tribunicia mentioned by Festus (*s. v.* 'Præteriti Senatores'). But as regards the time, Niebuhr is manifestly wrong, which he himself seems to have felt afterwards (ii., p, 403, note 885); for the Lex Ovinia refers to the censors, whom it directed to elect into the senate 'optimum quemque curiatim.' (Compare Göttling, p. 345, &c.; Walter, *Gesch. d. Röm. R.*, p. 100, &c.) During the early period of the republic, the right of electing persons into the senate belonged to the consuls, dictator, and military tribunes. But all the curule magistracies, as well as the quæstorship, conferred upon those persons who had held them the right of being elected into the senate. (Liv., xxii. 49, 'unde in Senatum legi deberent.') The quæstorship conferred this right probably from the earliest times, as it did in the time of Sulla [QUÆSTOR], and this circumstance explains why the patricians opposed the eligibility of the plebeians to the quæstorship. After the establishment of the censorship, the election of persons into the senate was wholly in the hands of the censors. All curule magistrates, that is, consuls, prætors, curule ædiles, and censors, had by virtue of their office a seat in the senate, and might speak on any subject. After their office was over they retained this right, but without being real senators. Now vacancies in the senate were filled up at every lustrum, and it was only on this occasion that the censors might elect those ex-magistrates into the senate whose conduct was unblemished. Hence we have to distinguish between two kinds of senators, real senators (senatores), and such as were allowed 'dicere sententiam in senatu.' (Fest., *s. v.* 'Senatores.') The old decem primi senatus are no longer mentioned. The honour of princeps senatus, which during the kingly period had been combined with the office of custos urbis, and had been granted by the kings for life, was afterwards united with the office of prætor urbanus, or with that of a military tribune (Liv., vi. 6), and only lasted for one year. After the establishment of the censorship, this honour was conferred by the censors, and at first upon the eldest among the living ex-censors; but afterwards upon any one whom the censors thought most worthy. (Liv., xxvii. 11.) If the censors thought a person who had held a curule office unworthy of being a senator, they passed over him ('præteribant:' Fest., *s. v.* 'Præteriti'); but this seems to have seldom occurred with persons who had held a curule office. (Liv., xxxiv. 44; xxxviii. 28.) The plebeians as an order never obtained the right of being eligible as senators; but as soon as the great offices of the republic became accessible to the plebeians, their claims to the dignity of senator could not be disputed. As therefore the quæstorship, consulship, censorship, and prætorship, were one after the other thrown open to the plebeians, their numbers in the senate likewise continued to increase. At last (perhaps in the year 131 B.C.; Walter, p. 165, note 156), even the tribunes of the people, after having before acquired the right to convoke the senate and to take part in its deliberations, gained by the Plebiscitum Atinium the rights of real senators. (Gellius, xiv. 8.) On certain occasions a dictator was created for the purpose of electing new members into the senate. (Liv., xxiii. 22, &c.) M. Fabius Buteo, in 216 B.C., not only elected such men as had held curule offices, but also such as had been plebeian ædiles, tribunes, quæstors, and persons who had distinguished themselves as soldiers. The senate, which at first had been the representative of the populus, thus gradually became the real representative of the people; for although the censors or a dictator were the electors, yet, either by custom or by law, they always elected such men as had held offices given by the people, so that it was in fact the people who elected the members of the senate, and the Roman senators themselves viewed their dignity as from the people. (Cic. *pro Sext.*, 65; *c. Verr.*, iv. 11; *pro Cluent.*, 56.) This also accounts for the fact that the members of the great colleges of priests, with the exception of the flamen dialis (Liv., xxvii. 8), had no seats in the senate; and for the same reason it was a disputed point whether the præfectus urbi should have a vote in the senate (Gellius, xiv. 8), for in the colleges of priests vacancies were filled up by co-optatio of the members themselves, and the præfectus urbi was appointed by the consuls, and none of them derived their power from the people. In the time of Cicero however this appears to have been altered, for we find that pontiffs might at the same time be senators. (Cic. *ad. Att.*, iv. 2.) Notwithstanding all this however, the senate, down to the end of the republic, preserved in a great measure its original character; it remained an aristocratic body.

During the republic we do not hear that any property qualification was required for a senator (Plin., *Hist. Nat.*, xiv. 1), though the senators must generally have belonged to the wealthiest classes. There is indeed a passage in Livy (xxiv. 11) from which it has been inferred that previous to the second Punic war a senatorial census was instituted (Niebuhr, iii., p. 406); but the words of Livy are too vague to admit of such an inference, and probably refer only to the fact that senators were among the wealthiest Romans, and were consequently able to make greater sacrifices to the republic than other persons. Göttling (p. 346) concludes from Cicero (*Ad Fam.*, xiii. 5) that Cæsar was the first who instituted a senatorial census, but the passage of Cicero is even less conclusive than that of Livy. The first to whom the introduction of a senatorial census is expressly ascribed is Augustus. He first fixed it at 400,000 sesterces, but afterwards increased it to 800,000, and at last to 1,200,000 sesterces. (Suet., *Aug.*, 41; Dion Cass., liv. 17, 26, 30; lv. 13.) If a senator lost or spent so much of his property as to fall short of the senatorial census, he was obliged to withdraw from the senate, unless the emperor connived, or supplied the deficiency. (Tacit., *Annal.*, ii. 48; xii. 52; xv. 28; *Hist.*, iv. 42; Suet., *Aug.*, 41; *Tiber.*, 47; Dion Cass., lx. 11.) The senatorial age was fixed by Augustus at twenty-five years (Dion Cass., lii. 20), and the names of the senators were entered on a list called 'Album Senatorium.' (Tacit., *Annal.*, iv. 42; Dion Cass., liv. 13; lv. 3.) Augustus reduced, as we have seen, the number of senators to 600, and cleared their body from the unworthy persons who had been admitted before his time. He also improved the senate by electing into it the most distinguished citizens of municipia and colonies, and even provincials. (Tacit., *Annal.*, iii. 55; xi. 25; Suet., *Vespas.*, 9.) Such senators of course resided at Rome, and, with the exception of those who belonged to Sicily or Gallia Narbonnensis, they were not allowed to visit their former homes without a special permission of the emperor. (Tacit., *Annal.*, xii. 23; Dion Cass., lii. 42; lx. 25.) At a later period these foreign senators were required to purchase a certain amount of landed property in Italy. (Plin., *Epist.*, vi. 19.) The emperors also assumed the right of convoking the regular as well as extraordinary meetings of the senate (Dion Cass., liii. 1; liv. 3), although the consuls, prætors, and tribunes continued to enjoy the same privilege. (Tacit., *Hist.*, iv. 39; Dion Cass., lvi. 47; lix. 24.)

Senators were never allowed to carry on any mercantile business. About the commencement of the second Punic war however, some senators seem to have entered into mercantile speculations; and a law was passed, notwithstanding the opposition of the senate, that no senator should be allowed to possess a ship of more than 300 amphoræ in tonnage (Liv., xxi. 63), this being thought sufficiently large to convey to Rome the produce of their possessions abroad (comp. Cic. *c. Verr.*, v. 18); from which passage it is clear that this law was not always observed. No one moreover could be elected senator whose parents were not free men by birth (ingenui). The first violation of this custom was attempted by the censor Appius Claudius Caecus, who elected into the senate the sons of freedmen. (Liv., ix. 29 and 46; Aurel. Vict., *De Vir. Illustr.*, 34.) But this election was considered illegal. Towards the close of the republic such proceedings appear to have been rather common. (Dion Cass., xl. 63; iii. 47; Horat., *Sat.*, i. 6, 21.) If a senator was struck from the lists of senators by the censors, he was not disqualified for any of the great state offices, but he might still obtain them, and thus find his way back to the senate. (Cic. *pro Cluent.*, 46; Dion Cass., xxxviii. 30; xliii. 52; comp. 'Nota' in *Dict. of Greek and Rom. Antiq.*)

The regular meetings of the senate (*senatus legitimus*) during the republic were held on the calends, nones, and ides of every month. (Cic. *ad Quint. Frat.*, ii. 13.) Extraordinary meetings (*senatus indictus* or *edictus*) might be convoked on any day, provided it was not a dies comitialis, or a dies ater. Augustus decreed that a senatus legitimus should only be held twice every month, on the calends and on the ides; that during the months of September and October, only a small number of senators, drawn by lot, should attend; and that their attendance should be sufficient to enable the body to transact business. (Suet., *Aug.*, 35; Dion Cass., lv. 3.) What number of senators was necessary in order to constitute a legal meeting is uncertain: on some occasions however, as we see from the senatus consultum de Bacchanalibus (Liv., xxxix. 18), a decree could not be made unless there were one hundred senators present. Sometimes also it was found necessary to enforce the attendance by a multa, or a pignoris captio. (Cic., *Philip.*, i. 5.) Augustus increased the severity of the law in this respect. (Dion Cass., liv. 18; lv. 3; lx. 11.) At first he required the presence of four hundred members to constitute a full assembly; but he afterwards reduced this number; and at a later period, the presence of seventy, or even fewer senators, was sufficient. (Lamprid., *Alex. Sev.*, 16.)

The places of meeting for the senate (curiæ or senacula) were always templa, *i.e.* places consecrated by the augurs; and there were originally three of them: 1, the temple of Concordia, between the Capitol and the Forum; 2, a place near the Porta Capena; and 3, a place near the temple of Bellona, outside of the city. (Fest., *s. v.* 'Senacula.') Subsequently however meetings of the senate were held in a great many other places. The place near the temple of Bellona was principally used for the purpose of giving audience to generals who returned from their campaigns, and were desirous to obtain a triumph; also to receive foreign ambassadors, especially such as were sent by an enemy, and were not allowed to enter the city. Towards the close of the republic, it was decreed that during the whole month of February the senate should give audience to foreign ambassadors on all days on which a senate could be held, and that no other business should be transacted in the senate until the affairs of the foreign ambassadors were settled. (Cic. *ad Quint. Frat.*, ii. 13; *ad Fam.*, i. 4.)

In the earliest times of Rome, the right of convoking the senate belonged to the kings or their vicegerents, and they also introduced the subjects for discussion. The princeps senatus, or custos urbis, put the question. The patres majorum gentium voted first, and the patres minorum gentium last. (Cic., *De Rep.*, ii. 20.) During the republic the senate might be convoked by the consuls, the dictator, the prætor, the tribunes of the people, the interrex, or the præfectus urbi: the decemviri, military tribunes, and the triumviri rei publicæ constituendæ, likewise exercised this right; but the persons who intended to convoke the senate generally offered sacrifices to the gods and consulted the auspices. (Gellius, xiv. 7.) The assembled senators appear to have sat in a regular and fixed order: first, the Princeps senatus; then the Consulares, Censorii, Prætorii, Ædilicii, Tribunicii; and lastly, the Quæstorii. In this succession they also gave their votes. (Cic., *Philip.*, v. 17; xiii. 14; *ad Att.*, xii. 21.) The majority always decided. This mode of voting remained the same during the empire. (Plin., *Epist.*, viii. 14; ix. 13; Tacit., *Annal.*, iii. 22; xi. 5.) The business was conducted as follows: the magistrate who had convoked the senate was always the president, and he laid before the assembly the subjects for discussion, opening the business with the words, 'Quod bonum, faustum, felix, fortunatum sit; referimus ad vos, patres conscripti.' After the subject of discussion was explained, the president asked the senators for their opinion in the order in which they sat. (Liv., i. 32; ix. 8.) If the consules designati were present, they had the precedence even of the princeps senatus. (Sallust., *Cat.*, 50; Cic., *Philip.*, v. 13.) If any of the members dissented from the measure proposed, he might express his opinion freely, or propose an amendment to it. After the discussions were over, the president called upon the members to vote; and the majority, which decided the question, was ascertained either by numeratio or discessio. A sitting of the senate was, generally speaking, not continued after sun-set; but in unexpected or very urgent cases the business was carried on by candle-light, and even till after midnight. Augustus introduced the custom that every senator, before he took his seat, should offer incense and a libation to the god in whose temple the meeting was held. (Suet., *Aug.*, 35.) During the time of the empire one of the consuls seems always to have presided in the senate, and the emperors only when they were consuls (Plin., *Epist.*, ii. 11); but by virtue of their tribunician power, they might at any session introduce any subject they pleased (Dion Cass., liii. 32), and subsequently this privilege was granted to them by an especial decree (jus relationis). (Vopisc., *Prob.*, 12; J. Capitol., *Pertin.*, 5; *M. Antonin.*, 6; Lamprid., *Alex. Sev.*, 1.) The measures or propositions made by an emperor were introduced in the form of written orations (orationes principum), and read in the senate by one of his quæstors. (Suet., *Aug.*, 65; *Tit.*, 6; Tacit., *Annal.*, xvi. 27.) The manner of conducting the business was on the whole the same as in the time of the republic. But when magistrates were elected in the senate, the votes were given by ballot. (Plin., *Epist.*, iii. 20; xi. 5.) Previous to the time of Cæsar the transactions of the senate were not kept or preserved in any regular way. (Plut., *Cat. Min.*, 23.) Cæsar was the first who ordained that all the transactions of the senate (acta senatus) should be kept and made public. (Suet., *Cæs.*, 20.) These transactions were written under the superintendence of one of the senators (called 'ab actis,' or 'à cura actorum'), by scribes appointed for the purpose. (Tacit., *Annal.*, v. 4, &c.; Spart., *Hadr.*, 3.) In case the business of the senate was carried on in secret, the senators themselves officiated as clerks. (Jul. Capitol., *Gord.*, 12.)

Down to the end of the republic the senate of Rome partook more or less of the character of a body representing the people: it was, as Dionysius says (v., p. 331; vi., p. 408), the head and soul of the whole republic, or the concentrated intelligence and wisdom of the whole nation. It is chiefly to the consistency, wisdom, and energy with which the senate acted during a long period that Rome was indebted for her greatness and her success.

During the kingly period the kings acted according to the determinations of the senate, and the kings had only the executive. The subjects on which the senate decided before they came before the people, comprehended the whole internal administration of the state, legislation, finance, and war. On the death of a king the senate proposed the new candidate to the comitia by means of the interrex. (Liv., *i.* 17.) At the establishment of the republic no change appears to have been made in the power and authority of the senate. The senate and the people had the sovereign power. At first all measures, whether relating to the administration or legislation, originated with and were prepared by the senate; but this power was afterwards considerably diminished by the attacks of the tribunes of the people. In many cases the original state of things became reversed, inasmuch as laws might originate with the people, and only require the sanction of the senate; or might have the power of laws even without this sanction. [Rome, p. 106; Tribunus. A still more formidable blow was inflicted upon the power of the senate when the tribunes obtained the right of invalidating its acts by their intercessio. [Tribunus.] The power which the senate exercised during the republic, when the tribunes did not intercede, may be comprised under the following heads:—

1. The senate had the control of the public treasury (aerarium) (Polyb., vi. 13); the accounts of all the revenues were laid before the senate, and no part of the public money could be expended without their consent. Hence no consul or magistrate could raise an army, or keep it at the expense of the state, unless he was authorised by the senate. [Scipio, p. 79.]

2. Crimes committed in Italy, such as treason, conspiracies, poisoning, and murder, belonged to the cognizance of the senate; moreover, if any private individuals or any of the allied towns of Italy had disputes among themselves, if they had done anything deserving punishment, or if they required assistance or a garrison, all this was within the power of the senate. (Polyb., vi. 11; comp. Liv., xxx. 26.) In cases however where a judicial sentence was required, the senate appointed a person, but did not pronounce sentence itself. (Cic., *De Off.*, i. 10; Val. Max., vii. 3, 4.)

3. All ambassadors sent from Rome, and all commissioners charged with the regulation of the affairs of a newly conquered province, were nominated by the senate, and the ambassadors themselves were in many cases members of the senate. All foreign ambassadors communicated with the Roman senate. (Polyb., *l. c.*; and Livy, in numerous passages.) Treaties concluded with foreign nations by a Roman general required the sanction of the senate.

4. The senate assigned to the consuls and prætors their respective provinces [Provincia], and the senate might at the end of a year propose the prolongation of their imperium.

5. The senate decreed all public thanksgivings (supplicationes) for victories obtained by the generals of the republic; and the senate alone could confer on a victorious general the honour of a triumph or of an ovatio. (Liv., v. 23; Cic., *Philip.*, xiv. 5.)

6. The senate in times of great danger could delegate unlimited power to the consuls; and this was done by the formula, 'videant consules nequid respublica detrimenti capiat.' The senate had also the supreme superintendence in all matters of religion, and decided whether the worship of new gods was to be adopted or not. [Serapis.]

During the empire the senate lost its former character, for the emperors became the sovereign, and the senate was a subordinate power, and little more than a high court of justice. [Rome, p. 110.] Respecting the provinces of the senate, see Provincia, p. 64. The senators however were always looked upon as persons of the highest rank. Vacancies were filled by the emperor at discretion, chiefly with equites, whence the equites are called seminarium senatus (Lamprid., *Alex. Sev.*, 19; Joseph., *Antiq. Jud.*, xix. 1.) Constantine established a second senate at Byzantium, and the emperor Julian conferred upon it the privileges which were enjoyed by the senators of Rome (Zosimus, iii. 11.) Both senates were still sometimes addressed by the emperors in an imperial oration concerning matters of legislation, and each of the senates still continued to be a high court of justice, to which the emperors referred important criminal cases. The senatorial dignity was now obtained either by descent, by the favour of the emperor, or by virtue of having held some office at the imperial court. The senators enjoyed many distinctions, but their burdens were exceedingly heavy, for they had to pay a peculiar tax (follis) upon their landed property, to give public games, and magnificent presents to the emperors, and, in times of need, large donations to the people. The emperors therefore contrived to elect into the senate the wealthiest persons from all parts of the empire. (Walter, *Gesch. d. Röm. Rechts*, p. 367, &c.)

From the time of Diocletian the senate was only a shadow of its former state, but it was still the highest object of the ambition of the wealthy Romans.

It now remains to mention some of the external insignia and the privileges of the Roman senators.

1. The *latus clavus*, or *tunica laticlavia*, or a tunica with a broad purple stripe, which was not sewed to it, but woven in it.

2. A kind of short boots with the letter C on the top of the foot. This C is generally interpreted to mean centum, and to refer to the original number of hundred (centum) senators.

3 A particular place (orchestra) in the theatres and amphitheatres. This was first assigned to the senate by Scipio Africanus Major, B.C. 194 (Liv., xxxiv. 54; comp. Cic. *pro Cluent.*, 47.) In the reign of Claudius they obtained the same distinction at the games in the Circus. (Suet., *Claud.*, 21; Dion Cass., lx. 7.)

4. On the day when sacrifices were offered to Jupiter, the senators had a public feast on the Capitol, and this distinction, which no one else had, was called jus publice epulandi. (Suet., *Aug.*, 35; Gellius, xii. 8.)

5 The jus liberæ legationis, that is, senators, when allowed to travel abroad, had a right to demand from the inhabitants of the towns or countries through which they travelled, all that was necessary for their support or accommodation. Towards the end of the republic this right was much abused, wherefore Cicero obtained the passing a law which limited the time during which a senator might be absent and enjoy the jus liberæ legationis to one year: Cæsar however extended it to five. (*Dict. of Greek and Rom. Ant.*, under 'Legatus.')

SENATUS CONSULTUM. [ROME, p. 117.]

SE'NECA, LUCIUS ANNÆUS, was probably born a few years before the Christian æra, at Cordoba in Spain, and was brought to Rome while quite a child for the prosecution of his studies and for his health. (*Con. ad Helv.*, 16.) He was the second son of Marcus Annæus Seneca, the rhetorician, and the author of 'Suasoriæ, Controversiæ, Declamationumque Excerpta,' whose memory was so strong that he could repeat two thousand words in the same order as he heard them. He had the reputation of being a man of taste, but when we consider that his taste was so comprehensive as to admit a hundred to the rank of orators in a century whose orators fame limits to five or six, we may reasonably doubt its value and delicacy. As was natural with such a man, he assiduously directed the studies of his son to rhetoric, a preference which Lucius soon rebelled against, and, placing himself under Papirius Fabianus, Attalus, and Sotion, devoted himself to philosophy. In common with many others who aspired to wisdom, young Seneca travelled into Greece and Egypt, and in his 'Quæstiones Naturales' (a remarkable work, which shows him to have been master of the scientific knowledge of his time), he has judicious and accurate remarks on Egypt and on the Nile. But his father at length succeeded in convincing him that worldly interests ought not to be sacrificed to philosophy, and he undertook the business of an advocate. He became quæstor, and under the emperor Claudius rose to distinction; but the particulars of his life are at this period nowhere traceable with any degree of certainty, and we must therefore suspend our judgment as to the truth of Messalina's accusation against him of adultery with Julia, daughter of Germanicus. (Tacit., *Ann.*, xiii. 42.) His intimacy and connection with her were certainly very equivocal, and the manners of the time still more so; but then Messalina, who was humbled by the pride of the princess, and who nowhere manifested any nice sense of right and wrong, is not worthy of much credit. The result however was Julia's exile and subsequent assassination, and Seneca's banishment to Corsica. Here, according to his account, he spent his time in the study of philosophy, and writing his treatise on 'Consolation.' This stoicism looks very well on paper, but, unfortunately for his credit, we find him courting the emperor in a servile strain of adulation, and begging to be restored to favour.

On the death of Messalina Claudius married Agrippina, who prevailed on him to recal Seneca, and to bestow on him the office of prætor (Tacit., *Ann.*, xii. 8), and she afterwards made him, with Afranius Burrhus, tutor to her son Nero. To Seneca's lot fell the instructing of the young prince in the principles of philosophy and the precepts of wisdom and virtue: with what success all the world knows. In fact an impartial scrutiny of the events of that period, and of Seneca's connection with Nero, leads to the probable conclusion of his being a pander to Nero's worst vices. Not to repeat the many stories current at Rome of his particular acts (which if not fully attested, are yet equally so with those of his virtue and decorum), we will only insist on his immense wealth, and demand whether Nero was a man likely to have bestowed such munificent presents (avaricious as he was known to be) upon one who had no other claim upon him than the instruction of precepts and axioms which he must have laughed at in supreme contempt? Juvenal speaks of 'the gardens of the wealthy Seneca.' He possessed, besides these gardens and country villas, a superb palace in Rome, sumptuously furnished, containing five hundred cedar-tables with feet of ivory, and of exquisite workmanship. His hard cash amounted to 300,000 sestertia, or two millions four hundred and twenty-one thousand eight hundred and seventy pounds sterling of our money; a sum, the magnitude of which might well excite the sarcastic inquiry of Suilius, by what wisdom or precepts of philosophy Seneca had been enabled in the short space of four years to accumulate it? (Tacit., xiii. 42, &c.) We will not affirm with his enemies that he instigated or abetted Nero in the murder of his mother, though we know that Seneca became the foe of his former protectress.

Seneca however soon found that the tyrant who had made such singular use of his precepts, and whose vices had so enriched his philosophical abode, had cast jealous eyes upon this very wealth. He therefore with consummate address offered to refund the immense treasures which he had accumulated, and begged permission to retire on a small competency. Nero would not accept this. Seneca then shut himself up, 'kept no more levees, declined the usual civilities which had been paid to him, and under pretence of indisposition avoided appearing in public.' (Tacit., *Ann.*, xiv. 53, &c.) Nero now attempted to poison him by means of Cleonicus, but he failed in the attempt. Shortly after Antonius Natalis, when on his trial for his share in the conspiracy of Piso, mentioned Seneca as one of the conspirators. All Seneca's biographers loudly deny this. Wishing to keep their Stoic free from the slightest taint, they adopt the most absurd conjectures, assert the most puerile motives, and suppose anything and everything that could clear him of the charge. One says Natalis wished to curry favour with Nero by implicating Seneca. But was Nero a man to need such roundabout measures? Another confidently asserts (upon a 'perhaps' of Brucker) that Nero himself instigated the charge. Upon what authority is this said? These are the most reasonable of the suppositions. We dissent from them all, and we dissent from every judgment of Seneca that we have hitherto seen. Seneca, by confession of every authority, dreaded Nero, had cause to dread him, and therefore even to save his life from impending danger would have strong reason for joining the conspiracy. Piso and Seneca were intimate friends. Natalis had said that he had been sent by Piso to visit Seneca during his illness, and to complain of his having refused to see Piso, and that Seneca, in reply, had said that frequent conversations could be of no service to either party, but that he considered his own safety as involved in that of Piso. (Tacit., *Ann.*, xv. 60.) Granius Sylvanus, tribune of the prætorian cohort, was sent to ask Seneca whether he recollected what passed between Natalis and himself. Sylvanus proceeded to his country-house near Rome, to which Seneca had either accidentally or purposely (Tacitus does not decide which) returned from Campania on that day; and he there delivered his message. Seneca replied, that he had received a complaint from Piso of his having refused to see him, and that the state of his health, which required repose, had been his apology. He added that he saw no reason why he should prefer the safety of another person to his own. We do not see in Seneca's life anything contradictory to the supposition of his being implicated in any conspiracy whatever: certainly not in one against Nero.

Nero, satisfied of his treason, ordered him to put himself to death. He bore this fate with Stoic fortitude, and opened a vein in each arm. His advanced age however caused the blood to flow so slowly that it was found necessary to open also the veins in his legs. This still not succeeding, Statius Annæus gave him a dose of poison, but, owing to the feeble state of his vital powers, it produced little effect. He then ordered his attendants to carry him to a warm bath, and, plunging into it, he was speedily suffocated. His wife Paulina is asserted by his biographers to have 'refused every consolation except that of dying with her husband, and earnestly solicited the friendly hand of the executioner.' Dion Cassius asserts that Paulina, who was considerably younger, was forced to have her veins opened owing to the stoical exhortations of her husband, and to fulfil her frequent promise of never surviving him. Tacitus says (xv. 63) that her veins were opened in compliance with her own wish, and that the blood was stopped by her attendants at the command of Nero: he adds that it is doubtful whether she was conscious of her veins being tied up.

The death of Seneca has been loudly applauded—has sometimes been called sublime; but this is owing to an ignorance of the time and inattention to Seneca's own doctrines. With the Stoics death is nothing ('mors est non esse,' *Ep.*, liv.); it is not an evil, but the absence of all evil ('mors adeò extra omne malum est, ut sit extra omnem malorum metum,' *Ep.*, xxx.). There is nothing after death—death itself is nothing:

> 'Post mortem nihil est, ipsaque mors nihil.' (*Troades*, act i.)

With such a doctrine there could be no fear of death, and consequently we find that courage to die was common in Seneca's time. 'At that period of languor and luxury,' remarks M. Nisard, 'of monstrous effeminacies, of appetites to which the world could scarcely suffice, of perfumed baths, of easy and disorderly intrigues, there were daily men of all ranks, of all fortunes, of all ages, who released themselves from their evils by death. How was it possible for them to avoid suicide, with no other consolation than the philosophy of Seneca and his theories on the delights of poverty? Marcellinus (Senec., *Ep.*, lxxvii.) is attacked with a painful but curable malady; he is young, rich, has slaves, friends, everything to make life pleasant—no matter, he conceives the fancy of the pleasure of dying. He assembles his friends; he consults them, as if he were going to marry. He discusses with them his project of suicide, and puts it to the vote; some advise him to do as he pleases; but a Stoic, a friend of Seneca's then present, exhorts him bravely to die; his principal reason is that he is *ennuyé*—no one contradicts the Stoic. He thanks his friends and distributes money to his slaves. He abstains for three days from all food, and is then carried into a warm bath, where he quickly dies, having muttered some words on the pleasure he felt at feeling himself dying. And this pleasure was so little of an affectation, so much had it become the fashion, that some of the austere Stoics thought themselves bound to place certain restrictions on it.' (*Etudes sur les Poètes Latins*, i., p. 95.) And further on. 'They committed suicide from *ennui*, from idleness, from want of patience to cure themselves of their ills, for distraction, much in the same way as they killed each other in duel under Cardinal Richelieu.' This throws quite another light on the transaction. In fact his death was like his writings, pompous, inflated, epigrammatic, and striking to common judgments, but bearing no inspection. His terse aphoristic style has rendered him one of the most frequently quoted authors of antiquity, and it was Scaliger, we believe, who remarked that he did more honour to the works of others than to his own.

Besides his 'Physical Questions,' 'Epistles,' and various moral treatises, he is the supposed author of ten tragedies. On this matter however there is much dispute, some declaring these tragedies to be the composition of five or six Senecas. But Quintilian, whose authority is superior to every other on the matter, speaks of Seneca without surname or qualification, and in quoting a verse from the *Medea*, cites it as a verse of Seneca, and not of *one* of the Senecas. (*Instit. Orat.*, ix. 2.) Further, Quintilian, in his list of the Roman poets (x. 1) (in which each name is accompanied by a distinguishing epithet), makes no mention of any author of these ten tragedies; but he says of Seneca, that he wrote orations, poems, epistles, and dialogues, thus appearing to include the tragedies under the term poems. The argument drawn from Seneca's own silence respecting them, or respecting any poetry of his whatever, is but negative, and is nullified by Tacitus, who distinctly asserts him to have written verses ever since Nero had taken to write them. (*Ann.*, xiv. 52.) But apart from these historical evidences, we believe internal evidence to be quite sufficient to convince the most sceptical—evidence not only of style and epigram, but of uniform coincidence in thought and expression.

Of the intrinsic merit of these tragedies there is as much difference of opinion as of their authorship. They have been lauded by commentators and abused by critics. They have been judged from a false point of view. They have been considered as imitations of the Greek dramas, and have been considered as dramas. Both these points of view are erroneous. They were never written for representation, but for reading aloud. This simple fact overturns all criticisms. Not being intended for the stage, any dramatic objection must be unfounded; nor could they for the same reason have been imitations of the Greek, which were written for representation. The proof of this fact is to be seen in the history of the Roman drama and literature by any one who looks attentively, and is to be seen also by a scrutiny of the pieces themselves. The plot is often concluded in the first act, but still he goes on through the other four with great patience. The scenes are not linked together; the incidents are not prepared. Now Seneca could not have been ignorant of the common rules of tragedy, known universally in his day; and if he has not attended to them, we are forced to conclude it is with intention that he has done so.

His tragedies were written to be read, and they were read with great applause. They have not the rudest attempts at dramatic delineation. A story is chosen, always a well known one, on which to string descriptions, declamations, and epigrams. The dialogue is the most appropriate form for such exhibitions, and consequently he has told his story in dialogue. This seems to us the whole matter. Considered in this point of view, they possess great merits of a certain order. Their delineations are uniformly Stoical; their sentiments elaborated from philosophy, with very little poetry in them; their epigrams admirable. Seneca was not a poet. There was no poetry possible at his time, and if it had been, Seneca's mind was of a *reflective*, not of an *emotive* cast. And although most of the poetry in these tragedies is critical, conscious, and reflective—although we seldom see that spontaneity of thought and feeling which in true poets springs up from the simplest reflection—yet we cannot but be struck with certain passages of unquestioned power and freshness both of thought and expression. There is a magnificent flash of dramatic feeling and expression in his 'Œdipus,' which is worthy of Sophocles or Shakspere, and not borrowed from the former, as so many of his beauties were. It is when Œdipus has put out his own eyes, on learning that his wife Jocasta was also his mother (Jocasta has killed herself, and her corpse is before him on the ground), and determining to wander, blind as he is, from Thebes, the birthplace of his woes, he makes two steps in advance, but arrests himself *for fear of stumbling against his mother*:

> 'Siste, ne in matrem incidas.'

This is very pathetic, and shows an intensity of dramatic consciousness which we find nowhere else in Seneca. It is in his 'Medea' that the celebrated prediction occurs which is generally applied to the discovery of America; with what critical propriety, any one may judge who will take the trouble of turning to it. ('Venient annis,' &c.)

The tragedies of Seneca were translated into English by Jasper Heywood, son of the epigrammatist, by Alexander Neyle, by John Studely, by Thomas Nuce, and by Thomas Newton; and there appeared a complete edition in 1581, entitled 'Seneca his Tenne Tragedies, translated into English, Mercurii nutrices horæ' (Collier, *Hist. Dram. Poet.*, iii., p. 14); but the translators by no means adhered to the original, interpolating lines, speeches, and chorusses as they thought fit. The editions of Seneca are very numerous. The most recent edition of all his works is the Bipont, 1809.

SENECA LAKE. [NEW YORK.]

SENECA INDIANS. [NORTH AMERICAN INDIANS.]

SENE'CIO (from *senex*, on account of its silvery capitate seed-down resembling the grey hairs of an old man), a genus of plants belonging to the natural order Compositæ. The species of this genus are very numerous, but are not remarkable for either beauty or utility. The common groundsel (*Senecio vulgaris*) is one of the most common of weeds. [GROUNDSEL.] The flower-buds and young tops are gathered as food for young birds, and especially for domestic Canary birds. *S. saracenicus* (broad-leaved groundsel) was used by the Saracens as an application to wounds. A few of the species are cultivated, the most pleasing of which are *S. hieracifolius*, the hieracium-leaved groundsel; *S. pseudo-China*, the Chinese groundsel; *S. hastatus*, the spleenwort-leaved groundsel; *S. elegans*, the elegant groundsel. The two last may be readily propagated from cuttings or raised from seeds; the two first may be increased by offsets, but require to be constantly kept in the hot-bed of a stove.

SENEFELDER, or SENNEFELDER, ALOIS, the son of a performer at the Theatre Royal, Munich, was born about 1771 or 1772. The history of this persevering inventor, and of the difficulties with which he had to struggle in bringing the art of lithography into successful and profitable operation, supplies an interesting illustration of the power of genius to overcome the most adverse circumstances; it is little known to the English reader, the only source of information with which the writer is acquainted being the autobiography included in the history of his inventions, of which an English translation was published in 1819

Senefelder, when young, was inclined to follow the profession of his father, who preferred placing him at the university of Ingolstadt, where he devoted himself to the study of jurisprudence, occasionally indulging his predilection for the stage by performing at private theatres, and by employing his leisure time in dramatic composition. In 1789 he wrote a comedy, called 'Die Mädchenkenner,' which was published, and by which he cleared fifty florins. Losing his father soon after, he was compelled, from want of pecuniary means, to discontinue his studies; and he tried for some time to devote himself to the stage. Disappointed in his hopes of success as a performer, he resolved to try his fortune as an author, and published a second play, which did not pay his expenses. While this was passing through the press, Senefelder made himself acquainted with the process of printing, and became desirous of procuring the necessary apparatus for printing his own works. Being too poor to gratify this desire, he endeavoured to discover some other mode of printing, but was defeated in several plans by want of means. One of the projects he abandoned from this cause was a kind of stereotyping. [Stereotype.] He then tried etching on copper, but found difficulties arising from his want of practical knowledge, and still more from the expense of the copper plates, which he ground and polished after using, to make them available for more than one operation. To diminish this difficulty, he used a piece of fine Kellheim stone for his exercises in writing backwards; and subsequently tried printing from it instead of copper, though without much success. Of this use of stone, merely as a substitute for copper, Senefelder disclaims the invention; but his experiments upon it were important, as leading to the discovery of chemical lithography. The next step towards this discovery was occasioned by an incident which curiously illustrates the situation of the needy inventor. Being unacquainted with the composition used by engravers for covering defective places in their etching-ground, or enabling them to rectify mistakes, he had invented a kind of chemical ink for the purpose, consisting of wax, soap, and lamp-black One day, when he had polished a stone plate for etching, his mother entered the room, requesting him to write a bill for the washerwoman, who was waiting for the linen. He found that he had not even a slip of paper for the purpose, having used all in taking proof impressions, and that the inkstand was dry; and as the matter was urgent, he wrote the list on the prepared stone with his chemical ink, intending to copy it at leisure. Some time afterwards, when about to clean off this writing, it occurred to him that, by the application of aquafortis and water, he might etch the stone so as to leave the writing in sufficient relief for printing from. The experiment succeeded; and as soon as he had brought this new invention into a practical form, he applied himself to the means of bringing it into operation, so as to gain a livelihood by it.

Being unable otherwise to raise the necessary capital for the construction of a press, the purchase of stones, paper, &c., Senefelder enlisted as a private in the artillery, as substitute for a friend, who promised him a premium of two hundred florins, with which he hoped to procure the means for carrying on his operations in his leisure hours, until he could procure his discharge. With these views he went to Ingolstadt with a party of recruits. But he was doomed to disappointment; for it was discovered that he was not a native of Bavaria, and therefore could not serve without a special licence. While at Ingolstadt, he was led to conceive the peculiar fitness of his new process for printing music; and he suggested it to a musician of the Elector's band, named Gleissner, who was preparing some music for publication. In connection with this person a few works were published, which proved the capabilities of the art. The elector Charles Theodore sent a present of a hundred florins to the printers, and promised an exclusive privilege for the exercise of their art: but the Electoral Academy of Sciences, before which Senefelder laid a copy of the first work, with an account of the process, acted very differently. He had mentioned the small cost of the press as an illustration of the economy of his invention, and was grievously disappointed when, instead of an honourable mention in the 'Transactions' of the Society, he received a present of twelve florins, with an intimation from the vice-president that his memoir had been favourably received; and that, as the expense of the press did not, according to his own statement, exceed six florins, he hoped a double compensation would satisfy his expectations.

The promising aspect of affairs at this time, about 1796, was clouded by the difficulty of constructing a more efficient press than had been used in the first operations. A rolling-press had been used in the first instance; but owing to a circumstance which escaped the notice of Senefelder, he failed in his attempt to make a new one. He therefore made a machine, in which the pressure was obtained by a stone of three hundred pounds weight falling from a height of ten feet: a plan which produced good prints, but broke the stones after a few impressions. Having a narrow escape from being killed by the falling stone in this press, Senefelder abandoned it, and constructed another on a different principle. Such obstacles, and the difficulty of finding suitable persons to employ in the new process, brought the establishment into discredit, and prevented the proprietors from obtaining their expected exclusive privilege during the life of Charles Theodore.

The lithographic printing here alluded to appears to have been mechanical, as Senefelder informs us that he discovered chemical printing—the art which has since attained so high a degree of excellence and utility—in 1798. For the principles of this beautiful process, we must refer to Lithography [vol. xiv., p. 44]; and the history of its introduction must be treated of very briefly. Some of the earliest specimens of the art, as applied to pictorial subjects, were executed under the superintendence of the Rev. Mr. Steiner, director of the Royal School establishments. In 1799 Senefelder obtained an exclusive privilege for Bavaria for fifteen years, and carried on a considerable business, employing his two brothers and two apprentices. As the process was no longer kept secret, many persons visited the office, among whom was Mr. André of Offenbach. With this gentleman Senefelder entered into partnership, and commenced arrangements for obtaining patents and establishing presses in Vienna, London, Paris, and Berlin. While engaged in this project, he visited London, but without succeeding in his object. Unfortunate circumstances led to a hasty dissolution of this promising partnership, in 1800. For some time afterwards, Mr. Von Hartl, who is described as imperial court agent, took an active part in promoting the invention, the application of which to cotton-printing then excited much attention. A fair prospect which now appeared opening for Senefelder was destroyed by the derangement in the cotton-manufacture caused by the suspension of commercial intercourse between England and the Continent, by Bonaparte; and some improvements which he had effected in calico-printing became useless to him by being divulged by a person employed, before a patent was secured for them. In 1806 an extensive lithographic establishment was formed at Munich, by Senefelder, in connection with Baron Aretin and others. This partnership lasted about four years, during which period a great variety of works were executed; some of them for the government. Several other lithographic establishments were also in successful operation in 1809, when Senefelder obtained an engagement which rewarded him for the vicissitudes of the early part of his career, and placed him in comfortable circumstances for the remainder of his life. A lithographic office was formed about that time for printing the plans of a new survey of the kingdom, of which a great number were required. Owing to an intrigue, the superintendence of this work was not, in the first instance, given to Senefelder; but in October, 1809, he was appointed to the office of inspector of the Royal Lithographic Establishment, with a salary of fifteen hundred florins per annum, and with permission to carry on his private business also. The subsequent improvements effected by Senefelder were attributed by himself to the ease and independence which this honourable engagement afforded.

As early as 1809 Senefelder had commenced a collection of specimens to illustrate an account of his invention; but circumstances impeded the completion of the work, which might probably never have been finished but for the exertions of Mr. Von Schlichtegroll, director of the Royal Academy of Munich, who, in 1816 and 1817, published several letters on the subject, urging the publication of a work that should perpetuate the memory of the invention, and set at rest the erroneous rumours then prevalent on the subject. Senefelder therefore wrote and published an account of his inventions and discoveries, with a preface by Von Schlichtegroll, and a dedication to the king of Bavaria. This work was shortly translated both into French and English, the latter translation being published by Ackermann, in 1819 in a quarto volume, entitled 'A Complete Course of Lithography,' &c. It has no pretension to literary merit, but cannot fail to prove interesting as a simple and circumstantial record of the experiments and difficulties attending the invention of a highly important art. It enters minutely into private circumstances; but, as remarked in the preface by his friend, 'In the history of an important invention, minuteness cannot be called a defect. How interesting would it be to read all the private circumstances of the lives of John Guttenberg, or John Faustus, if a narrative of the origin of typography, similar to this of the origin of lithography, were in existence.' The illustrations of various styles, some of which are curious, add to the value of the work, to which is prefixed a portrait of Senefelder.* The latter part of the work contains a valuable body of instruction for the practice of the different branches of the art.

The rapid extension of lithography, even before the publication of this book, must have been highly gratifying to the inventor, who observed on this subject, 'I esteem myself happy in seeing, in my own life-time, the value of my invention so universally appreciated; and in having myself been able to attain in it a degree of perfection which, in a thousand other inventions, has not been reached till long after the death of the first inventor.' In 1819 the Society for the Encouragement of Arts, &c., in London, spontaneously voted their gold medal to Senefelder, as the inventor of lithography.

Senefelder married about the time of his appointment to the office in which, we believe, he spent the remainder of his life. He died at Munich, Feb. 26, 1834, in his 63rd year.

SENEGAL is the name of a large river in Western Africa, which enters the Atlantic by two embouchures between 15° 50′ and 16° 30′ N. lat. It is the largest river of Senegambia, and drains nearly half the surface of that country. The eastern and most mountainous parts of Senegambia, those which lie between 10° and 15° N. lat. and between 7° and 12° W. long., are traversed by numerous rivers, which, by their union, form the Senegal. The largest of these branches are the Ba Woolima and the Ba Fing. The last-mentioned river is justly considered the principal branch, as it traverses a much greater extent of country than the other rivers before it joins them. It rises, according to the statement of Mollien, near 10° 30′ N. lat. and 10° 45′ W. long., in the mountain-range which encloses the elevated table-land of Foota Jallon on the south, and divides the waters which fall into the Ba Fing from those which join the Kabba, one of the largest rivers of Sierra Leone. The Ba Fing flows first from north to south, but it soon turns eastward, and passes at a little distance to the south of Timbo, the capital of Foota Jallon. Soon afterwards it runs north, and in that direction it traverses the south-eastern portion of the plain of Foota Jallon. After a course of hardly more than 30 miles it enters the mountains which divide Foota Jallon from the Wilderness of Jallon Kadoo. Caillié, who passed it not far from Ba Fila, and the place where it enters the mountain-region, found that it ran with great rapidity between dark granite rocks, from which its name (Black River) is said to be derived. At this place it was about 100 feet wide, and the depth varied between 12 and 18 inches. Having passed through the mountains in a north-eastern direction, it turns north, and enters a less mountainous country, which it traverses in a north by west direction to its confluence with the Ba Woolima. Mungo Park, on his return from Bambarra, passed the Ba Fing near 12° N. lat., at the town of Manna, by a bridge of bamboos, of singular construction, of which he has given a sketch in the account of his first journey. The Ba Fing is joined by some large tributaries, of which the Furkooma runs more than 150 miles. The course of the Ba Fing to its junction with the Woolima exceeds 400 miles. The other great branch of the Senegal, the Ba Woolima, rises above 350 miles from the source of the Ba Fing, to the north-east, at the eastern extremity of the mountain-range which separates Senegambia from Soodan, and at no great distance from the banks of the Joliba, or Quorra, near 13° N. lat. and 6° 40′ W. long. Its course is first to the north-west, and then nearly west, at a short distance from the mountains, until it joins the Ba Fing, after having run more than 300 miles. From the south it is joined by the Kokorro, which exceeds 200 miles in length. The union of the Ba Fing with the Ba Woolima takes place near 14° 10′ N. lat. and 10° 30′ W. long., and from this place the river is called Senegal. About 15 miles below the union of its branches, the Senegal contains a cataract, called the Feloo Falls, which, according to the statement of Golberry, is 80 feet high. In this part the river runs north-west, but it soon turns to the west, and, at the distance of about 100 miles below Feloo Falls, it is joined from the south by the Ba Faleme, which flows more than 100 miles, and is navigable for a considerable distance from its mouth during the rainy season. Some miles farther down the Senegal is joined by a small river, which, according to the statement of Mollien, originates in a lake called Tiali, from which another river, the Nerico, issues in a southern direction, and falls into the Gambia. Thus during the rainy season a natural water-communication exists between the largest rivers of Senegambia. But we must observe, that both Mungo Park and Gray, who travelled very near to the common origin of these two rivers, do not mention such a circumstance. After having been joined by this small river, whose name is not mentioned, the Senegal leaves the mountainous and hilly country of Senegambia, and enters a plain which extends to its very embouchures. In this plain its course is first to the north-west, and afterwards to the west. In this part its course is extremely tortuous, the windings of the river being so numerous as to make its course double the length which it would have if it ran in a straight line. In that part of its course which lies to the west, the Senegal divides into two large arms, which reunite after having been separated for a distance exceeding a hundred miles. These two arms enclose two islands, called Bilbos and Morfil, which have an average width of six miles, and are separated from one another by a narrow arm of the river. The northern or principal arm preserves the name of Senegal, and the southern is called Morfil, or the River of Elephants' Teeth, on account of the great number of elephants which are said to live on its banks. After the two arms of the Senegal have reunited, it flows, chiefly in one channel, for more than 60 miles, but in approaching the sea it divides, near Faf, into two arms. The principal arm continues westward to the sea. The other arm, which is called Saguerai, runs south, and then south-west, and rejoins the principal arm after a course of nearly 50 miles, almost opposite the town of S. Louis. The principal arm, having approached the sea within six miles, divides again. The smaller branch, which is called the Marigot de Marigouines, or the River of the Moskitos, runs in a north-west direction until it falls into the sea: it may be navigated by small coasting vessels of sixty tons burden. The larger branch, or the proper Senegal, turns south by west, and flowing nearly parallel to the beach, gradually approaches the sea. Between the river and the Atlantic there is a strip of low land, nearly level, and covered with sand: it is called the Point of Barbary, and gradually diminishes in width, so that opposite the island and town of S. Louis it is less than 300 yards across. About five miles farther south it terminates at the mouth of the river. The tract of land enclosed by the Senegal and Saguerai consists of many islands, two of which are of considerable extent, and separated from one another by an arm which branches off from the Saguerai and joins the Senegal. The northern island is called Bequio, and the southern Bifeche. These islands are entirely covered with wood, and in the wet season a great portion of them is laid under water. The course of the Senegal, as far as it runs southward, is nearly forty miles long; but its waters in few places run in one channel, the middle of the river being occupied by a string of islands, some of which are several miles in length, and in some places more than half a mile in width. Even after its junction with the Saguerai the eastern banks continue to be skirted by islands. The greatest depth of the river is generally found to be west of the islands. Its currents are very rapid, and contain a large quantity of sand, which, when brought to the sea, meets the swell of the ocean, and is thrown back towards the land. Thus a bar has been formed across the mouth of the river, on which there is very little water, except at one place, where the currents have forced a passage through the sands: this is called the Pass of the Bar; it is generally about 250 yards wide and 15 feet deep, but these dimensions are subject to change. Only vessels drawing 12 feet water can pass through this entrance of the river, as the surplus is necessary for the pitching of the vessels which is produced by the strong swell of the sea. The mouth of the river was formerly two miles farther south than it is at present. In 1812 an unusually extensive inundation opened the present mouth, through the narrow sands of the Point of Barbary, and the old mouth was almost entirely filled up with sand.

---

* Senefelder had wished to supply impressions of the original illustrations for the English translation of his work, an arrangement which would have greatly increased its value; but this was prevented by our Custom-House regulations, as the prints for each copy of the book would have paid more than a guinea and a half duty. They were therefore copied, and printed at Ackermann's press.

As a navigable river the Senegal is far inferior to the Gambia; for the Gambia has no such obstacles at its mouth, and the Senegal is much inferior to it in depth, and so full of shoals that it cannot be navigated by large river-barges in the dry season. Gray states that at the end of the dry season it is only eighteen inches deep near Bakel, or Baquelle, the farthest of the French settlements. The ascent of the Senegal is only practicable in the wet season, and even then the voyage is slow and tedious, partly on account of the rapidity of the current, and partly because of the numerous windings. It may indeed be ascended to a greater distance than the Gambia, to the foot of the Feloo Falls, which are more than 500 miles from its mouth; but in general it is only navigated to the mouth of the Faleme. The river begins to rise some weeks after the rains have set in, generally in the first week of June; sometimes it attains the height of 40 feet above its lowest level at Bakel, but lower down it does not rise so high. It attains its highest level in the month of August, and begins to fall about the middle of September. In November or the beginning of December it again enters its bed. The inundations produced by the rise appear to be most extensive along the lower part of its course, especially where the islands of Bilbos and Morfil occur.

(Golberry's *Travels in Africa*; Mungo Park's *Travels in the Interior Districts of Africa*; Mollien's *Travels in Africa to the Sources of the Senegal and Gambia*; Gray's and Dochard's *Travels in Western Africa*; Savigny's and Correard's *Narrative of a Voyage to Senegal*; and Caillié's *Travels through Central Africa to Timbuctoo*.)

SENEGAMBIA is a term adopted by geographers to indicate a part of the western coast of Northern Africa, but it has not always been applied to the same extent of country. Originally it was only used to indicate the countries which lie between the Senegal and Gambia, from the names of which two rivers the term has been composed, or rather, only the tract between the European establishments on the banks of these rivers, for the country itself was almost entirely unknown in Europe nearly to the end of the last century. It is true that this part of the African coast was visited by Hanno, the Carthaginian admiral, and that it was again discovered by the Portuguese in the fifteenth century, between 1444 and 1469. [AFRICA, vol. i., p. 174.] The Portuguese also formed several commercial establishments near the mouths of the principal rivers, but they were neglected after the route to the East Indies had been discovered by Vasco de Gama (1497). The French and the English next tried to get a footing there, and the French acquired the Senegal about 1675, and the English the Gambia in 1686. They formed settlements at the mouths of these rivers, and their merchants began to trade on the banks, forming depôts for their goods at certain places. The remotest French commercial establishment was at S. Joseph or Makannah, not very far below the Feloo Falls, and the English advanced by degrees to Baraconda, some miles below the last rapids of the Gambia. Thus the course of these rivers and the countries immediately adjacent to their banks were explored, but nothing further was known up to the year 1788, when an association was formed in London for promoting the discovery of the interior parts of Africa. The year before, the settlement of Sierra Leone had been made for the negro slaves who had obtained their freedom in the West Indies. Since that period the interior of Western Africa has been explored by several travellers. Houghton traversed it in 1790 and 1791, from the banks of the Gambia in a north-eastern direction, but he did not add much to the information then existing respecting these countries, as he was killed in the town of Yarrow in Ludamar, before he had sent a detailed account of his travels. Winterbottom set out in 1794, from the mouth of the river Nuñez or Kakoondy, and went as far east as Timbo, the capital of Foota Jallon; and he first gave us some account of that part of Western Africa. Mungo Park, between the years 1795 and 1797, succeeded in traversing the countries drained by the upper branches of the Senegal, and in reaching the banks of the Joliba or Niger. As he took different roads in going and returning, a considerable part of the countries on the Senegal and Gambia rivers was explored by him, and he collected much valuable information respecting those parts which he did not see. This intrepid traveller considerably enlarged our information by his second journey (1805), when he again chose a different route through the countries drained by the Senegal. [PARK, MUNGO.] His death, and the threatening aspect which the war with France assumed at this period, put a stop to the zeal of the English for discovery in Africa; but after the return of the peace, the English government, wishing to open a trade between the countries on the Joliba and the settlements on the Gambia, set on foot a great expedition for that purpose, which was successively conducted by Peddie, Campbell, and Gray. Though this expedition did not accomplish its object, it traversed a great part of Senegambia in different directions (between 1817-20), and collected much interesting information. Denham and Clapperton succeeded in penetrating from Tripoli through the Great Desert, and reaching Bornou in Soodan, whence they advanced as far westward as Sackatoo (near 5° E. long.) Before these journeys were accomplished, Laing set out (1822) from Sierra Leone, and reached the town of Timbo by a different route from that chosen by Winterbottom and Campbell. After the return of Denham and Clapperton, the British made no other attempt to penetrate to the Joliba by the dangerous route through Senegambia, as they had formed a plan of reaching it by another way, which was nearly accomplished by Clapperton and Lander. In the mean time the French had begun to explore these countries. Mollien, departing (1818) from St. Louis, traversed the whole country between the mouth of the river Senegal and the sources of the Gambia, crossing the routes of the British travellers. He went as far as Timbo. The attempt of Beaufort, in 1824, to reach the Joliba did not succeed, and added little to our knowledge of the country, as he did not go farther than Bakel on the Senegal. Caillié however, in his great journey, traversed the country between the river Nuñez and Sierra Leone in 1827, and after having passed the Ba Fing, or Senegal, not far from its source, reached Timbuctoo, and returned to Europe by the Great Desert, and through the empire of Marocco.

By these numerous journeys we have acquired a tolerably exact notion of the natural features and productive powers of the countries of Western Africa which are drained by the rivers whose mouths are found between the embouchure of the Senegal (16° 30′ N. lat.) and the island of Sherboro (7° 30′ N. lat.). Consistently with this information, we shall divide these countries into two unequal parts, and name the northern and larger, or that which is drained by the rivers that enter the sea north of Cape Verga (10° 20′ N. lat.), Senegambia, and the southern and smaller part, Sierra Leone. The dividing-line between these two countries begins at Cape Verga, whence it extends in an east-north-east direction to the sources of the river Nuñez, and thence eastward to those of the rivers Rio Grande and Gambia. Near the latter terminates the elevated table-land of Foota Jallon, in which all the larger rivers of Senegambia take their rise, and where probably also the sources of the Joliba or Quorra are found. Towards the east Senegambia is supposed to comprehend all the countries drained by the numerous upper branches of the Senegal, and to extend to the high land which separates them from the countries on the banks of the Upper Joliba. A continuous ridge of high land extends along the northern side, and close to the banks of the Ba Woolima, or eastern branch of the Senegal, from its source to its junction with the Ba Fing, or western branch; and this ridge constitutes the north-eastern boundary of Senegambia. Farther west the valley of the river Senegal, which is bordered on the north by the great desert of the Sahara, is considered to be the most northern country belonging to Senegambia. The Atlantic Ocean washes its western shores, constituting a coast-line which probably exceeds a thousand miles in length. The countries enclosed within these boundaries cover an area exceeding 200,000 square miles; so that Senegambia may be compared with France in extent. From Cape Verde, its most western point, in 17° 30′ W. long., it extends eastward to the source of the Ba Woolima, which lies near 6° 40′ W. long., through a space about 480 miles in length. Cape Verga, its most southern point, is in 10° 20′ N. lat., and the valley of the Senegal approaches in some parts to the parallel of 17° N. lat.

Surface.—Senegambia comprehends a lower and a higher country The lower country lies along the shores of the sea, and the higher extends over the interior. The dividing-line between these two large regions, which are nearly equal in extent, is tolerably well determined by a line drawn from Cape Verga to Debukko on the Nuñez and Kade on the Rio Grande towards the north-east, and then towards the north to the rapids of the Gambia above Baraconda, whence it extends again in a north-eastern direction to Bakel on the Senegal. Though the higher region is generally the more fertile and more populous, the several parts of both regions differ greatly in fertility.

The Country between the Senegal and Gambia.—The valley of the Lower Senegal consists properly of the bottom which extends along its course on both sides of the river from its mouth to Bakel. It is subject to inundations during the rainy season, during which the river in some places rises 40 feet above its lowest level. In some places this bottom is perhaps not more than five or six miles wide, but in others it spreads out to 15 or even 20 miles. As the subsoil consists of a light sand, which is covered with alluvial matter, it opposes little resistance to the rapid current of the river, and hence the Senegal frequently divides its waters, and forms arms which again reunite. Thus the river bottom is chiefly composed of a succession of smaller and larger islands, frequently intersected by narrow channels. These arms of the river, called *marigots*, are almost countless on the southern banks of the river west of 13° W. long. The main current of the Senegal runs in the channel which borders on the Sahara, and on the north of it the marigots are not numerous, nor of great extent. The whole bottom is of great fertility. In its natural state it is covered with forests, mainly consisting of trees of immense size, which occupy the greatest part of it, the cultivated places being neither numerous nor extensive, though they yield rich crops of rice, millet, maize, cotton, and tobacco. The population is not great, which may be attributed to the unhealthiness of the climate during and after the rainy season.

Between the mouth of the Senegal and that of the Gambia, and nearly at equal distances from each, lies Cape Verde (14° 40′ N. lat.), a wide projecting promontory. Its western extremity is a mass of rocks of moderate elevation and volcanic origin. In its character it greatly resembles the Cape Verde Islands, which are nearly 500 miles from it in the Atlantic Ocean. The northern descent of this isolated mass is rather steep, and at its eastern extremity are two hills rising about 600 feet above the sea: they are called *mamelles*, or paps, and serve as a beacon to mariners. From these hills the rocks descend gradually to the west and south. The central parts of this tract have a moderately fertile soil, which is well cultivated, and produces large quantities of cotton, two kinds of millet, and French beans. The uncultivated districts are used as pasture-grounds for cattle, or are covered with briars. In some parts, especially towards the western extremity, there are many large baobab-trees, and in others dates and pine-apples. This small tract contains about 10,000 inhabitants.

Cape Verde constitutes the point of separation between two coast tracts which differ greatly in natural features and productive powers. The country between the Cape and the mouth of the Senegal greatly resembles that part of the Sahara which extends from that river northward to the Bay of Arguin. Along the sea there is a low sandy beach, lined with sand-banks, on which there is so little water that it cannot be approached by the smallest boat. The country adjacent to the shores is a dead level, covered with a fine loose sand, which it is quite impossible to travel across, except where it has been covered and consolidated by the sea during the flood. It is quite destitute of vegetation, except in a few spots which are covered with a kind of hard and dry grass. During the rainy season the soil is drenched with water, and during the dry season is subject to dense fogs and heavy dews, which fall at sunset, and moisten and penetrate like the drizzling rains of Europe. But no stream of running water is formed by this abundant moisture. This flat sterile tract occupies the whole coast to the distance of about two miles from the sea. At the back of it rises an unbroken ridge of sandy downs of considerable height and rather steep acclivity. They are likewise destitute of vegetation, and seem to occupy a space from 6 to 12 miles in width. These downs prevent the waters which collect in the country lying farther east from reaching the sea, and hence extensive swamps are formed at the base of their eastern declivity. These low grounds are almost entirely covered with water during the rainy season, but in the dry season a great portion of the swamps is dried up, and as the alluvial soil is of great fertility, it produces rice and indigo, with large quantities of mandioc and yams. For want of information we are unable to determine the extent of this swampy region towards the east, and the line where it borders on the table-land of the Jaloofs, nor do we know anything of the amount of the population.

The country contiguous to the shores of the Atlantic, between Cape Verde and the mouth of the river Gambia, is of a different description. The coast-line is well defined, but does not extend in a straight line. It is also broken by several watercourses. The low beach is covered with mangrove-trees. The country rises gradually from the beach to the distance of 30 or 40 miles, and probably farther, though our knowledge of this part of Senegambia does not extend farther into the interior. The whole tract, in its natural state, is covered with tall forest-trees, but a considerable portion of it is under cultivation, producing rice, maize, and millet in abundance. The cattle which pasture on the cleared grounds are of great size. All these products, together with pigs and poultry, are taken from these parts to the French and English settlements, especially to Goree. There are several small harbours on this coast, Red Cape, Portudal, Serine, Fatik, and the mouth of the river Joombas. The last-mentioned may be entered by vessels of considerable size. This part of Senegambia is rather populous, and probably contains from 300,000 to 400,000 inhabitants.

To the east of the countries hitherto noticed lies the table-land of the Jaloofs, which is of great extent, occupying the whole country between the valleys of the Senegal and Gambia from 16° to 13° W. long. The interior of this vast region seems to resemble the country which divides the valley of the Senegal from the Sahara, but its character is not known, as it has not been visited by travellers, and appears to be only inhabited by some wandering tribes during the rainy season, on account of the pastures which are found there at that time. The most elevated portion of the table-land seems to be situated between 14° and 15° 10′ N. lat., and between 13° and 15° W. long., but the declivities extend north and east to the valley of the Senegal, south to that of the Gambia, and west to the swamps already mentioned. Towards the mouth of the Senegal they approach very near to the river, enclosing even the lake of Gher, or Panieh-Fool, which is about 30 miles east of St. Louis, and extends from south-west to north-east about 18 miles, with a breadth varying from one to two miles. These declivities have been seen by travellers, who found that their surface was almost entirely covered with a reddish sand, which absorbs abundance of moisture without acquiring the least degree of fertility. Still there occur some tracts of moderate extent which are enclosed by higher grounds, in which the waters of the rainy season have collected, and given to the sand a mixture of mould which so far fertilises these tracts that millet can be cultivated on them. In these depressions villages are situated, but they occur only at great distances from each other. Water is only to be obtained from wells, which vary from 20 to 80 yards in depth, and in making these wells it was found that a thick stratum of sand covers a subsoil entirely composed of ferruginous stone. These stony masses appear to constitute the upper soil of the more elevated portion of the table-land. It produces nothing but a few shrubs and some isolated trunks of the enormous boabab, which seem to vegetate best in the soil where other trees languish. Where the ground is not entirely composed of this ferruginous rock, large forests of acacias are found. The most fertile portion of this inhospitable region is the north-eastern declivity, where the surface is much less level, and in many places interspersed with high hills and short ridges, between which there are many tracts of considerable extent, on which millet, cotton, and indigo are cultivated, and on the pastures of which large herds of cattle are fed. This is particularly the case near the only two rivers by which this region is drained, the Saldi and Guiloom. The ferruginous rocks here also cover large tracts, but the inhabitants have turned them to account, having in many places furnaces to smelt them for the purpose of extracting the iron. This part of the table-land, though much less fertile than the adjacent valley of the Senegal, appears to be no less populous.

South-east of the table-land of the Jaloofs begins the higher country, which does not however immediately rise into mountains, but the western districts consist of numerous hills and short ridges, rising to a moderate elevation. A range of mountains which runs along the western banks of the Ba Faleme may be considered as the boundary-line between the hilly and mountainous country. The hills, consisting mostly of ferruginous rocks, from which iron is extracted, are for the most part thinly covered with low stunted wood, little of which is fit for anything but fuel. The valleys and level grounds which are enclosed by these hills are in many places rather extensive, and mostly cleared for the purpose of cultivation, to which the soil is well adapted. The beds of numerous torrents intersect the valleys in every direction: they are dry in the dry season, but during the rains they conduct the water which is collected on the high grounds to the Faleme and Gambia. During the dry season, water, except near these rivers, can only be obtained from deep wells. Towards the source of the Faleme the country, though more elevated, is much less broken, and there occur some extensive plains, which are partly covered with woods and partly with jungles of bamboo. A very small part of them is cultivated, and they are the haunts of wild beasts, especially of elephants and lions. Though there is perhaps no part of Senegambia of equal extent more populous than this hilly region, only a small proportion of its surface is under cultivation. Millet, maize, rice, cotton, and indigo are extensively cultivated. Besides tobacco, there are cultivated red pepper, water-melons, pumpkins, gourds, onions, and pistaccia nuts. Numerous tamarinds, boababs, *rhamnus lotus*, and other fruit-trees are scattered over the valleys, and many parts of the country are very picturesque. The inhabitants are tolerably rich, which is partly owing to the circumstance that the most frequented commercial road between Soodan and the European establishments on the coast passes through this region.

The mountain-region extends over the western portion of Senegambia, including all the countries situated on and between the numerous rivers which, by their confluence, form the Senegal. As far as our knowledge goes, this region is surrounded on the south, east, and north by a continuous range of mountains, which divides it from the western countries of Soodan. The south-western portion of this range is connected with the elevated table-land of Foota Jallon between the sources of the rivers Ba Fing and Joliba, probably near 10° W. long., and between 10° and 11° N. lat. From this point it extends in an east-north-east direction to 6° 30′ W. long. where it declines to the north and north-west; but it soon runs west by north, in which direction it continues along the northern banks of the Ba Woolima to the confluence of that river with the Ba Fing (10° 30′). Thus this range forms an irregular semicircle. At its western extremity it seems to enlarge into a mountain-region, which extends westward to some place nearly due north of St. Joseph, or Makanna, on the Senegal. The elevation of this range is not known. In a few places where it has been crossed by travellers, it does not rise above the line of trees. The highest part is known by the name of the Fooladoo Mountains, which lie on the northern banks of the Woolima River, between 9° and 10° W. long. The western boundary of this region is formed by another range, which is connected on the south with the mountain-region in which the rivers Gambia and Rio Grande originate. From this region it branches off in a north-north-west direction, and its northern extremity seems to terminate in hills on the western banks of the Ba Falême, not far from its junction with the Senegal. This range does not appear to form a connected series of heights, as Mungo Park does not mention that he passed over a high ridge in travelling from the banks of the Upper Ba Falême to those of the Gambia river. The region which is enclosed by these ridges, being farther from the coast than any other part of Senegambia, is the least known portion of it; and we have no other information than what is contained in Park's 'Travels.' It seems that the whole is occupied by rocky ridges, which however do not attain the elevation of the range which separates Senegambia from Soodan. The direction of the water-courses shows that these ridges extend in a general direction from south-east to north-west. It is remarkable that in such a mountainous country, which for five or six months is subject to heavy rains, water is scarce at some distance from the watercourses, a fact which is owing to these ridges consisting almost entirely of iron-stone and slate with a very thin covering. They are generally bare, or only covered with isolated stunted shrubs. In the valleys, which in some parts are extensive, a good deal of alluvial soil is found; and in these places millet, maize, and other grains are cultivated. In the valleys there are also many high trees which occasionally extend up to the ridges. On the southern district is a wilderness, partly covered with trees and partly with dry bamboos. It extends upwards of 100 miles from east to west, and is inhabited by wild beasts. This region is rich in metals. Excellent iron is obtained by the negroes from the iron-stone; and there are several places where gold in considerable quantities is collected.

The Valley of the Gambia and the Country south of it.—The country situated immediately on the banks of the Gambia, as far as Pisania, consists of a level alluvial tract extending about two miles from the river. It is subject to annual inundations during the rains. A great part of it is swampy, or covered with mangrove-trees; in other places the ground has been cleared, and is cultivated with rice. At the back of this low tract the country rises to a moderate elevation above the level of the river when swollen by the rains. The surface of this higher ground is in some parts tolerably level, in others diversified with gentle eminences, and there are also a few hills and broken tracts. The soil is very various. Though often sandy, it is rather fertile; but sometimes it consists of a hard yellow clay, mixed with small quartz pebbles, and is of indifferent quality. Woods still cover a considerable part of the surface, but the trees are not lofty. Baobabs, tamarinds, the rhamnus lotus, and other fruit-trees are grown in several places; but the principal objects of cultivation in the cleared grounds are mandioc, maize, cotton, indigo, and French beans. Where this region approaches the table-land of the Jaloofs, the soil consists of a mixture of dark red sand and small iron-stone gravel, is unfit for agricultural purposes, and only covered with low stunted trees, mostly mimosas and acacias.

The coast-line between Cape St. Mary, situated at the mouth of the Gambia, and Cape Verga, is extremely low, and is intersected by numerous channels, which form many islands. It is said that the whole space between the Gambia and Nuñez is occupied by an archipelago of low islands, and that the channels which divide them may be navigated at high-water by vessels of four or five feet draught, so that they may pass from one river to the other amidst the islands of this extensive archipelago. The natives affirm this to be the fact, but that they are prevented from using this navigation by the hostile tribes which inhabit the islands. The mud-banks which surround these islands towards the open sea so dangerous to larger vessels that a part of the coast between the river Compoonee and the Rio Grande has never been surveyed, and is laid down on our maps at random. These low islands consist mostly of mud, and are covered with mangrove and palm trees. Though they do not contain fresh water, they are not only inhabited but populous. It seems that the inhabitants use the palm-wine as a substitute for water. They cultivate some roots and rice, but chiefly occupy themselves with making salt, an important article of commerce in these parts of Africa, as all the salt consumed in Soodan is either obtained from the Sahara or from this coast. This low archipelago constitutes the outer edge of a level and low country, which extends to a great distance inland. It seems for the most part to be composed of alluvial soil, and the large rivers which traverse it divide into many arms, several of which reach the sea, whilst others re-unite. It is conjectured that all the rivers between the Gambia and Compoonee are united by such channels branching off from the rivers, especially from the Rio Grande. The whole country to a great distance from the shore thus resembles a net-work. It is of great fertility, but in general very little cultivated, though it produces rice, maize, yams, mandioc, bananas, papaws, guavas, and oranges in great abundance. The greater part of the country is covered with high trees, and supplies good timber for the European settlements on the coast. In some places there are savannas, which serve as pasture-ground for large herds of cattle.

At the back of this low plain, between 14° 30′ and 13° W. long., lies a more elevated country, constituting a kind of second terrace. Its surface is slightly undulating, hills not being numerous except towards the southern and eastern boundaries, where this terrace borders on the mountain-region. The soil of this country, so far as it is known, has a considerable degree of fertility. The depressions of the surface are like reservoirs, in which the water collects during the rain, and at that season they are converted into swamps, but the inhabitants avail themselves of this circumstance to cultivate rice to a great extent. They also grow millet and maize, with cotton, indigo, and several roots and fruit-trees. The inhabitants are said to be careful and industrious agriculturists. They have also large herds of cattle, sheep, goats, and pigs, and rear much poultry. In no country perhaps on the globe are bees more abundant. Honey and wax are great objects of trade. The Portuguese export large quantities of the wax from their settlements on the several branches of the Rio Grande.

The mountain-range south of the Gambia begins a little west of 13° W. long. The country does not rise immediately into mountains, but a large part is covered with hills, which rise gently above one another, and are covered with large clumps of trees. The valleys between them have a fertile soil, but cultivation is not much attended to. Farther east there are several ridges of mountains. Between the Gambia and Rio Grande they appear to approach 13° W. long., but south of the last-mentioned river they do not pass much to the west of 14° W. long., except that a ridge approaches the river not far from Kade. These mountains are very little known. Those which fill up the country between the principal branch of the Rio Grande and its confluent the Coomba are called the Tangui Mountains, and another ridge, south of the Rio Grande, the Badet Mountains. Their elevation seems to be considerable, but they do not appear to rise above the line of trees. These two ridges unite with others at the place where the Gambia and Rio Grande originate, and here they constitute a mountain-knot which forms the western and northern boundary of the table-land of Foota Jallon. The mountains are mostly bare, their surface consisting of ironstone, greyish ashes, and yellow sand; in some places they exhibit traces of volcanic action. The valleys are covered with large trees. The inhabitants are mostly herdsmen.

The table-land of Foota Jallon consists properly of a plain of considerable extent, surrounded by higher grounds, and chiefly by lofty mountains. From north to south it extends about 80 miles, and perhaps still more from east to west. The surface is diversified by gentle hills. The elevation of this plain is not known, but it can hardly be less than 2000 feet above the sea. In the mountains which enclose it on the south, and which appear to be connected with the Kong Mountains, are the sources of the Ba Fing, the principal branch of the Senegal, and the waters issuing from them run above a thousand miles before they reach the sea. This river traverses the southern part of the plain, receiving all the waters collected on the surrounding mountains: it forms many rapids in its course through the chain which encloses the plain on the east, and finally enters the mountain-region of Eastern Senegambia. The greatest part of the plain is converted into a temporary lake at the end of the rainy season, but this is very favourable to the growth of rice, which is extensively cultivated. Indian corn is also grown, but millet, to the growth of which humidity is not favourable, is seldom seen. Among the fruit-trees oranges and papaw-trees are most numerous, and the bananas are cultivated with care. The baobab does not exist, but there are many other trees of prodigious dimensions. Cattle are rather numerous. This is certainly the best cultivated part of Senegambia, and also the most populous. Along the roads by which the Europeans travelled who visited this country, villages and towns occur at short distances from one another, and in some parts the plantations were nearly contiguous. The inhabitants derived considerable advantages from the commercial road through their country which connects the countries south of the Joliba with Sierra Leone. The elevated ground which extends from the south-western edge of the table-land westward to Cape Verga does not appear to rise to a great elevation, the highest summits probably not exceeding 3000 feet above the sea. Towards Cape Verga they are of moderate height.

Rivers.—Besides the Senegal and Gambia, which are the largest rivers of Senegambia, the country south of the Gambia is drained by two rivers, which are navigated to a considerable distance from their mouth: these are the Rio Grande and the Nuñez or Kakoondee.

The Rio Grande is stated to originate on the western declivity of a range of mountains, the waters from the eastern slope of which form the most remote branch of the Gambia, near 10° N. lat. and 11° W. long. As far as its course lies within the mountain-region, it is joined by numerous tributaries, among which however the Coomba only is a considerable stream, and its course is rapid. Before it leaves the mountain-region it is said to form a cataract near 13° 20′ W. long., and from this point downwards the river is navigable for river-boats. At a distance exceeding a hundred miles from the sea the river divides into several branches. That branch which continues to flow in a western direction is commonly called on our maps Rio Grande, but the native name is Butolah. Small vessels may ascend it as far as Bolola, a short distance below the bifurcation. Its mouth is opposite to Bulama Island, which belongs to the group of the Bissagos or Bijooga Islands. [BISSAGOS.] That arm which runs northward from the point where the bifurcation takes place is called Jeba river. Having continued in that direction about 50 miles, it turns westward and divides again at the Portuguese settlement of the same name. This branch is navigable for small vessels from Jeba to the sea, and for larger vessels from a point about five miles above Bissao. The most northern arm, which is called the Cacheo river, is navigable for vessels drawing not more than ten feet water to the settlements of Cacheo; and for smaller ones much farther. As the country between these arms is exceedingly low, and its soil mostly consists of alluvium, which is inundated for some months in the year, there is said to be a great number of minor channels by which the principal branches of the rivers are united.

The river Nuñez, or, as it is called by the natives, Kakoondee, is much inferior in size: its whole course probably does not exceed 250 miles, while the Rio Grande runs more than 400; but it offers a safe navigation to a great distance from the sea. It rises in that chain of hills which separates Senegambia from Sierra Leone near 13° W. long., and its general direction for about two-thirds of its course is to the west, and the remainder to the west of south. In the upper part of its course it is full of rapids and falls. It becomes navigable for vessels of moderate size above the settlement of Debucko or Rebucko, and up to this place the tide ascends. From this place downward the general depth of the river may be stated at two and a half to three fathoms at low-water, with a rise and fall of about twelve feet. The river has three channels at its mouth, two of which are navigated by vessels. The northern admits only vessels drawing less than twelve feet, but the southern may be entered by large ships. They are separated from one another by an island called Sandy Island. The low country near its mouth is uninhabited for want of fresh water, and the first settlement, Walkeria, occurs at the distance of 70 miles from the sea, measured along the course of the river.

Climate.—The year is divided between the rainy and the dry seasons. The commencement of the rainy season varies between the 1st of April and 1st of June, and its termination is between the 1st and 31st of December. The rains in the beginning are neither frequent nor heavy; but towards the end of June they begin to increase, and in July and August they sometimes continue for two or three days together. They are frequently accompanied by violent gusts of wind, called *tornadoes*, attended with thunder. In September the rains are generally slight, and tornadoes with heavy rains are comparatively rare. In October and November only slight rains occur at intervals of several days. Tornadoes occur at the beginning and termination of the rainy season. The prevailing winds during this season are from the south-west to the west and north-west; towards the end of November, from the north-east and east, and they immediately produce a great change in the face of the country. The grass soon becomes dry and withered; the rivers subside rapidly, and many of the trees shed their leaves. About this period the *hamattan* is generally felt, a dry and parching wind which blows from the north-east, and is accompanied by a thick smoky haze, through which the sun appears of a dull red colour. This wind has been compared with the samiel of the Arabian desert, but it does not produce such hurtful effects. It blows from that side where the Sahara is situated, and passing over its sandy plains, it acquires an extraordinary degree of dryness, parching up everything which is exposed to it. It is however considered healthy, especially by the Europeans. During the long rainy season the air is so loaded with moisture, that the inhabitants may be said to live in a sort of vapour-bath, and everything which is not close to the fire becomes damp and mouldy. The hamattan quickly changes this state of things, and many persons who have fallen ill during the rains, recover in a short time. But it produces chaps in the lips, and afflicts many of the natives with sore eyes. The easterly winds of the dry season extend to the shores of the sea as far south as Cape Verde. But south of it, Captain Belcher, in surveying this coast, found that the westerly and especially north-westerly winds were almost continuous, except in some places where there is a regular alternation of land and sea breezes, the land-breeze blowing with great regularity from 10 o'clock in the evening till sunrise. In these parts there is always a haze over the land during the dry season, particularly in the day, by which the view is very much limited; but in the rainy season every shower clears the atmosphere, and distant objects are distinctly seen.

Senegambia has long been noted for the great degree of heat to which it is subject all the year round. It was considered to be the hottest country on the globe, at least of those which border on the sea. But this opinion was founded on imperfect observations. It does not appear to be subject to a greater degree of heat than other countries situated in the same latitude, except those tracts which lie along the banks of the river Senegal, and consequently in the vicinity of the Sahara. The French settlement of Bakel on that river is more than 300 miles from the sea in a straight line, and consequently its temperature can be little affected by the ocean, while it is much affected by the vicinity of the desert. In Gray's 'Travels in Western Africa' there is a summary account of the temperature of that place, according to which it appears that during the five months of heavy rains, from July to November, both included, the mean temperature is 82·62°; for the three following months (December to February) 78·12°; and for the remaining four months 86°. The mean annual temperature appears therefore to be somewhat above 83°, or four degrees higher than along the coast. The thermometer occasionally rises to 110° in April and May which are the hottest months of the year, and sinks in December to 56·25°, which gives a range of 54° of the thermometer during the year. We are almost entirely without information respecting the temperature of the mountain-region. A few observations in Gray's travels seem to indicate that the temperature, not far from the sources of the Rio Grande, is from 10 to 12 degrees lower than that of the low valley of the Gambia near Pisania, and it is probable that the temperature of the table-land of Foota Jallon is still lower. In all the parts of Senegambia which are remote from the coast, the hottest part of the year is during the last months of the dry season and at the beginning of the rains; but on the coast the rains immediately depress the temperature several degrees. On the coast, the range of the thermometer generally varies between 65° and 95°, and rarely attains 100°. The mean annual temperature is 79·7°.

Productions.—A country with such a climate and extensive tracts of great fertility must be capable of producing all kinds of tropical vegetable products. It does not appear that any of our grains are cultivated, nor other plants which constitute important objects of agriculture in Europe, with the exception of hemp, which however is not exported, but made into ropes and cords, in which state it is brought to the European settlements. The grains which are cultivated to a great extent are rice, maize, and millet. Rice is chiefly grown in great abundance in the valleys of the rivers, which are all subject to inundation during the rainy season; but it is also raised in the lower districts, particularly in the country surrounding the numerous arms of the Rio Grande. In the more elevated tracts, and especially in the mountain-region, maize is the principal grain which is cultivated, and millet is extensively grown in the more sterile parts, especially between the Senegal and Gambia. Besides these grains there are cultivated for food the ground-nut, mandioc, yams, and bananas. The most common vegetables are red-pepper, pumpkins, water-melons, gourds, sorrel, onions, a kind of French beans, and ginger. Cotton and indigo are grown in many places; the latter grows wild. The fruit-trees of Europe do not succeed, except oranges, lemons, figs, and vines; those which are cultivated are rhamnus lotus, dates, papaws, guavas, and pistaccia-nuts. The forests contain several trees, the fruits of which are used as food. The most remarkable is the butter-tree (*Elæis Guineensis*). The immense forests which cover a great part of the country consist of a great variety of trees, among which the baobab is distinguished by its size. Other trees are used as timber, dyes, or for cabinet-work, as the African teak, the mahogany-tree, the mangrove, and others. Several articles of commerce are collected in the woods. The mimosa from which the gum is obtained is common on the table-land of the Jaloofs, though less so than north of the Senegal. There are some trees which yield caoutchouc. Cassia and cardamums are brought from the interior to the coast. Orchil, an important article in the Portuguese settlements, is also collected in the interior. Along the sea-coast, and also on the islands, and in the low flat country between the Rio Nuñez and the Gambia, different kinds of palms are found in great abundance; palm-oil and palm-wine are important articles of domestic economy. The cabbage-tree is also common.

The domestic animals do not differ from those of Europe, except that a few camels are kept in the desert of the Jaloofs and in the countries near the Sahara. Horses are numerous and the breed is good. A great number are shipped from the Gambia to the Cape Verde Islands and Sierra Leone. Black cattle is very plentiful and of great size. Butter in a melted state is a considerable article of inland trade, and hides and horns are largely exported. Sheep and goats are confined to some tracts, but pigs and fowls are reared everywhere, the negroes being very fond of pork, though those who are Mohammedans abstain from it. Among the wild animals the elephant occupies the first place. Though not common in the low swampy countries along the coast, in the interior, and especially in the wooded country between the upper courses of the Gambia and Faleme, and in the Wilderness of Jallon Kadoo, there are numerous herds of elephants, and from these parts nearly all the ivory is brought which is exported from the English and Portuguese settlements on the Gambia, Rio Grande, and Nuñez. The tusks of these elephants however are in general not so large as in the countries nearer the line. The hippopotamus is numerous in all the rivers, especially in the Senegal. It is even found in the sea which separates the Bijooga Islands from the continent. There are lions, leopards, and panthers. The striped hyæna is very common. The wild animals which are used for food are the buffalo, the wild boar, which is of prodigious size, deer of different kinds, antelopes, the hare of the Cape, and porcupines. There are also several kinds of monkeys, some of which are eaten. The cynocephalus is destructive to the fruits. Alligators frequent all the rivers, and the boa is found in the lower marshy country. Among the birds the white heron is one of the most beautiful. Guinea-fowls, turtle-doves, and wood-pigeons are abundant. Plovers of various kinds, wild ducks and geese, are met with in immense flocks on the edges of the marshes in the lower country. On the desert islands and cliffs along the coast there are large flocks of boobies. Turtles are rather numerous on some of the islands. The rivers do not abound in fish so much as the sea, particularly round the Bijooga Islands. Perhaps there is no country on the globe where bees are more common; honey is a considerable article of inland trade, and wax in large quantities is exported. There are several kinds of large ants; their hills resemble the huts of the negroes.

We know very little of the mineral wealth of Senegambia; but it would seem that the greater part of the mountains are mainly composed of iron-stone, and that iron exists there in inexhaustible quantity. The natives are also acquainted with the art of extracting the metal, and there are furnaces in some parts. The iron thus obtained is of various quality; some is said to be very malleable. Gold is found in those parts which lie between the affluents of the Upper Senegal, as in Bambook, Fooladoo, Manding, &c. It occurs mostly in the form of small grain or powder in an alluvial soil. Part of it reaches the European settlements on the coast; but the greater part goes into the interior of Africa and the countries on the Mediterranean by the way of Timbuctoo.

Inhabitants.—The inhabitants of Senegambia belong properly to the negro race. But it appears that from a very remote period the Moors, who inhabit the north-western part of Africa, and wander about in the Sahara, have entered Senegambia in considerable numbers, and mixed with the most populous tribes of the negro race. These tribes are known under the names of Foulahs or Foolahs, Jalofs or Jaloofs, Mandingoes, and Serrawollies; and they occupy the more elevated part of Senegambia, leaving to the other minor tribes only the low country which extends along the sea from the mouth of the Gambia to Cape Verga. The most northern of these smaller tribes are the Sousous and Feloops, who inhabit the country between the Gambia and Rio Grande. The islands formed by the last-mentioned river are occupied by the Papels and Balantes. The Landamas live between the Rio Grande and the river Nuñez, the Naloos south of the Nuñez, and the Bagoes on the low shores of the sea on both sides of the Nuñez.

The nations among which the Moors have settled have partly embraced the Mohammedan religion. The structure of their body differs also more or less from that of the true negro race. The inhabitants of Bondoo, who are a mixture of Foolahs, Mandingoes, Serrawollies, and Jaloofs, are described as of middle size, well-made, and very active; their skin of a light copper colour, and their faces of a form approaching nearer to the European type than any of the other tribes of Western Africa, the Moors excepted. Their hair too is not so short and woolly as that of the negroes, and their eyes are larger and rounder, besides being of a better colour and more expressive. The women in particular vie in point of form with the handsomest women in Europe, and they have very delicate features. The different tribes speak different languages; but that of the Foolahs and Mandingoes is generally understood by all of them. In point of civilization they are far more advanced than the other black tribes. They cultivate the ground with industry and skill; they are well acquainted with the advantages of commerce; they are active traders, and they manufacture clothing, the different articles of household furniture which they require, together with the implements of husbandry, carpenters', blacksmiths', and leather-workers' tools and knives, spear and arrow heads, bridle-bits, and a variety of small articles. All these things, taking into account the very rough materials and tools that are employed, are finished in a manner which shows great taste and ingenuity on the part of the workmen, and leads to the supposition that they have practised those arts for a long time. There are schools in almost every town for the instruction of youths who intend to make the Mohammedan religion their profession, in which they are instructed in reading and writing Arabic from the Korán. Their habitations are rather small, but they are kept clean and neat. They do not go naked, but are dressed in a very decent manner. The women dress in cotton stuffs of their own manufacture, except that some have a few pieces of silk and painted cotton, which they obtain from the European settlements on the coast. They always wear a veil thrown loosely over the head, which is intended to imitate thin muslin; and it must be admitted that they have by no means made a bad attempt.

The smaller nations, who exhibit in their bodily structure the true negro type of the Ethiopian race [Man, vol. xiv., p. 363], have remained in a much lower state of civilization, though they are much above the savages of South America. They cultivate some rice, but in a very unskilful and slovenly way. They have plenty of pigs and fowls, but few cattle, and no other domestic animals. They generally wear only a piece of cloth about their loins. Their huts are extremely dirty, and their habits are improvident. They are ferocious in their manners, treacherous, cruel, and oppressive; and a tribe of the Bagoes are complete pirates.

Political State of Society.—We have little information on this point respecting the smaller and less civilized tribes. It appears that little authority has been introduced among them, and that in this respect they resemble the savage tribes of America. They do not keep slaves, and have adopted the practice of selling their prisoners of war to the slave-traders.

The larger tribes however have established regular government. In most of the small and independent states of Senegambia it resembles the government which formerly existed in Poland, the administration of the country being in the hands of the king and an hereditary nobility. Each town or district is under a chief. It would also seem that certain revenues,—as, for instance, the presents received from the merchants who traverse the country with goods,—are divided among these petty chiefs. But the king has the power of making war and peace. In case of war, the chief of each village must proceed to head-quarters with his followers. All these nations keep a considerable number of slaves. The government of Footatoro is a kind of theocratical republic.

Political Divisions and Places.—The whole country along the sea, from the mouth of the Senegal to Cape Verde, and as far inland as the western declivity of the table-land of the Jaloofs, is subject to the king or Dámel of Kayor, who resides in the town of Macaye, of which place we have no information. The inhabitants are Jaloofs. Within the boundary of this state is the town of Cogue, which is a commercial place, as two roads unite here, one leading southward to the Gambia, and the other eastward to Footatoro. It has 5000 inhabitants, and many Moors are settled there. The numerous villages on the rocky peninsula of Cape Verde constitute an aristocratical republic, governed by a senate, which is composed of the chiefs of these villages.

Between Cape Verde and the mouth of the Gambia are the small states of Baol, Sin, and Barra. Baol is dependent on Cayor. Sin contains the small harbour of Jaol. Barra comprehends the country north of the mouth of the Gambia, where the king resides in the town of Albreda with 3000 inhabitants. The French have a commercial establishment at this place. East of Barra is the small state of Badiboo. The countries are inhabited by Jaloofs, with the exception of Barra and Badiboo, where Mandingoes are numerous.

North of the two last-mentioned states is that of Salum, which extends westward to the sea, where it occupies both sides of the river Joombas. The capital Cahore is built on its banks, and small vessels can ascend as far as the town. It is a considerable place, and has some commerce with the French settlement of Goree. On the east Salum extends to the banks of the Gambia, and on the river is built the town of Kawour, a commercial place with 800 inhabitants. The population consists of a mixture of Jaloofs and Sousous. Between Salum and the state of Wooli, which lies farther east, are the two small states of Yanimaroo and Katoba, both on the north bank of the Gambia. In Katoba is the small commercial place of Kayaye, where an English merchant resides. The inhabitants are a mixture of Mandingoes and Sousous. Wooli is mostly inhabited by Foolahs. It extends a considerable distance along the banks of the Gambia, and Medina, the capital, has about 1000 inhabitants; but in its vicinity there are some still larger places.

On the southern bank of the river Senegal, not far from its mouth, begins the kingdom of Walo, which extends nearly to the western extremity of the island of Morfil. It is inhabited by Jaloofs and the capital is Ender. The islands of Morfil and Bilbos, and the country south of them along the Marigot of Morfil, are inhabited by Foolahs, subject to a sovereign called Siratic. On the northern declivity of the table-land of the Jaloofs is the state of Burba Jaloof, inhabited by Jaloofs; it is of great extent, but a large part of it is a desert. The residence of the king is Wamkror. On the eastern declivity of the table-land lies the state of Footatoro, which comprehends also the low land along the western banks of the Senegal, where it runs northwest. This country, which is more extensive than most of the others, is divided among seven chiefs, who form a council, and elect a marabout, or priest, for their king, who however can do nothing without the consent of the council, and reigns only during its pleasure. It frequently happens that this chief of the federative aristocracy is changed two or three times in a year. The capital of Footatoro is Chuloigne. Sedo and Canel are rather large towns. The inhabitants are chiefly Foolahs.

The states hitherto noticed are situated in the lower region between the Senegal and Gambia. In the mountain-region and contiguous to the western and southern banks of the Senegal is Galam, which comprehends the country from the Falls of Feeloo (10° 30′ W. long.) westward, but does not extend to a great distance from the river. It is divided into Lower and Higher Galam, by the Ba Faleme. The latter is also called Kajaaga. It is densely inhabited, a string of towns occurring along the banks of the river, among which Tuabo, Makanna, and Mussala are considerable places. At some distance from the river is the town of Joag. The inhabitants are mostly Serrawollies; they are much engaged in trade with the French who are established on the banks of the Senegal and the countries which lie farther east as far as the Joliba. They are distinguished by their manufacture of cotton stuffs, to which they give a fine and permanent blue colour.

Between Galam and Wooli on the Gambia is Bondoo, the most powerful state in these parts of Senegambia, which is probably owing to the king, whose title is Alamy, being less dependent on the chiefs of the villages and towns. The inhabitants, who are a mixture of Jaloofs, Foolahs, Serrawollies, and Mandingoes, are much occupied in trade and manufactures. The most important places are Boolibany and Fatteconda. East of Bondoo and south of Kajaaga is Bambouk, which is noted for its gold-mines. [Bambouk.]

The other states which lie farther east and south in the most elevated part of the mountain-region and between the numerous tributaries of the Senegal, are much less known than those hitherto described. There are probably some of which we have no information at all. The most extensive are Foolado, the antient country of the Foolahs, who however were expelled from it by the Mandingoes, with the towns of Koeena, Kemiinoom, and Bangassi; Manding, the native country of the Mandingoes, which comprehends the most eastern portion of the mountain-region, and has several mines of gold, with the towns of Sibidooloo and Kamalia; Jallon Kadoo, the uninhabited wilderness which extends between the sources of several branches of the river Senegal; Konkodoo on the Ba Fing, or principal branch of the Senegal, which has some rich mines of gold, with the town of Konkroma; Satadoo, with the capital of the same name; and Dentilla, with the towns of Baniserile and Kirwani, which is inhabited by very intelligent agriculturists, and where there are several smelting-furnaces. On the river Gambia is the petty state of Neola, with the town of Tambacunda; and that of Tenda, with the town of Jallacotta.

It does not appear that there is any large kingdom or state south of the Gambia, with the exception of that of Foota Jallon. This kingdom indeed seems to have acquired a decided superiority in the southern parts of Senegambia, more especially south of the Rio Grande: for as it has subjected the tribe of the Landamas, who inhabit the country between that river and the Nuñez, and rendered it tributary, it may be said that its dominions extend to the very shores of the sea. The principal seat of its power is the well cultivated and populous plains of the elevated table-land of Foota Jallon, where the capital, Timbo, not far from the sources of the Senegal, contains 7000 inhabitants, and several other towns from 3000 to 5000 inhabitants, as Labee: in some places the villages are nearly contiguous to one another. The mountain-ranges which surround these plains are all subject to the sovereign of Foota Jallon, who seems to consider also the wild and uninhabited countries along the upper course of the Gambia, and between it and the Faleme, as belonging to his dominions. How far they extend to the east and south is not exactly known, but they do not appear to reach the banks of the Joliba, nor beyond the principal range of the Kong Mountains. Most of the inhabitants are Foolahs, but in the fastnesses of the mountains there are still some small native tribes of negroes. As the shortest road from the sea-coast to the countries on the upper course of the Joliba or Quorra is that which traverses this table-land, Foota Jallon will probably rise to some importance with the extension of European commerce. It seems that a regular commercial connection already exists between it and our settlements at Sierra Leone. [SIERRA LEONE.] In the country which extends between Foota Jallon and the coast, there does not seem to be any political society which deserves the denomination of a state. Each village appears to have a chief, but there is no political connection among the villages.

European Settlements and their Trade.—The European settlements in Senegambia differ materially from those in other parts of the world. They are strictly commercial. The settlers have not acquired the property of any land, except the place on which they have settled, and no cultivation is carried on by them or their people, except at a few spots which are rather gardens than plantations. These settlements were originally established for the purpose of procuring negro slaves for the plantations in America. The country however had other productions which were valued in Europe, and the natives of the interior were desirous of obtaining several articles of European manufacture, partly for their own consumption and partly to sell them to the nations of Soodan. Accordingly these settlements were not abandoned on the abolition of the slave-trade, like those on the coast of Guinea [GUINEA], and they continue in a thriving state. Each of the three European nations which have formed settlements has taken possession as it were of one of the three large rivers, the French of the Senegal, the English of the Gambia, and the Portuguese of the Rio Grande. Each has built a fortress on an island not far from the mouth of the river, which serves as a safe place of deposit for goods which are imported, and from which the productions of the country are shipped. The merchants set out from these places in large river boats with their goods at certain seasons of the year, and ascend the rivers as far as they are navigable. They stop at certain points to which the natives bring their productions to exchange for European manufactures. In a few positions on the banks of the rivers small fortresses or blockhouses are erected, in which some black soldiers with two or three European officers are kept for the protection of commerce. Some merchants, particularly English and Portuguese, have formed commercial establishments not far from these fortresses in those villages which are advantageously situated for commerce.

The principal French settlement is St. Louis, a town containing about 15,000 inhabitants, of whom about 800 are whites. It is built on a sandy island, about two miles long and a quarter of a mile wide on an average, which is about five miles from the mouth of the river. Only vessels drawing less than 12 feet of water can sail up to the town, as there is a bar across the mouth of the river. [SENEGAL.] The streets are straight and regular, but otherwise the town has nothing remarkable in it; few of the houses are well built, and the negro population live in huts. The French have also two small fortresses on the banks of the Senegal, one at Podhor, at the western extremity of the island of Morfil [SENEGAL], and the other at Bakel, or Baquelle, in the kingdom of Lower Galam, not far from the junction of the Faleme with the Senegal. Between Podhor and St. Louis there are several places to which the Moors of the tribes of the Trarza and Braknas bring at certain seasons the gum which they collect in the mimosa forests of the south-western districts of the Sahara. Such places are called markets, and are only inhabited during the stay of the Moors. The most frequented are the Escale du Désert and the Escale du Coq, or Braknas. At Bakel the French get a part of the produce of the gold-mines of Bambouk and some ivory which is obtained in the wild countries farther south, but the largest part of the ivory is carried to the Gambia. The French have also a fortress on the island of Goree, near Cape Verde [GOREE], where they formerly procured a considerable number of slaves. At present some small quantities of cotton and indigo are got on the coast between Goree and the mouth of the Gambia, especially at Albreda, a mercantile settlement in the kingdom of Barra. The French have lately formed an establishment at the mouth of the river Casamanza, which enters the sea between the Gambia and the Rio Grande, but we have no information respecting this place and its trade.

The English settlements are principally on the Gambia. Some English merchants have formed establishments on the river Nuñez at three places, which however are not protected by government. The Foolahs from Foota Jallon and its neighbourhood bring to these settlements gold in the form of rings, weighing from one to ten ounces each, ivory, some slight articles of leather, pouches, rice, and fruit. The principal fortress on the Gambia is Bathurst on the island of St. Mary [BATHURST, vol. iv., p. 38], but there are several mercantile settlements farther inland up to Macarthy Island, which is about 180 miles in a straight line from Bathurst, where a small fortress called Fort George has been erected. A mercantile settlement is found still farther east at Kayaye, and formerly one existed at Pisania, but it has been abandoned. Fort St. James is about 20 miles east of Bathurst. It does not seem that the British settlements have suffered by the abolition of the slave-trade. The exports from Bathurst are numerous and increasing: they consist of bees'-wax, ivory, African teak, rice and maize, hides, gold, ginger, gum, palm-oil, timber, horses and bullocks, which go to the West Indies, tortoise-shell, bullocks' horns, ground-nuts and orchil.

The Portuguese settlements are dispersed along the banks of the different arms of the Rio Grande and on the Casamanza. The principal settlement is Bissao, a well-built fort and town on a large and fertile island of the Jeba branch of the Rio Grande. It has about 3000 inhabitants and an excellent and spacious port; the population consists chiefly of mulattoes and blacks. Higher up the same branch of the Rio Grande is Jeba, with a population short of 1000 inhabitants, which likewise consists of blacks and mulattoes. On the southern branch of the Rio Grande is Bolula, a mercantile establishment, and on the northern or Cacheo branch the town of Cacheo, a considerable place with a harbour, which however is only accessible to vessels drawing ten feet of water, as a bar runs across the mouth of the river. In the country of the Feloops, between the Cacheo branch of the Rio Grande and the Gambia, the Portuguese have several settlements, as at Zinghinchor and Mahia Kakonda on the Casamanza river, and at Vintang on a small river which falls into the Gambia. To all these places the natives bring ivory, wax, hides, horns, and some gold, the greater part of which is shipped to England from Bissao and Cacheo. Many Portuguese have settled in this country as agriculturists and have married black women. The number of mulattoes in these parts is considerable.

Nearly all the articles of commerce which are exported from the European settlements in Sengambia are brought from the interior by small caravans or cafilas, which sometimes proceed to the coast, but generally stop at certain places where commercial establishments are found, and take in exchange for their goods, fire-arms, powder, India goods, coral, amber, glass-beads, iron, tobacco, rum, and cutlery. Though a great part of Senegambia is rich in iron-ore, the process of obtaining the metal from it is so rude and requires so much labour, that many of the natives prefer buying it from Europeans.

Commerce with Soodan and Timbuctoo.—A considerable commerce is carried on between Senegambia and the countries farther east. The principal articles of trade are salt, slaves, and gold. All the salt which is consumed in Senegambia and Soodan is drawn either from the great salt depôts of the Sahara at Shingarin and Toudeni, or from the coast of the Atlantic between the mouths of the Gambia and Cape Verga, where some of the savage tribes, especially the Bagoes and Balantes, make large quantities from sea-water. The salt made on the sea-coast is carried by the native traders nearly over all Senegambia; for Mungo Park observes, that both kinds of salt are brought to Booree in Manding, but it would seem that the salt of the Sahara is consumed in some of the countries situated on the middle course of the Senegal. Even before the abolition of the slave-trade slaves were sent from Senegambia to Timbuctoo, whence they found their way to the northern countries of Africa; and it is supposed that this branch of commerce has lately much increased. A large portion of the gold collected in the countries situated on the banks of the upper branches of the Senegal goes likewise to Timbuctoo, and thence to the countries on the south of the Mediterranean. The cafilas by which this commerce is carried on follow two routes. The most northern departs from the Senegal in the kingdom of Kajaaga or Upper Galam, to which country the traders go from all parts of Senegambia. Hence the road runs east-north-east to Yarra, and then east to Benown in Ludamar. From Benown it continues east through countries which are little inhabited on account of their sterility, to Walet in Beroo. From Walet it again passes through deserts, until it approaches the Joliba near Baracanga, whence it continues at a short distance from the banks of the river to Timbuctoo. The southern caravan-route leads from the banks of the Gambia through Neola, Dentila, and Konkodoo, to the great wilderness of Jallon Kadoo, which having traversed from west to east, it passes over the mountain-range between Kamalia and Bammakoo. At Bammakoo the goods are embarked on the Joliba, and descend to Yamina, Sego, Sansanding, Jenneh, and Timbuctoo.

(Golberry's *Travels in Africa*; Mungo Park's *Travels in the Interior Districts of Africa*; Mollien's *Travels in Africa to the Sources of the Senegal and Gambia*; Gray's and Dochard's *Travels in Western Africa*; Caillié's *Travels through Central Africa to Timbuctoo*; Savigny's and Corréard's *Narrative of a Voyage to Senegal*; Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar*; Belcher's *Extracts from Observations on various points of the West Coast of Africa*, in *London Geogr. Journal*, vol. ii.; Hay's *Supposed Junction of the Rivers Gambia and Casamanza*, in *London Geogr. Journal*, vol. iii.; *Proceedings of the Association for Promoting the Discovery of the Interior Parts of Africa*; Brunner, *Reise nach Senegambia*, Bern, 1840.)

SENESCHAL, a word rarely used except by persons who affect a kind of refinement of style which they think is attained by using words of exotic growth rather than words the natural growth of their own soil, the meaning being precisely that which is represented by the word 'steward;' and this when the word is applied to officers so designated of the greatest eminence; the lord-high-steward of England or of Scotland being the proper phrase for that great officer, and not lord-high-seneschal. But the functions of the officer called steward in Britain corresponding with those of the officer called seneschal abroad, and especially in France, when the word appears in Latin, it is represented by *senescallus*, writs running 'Senescallo Hospitii Regis,' &c., when addressed to the steward. In poetry and romance-writing it is sometimes used for a principal officer in the household of distinguished persons, when it is thought that the word steward would be too familiar, and suggest an officer whose duties are of an inferior class to those of the seneschal.

SENLIS, a town in the department of Oise in France, 26 miles from Paris on the road to Cambray and Mons. This town was the capital of the Silvanectes, an antient Belgic nation, and received from the Romans the name of Augustomagus, which towards the close of the Roman period was exchanged for the name of the people, Silvanectes, whence by corruption the modern name of Senlis. It was at this period a walled town, and some remains of the walls still exist. The Carlovingian kings had a palace at Senlis. In the middle ages it gave title to a county held by a branch of the Carlovingian family, and sometimes united with the counties of Valois and Vermandois, and afterwards united to the crown. In A.D. 1173 the municipality of Senlis was established by charter, and confirmed, A.D. 1201, by letters of Philippe Auguste. The town was taken by the peasantry of Valois in the revolt of the Jacquerie in the fourteenth century; and by the Bourguignons in the civil broils of the fifteenth. In A.D. 1418 it was besieged in vain by the Armagnacs; but surrendered to Charles VII., A.D. 1429. It was repeatedly attacked, sometimes successfully, by the opposite parties in the war of the League.

Senlis is on the slope of a hill rising from the north bank of the Nonette, a feeder of the Oise: it consists of the city (La Cité), of an oval form, surrounded by boulevards and the remains of antient fortifications, and three suburbs. The remains of the fortifications, consisting chiefly of the ruins of the two gates of Meaux and Bellon, and of the castle, show the place to have been very strong. The streets are generally narrow and crooked, and the houses ill-built. One street, which traverses the town in a north-east direction, is wide and straight, but is lined chiefly with garden walls. There are some pleasant promenades. The ex-cathedral is a Gothic building of moderate size, of the age of Louis XII. It has two western towers, one of them crowned with a spire, 224 feet high according to some authorities, or about 284 according to others. There are a college, a handsome theatre, public baths, an hospital, and an ex-abbey, now used as a cotton-mill.

The population in 1831 was 5066, in 1836 it was 5016 The chief manufactures are of cotton and woollen yarn, calico, linen, lace, leather, glove-leather, parchment, potato-starch, chicory, and chocolate. There are bleach-grounds for linen, washing-places for wool, saw-mills for marble and other stone, a large stereotype printing-office, employing 200 men (Dupin, *Forces Product.*), and a letter-foundry. There is one yearly fair of nine days, and a monthly market for wine. Trade is carried on in corn, flour, wine, timber, and stone. There are stone-quarries and extensive woods near the town, and sand-pits for the sand used in making flint-glass; there are also some lime-kilns.

The arrondissement of Senlis comprehends an area of 511 square miles, and includes 132 communes. It is divided into seven cantons or districts, each under a justice of the peace. The population in 1831 was 79,080, in 1836 it was 78,790.

SENNA. [CASSIA.]

SENNA is a country on the eastern coast of Africa, and a portion of that region which on our maps is called Monomotapa, and has acquired some fame on account of the rich mines of gold which it contains. It is situated between 16° and 20° S. lat., and between 30° and 37° E. long., and is stated to cover a surface of 43,200 square miles, being only about 7000 square miles less than England. It forms the capitaney of the Rios de Senna, the only territory that the Portuguese really possess on the east coast of Africa, their other possessions, as Mozambique, Pemba, &c., consisting only of fortified towns, to which no territory or only a very small territory is annexed. This capitancy is bounded on the east by the sea, on the south by the mountains of Sofala, and it extends to the kingdoms of Quiteve and Barne, which enclose it on the west. To the north of it is the independent kingdom of Moraves, from which it is chiefly separated by the course of the river Zambizi.

The shores of Senna are low, and continue so for some distance inland, but the country gradually rises as we proceed westward. At the distance of 150 to 180 miles from the sea there are some ranges, which do not appear to rise to a great height. They seem to run parallel to the coast, and to be divided into two ranges by the wide plain of Senna, through which the Zambizi runs. A great part of the country west of these ranges appears also to be a plain, the surface of which however is hilly. In approaching the western boundary near 30° E. long. the country is covered with mountains.

Senna is well watered; numerous small rivers descend from the adjacent mountains, all of which join the Zambizi. This river, whose course probably exceeds 800 miles, originates in the countries west of Senna, of which we have no account. Its upper course within Senna is from south-south-west to north-north-east, but it gradually turns more to the east. It is not known where it becomes navigable, but it is certain that from the town of Teté downwards it is navigated, though the navigation is very tedious in the wet season owing to the rapidity of the current, and in the dry season on account of the numerous shoals and the deficiency of water. Above Teté the Zambizi enters the flat country, but it runs between high rocky banks until it enters the low country at the distance of about 50 miles from the sea in a straight line. In the low country it divides into two branches at Marooro, of which the northern is called the river Quilimane, and the southern Luabo, and both branches are navigable. A large branch separates from the Luabo not far from the place of division, and bisects the delta of the Zambizi, falling into the sea at nearly an equal distance from the mouths of the Quilimane and Luabo. It is called the Melambey, from a place near its mouth. The embouchures of the Luabo and Quilimane are about 60 miles from one another. Where these rivers flow through the level tract, they form a great number of islands, which in some places are so numerous as to constitute an archipelago, and by which the volume of water brought down by the river is divided into numerous narrow channels, in which the current running with great velocity renders the navigation laborious.

The delta of the Zambizi and the low country near the sea consist of a flat, which is marshy and covered with mangroves to low-water mark. Higher up the banks are more elevated, the ground is cleared to a greater extent, and the country abounds in villages: but towards the place where the river divides into arms, nearly the whole surface of the country is covered with rushes and bamboos, interspersed with extensive swamps, which during the rainy season send up pestilent vapours. A few isolated trees, a species of palm, are scattered over this unwholesome waste. The more elevated part of the country, about the town of Senna and higher up the river, is an extensive plain, which descends towards the banks of the river with a gentle slope. It is chiefly covered with a forest consisting of a great variety of trees, which are united by creeping plants climbing and hanging from branch to branch in festoons. In some places these trees are of a vigorous growth, but in general they are stunted.

The year is divided between the rainy and the dry season. The rains commence in the beginning of November, and continue to the end of March. They are very abundant, especially in the beginning of the wet season. The river soon rises above its banks, and inundates the contiguous country to the distance of several miles inland. During this period the heat is very oppressive, but not unwholesome in the higher parts of the country, except in the vicinity of lakes.

The cultivated grains are rice, maize, millet, and wheat. The sugar-cane was introduced some time ago, and seems to succeed well. Coffee is grown in the more elevated country. Indigo grows wild, as well as the cotton-shrub, which produces cotton of a very fine quality. The latter is cultivated by the blacks, but only for home consumption. It is stated that in some parts of the colony a deep scarlet-coloured cotton is produced. Vegetables are grown in considerable quantities, consisting of cabbages, lettuces, spinach, peas and beans, potatoes, yams, and ground-nuts. A kind of grass is cultivated as food. Before it is quite ripe, it is plucked, dried, and husked in a large wooden mortar, and then ground between two rough stones. The meal thus obtained is made into a porridge, which is generally eaten with fish. The fruit-trees are only tamarinds, oranges, cocoa-nuts, palms, and mango-trees. Among the forest-trees is a species of cotton-tree, of a gigantic size, frequently measuring sixty feet in circumference. The wood is used for canoes in preference to any other, as not being subject to the attack of worms. Large boats fifty feet long are made of a single tree hollowed out.

The wild animals are elephants, rhinoceroses, lions, hippopotami, alligators, monkeys, and deer; but there are probably many others, which have been overlooked by the few persons who have visited this country. There are the common domestic animals. In Owen's 'Narrative' tiger-skins are mentioned as one of the articles of export. Fish is very plentiful in the river, and constitutes one of the principal articles of food of the negro population. Bees are very common, and wax is an article of export.

Gold and iron are the only metals which are known to exist in abundance. Gold is chiefly found in the mountains of Sofala, and in those which surround the colony on the west; and it does not appear that this article is brought from the kingdom of Moraves, but it is obtained in those of Quiteve and Barne. Iron is obtained in abundance from the southern districts of the colony, and also from the kingdom of Moraves: the hoes with which the slaves till the ground are made of it. Marble is got in the hills which run parallel to the coast. The population consists of a few Portuguese and mulattoes, and a great number of blacks. According to the statement of the governor of Rios de Senna, the number of the whites and mulattoes in 1810 did not exceed 500. The negroes are partly free and partly slaves of the whites and mulattoes. It is not stated whether they belong to one or more tribes, nor whether they speak one or more languages. The colony is divided into several districts. Every district is governed by a Portuguese, who pays annually a small tax to the king, and collects a revenue from the free negroes resident on his land. These negroes pay the taxes in kind, consisting of bees'-wax, fowls, meat, vegetables, and rice.

The only harbour in the colony which is visited by vessels is that of Quilimane, about eight miles from the sea, on the northern arm of the Zambizi. [MOZAMBIQUE, vol. xv. 766.] The town of Senna, the capital of the colony, stands in a plain on the banks of the Zambizi, about 180 miles from the sea, measured along the bends of the river. Only about ten houses, inhabited by the Portuguese, have and pretensions to the style of European buildings: the black population live in huts. The number of inhabitants probably does not exceed 3000. A small part of the plain is cultivated; and the remainder is covered with a forest of tamarind, mango, and cocoa-nut trees. The largest place seems to be Teté, which is about 360 miles from the mouth of the Zambizi. It is described as superior, both in size and situation, to Senna and Quilimane, and stands in a mountainous tract, with the river flowing beneath: it is considered a very healthy place; and the inhabitants are a very active and industrious set of people: they cultivate the sugar-cane, and make sugar and muscovado.

This colony might become an opulent and commercial country; but it has been neglected by the government, and the inhabitants have not availed themselves of its fertile soil and its numerous and valuable productions. The few articles of export are those which may be obtained nearly without labour. They consist of the teeth of the hippopotamus, elephants' tusks, rhinoceros-horns, tiger-skins, honey, wax, and gold-dust. The imports, of which the greater part are sent into the interior for the purchase of gold, ivory, and slaves, are as follow: cotton stuffs of various qualities, coloured and plain, woollens and silks, millstones, false coral, large white and metal beads, pewter, gunpowder, arms, earthenware, brandy, wine, liquors, sugar, soap, salt-meat, butter, oil, pitch, lavender, salt-fish, spices, olives, tea, coffee, and chocolate. Many of these articles answer the purposes of money.

When Vasco de Gama entered the Quilimane branch of the Zambizi, he found a great number of Arabs in the country. The Portuguese seem to have taken possession of the coast about the middle of the sixteenth century; and having obtained some account of the great abundance of gold in the interior, Francisco Barreta penetrated, in 1585, as far inland as Teté. To protect the commerce which was eventually opened by this expedition, various forts and strongholds were erected on the banks of the Zambizi and its dependent rivers, to awe the surrounding tribes. The most important advantages that Portugal derived from this possession was an abundant supply of slaves for the Brazil market. (Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar*.)

SENNAAR is a country situated in the north-eastern parts of Africa, on the banks of the Nile, and at the junction of its two great branches, the Bahr-el-Azrek (Blue River) and the Bahr-el-Abiad (White River). It was formerly an independent state, and one of the most powerful in that part of Africa; but it now constitutes a part of the Egyptian province called Beléd-es-Soodán (or country of the blacks). This province comprehends all the countries which lie on both sides of the Nile south of Wadi Halfah, or the second cataract (near 22° N. lat.), with the exception of Abyssinia, and consequently comprises those countries which are known by the collective name of Nubia and Sennaar, to which must be added Kordofan. The most important part of Beléd-es-Soodán is Sennaar, and the seat of the provincial government has been fixed at Kartoun, a town built in modern times at the confluence of the Bahr-el-Abiad and Bahr-el-Azrek.

The boundary lines of Sennaar are imperfectly known; and, as it appears, they have varied considerably at different times, like those of most other countries in that part of Africa. It seems however that all the countries lying south of 16° N. lat. generally belonged to Sennaar, and that it extended southward to 12° N. lat., and perhaps somewhat farther. Between these parallels it comprehended the whole of the peninsula, or, as it is called by the natives, the Island of Sennaar, which is enclosed by the two great branches of the Nile, a considerable part of what is called the Island of Atbara, or the country between the Bahr-el-Azrek, the Nile, and the river Atbara, and a tract of country west of the Bahr-el-Abiad, extending along the banks of the river, with a part of the desert which divides this tract from Kordofan. Within these boundaries, Sennaar comprises, according to a rough estimate, about 60,000 square miles, or a little more than England and Wales. On the north is Dar Shendy, a part of Nubia, on the east some wandering tribes, on the south-east Abyssinia, on the south the mountain tribes of the Nuba, and on the west is Kordofan.

Surface and Soil.—The most fertile portion of this country is that part which lies between the two great branches of the Nile, and, as already observed, is called the Island of Sennaar. At its southern extremity, between 11° and 12° N. lat., is a mountain-region called Jebel Fungi, which however is only known from the accounts of the natives, as no European has penetrated so far to the south. It seems to constitute a link of that great chain which appears to traverse Africa in its whole width from east to west, near 10° N. lat., and which is called by Abulfeda and Edrisi Jebel-al-Komri, or the Mountains of the Moon. South of 11° the Jebel Fungi is certainly connected with the mountains of Abyssinia, and seems only to be divided from them by the narrow valley through which the Bahr-el-Azrek flows to the north. How near the Jebel Fungi approaches the banks of the Bahr-el-Abiad is not known, nor is it exactly known how far its most northern offsets advance into the peninsula of Sennaar. All the information collected from the natives however agrees in assigning to this range rich mines of gold and iron, both of which are worked. This part of Sennaar, so far as it has fallen under the observation of European travellers, that is, as far south as 13° 30′ N. lat., is a plain on which only a few isolated hills rise; and these hills do not occur north of 14° N. lat. The greater part of this plain appears to be formed by the alluvial deposit of the rivers. It is nearly a dead level, and the Bahr-el-Azrek rises during the floods to within 2 and 3 feet of the summit of its banks, and the Bahr-el-Abiad in most parts spreads over a large tract of country. The soil is in general very good, and in some parts of excellent quality, though there are also tracts which are nearly sterile. With the exception of these tracts, which do not appear to be of great extent, the whole might be made available for agricultural purposes; but at present it does not produce much, as artificial irrigation is little practised. Dhourra however is sown at the end of the rainy season, but in general only so much is grown as is necessary for the maintenance of the population. Burckhardt however states that a great part of Nubia, or the countries north of Sennaar, receives annually large supplies of dhourra from Sennaar. Holroyd thinks that if a canal were cut from Wadi-Medinah on the Bahr-el-Azrek to Monkarah on the Bahr-el-Abiad, with branches north and south, almost all the land might be used for the production of cotton, indigo, tobacco, sugar, and grain. The most northern part of the peninsula has little wood, and is less fertile than the southern. In the southern part, between Wadi-Medinah and Monkarah, the country is beautifully studded with prickly acacias, and has plenty of good timber near the Bahr-el-Abiad. The bottom along the banks of the Bahr-el-Azrek is narrow, and similar to that in Egypt, being hardly more than two miles wide on an average. During the inundations it is annually covered with a deposit of rich earth, and is exceedingly fertile. But the valley of the Bahr-el-Abiad is of a different description. The low flat along its banks is of greater extent, generally measuring four miles across, but it is chiefly sandy and sterile, and after the inundation grass springs up, a production nearly unknown in the valley of the Bahr-el-Azrek and Nile. The flat country which lies at the back of these banks of the Bahr-el-Abiad is also inundated to a considerable extent; and it appears that it is mainly owing to this circumstance that the woods which cover this tract contain so many timber-trees, which, especially on the western side of the river, are of large size, as they grow in a better soil. South of Wadi Shellaï the forests extend to the very margin of the river.

The country west of the Bahr-el-Abiad belongs principally to Kordofan [Kordofan]; south of it is a mountain-region, whose general appellation seems to be Jebel Nuba, from a nation which inhabits its fastnesses; this mountain-region is said to be rich in gold and iron. The most northern offsets of this region are called Jebel Daïr and Jebel Minmin, and approach within 25 miles of Obeid, the capital of Kordofan. These mountains and their inhabitants have not yet been subjected to the sway of the pasha of Egypt, though the level country forms a part of Beléd-es-Soodán. That part of this country which belongs to Sennaar probably does not extend in width more than from 12 to 15 miles from the river to the north of 14° N. lat., but probably much farther south of 14° N. lat. Its fertility is not equal to that of the island of Sennaar, part of the soil being light and too sandy. The boundary between this fertile tract and Kordofan is formed by a desert country, which is from two to three days' journey across, and is called the Desert of El Habsháběh. It contains no water, but it is inhabited by some wandering families, and is the resort of ostriches and herds of the antilope oryx.

The peninsula between the Bahr-el-Azrek and the Atbara, or Astaboras of the antients, the largest of its confluents, is also a flat country. The plain extends southward to the country of the Shangallas, which belongs to Abyssinia, where it terminates at the mountain-region of Habesh. Some of the hills which lie isolated on the plain constitute short ridges, and rise nearly to the elevation of mountains, epecially those at Mandera, Rera, Gous Regeip, and Colboshir; the last is not far from Shendy in Nubia. These mountains are the retreat of the nomadic tribes of the Shukeriehs and Bisharies, who cannot be dislodged from them, and wander about in the plains with their herds as long as they find pasture, retiring towards the end of the dry season to the uncultivated banks of the Atbara, where they still find grass when the vegetation of the plain has withered, and where they wait for the setting in of the rains. A great part of the plain is far from being a desert. It is thickly covered with stunted trees and grass, or with grass only, which grows to a considerable height. In other places the soil is bare and generally sandy; in a few places it is rocky. But in general the soil is tolerably good, and after the rains will produce dhourra. The Shukerieh Arabs also cultivate some patches.

Rivers.—The principal rivers, the Bahr-el-Azrek and Bahr-el-Abiad, are mentioned under Nile. The Bahr-el-Azrek and its tributaries have a very rapid course, but the Bahr-el-Abiad, after its waters have subsided, flows with a very gentle current. Burckhardt observes, that at Shendy, the Nile, at the time of his travels, was not used for navigation. But it is certain that both the Bahr-el-Abiad and the Bahr-el-Azrek are now navigated, and the Shillúks on the Bahr-el-Abiad have a great number of boats. There is no doubt that the Nile in all its course may be navigated, and also its upper branches, as far as they are known to us, and this fact is proved by the boat-building establishments which the pasha of Egypt has erected on the Bahr-el-Abiad. That the Nile is very little navigated in a great part of its course, must be attributed to the want of timber, which is not found on its banks, and is only plentiful on those of the Bahr-el-Abiad. It is further remarkable, that, with the exception of some small rocks, only a few islands occur either in the Nile or in the Bahr-el-Azrek, and all of them are composed of rocks, and bare. But in the Bahr-el-Abiad there is a number of low islands covered with wood, so far as its course has been examined by Europeans, and if the accounts which have been collected from other sources may be relied on, their number increases in proceeding farther south, and is stated to be so great south of 13° N. lat. in the country of the Shillúks, as to form an archipelago in the river, whose banks are said to be from 5 to 6 miles distant from one another in these parts. This circumstance probably has given rise to the opinion that the Bahr-el-Abiad traverses extensive lakes in the upper part of its course. All these islands are covered with high trees.

The tributaries of the Bahr-el-Azrek are mentioned under Nile. Linant mentions five tributaries of the Bahr-el-Abiad, the most northern of which is the Nid-el-Nil (the feast of the Nile), and it is said to run south of the mountains of Daïr, which, according to Holroyd, are only 25 miles south of El-Obeïd. This river, which must now be considered as the limit of our knowledge of this country, appears to run, near 12° 30′ N. lat., through the northern offsets of the Nuba Mountains, and probably falls into the Bahr-el-Abiad near 12° N. lat. It is said to traverse the populous country of Tagalla, and to flow from a great lake. One of its tributaries is called Bahr-Sudán.

Climate.—Our knowledge on this point is very defective, almost all the travellers who have visited this country having been there at the end of the dry season. We only know that in spring the thermometer at noon rises to 100° and 118°; but it is said that it attains a greater height about the summer solstice. The regular rainy season generally begins in the middle of May, or the beginning of June, and continues to the end of September. But some rains occur even in the beginning of April, which are generally attended by hard gales from the north or north-east. Before the rains regularly set in, two or three times in the spring hurricanes occur. The wind comes from the south-east. After blowing tremendously for ten or twenty minutes, the atmosphere assumes a blood-red colour, which is soon succeeded by total darkness, which lasts about a quarter of an hour. The hurricane usually subsides at the end of two hours from its commencement; but the air is loaded with sand for two or three days afterwards. At the commencement of the hurricane it seems as if an immense chain of sandstone rocks is driven before the wind. Burckhardt states that the wet season in these parts has none of those dreadful effects which are experienced in Senegambia and other countries of Western Africa; but Linant observes that before the rains set in, the country is visited by an epidemic, which depresses the spirits, and sometimes produces a degree of madness. It is often fatal to the natives.

Productions.—The grain most cultivated is dhourra, or millet (Holcus sorghum), and it is an article of great inland trade, as Nubia and other adjacent countries draw their supplies chiefly from Sennaar. Wheat is also cultivated; but other grains are not grown. The cultivation of the sugar-cane seems to be confined to a few places. In the kitchen-gardens there are grown onions, red-pepper, bahmiyeh, a mucilaginous vegetable, chick-peas, kidney-beans, cucumbers, and some plants which are not found in Europe; cotton and tobacco are grown as objects of commerce; near the town of Sennaar there are lemon-trees. In Kordofan there are large plantations of tamarinds, the fruit of which makes a considerable article of trade. In a few places dates-trees are found, the fruit of which is generally larger than those of Egypt.

The timber on the banks of Bahr-el-Abiad is used for boat-building. The boats are built of acacia. In the desert between Sennaar and Kordofan there is a thorny shrub, called askanit, whose fruit is used as food. There are also some wild fruit-trees, among which is the allobé-tree, whose fruit in a dry state is of the size of a pigeon's egg, has a subacid taste, and, being considered a dainty, is an article of trade. The fruits of the monkey-bread (Adansonia digitata), the doum-tree, and nebeck-tree are considered as very good. In the desert between Sennaar and Kordofan there are two kinds of gums, gum-arabic and gum-liban. The liban is used as a perfume, and carried to Cairo and other places in Egypt and Arabia.

Horses are more numerous than in the countries farther north on the banks of the Nile. The chief wealth of the numerous nomadic tribes which inhabit the uncultivated districts of the country, consists in their camels, cattle, sheep, and goats. The camels are killed for food. The cattle are of good size, but the sheep and goats have bare skins, without wool or hair. Pigs are not kept; fowls are plentiful, at least in some places. In some parts the civet cat is kept on account of the musk obtained from it.

Wild animals are very numerous. The elephant is found as far north as 14° 30′, and in some parts in great numbers. Burckhardt states that the rhinoceros is found in Sennaar, but later travellers do not mention it. The giraffe is abundant in Atbara. Burckhardt mentions the tiger, but it is uncertain if this animal is found here; lions are mentioned by several authors. The animals whose flesh is used as food, and which are very plentiful, are mountain-goats, antelopes, wild cattle, wild asses, and hares. There are several kinds of hyænas and monkeys. The rivers are inhabited by the hippopotamus and the crocodile. The hippopotamus is very destructive to the fields, and it is hunted on that account as well as for its hide. From the skin whips are made, which are a considerable article of trade. The flesh of the crocodile is eaten. Birds are numerous. Water-fowl are not found on the banks of the Bahr-el-Azrek, but are very plentiful on those of the Bahr-el-Abiad. Travellers have noticed cranes storks, swans, pelicans, ducks, geese, and two kinds of ibis. Ostriches are abundant in the desert, especially in that tract which separates Sennaar from Kordofan; their feathers are a considerable article of trade. There are also eagles and vultures. There are several birds distinguished by the beauty of their plumage. Wild Guinea-fowls are very numerous. Burckhardt observes that he found on the banks of the Atbara a greater number of singing-birds than in any other part of the East that he had visited. An immense quantity of honey is collected in these countries, especially on the islands of the Bahr-el-Abiad, and it is a considerable article of trade.

Little is known of the minerals of this country. Gold and iron exist, as already stated, in the Jebel Fungi, and iron is also found in the desert which divides Sennaar from Kordofan. In Kordofan the iron-ore covers several large tracts on the surface of the desert, but up to this time it has not been worked. There are some salt-works on the Bahr-el-Abiad, but most of the salt used in Sennaar by the rich is brought from Boeydha in Nubia. The poor use a brine as a substitute, which they procure by dissolving in hot water lumps of a reddish-coloured saline earth, which they obtain from the nomadic tribes of the Atbara.

Inhabitants.—The inhabitants of Sennaar are either free cultivators or the mowelled. The latter are a peculiar race; they are descendants of slaves, who from generation to generation live at large, and pay their masters monthly a part of their gains. If the slaves of two masters marry, their children become the joint property of their masters, and it is not unusual for six or more masters to possess a property in a single slave. In appearance there is no difference between the slaves and the free population. The slaves have usually a darker complexion, but some of them are light-coloured and handsome. The nation is certainly of Arabic origin, and speaks no other language than the Arabic; however, as their colour is darker than that of the Bedouin tribes in the vicinity, it is probable that another tribe approaching nearer the negro race has been incorporated with them.

In the interior of Sennaar, south of 14° 30′ N. lat., are the Bukarah Arabs, who have maintained their independence, and are always at war with the Egyptian government. We possess no account of this tribe. On the western banks of the Bahr-el-Abiad is the Bedouin tribe of Husaniyeh, which extends southward nearly to 13° 30′. They are generally fine men, a shade lighter than those of Sennaar, and the females are not so dark as the males.

South of the Husaniyeh Arabs are the Shillúks, who for many years were at war with the Egyptians. As they inhabit the western banks of the Bahr-el-Abiad and its islands, their hostile disposition against all light-coloured people has prevented European travellers from proceeding farther south. But it is stated that in 1838 they concluded a treaty with the governor of Beléd-es-Soodán, by which they submitted to Mohammed Ali. The few individuals of this nation who have been seen by Europeans were clumsily formed, their legs being too short for the size of the trunk. The heads of some were shaved; the hair of those unshorn was curled and woolly. Their countenances are harsh and savage; their cheek-bones high, and noses narrow near the root, but broad and flattened towards the nostrils. The incisor teeth of the lower jaw had been extracted. The only weapons they had were sticks, shields, and spears of a rude construction They are very expert at killing the crocodile and hippopotamus with the same spears which they use for self-defence. They speak a language different from that of their neighbours, but nothing is known about it. They wear no covering, and worship the sun and moon. Their sovereign is said to reside on an island of the Bahr-el-Abiad, called Abba. Opposite the Shillúks, on the eastern banks of the Bahr-el-Abiad, live the Denka, who were originally the same nation, but they are now quite distinct, and constantly at war. The principal wealth of both nations consists of cattle.

The peninsula of Atbara is the residence of two powerful tribes, the Bisharies, or Bishareen, and the Shukerieh. The former occupy the northern portion of the country. [BISHAREEN.] The Shukerieh are handsome men, with fine countenances, tall, and not black. They are proud, but more polished and less debauched than the Bisharies. They do not speak Arabic, but we are not informed whether their language has a resemblance to that of the Bisharies. Though these two tribes derive their subsistance chiefly from the produce of their herds of camels, cattle, sheep, and goats, they repair to the banks of the Atbara immediately after the inundation to sow dhourra, and remain there till the harvest is gathered in. During the hottest part of the summer, when the grass is dried up in the desert, they again descend to feed their cattle on the herbage on the borders of the stream. It appears that a small tribe of the nation of the Adindoas, or, as Burckhardt calls them, of the Hadendoa, who live on the east of the Atbara river, has settled west of that river, in the vicinity of Gous Regeip. They are also a nomadic nation, but occasionally cultivate dhourra. These tribes are not subject to the Egyptian government.

Government.—The pasha of Egypt maintains a regiment of infantry, consisting of 4000 men, and two regiments of Turkish cavalry, each of 400 men, in Beléd-es-Soodân, and governs the province by a sandjar, who resides in the town of Kartoun. But only a small portion of the country is immediately subject to the governor, nearly the whole being under the authority of native sheicks, who annually pay the governor a fixed sum of money. The territories of some of these sheicks are very extensive.

Towns.—The most populous place at present is Kartoun, situated at the confluence of the two great branches of the Nile. Though it is not yet 20 years since it was a miserable village, it had a population of 15,000 four or five years ago, in consequence of being fixed upon as the residence of the governor. The houses are built partly of sun-dried bricks and partly of dhourra-stalks. The former capital was Sennaar, which contained a population of from 10,000 to 12,000 individuals, The town was destroyed when the Egyptians occupied the country in 1822, and in 1829 it consisted of a heap of ruins, except a few houses which were inhabited by some merchants. But in 1837 it appears that nearly the whole town had been rebuilt, and that the inhabitants had resumed their manufacturing industry. Among the manufactures which were offered to Holroyd were mats with beautiful devices made of split doum-leaves, and dyed of various colours, conical straw covers for plates in elegant patterns, silver stands for coffee-cups in filagree, warlike weapons, as spears, knives, &c., and amulets, which are worn for security from every kind of disease and casualty. There is a well-furnished bazar. Wady-Medinah and Missalemieh, between Sennaar and Kartoun, carry on some commerce with the adjacent county. No place on the Bahr-el-Abiad has risen into importance. At Monkárah are the dock-yards on which annually about 30 boats are built for the pasha of Egypt, but it contains no inhabitants except the workmen employed in their construction. In the interior and within the mountain-region of Jebel Fungi is the town of Goleh, which is said to be equal in size to Sennaar, and to be noted for its iron-ware.

Manufactures.—That branch of industry in which the Sennaarese are most distinguished is leather, which is of the best quality, and much superior to that made in Egypt or Syria. This leather however is not frequently exported, but worked into different articles, which have an extensive sale in the valley of the Nile and in Arabia. The most important of these articles are camel saddles, sandals, and leathern sacks. The camel saddles are of elegant and durable workmanship, ornamented with many pretty leathern tassels. They are exported to Egypt for the dromedaries or riding-camels, and sell at a high price. The Sennaar sandals are worn by all well-dressed men and women throughout Nubia. They are made with a neatness which surprises all foreigners. They generally sell for two Spanish dollars the pair. The leathern sacks are of two kinds. The large water-skins called reys are made of ox-hides, and are used by the caravans for transporting water through the desert. They keep the water much better than the smaller goats'-skins, and the thickness of the leather prevents it from evaporating so readily. The goats'-skins made in Kordofan are much valued, as they have no seam, while the common ones are sewed up on three sides. Another kind of leathern sacks is exported from Sennaar to Suakim, and thence to Arabia, especially Yemen, where they are used for carrying provisions in travelling. Minor articles of leather, which are articles of commerce, are water-flasks, which are much esteemed in Egypt, whips, and ropes. Where dates grow, cords and ropes are made of the fibrous interior bark of the palm date-tree, and in some places of reeds. The shields made of the skins of the rhinoceros and giraffe are used all along the Nile and across the mountains as far as Cosseir and Kenneh in Upper Egypt.

Cotton-cloth is made by the women for domestic use, but it constitutes also a considerable article of trade in Northern Africa, under the name of damour. The workers in gold, silver and iron are very skilful, and execute their work neatly with very simple tools. Pottery is made to a considerable extent in Sennaar; in Kordofan are made large wooden dishes or bowls, which are carved out of the root of some trees; they are rubbed with butter, and then held over the fire to give them a black colour. The bowls are placed along the walls of the sitting-rooms as ornaments. They are very nicely worked, and it is impossible to observe the smallest trace of the instrument with which they are made. In some places coloured straw-hats are made with great neatness, and they are sent to different countries in the neighbourhood.

Commerce.—The province of Beléd-es-Soodân is the seat of an extensive commerce. Its commercial relations with the interior of Africa extend as far as Begharmi, which is situated much nearer to the Bight of Benin than to the Red Sea, and nevertheless receives some articles, especially the spices of India, by the way of Shendy in Nubia, or by Sennaar. The caravans which depart from these places go as far as Cairo. Numerous pilgrims from the interior of Africa pass through Shendy and Sennaar on their road to Suakim on the Red Sea, and by the same way many products of the country and of the interior of Africa are sent to the coasts of Arabia, where they are partly exchanged for the goods brought from Hindustan and the Indian Archipelago, while European goods reach Abyssinia and the eastern countries of Soodan by the way of Egypt. As the merchants who carry on this extensive commerce are obliged to pass through countries inhabited by nomadic and predatory tribes, they unite for their security in caravans, and always follow certain roads.

Two caravan-routes lead to the port of Suakim on the Red Sea; one from Sennaar, and the other from Shendy. The route beginning at Sennaar follows the course of the Bahr-el-Azrek to its confluence with the Rahad river, then stretches across the peninsula of Atbara in a north-east direction to Gous Regeip on the river Atbara. East of the river its direction is east-north-east, until it strikes the southern extremity of the mountain-range called Jebel Dyaab, when it turns north-north-west, and running at a short distance from the eastern base of the mountains, joins the Red Sea at Suakim. The caravan-route which begins at Shendy follows the banks of the Nile to the village of Kaboushye, a distance of about 30 miles, and then strikes across a desert portion of the peninsula of Atbara in an east-north-east direction to the village of Atbara on the river of the same name. Afterwards it runs more to the east, and traverses the hilly region called Langay and the range of the Jebel Dyaak not far from Suakim.

The great caravan road from Shendy to Cairo follows the course of the Nile as far as Berber (18° N. lat.), whence it runs nearly in a due north direction through the desert country east of the river, crosses the range called Jebel Shigre near 21° N. lat., and again approaches the Nile near 23° N. lat., but reaches its banks only at the village of Daraou, about ten miles north of Assouan, on the east bank of the river. At this place the caravan-road terminates, and the goods are embarked in boats to be conveyed to Cairo and other places of Egypt.

The common route between Shendy and Sennaar lies along the banks of the Nile and the Bahr-el-Azrek, but there is a shorter road through the desert, which runs nearly due south from Shendy to Abouharras at the confluence of the Bahr-el-Azrek with the Rahad.

Two caravan-roads lead from Sennaar to El-Obeïd in Kordofan. The northern crosses the Bahr-el-Abiad at Monkarah, and the southern at Aleïs, the most northern place inhabited by the Shillúks. From El-Obeïd the route passes westward to El-Tusher, the present capital of Dar-Fur, and thence to Kobbe and Kubkabíyah. Sometimes the caravans from El-Obeïd and Kobbe do not go to Sennaar or Shendy but proceed across the desert west of the Bahr-el-Abiad and the Nile to the banks of the Nile at Debba, nearly opposite the ruins of old Dongola (18° N. lat.).

The common commercial road from Sennaar to Gondar in Abyssinia runs in an east-south-eastern direction to Ras-el-Fil, where the merchants of both countries meet and exchange their goods.

Few of the articles imported into Sennaar are brought from European markets. The principal articles imported from Egypt are the sembil and mehleb, both of which are in great request in Soodan; the former as a perfume and medicine, and the latter as a condiment. The sembil is the Valeria celtica or Spiga celtica of the Italians, and is chiefly grown in the southern provinces of the Austrian dominions; it is sent from Venice and Trieste to Alexandria. The mehleb is brought from Armenia and Persia, and shipped at Smyrna and other ports of Asia Minor for Egypt. It appears to be the fruit of a tilia. These two articles are also imported into Massowah from Jidda for the Abyssinian market. Sugar is brought from Upper Egypt, and soap from Syria, where it is manufactured. From Egypt are also imported many manufactured articles, as takas, a sort of coarse cambric dyed blue, white cotton stuffs with red borders, made at Mehalla in the Delta, melayes, a blue striped cotton cloth, linen made at Siout and Manfaloot, and sheepskins dressed with the wool on, which are often dyed blue and red, and are used as saddle-cloths for the horses, dromedaries, and asses of the natives, and as carpets for the women's apartments. European manufactures are not regularly imported, though some scarlet cloth, velvet, satin, and gold-embordered stuffs of the lighter kind from Lyon and Florence, and a variety of English calicoes or cambrics, are occasionally in request. Beads are a considerable article of import. The most common are small wooden beads, made by the turners of Upper Egypt; others are made of the kernels of the doum-tree, of which the chief manufactory is at Denderah in Upper Egypt. A variety of beads of a red and blue colour are brought from Jerusalem. The better sort of glass beads are sent from Venice, but the greater part are made at El-Khahil near Jerusalem, where there are extensive glass-houses. A kind of beads called reysh are brought from Suakim to Sennaar; they come from the East Indies, principally from Surat, and are perforated balls of coloured agate, of the size of a small cherry; they are in great request all over Eastern Africa, especially in Dar-Fur, Dar-Zaleh, and Borgho, where they fetch a high price. The reysh are worn as necklaces by the women. Coral of an inferior kind, false coral made in Venice, and transparent amber are sold in small quantities. Paper, made in Genoa and Leghorn, goes to Dar-Fur and other countries farther west. Yellow brass-wire is in great demand, as it is used for ornamenting the lances by twisting it round different parts of the shaft. Old copper, principally large boilers and pots, are much in request; pewter in thin bars is sold in small quantity. Of hardware the most saleable articles are common razors, files, thimbles, scissors, needles, nails, steels to strike fire with, and sword-blades. The sword-blades are made at Solingen on the Rhine. Tar is imported to make the water-skins waterproof, and to rub the backs of the camels. Silver trinkets for female ornaments, such as bracelets and ear-rings, are imported in great numbers; most of them go to Dar-Fur. Small bells to ornament the bridles and halters of the camels are also imported from Egypt. Looking-glasses of Venetian and Trieste manufacture, with gilt covers, are a considerable article in the Egyptian trade; the most common kind are about four inches square; others, which are round and of about the same size, are made in Cairo. No woman marries without decorating her room with such a looking-glass. Among the imports from Egypt are Spanish dollars.

The principal article of export is slaves. They are partly imported into Sennaar from Abyssinia, Kordofan, and Dar-Fur, and partly taken from the mowelled, or native slaves of the country. The Abyssinians are the most valued for beauty and fidelity, but they are not so strong as the others. The next in estimation for beauty are the mowelled, but they have not a good character for honesty. The slaves from the Nuba mountains and those from Dar-Fur are perfect negroes, not good looking, but honest and faithful. Children and young females are sold at the highest price, often for 100 dollars each. The second article is the damour, or cotton-stuff, which is always in great demand, as the cotton manufactories of Sennaar and those of Begharmi furnish the greater part of north-eastern Africa with articles of dress. The third article in importance seems to be gold, which is partly got from the mines in the Fungi and Nuba mountains, and partly from Abyssinia. The principal market for gold in Abyssinia is Ras-el-Fil, nearly half-way between Sennaar and Gondar. The gold is principally bought by the Suakim traders, who carry it to Jidda, where it is given in payment for Indian goods. Other important articles of export are ivory, mostly from Dar-Fur, rhinoceros horns, musk, whips and other articles of leather, ebony, the coffee brought from the western districts of Abyssinia, honey, and ostrich feathers. Minor articles, mostly brought from Kordofan, are gum-arabic of the best quality, tamarinds, gum-leban, natron from Dar-Fur, sheshme, a seed used in Egypt for diseases of the eyes, and shooshe, a small pea of Kordofan and Dar-Fur growth.

India goods reach Sennaar by the way of Jidda and Suakim. They consist of different sorts of cambric from Surat and Madras, of coarse muslins from Bengal, of spices, especially cloves and ginger, of India sugar, the beads called reysh, and sandal-wood. A part of all these articles passes farther west to Dar-Fur, Dar-Zaleh, and Begharmi. Besides gloves, gold, and other articles, the merchants from Suakim export a great number of horses of the Dongola breed, and tobacco, which two articles find a ready sale in Yemen, at Hodeida, Loheiha, and as far south as Mocha.

The inland trade of Sennaar is very active, partly in consequence of the great number of caravans which continually traverse the country, and create a great demand for camels, which are brought to those places through which the caravans pass, and partly on account of the different productions of the several parts which constitute the province of Beléd-es-Soodán. There are always considerable caravans on the roads conveying dhourra from Sennaar to those parts which are less fertile, or where the cultivation of the ground is less attended to.

No gold currency is in use among the merchants of Sennaar except unstamped pieces or rings of pure gold. They are of different sizes from 30 paras (2*d.*) to 240 piastres (3*l.*); and during the whole time the market lasts, an officer sits with the scales before him, and weighs gold gratis for all persons. Spanish dollars are current. The inhabitants of Kordofan make an iron money from the ore which is obtained in the desert between the Bahr-el-Abiad and Kordofan. This money resembles the section of a mushroom, is made without any reference to weight, and each piece passes for one para, forty being equal to one Turkish piastre, which, according to its present rate of exchange, is equal to 2½*d.* sterling. In some parts the beads are used as small coin. In some towns all money transactions are made in reals, an imaginary coin, equal in value to 15 piastres.

History.—The antient history of Sennaar is very little known. It appears that it once formed a part of the empire of Abyssinia, and at a later period of Nubia. In the thirteenth or fourteenth century it was wrested from Nubia by a family which came originally from Teysafaan, a country in Soodán; and at one time that family was in possession of nearly all Nubia, the whole country from the second cataract to the mountains of Fungi being subject to them. On the east their empire included Suakim and a large tract of the coast of the Red Sea, and on the west it extended beyond Kordofan. In the course of time the sovereigns, called *muks*, became too indolent to transact business, and appointed a vizier, who soon possessed himself of all the power, though he continued to pay outward respect to the muk. This took place about 200 years ago, and since that time the power of Sennaar has been decreasing, and several chiefs have become nominally and really independent. In 1822 the country was invaded by the army of Mohamed Ali under Ismael Pasha. The vizier made no resistance, but obtained good terms for himself, by which the southern part of Sennaar, which lies within the mountains of Fungi, was left to him as a vassal of the pasha of Egypt, and the muk was reduced to the station of a private individual. As already observed, the Shillúks on the banks of the Bahr-el-Abiad have submitted to the pasha, which was effected by the annual military expeditions that the pasha's governor sent to that country for the purpose of seizing the inhabitants as slaves.

(Burckhardt's *Travels in Nubia;* Linant, 'Voyage on the Bahr-el-Abiad,' in *London Geogr. Journal*, vol. ii.; Lord Prudhoe's 'Journey from Cairo to Sennaar,' in *London Geogr. Journal*, vol. v.; and Holroyd's 'Notes on a Journey to Kordofán,' in *London Geogr. Journal*, vol. ix.)

SENNERTUS, DANIEL, was born at Breslau in 1572. In 1601 he took the degree of Doctor of Medicine at Würtemberg, and in the following year was elected professor there. He died of the plague in 1637. During his life, and for many years after, Sennertus enjoyed the highest possible reputation as a learned and skilful physician. His works, which are very numerous and long, prove him to have been a skilful compiler from those of others. He was the first to endeavour to reconcile the then modern doctrines of Paracelsus with the antient ones of Galen, which they had well-nigh overturned; and he appears to have been much less credulous than most of his contemporaries on the subjects of alchemy, the universal remedy, and others of the like kind. The whole works of Sennertus were published in fol. at Venice in 1645, and in subsequent years at Paris and Lyon.

SENS, a town in France, in the department of Yonne, 67 miles south-east of Paris, on the road to Lyon. This town existed at the time of the Roman conquest, and is mentioned by Cæsar under the name of Agendicum. Ptolemy writes it 'Αγηδικὸν; and in the Antonine Itinerary it is Agedincum. It was afterwards called Senones from the name of the people to whom it belonged, and from thence is derived the modern Sens. Some antiquaries dispute the identity of Agedincum with Senones, and contend for the former being on the site of the modern Provins [Seine et Marne]; but this opinion does not appear to be well sustained. Agedincum or Senones became under the Romans the chief town of Lugdunensis Quarta, or Senonia. It became at an early period the seat of a bishopric, and afterwards of an archbishopric. In the middle ages it was the capital of a county, which was united to the crown by the kings Robert and Henri I.

The town, properly so called, is of an oval form, surrounded by walls now partly destroyed. The foundations of these walls are of large stones, five feet long and three or four feet thick, rising to unequal heights above the soil. Upon these is raised the upper part of the walls, faced with small stones four or five inches square, varied with triple courses of brick. Some of the large stones of the foundation bear Roman inscriptions or fragments of sculpture. There are traces of Roman roads leading from Sens in various directions. Of the nine gates of the city, three belong to the middle ages, and the rest are modern. The streets, with the exception of that through which the Paris and Lyon road passes, are narrow and crooked, and the houses generally ill-built. The town is on the right bank of the Yonne, over which are two bridges: it is near the junction of the Vannes, which flows on the south side of the town, and the waters of which distributed through the streets contribute to their cleanliness. The principal public building is the cathedral, which is a large Gothic structure of various dates, remarkable for the size and general good effect of the nave, and for the height of the tower. The cathedral contains a handsome monument to the Dauphin and Dauphiness, the parents of Louis XVI., Louis XVIII., and Charles X. The principal modern building is the college. There are public baths, a theatre, an hospital, a seminary for the priesthood, and some pleasant public walks.

The population in 1831 was 9267 for the town, or 9279 for the whole commune; in 1836 it was 9095 for the commune. The chief manufactures are of glove and other leather, cotton-yarn, straw and chip hats, woollen stuffs, polished steel, glue, candles, tin clepsydras or water-clocks, potato-spirit, tiles, and earthenware. There are a bleach-ground for linen, a brewery, and some cinder-mills. The chief trade is in corn and flour for the supply of Paris, wines, wool, hemp, tiles and bricks, bark, leather, tan, timber, &c. There are five yearly fairs. Sens has a public library of 5500 vols., and a museum. There are nursery-grounds in the neighbourhood.

The archbishopric of Sens is now united with that of Auxerre. The department of Yonne constitutes the diocese. The suffragan bishops, with their dioceses, are as follows.—

Sees.	Dioceses.
Troyes . .	Department of Aube.
Nevers . .	„ Nièvre.
Moulins . .	„ Allier.

The arrondissement of Sens comprehends an area of 474 square miles, and includes 90 communes. It is divided into six cantons or districts, each under a justice of the peace. The population in 1831 was 60,342; in 1836, 61,036.

SENSATION. [Nervous System.]

SENSES. The senses are the faculties by which we become acquainted with some of the conditions of our own bodies, and with certain properties and states of external things, such as their colour, taste, odour, size, form, density, motion, &c. The senses are five in number, namely, sight, hearing, taste, smell, and touch; and each of them is exercised in the recognition of an impression conveyed along some nerve to the brain. The particular physiology of each is contained in the article devoted to its organ [Eye; Ear; &c.]; here we shall only consider some of the circumstances common to them all.

There are no kinds of sensation produced by external causes which we may not also derive from conditions of the nerves arising independently of such external causes. Thus heat and cold, painful and pleasing sensations, are often felt as the results of internal causes acting on the nerves of touch or common sensation; so also light and various colours are often perceived in the dark; noises seem to be heard in the ears when no sounding body is near; and smells and tastes are sometimes perceived, as if in the nose and mouth, without any external cause from which they can proceed These facts constitute a part of the proof that that of which the mind is rendered conscious by any of the senses is not the condition of the body said to be perceived, but the condition of the nerve through which the impression is conveyed to the brain; a condition which may result either from internal causes or from the influence of something external.

The same internal cause acting on the organs of the several senses produces, through the medium of each, a sensation peculiar to itself, and similar in kind to that perceived in the exercise of that organ's normal function. Thus a congestion of blood in the retina produces a sensation of flashes or sparks of variously coloured light; one in the expansion of the auditory nerve gives rise to ringing or other sounds in the ear; one in the skin or other part supplied with nerves of common sensation excites itching or pain or heat; and so on. In like manner the same external influence applied to the several kinds of nerves produces through each a peculiar and proper sensation. Thus, when the eye, ear, tongue, nose, and skin are successively electrified, sensations of light, sound, taste, odour, and pain are successively produced; and blows on the ear and surface of the body produce through each a sensation similar in kind to that which it is the proper function of each of those parts to convey.

The senses are exercised therefore in many circumstances besides those by which we are informed of the conditions of external things. The condition of a nerve becomes perceptible whenever it is disturbed from its state of absolute rest; and it is perceived as if it were being acted on by some external influence. The sensations thus produced by internal causes are called *subjective*, and their existence proves not only that by our senses we perceive immediately only the conditions of our nerves, but also that each kind of nerve is capable of communicating only one kind of sensation, which is always, in some form or other, perceived, whatever be the circumstances by which the nerve is disturbed from its state of rest. The optic nerve, for example, gives a sensation of nothing but light, however it may be acted on from without or from within; even severe injuries of it, such as cutting it asunder, produce the appearance of a flash of light, but no pain properly so called (for that which is called a painful sensation of light is very different from pain in any part supplied only by nerves of touch). And in like manner the auditory nerve under no circumstances conveys any sensation but that of a sound. A nerve of one sense therefore can in no case discharge the function of a nerve of any other sense.

We are totally ignorant of what the energetic condition of a nerve consists in, as well as of what it is that renders each nerve peculiarly and properly susceptible of impressions from only one kind of external circumstances, and of what are the causes of the different impressions exercised by different modifications of that one kind of stimulus. For example, we not only cannot tell how heat and light (whose very existence we only learn by our senses) act upon the nerves of the skin and of the eye, but we cannot tell why different kinds of light put the filaments of the optic nerve in such different conditions as to give through them the impressions of different colours, nor why the different temperatures of bodies produce in us the sensations of what we call different degrees of heat and cold. Nor do we know more of the simple action of any other of the senses.

Our ideas of the simple sensible properties of bodies, such as their colour, taste, odour, &c., seem not susceptible of analysis; but this is not the case with the ideas which we obtain, by the exercise of our senses, of some other properties and conditions of external things, such as their size, form, motion, &c.

Our knowledge of the size and form of a body seems to be the result of our appreciating the extent of sensitive surface upon which at any given time it makes its impression. When, for example, anything is touched by the surface of the body, the impression is conveyed by each of all the nervous filaments whose extremities lie within the space of contact; and if the body be small enough to be touched at once in all its parts, we judge of its size by that of the extent of surface over which it is capable of putting our nerves in a condition sensible to the mind; the dimensions of parts of our own body being in all cases the standard with which we ultimately compare those of other bodies. Or, where the body whose size is to be estimated is too large to be at once touched, then by passing a sensitive surface over its several parts, and appreciating (as we do by another exercise of our senses) the time required to traverse the whole of them, we acquire a knowledge of its extent. The appreciation of magnitude by the eye is always less perfect than that by touch, and is probably very erroneous till it has been frequently corrected by the evidence of touch in all the cases in which the latter sense can be employed, and by the comparison of the data obtained in one set of cases, by the exercise of both senses, with those of other cases in which sight only can be used. When a body or any number of objects is seen, we are sensible of the extent of surface of the retina which is occupied by the image formed by the concentrated rays of light proceeding from it or them; and we thus obtain a relative measure of their size. But the size of the image being absolutely much smaller than that of the object, it is only by the evidence of touch that we discern what relation the size of the body bears to the size of a part of our own body, and thereby what are, according to this ultimate standard, its dimensions.

Of the form of bodies we judge by our senses in the same manner as of their size, that is, by the estimation of the extent in different directions of the sensitive surface impressed in different modes by different kinds of light, or by bodies presented in different positions to the extremities of the nerves.

The perception of the locomotion of a body is derived from our perception of the movement of the impression which it produces over a sensitive surface, whether that of the eye or of the skin. And here also the evidence of sight is more fallacious than that of touch; for the movement of the impression on the retina being the same whether the eye, or the object seen, is moved, a person moved by other than his own efforts commonly requires the aid of other senses, or of his experience and understanding, to determine whether he himself, or the object he gazes at, be in motion; and indeed children in such cases commonly judge wrongly.

A kind of motion of which one at least of our senses has a most delicate perception is that of a vibrating body. By the skin the repeated impulses at short intervals produced by the vibrations of any body are felt as a tingling or itching, and this very obscurely. By the ear the same vibrations are perceived as sound, and this with such delicacy, that, according to the experiments of Savart, a note is distinguishable, though to produce it the air vibrates 48,000 times in a second: and if the undulatory theory of light be true, the eye can distinguish from other impressions of the same kind those which result from waves of light one-sixteen-millionth of an inch in breadth, and of which 727 billions move in one second.

One of the most remarkable results of the exercise of our senses is the appreciation of the distance of objects. It is probably only by experience that we discern that the bodies which become the objects of our senses are external to us; for, as already stated, all our ideas of external things are derived from the condition in which the nerves within us are placed by their influence, and not always by their direct influence. The eye, for example, sees nothing of the object of sight itself, but the extremities of the rays of light emitted from the object fall upon the sensitive extremities of the nervous filaments of the retina; and so of sounds, the body producing them being at a distance. Yet we judge that what we see and hear is neither within ourselves, as the impression of it is, nor near us, as the very sound and light which we perceive are, and as the bodies which we taste and touch are, but at a distance such that an appreciable voluntary motion will bring us nearer to them, and enable us perhaps to judge of them by the touch, from which we gain our first and least fallible impressions.

The appreciation of our own voluntary motion is the most important aid to our senses. Forming the standard to which all our ideas of force are ultimately referrible, it is of the highest importance, either separately or in conjunction with our senses, in enabling us to judge of velocity, weight, hardness, &c. But this has been already considered in the article MUSCLE.

Notions of a sixth sense have been entertained. Spallanzani observing that bats in flying avoid walls in the dark, conceived that they have some special sense for that and other similar purposes. But there can be little doubt that it is by the touch of the extremities of their wings that they perceive the resistance of near objects, and it is probable that all the examples of supposed peculiar senses are referrible to the refined exercise of one of those generally admitted, or of the muscular sensibility. Müller (*Physiologie des Menschen*, bd. ii., p. 275) justly says on this subject, 'The essential of a new sense does not consist in external things being perceived which commonly do not act upon the senses, but in external circumstances exciting a peculiar kind of sensation which does not exist among the sensations of our five senses. A peculiar kind of sensation must depend on the energies of the nervous system, and that such a one occurs in particular animals cannot be *à priori* denied; but there are no facts known which prove the existence of a new and peculiar kind of sense; and it is quite impossible to observe anything respecting the nature of a sensation in any one else than one's self.'

SENSIBILITY, an aptitude for receiving impressions of the senses. This is its physiological meaning, as designating that faculty of the senses whereby things external are made to act upon us. That peculiar fineness of organization which renders a man alive to the impressions of physical objects, has, by a natural metaphor, become the expression of that peculiarity of mental organization which renders the mind alive to impressions of moral objects, such as pity for the distress of others, admiration of heroic courage or patient endurance, &c.; and thus a person with a keen sense of grandeur, sublimity, nobility, beauty, or pathos in nature or art, is said to possess great sensibility. It is this moral aspect of sensibility which in all people creates the love of poetry and fiction, and when possessed in a high degree, creates the poet himself.

The theory of universal sensibility propounded by Campanella is so striking, and has such a poetico-metaphysical interest, that we take this opportunity of giving our readers a brief outline of it, as given in his work *De Sensu Rerum:*

'All things *feel (sentiunt)*; if they did not, the world would be a chaos. For neither would fire tend upwards, nor stone downwards, nor waters to the sea; but everything would remain where it was, were it not conscious that destruction awaits it (*sentiret sui destructionem inter contraria*) by remaining amidst that which is contrary to itself; and that it can only be preserved by seeking that which is of a similar nature. Contrariety is necessary for the decay and reproduction of nature; but all things strive against their contraries, which they would not do if they did not perceive what is their contrary. God, who is primal power, wisdom, and love, has bestowed on all things the power of existence, and so much wisdom and love as is necessary for their conservation during that time only for which his providence has determined that they shall be. Heat therefore has power, and sense, and desire of its own being: so have all other things, seeking to be eternal like God; and in

God they are eternal, for nothing *dies* before him, but is only *changed*. Even to the world, as a sentient being, the death of its parts is no evil, since the death of one is the birth of many. Bread that is swallowed dies to revive his blood; and blood dies that it may live again in our flesh and bones; and thus the life of man is compounded out of the deaths and lives of all his parts: so is it with the whole universe. God said, Let all things *feel;* some more, some less, as they have more or less necessity to imitate my being (*et me imitentur in essendo*); and let them desire to live in that which they understand to be good for them; lest my creation come to nought.

'The sky and stars are endowed with the keenest sensibility; nor is it unreasonable to suppose that they signify their mutual thoughts to each other by the transference of light, and that their sensibility is full of pleasure. The blessed spirits that inform such living and bright mansions behold all things in nature and in the divine ideas. They have also a more glorious light than their own, through which they are elevated to a supernatural beatific vision.

'The world is full of living spirits; and when the soul shall be delivered from this dark cavern, we shall behold their subtle essences. But now we cannot discern the forms of the air and the winds as they rush by us, much less the angels and dæmons who people them..... The world is an animal, sentient as a whole, and enjoying life in all its parts *omnesque portiones ejus communi gaudere vita*).'

From the foregoing outline may be gleaned a general idea of this hypothesis and its daring assumptions, which, however consonant to a poetical temperament, require greater accuracy, larger data, and more logical deductions, before this hypothesis can have any weight with exact thinkers; and in fact it has gained few converts.

SENSITIVE PLANTS is a term commonly applied to those species of plants that possess the property of visibly moving their leaves when they are touched or otherwise stimulated. This term is not applied generally to plants in which any movements can be observed; for the power of moving under the influence of certain external stimulants is a very general property of the tissues of plants, and especially of the flowers. [Sleep of Plants.]

There are a great number of species of plants of various families, that possess the power of moving under the influence of a slight touch, and we shall here point out some of the most remarkable. That which is best known is a plant belonging to the order Leguminosæ, called *Mimosa pudica*. It is a native of tropical climates in moist districts, where it is exposed to a temperature of between 70° and 80° Fahr. It is in its native districts where its excitability is seen to the greatest perfection. A knock upon the ground at a short distance from the plant is sufficient to produce an influence on the leaves; and Von Martius says, that at Rio Janeiro the falling of horses' feet by the way is sufficient to set whole masses of mimosas in motion. When in this country, the motions of the plant are always best displayed in high temperatures. It is an annual, and has compound digitate leaves, which are formed of four pinnules, or leaflets, each of which is furnished with numerous pairs of smaller leaflets, which, in a natural state, are expanded horizontally. The parts of the leaf which are subject to the movements are the joints, or the points where the petioles and subpetioles are united to the stem and each other. At each of the joints there is a little swelling or knot, in which the irritable property seems to reside. If any one of the pairs of leaflets be touched or cut, or concentrated light be thrown upon it from a lens, the 'leaflet will immediately move together with the one opposite to it, both bringing their upper surfaces into contact, and at the same time inclining forwards or towards the extremity of the partial petiole on which they are seated. Other pairs of leaflets nearest to the one first stimulated will then close in succession in a similar manner; and at length the partial petioles themselves fold together by inclining upwards and forwards. Last of all, the influence is transmitted to the common petiole, which bends downwards with its extremity towards the ground, in a direction the reverse of those taken in the former cases. The effect is next continued to the other leaves nearest to the one first stimulated, and they fold their leaflets and depress their petioles in a similar manner.' (Henslow.) The influence of the stimulant is communicated as easily from below as above; and if the leaf is touched in the centre, the effect takes place above and below the seat of irritation.

These effects are not alone produced by mechanical irritants, for if various corrosive substances, as bichloride of mercury, sulphuric acid, caustic potash, &c., are applied to the knots of the joints, the same phenomena are observed. The removal of the plant to a higher temperature will produce the same result, as well as exposing it to a lower temperature or a draught of cold air.

The mechanism by which these movements are effected seems to reside in the swelling of the joints. If one of these swellings is cut into on one side, the leaf will be drawn to the wounded side, and if it be cut into on the upper side, the leaf will remain permanently elevated, and if on the under side, it will be permanently depressed. It is not however all the tissues composing the joint in which the irritable property resides, for Dutrochet found that on removing the woody fibre and leaving the cortical substance and pith, no irritability remained, whilst this property continued if the latter were removed. He therefore concludes that it is in the woody fibres and ducts that this property resides Burnett found that if a single leaf with its stalk was removed carefully, it retained its properties for some time after. Mayo asserts that the under portion of the swellings of the joints is much more susceptible than the upper portion, and produces contraction under the influence of much slighter stimulus.

In the minute anatomical structure of the swelled joints of Mimosa some differences from the structure of other plants have been pointed out; but not greater, it appears to us, than would occur on the comparison of the structure of the same part in any two different species.

Another remarkable instance of the movements of the leaves of plants in the order Leguminosæ is seen in the *Hedysarum gyrans*. This plant is a native of Bengal, and has ternate or three-parted leaves. The end-leaf is much larger and broader than the two side leaves. The motions in these leaves are continual, and not produced by any accidental stimulus, as in the last case. Hufeland, who has described the motions of these leaves very carefully divides them into two kinds, voluntary and involuntary. The involuntary movements are those which take place in the large terminal leaflet, and which are only observable during the influence of the sun's rays upon the plant. Early in the morning the petiole forms an acute angle with the stem, and as the sun's rays get stronger, the leaf, which was previously dependent, begins to rise; this goes on 'till noon, when the leaf and the petiole are on the same plane; as the sun declines, the leaf begins to fall, and the petiole approaches closer to the stem, till at last, when night comes, the stem and petiole are parallel and embraced by the leaf, which cannot be separated without destroying its tissues. These movements are seen best in hot weather and clear days. The passing of a few clouds over the sun will influence the movements considerably. This motion is entirely independent of mechanical stimuli, and cannot in any way be increased by their application.

The second kind of motion in these plants, called by Hufeland voluntary, is seen in the two smaller lateral leaflets. This movement consists in the alternate rising and falling of the two opposite leaflets; when one is up, the other is down. By the time the one has attained its lowest point, the other has attained its highest, and they thus both commence a contrary action at the same moment. These movements continue day and night. The rapidity with which they are effected differs according to circumstances. In the hot native climate of the plant these leaves move most rapidly. Under favourable circumstances Meyen has observed the entire change in the position of the leaves to take place in one minute, but it mostly requires a longer period than this. The younger the leaves are, the more rapid is the motion, and in the older leaves both the one and the other movements cease. Both Hufeland and Meyen have recorded the result of their experiments with electricity on these movements, and they found the motions decidedly influenced both by electricity and galvanism. The structure of the petioles in these plants is very similar to those of the Mimosa pudica, and, as in them, does not throw any light on the peculiar movements they possess.

The resemblance between the movements of these plants and those of animals, especially of some of the lower forms, has led some to suppose that they are of the same nature, and that in plants, as in lower animals, they may depend on a nervous system not demonstrable by the dissecting knife, but existing in a diffused form and evinced by its peculiar functions. This inference however cannot be correctly drawn in the present state of our knowledge. We know too little of the intimate nature of those complicated phenomena which are termed life, to be able to carry out such a generalization. The difference between the movements of these plants and those of the lower animals seems to consist in the end which they accomplish. In animals the end or object of motion is always the nutrition or reproduction of the species, but in the motions of these plants no such end is effected. In fact, in our present want of knowledge on the subject, the motions of the leaves of plants at least may be called accidental. The movements observed in some of the tissues and in the stamens and pistils of plants have a much more striking affinity with the motion of animals than those mentioned above.

Besides the Mimosa pudica there are several other species belonging to this genus that possess the same property, though not in so remarkable a degree. Amongst these may be named *Mimosa sensitiva*, *M. viva*, *M. casta*, *M. asperata*, *M. quadrivalvis*. *M. pernambucana*, *M. pigra*, *M. humilis*, *M. peltata*, *M. dormiens*. Species of other genera of the same natural order Leguminosæ exhibiting these movements are *Smithia sensitiva*, *Æschynomene Indica*, *A. pumila*, and *Desmanthus stolonifer*. The locust-tree when its branches are roughly shaken closes up its leaves, and the same has been observed of *Gleditschia triacantha*, and it is probable that close observation during hot weather would prove that other leguminous plants possess this property.

Another family of plants that exhibit sensation when touched or stimulated is Oxalidaceæ. The *Oxalis sensitiva*, called by De Candolle, on account of its sensitive properties, *Biophytum*, has long been known to possess this property. *Averrhoa bilimbi* and *A. carambola* are both plants belonging to Oxalidaceæ, and have been described by travellers as possessing the property of folding their leaves on the application of a stimulus. But it is not only in these species that this property resides, for Professor Morren of Liege has observed it to occur more or less in all the species of the genus Oxalis. His observations were first made on the *Oxalis stricta*, which, if hit smartly on a warm day, will contract its leaves and assume a position as in the ordinary sleep of the leaves of these plants. He has also observed the same movements in *O. acetosella* and *O. corniculata*, and many extra-European species. The movements in these plants consist in the folding up of their leaves, so that the two halves of the leaf approach each other by their superior surface. The midrib is also slightly bent, so that its inferior surface presents a convexity; and the petioles of the leaflets bend downwards, so that the leaf, when irritated, becomes dependent. A full account of the structure and movements of these plants will be found in Professor Morren's paper entitled 'Notes sur l'Excitabilité et le Mouvement des Feuilles chez les Oxalis,' in the 6th volume of the 'Bulletins de l'Académie Royale de Bruxelles.'

In the family Droseraceæ, or Sun-dews, are some plants which exhibit a considerable amount of irritability. A description has already been given of the *Dionæa muscipula*, or Venus's Fly-trap [Dionæa], whose leaves have the remarkable property of contracting upon insects that may happen to alight upon their surface. None of the sun-dews enclose insects in their leaves in this manner, but the surface of their leaves is covered with long hairs, which secrete a viscous matter. When any insect settles upon the leaf, it is entangled with the viscous secretion; and before it has time to escape, the hairs exhibit a considerable degree of irritability, and curving round, pin the animal down on the surface of the leaf.

Other instances of vegetable irritability occur in the Berberis vulgaris, Mimulus, and Stylidium. [Berberis; Mimulus; Stylidium.]

Among the Cryptogamia are some which exhibit motions more nearly resembling those of the animal kingdom than any we have referred to above. It appears that the lower we descend in the animal and vegetable kingdom, the more nearly do the objects of the two kingdoms approach each other. It is well known that many of the minute organic beings that require a microscope to ascertain their existence have been referred by some naturalists to the animal kingdom, and by others to the vegetable kingdom. But since the publication of Ehrenberg's great work on Infusoria, botanists seem to have given up all claim to the beings which he has described and figured in so masterly a manner as animals, but which had previously been looked upon as plants Independently however of the doubtful microscopic genera of Baccillaria, Synedra, &c., there are several of the Conferva tribe that exhibit singular movements. One of the most remarkable of these is the Oscillatoria. The movements of this plant were discovered in 1753 by Adanson. When the fibres of this plant are seen in water, they are constantly moving, now doubling themselves into the form of the letter S, then straightening themselves and doubling again, and so on. When a fibre is laid flat upon a plate, it turns itself backwards and forwards like the band in pronation and supination. Sometimes these motions are slow, sometimes quick, and at other times they are effected by jerks. These motions only occur in the young fibres, and cease entirely when they are fully grown. These plants are very abundant in ditches, ponds, and damp places, and may be easily procured for the purpose of inspection. The rapidity of their growth is very extraordinary: they grow ten or twelve times their length in the course of as many hours. Some have attributed these movements to their rapid growth, but this will hardly explain their wavering motion.

Meyen describes a small cryptagamic plant, which he calls *Stigmatonema stellata*, as possessing the power of moving its fibres in different directions. A very peculiar spiral contraction of the fibres in one of these confervoid plants has been observed by Link. This plant, if its fibres be elongated for almost any period, immediately contracts them into a spiral form when the force is removed. It has been called by Link *Spirogyra princeps*.

For further information on this curious subject, the reader may consult Meyen's *Neues System der Pflanzen Physiologie*, band iii.; Dutrochet's *Mémoire sur la Motilité des Végétaux;* and various papers by Morren, in the *Mémoires de l'Académie Royale de Bruxelles*.

SENSO'RIUM. [Brain.]

SENTENCE. [Organon.]

SENTINEL or **SENTRY** (from *sentire*, to look or perceive) is a term now applied to an infantry soldier when placed on guard before the palace of a royal personage, or before some other public building; also when guarding the ramparts of a fortress, or, on an army being in the field, when he is stationed on the exterior of the line of outposts. [Piquet.]

SEPAL (in Botany). This term is applied to the divisions of the calyx. [Calyx.] According as the calyx is divided into parts, it has received designations expressive of their number, the term *sepalous*, with a Greek numeral prefixed, being used. Thus, for example, if there are two sepals, the calyx is disepalous; if three, trisepalous; if four, tetrasepalous, and so on. Sometimes the sepals all adhere by their edges; this is called by some writers a *monophyllous* calyx, and by others more properly a *gamosepalous* calyx.

SEPARATE PROPERTY. By the common law of England the husband acquired by the marriage a freehold interest in, and a right to dispose of the rents and profits, during the joint lives of himself and his wife, of all the estates of inheritance of which she was at that time seised, or might become seised during the coverture, as well as a right to an estate for his own life as tenant by the curtesy in the event of his surviving his wife and there having been issue of the marriage. By the common law, also, marriage was an absolute gift to the husband of all the goods and personal chattels of which the wife was actually possessed at that time or might become possessed during the coverture, and it gave him a right to dispose of her chattels real and of such of her choses in action as he should have reduced into possession during the same period. There was no mode by which the wife could take or enjoy any estate or property absolutely independent of her husband.

In process of time, however, limitations of both real and personal property to the separate use of the wife were established in Courts of Equity, and the validity of them has been recognised even in Courts of Law. It was at first considered necessary that property which was to be enjoyed by a married woman for her separate use should be vested in trustees for her, but it has since been settled that where either real or personal property is given to the separate use of a married woman, without any appointment of trustees, the husband shall be considered a trustee for her. This principle applies *à fortiori* when the property is expressly given to the husband for the separate use of his wife. In the same manner the agreement in writing between the husband and wife before marriage, that his wife shall be entitled to any specific property for her separate use, converts him into a trustee for her as to that property; and if the subject of the agreement be real estate, and be such as to give the wife a power of disposition, the agreement will be binding on her heir, and make him a trustee for her appointee. The consideration of what is or is not a valid settlement of property by the husband to the separate use of his wife as against creditors and purchasers, belongs to the general doctrine of marriage settlements. [SETTLEMENT.]

Many questions have arisen upon the construction of particular instruments as to what words are necessary to raise a trust for the separate use of the wife. The result of the cases upon this point may be stated to be, that when, from the nature of the transaction and the context of the instrument, the intention to limit the property to the wife for her separate use is clear, whatever may be the particular expressions used, that intention will be carried into effect; but that the courts of Equity will not interfere to deprive the husband of the interest which he would otherwise take in his wife's property upon doubtful inferences or ambiguous expressions. It has sometimes been doubted whether property could be limited in trust for a woman, whether married or sole at the time, so as to enure to her separate use in the event of a second or future marriage; but the recent decisions upon this point, in accordance with the general practice of conveyancers, leave no room now to doubt their validity. The intention to extend the limitation to future covertures must however be clearly declared; for if the apparent object be to protect the fund against the particular husband, a declaration that the trust shall continue during the life of the woman will not extend it to a future mariage.

Separate estate may be acquired not only in lands and personalty, but in the profits of trade carried on by the wife on her separate account, in consequence either of express agreement between her and her husband before marriage, or his subsequent permission. Upon the general principles applicable to marriage settlements, the agreement in the former case will be good against creditors; in the latter, against the husband only. In such cases the stock in trade and property required for carrying on the business are usually vested in trustees for the wife, who is considered at law as their agent, and should carry on all business transactions in their names. But if no trustees should have been appointed, the rule of equity before stated will apply, and the husband will be bound by his agreement, that all his wife's earnings in trade shall be her separate property and at her own disposal.

When personal property, whether in possession or reversion, is settled to the separate use of a married woman, she may dispose of it and the produce of it as a feme sole to the full extent of her interest, though no particular power be given by the instrument of settlement. But a mere limitation of real estate in fee to the sole and separate use of a married woman, though it enables the wife to dispose of the rents and profits as a feme sole, gives her no power of disposition over the estate beyond what she has by the common law. The gift to the separate use may be accompanied by an express power of appointment by deed or will. The rules of law relating to the formal execution of such powers, and the cases in which defective execution will be supplied, are the same as those which are applicable to the execution of powers in general. [USES.]

It is not necessary in all cases of settlement of personal property to the separate use of a married woman, accompanied with a power of appointment, that she should appoint in terms of the power. Upon this point the following distinctions are established:—1, When there is an express limitation of an estate for life in the fund to the wife, with a power to appoint the principal after her death, the wife can dispose of the capital only by an execution of the power, which may be immediate, if the power authorise an appointment by deed; but if it require the appointment to be made by will only, then it cannot take effect till after her death. This is equally true whether the limitation in default of appointment be to a stranger, to the next of kin, or to the executors and administrators of the wife. 2, When the wife takes the absolute interest in the property, although it should be limited to her in the form of a power, she may dispose of it under her general power, and without regard to the ceremonies prescribed by the instrument. Under the second head are included all the cases in which the trust for the wife appears to be of the principal and not of the interest only, and the effect of such a limitation will not be controlled by the introduction of any subsequent provisions as to the mode of payment of the interest or otherwise.

The foregoing observations with respect to the powers of disposition by a married woman of the capital of a fund given generally to her separate use, are equally applicable to the cases where the interest or rent of property only, or income of whatever kind, is the subject of the settlement. If no particular power to dispose be given, she may do so under that general power which, as before mentioned, a married woman possesses over her separate personal estate, and even where a particular mode of disposition is prescribed in the instrument of settlement, she will not, it seems, be bound to follow it.

If the wife, having a general power of disposition of her separate property, permit her husband during his life to receive and apply her separate estate as his own, a gift from her will in general be presumed, and she will not be allowed at his death to charge his estate with the amount so received.

If the wife, having power to dispose absolutely of her separate property, die without making any disposition of it, the quality of separate property, it seems, ceases at her death, and the surviving husband is entitled to the fund. If the property consist either of chattels real or personal in possession, he will be entitled to them without administration; but if of choses in action, he must take out administration to her estate.

In some cases where a married woman, having an absolute power of appointment over a fund, has executed it, a bill has been filed in order that the consent in court of the wife to the disposition might be taken; and this practice occasioned a doubt whether it was not necessary that the wife's consent in court should be obtained, especially in cases where the appointment was in favour of the husband. But unquestionably the appointment is valid without any such consent, and the presence of the wife in court, whether the appointment be to her husband or to strangers, is entirely unnecessary.

It was at one time doubted whether the wife's general power of alienation of her separate estate could be restrained by the expressed intention of the settlor, such restraint being thought repugnant to the interest which she had in the property; but the power of the settlor to impose it is now established by undoubted authority. The intention to impose this restraint will not however be inferred in the absence of express words to that effect. If the gift be to a woman unmarried at the time when it takes effect, a clause against anticipation, that is, a clause which prohibits or limits the power of alienation, though inserted expressly in contemplation of a future marriage, is inoperative, as it would be in the case of a man, to prevent alienation while she continues sole; and if the gift be to a woman married at the time, the property becomes absolutely disposable by her upon the expiration of the coverture. It has also been much questioned whether, in the cases supposed, the property, if not alienated by the woman while discovert, would be subject to the settlement to her separate use and to the prohibition against anticipation during any future coverture or covertures. The question has been lately decided in the affirmative, and may now be considered as settled. (Tullet *v.* Armstrong, 4 M. & C., 390.)

It has been stated that if a married woman has property settled to her separate use, without any restraint on alienation, she may dispose of it as a feme sole, either with or without consideration; but it seems to be now determined (though there are conflicting decisions on the point among the older authorities), that, in order to affect her separate estate, she must show an intention to charge it, and that it is not liable to answer generally the demands of creditors. It is not very clearly determined in what cases and from what circumstances the intention to charge the separate estate will be presumed. It seems to be established that the separate estate of a married woman is liable to debts for which she has given a written security or acknowledgment, such as a bond or promissory note. The extent to which a woman's separate property may be subjected to the demands of creditors claiming under parol agreements has not been determined. If the separate property consists of land, it will of course not be liable; because, by the statute of Frauds (29 Car. II., § 3), no agreements can affect lands unless they are in writing and signed by the party to be charged; but if of personalty, it is probable that an express parol agreement that her separate property should be charged with the payment of a debt, or even perhaps a tacit agreement to be implied from the circumstances, as when the wife is living separate from her husband, would be held binding on the property.

It has sometimes been considered that upon the principle of the general liability of the separate property to debts, after the death of the wife, in the administration of it among creditors, all ought to come in *pari passu*, as in other cases of the administration of equitable assets; but the later authorities seem to show that the separate property of a feme covert is not subject at her death to any such general liability, and from this it would appear to follow that the creditors whose debts are charged upon it ought, as specific incumbrancers, to be paid according to their priorities.

The wife, in equity, as at law, can incur no personal responsibility by her engagements as to her separate property, and is liable only to the extent of that property in the hands of her trustees: but in suits respecting her separate estate she is treated in all respects as a feme sole, and is personally answerable for contempt in not obeying the orders of the court. In such suits, if she is a plaintiff, she must sue by her next friend, and not with her husband, who however should be made a defendant to the wife's bill: and if she is a defendant, she must be served personally with process in the cause. She must answer by her next friend separately from her husband, who ought however to be made a party to the bill.

(Roper *On Husband and Wife;* and Sugden *On Powers.*)

SEPARATION A MENSA ET TORO. [DIVORCE.]

SE'PIA. [SEPIADÆ.]

SE'PIADÆ (σηπία), a family of CEPHALOPODA. Under this head we shall treat of all those forms which are vulgarly termed *Cuttle-fishes.*

The genera comprehended under that term have been thus defined:

Animal in the form of a sack or purse, with or without fins; head large, very distinct, crowned with brachial appendages to the number of eight or ten; arms very unequal, always furnished with suckers on their internal surface, with or without hooks; branchiæ pyramidal; orifice of the organs of generation opening into the branchial pouch, which last communicates with the external surrounding medium by a sort of funnel, the tube of which opens under the neck.

Shell monothalamous or rudimentary, sometimes horny or cellular, but never polythalamous.[*] (Rang.)

Dr. Leach divided the group of *Cuttles* into two families, the *Octopods* and the *Decapods.*

OCTOPODS.

Animal short, bursiform, ordinarily deprived of fins; head very distinct; eight sessile arms, generally nearly equal, and furnished with simple suckers; naked or testaceous; no internal testaceous rudiment, but only two small cartilaginous pieces in some species.

Professor Owen, in common with other zoologists, divides the Octopods into two groups or families, the *Testacea* and the *Nuda.*

The *Testacea* consist of the genera *Argonauta* [PAPER NAUTILUS and BELLEROPHON]. [CEPHALOPODA, vol. vi., p. 429.]

The *Nuda* [CEPHALOPODA, *ibid.*] comprise the genera *Eledone* and *Octopus.*

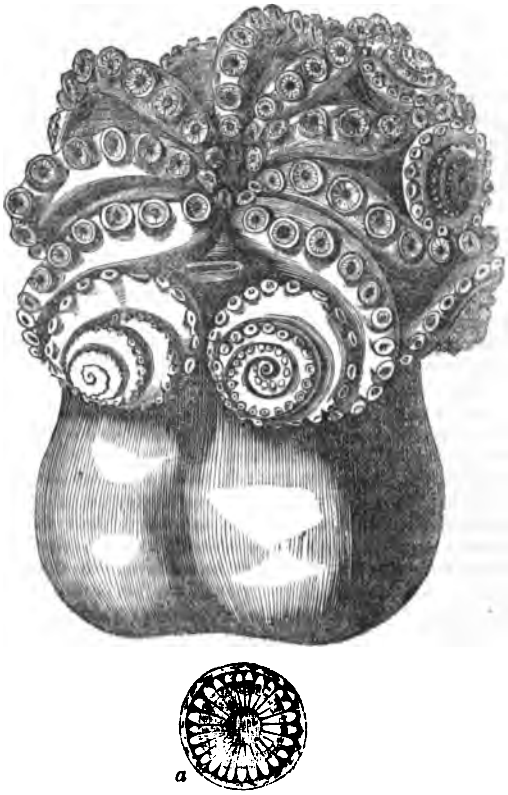
Eledone. (Aristotle; Leach.)

Generic Character.—Arms provided with a single series of sessile acetabula.

Example.—*Eledone ventricosa* (*Octopus ventricosus,* Grant).

Description.—Body short, round, the eight arms connected at their base by a membrane.

Our cut was taken by permission from the beautiful specimen captured at St. Just, Cornwall, in 1822, and preserved in *Mus. Coll. Chir.*, among the preparations illustrative of natural history in spirit, No. 164 A. 'Its arms are compressed, and connected at their roots by a thick web, and in the contraction preceding death they have become spirally convoluted in a very elegant manner; the three upper or dorsal pairs describing four gyrations, the ventral pair five; the surface of the integument is slightly wrinkled and granulate; it is of a mottled lilac or livid colour behind, but is smooth and approaches to white on the opposite aspect of the arms.' (*Catalogue,* part iv., fasc. 1.)



Eledone ventricosa. a, Sucker of Eledone.

Octopus. (Lam. πολύπους, Polypus, Antiq.; and Leach.)

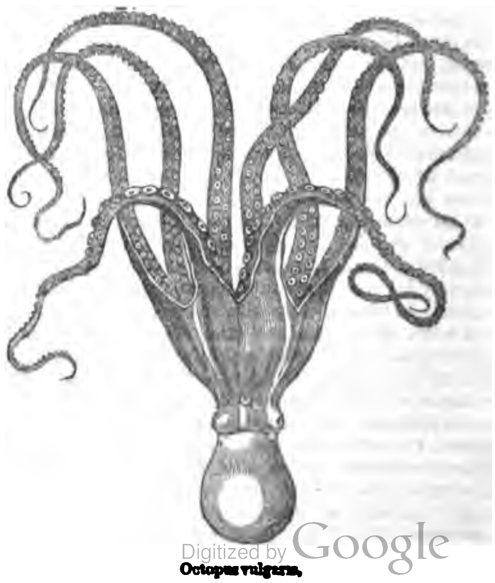
Generic Character.—Arms provided with a double alternate series of sessile acetabula.

Example.—*Octopus vulgaris* (*Sepia octopodia,* Linn.; *Sepia octopus,* Gmel.).

Description.—Body short and ovoïd, the eight arms connected at their base by a wide membrane.

Locality.—The European seas.

This is the *Eight-armed Cuttle* of Pennant; the *Poulp* or *Preke* of the English. Professor Owen has given a very good figure of this species, representing it in the act of creeping on the shore, its body being carried vertically in the reverse position with the head downwards, and its back being turned towards the spectator, upon whom it is supposed to be advancing. (*Cyclopædia of Anatomy and Physiology,* vol. i., f. 210.) This is the cephalopod which is said to be luminous in the dark. Linnæus quotes Bartholinus for the statement that one gave out so much light, when the candle was taken away, 'ut totum palatium ardere videretur.' It has also been alleged that the application of



Octopus vulgaris.

---

[*] But note: the animal of *Spirula* is a decapod. [SPIRULIDÆ.]

ts suckers upon any part of the human body occasions inflammation and subsequent pain.

Three specimens of Octopus vulgaris are preserved in spirit. (*Mus. Coll. Chir.*, Nos. 162, 163, 164.)

It was probably a species of *Octopus* that Mr. Beale encountered while searching for shells upon the rocks of the Bonin Islands. He was much astonished at seeing at his feet a most extraordinary looking animal crawling towards the surf, which it had only just left. It was creeping on its eight legs, which, from their soft and flexible nature, bent considerably under the weight of its body; so that it was lifted by the efforts of its tentacula only a small distance from the rocks. It appeared much alarmed at seeing him, and made every effort to escape. Mr. Beale endeavoured to stop it by pressing on one of its legs with his foot; but although he used considerable force for that purpose, its strength was so great that it several times liberated its member, in spite of all the efforts he could employ on the wet and slippery rocks. He then laid hold of one of the tentacles with his hand, and held it firmly, so that the limb appeared as if it would be torn asunder by the united efforts of himself and the creature. He then gave it a powerful jerk, wishing to disengage it from the rocks to which it clung so forcibly by its suckers. This effort it effectually resisted; but the moment after, the apparently enraged animal lifted its head with its large projecting eyes, and, loosing its hold of the rocks, suddenly sprang upon Mr. Beale's arm, which he had previously bared to the shoulder for the purpose of thrusting it into holes in the rocks after shells, and clung with its suckers to it with great power, endeavouring to get its beak, which Mr. Beale could now see, between the roots of its arms in a position to bite. Mr. Beale declares that a sensation of horror pervaded his whole frame when he found that this monstrous animal had fixed itself so firmly on his arm. He describes its cold slimy grasp as extremely sickening, and he loudly called to the captain, who was also searching for shells at some distance, to come and release him from his disgusting assailant. The captain quickly came, and taking Mr. Beale down to the boat, during which time the latter was employed in keeping the beak of the cuttle away from his hand, quickly released him by destroying his tormentor with the boat-knife, when he disengaged it by portions at a time. Mr. Beale states that this cephalopod must have measured across its expanded arms about four feet, whilst its body was not bigger than a large clenched hand. It was the species called by the whalers 'rock-squid.' (*Natural History and Fishery of the Sperm Whale.*)

DECAPODS.

Animal generally elongated, cylindriform, having a thick sac, furnished with natatory expansions; head very distinct, crowned with ten arms, eight of which are sessile, shorter than in the octopods, and furnished with acetabula or suckers along the whole length of their internal surface, and two much longer (*tentacula*), which are retractile, not situated on the same line with the arms, pediculated, and furnished with suckers, which are situated ordinarily on the enlarged and terminal portion only.

No *shell*, but only a testaceous rudiment or support, which is either cartilaginous or calcareous in the interior of the back, in the greatest part of the genera.

Under this division come the *Teuthidæ* or *Calamaries*, and the true *Sepiadæ*, or *Cuttle-fishes*, properly so called.

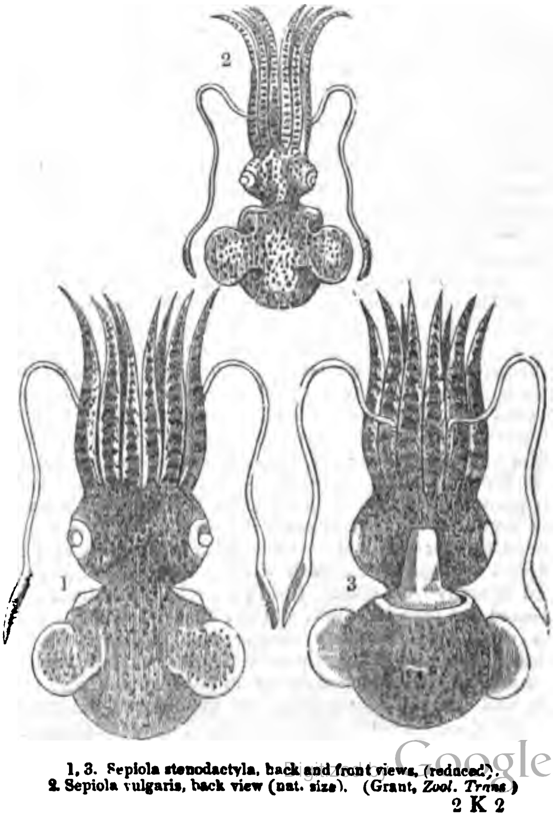
Sepiola. (Rondeletius. Leach.)

Generic Character.—Head of equal breadth with the body, owing to the magnitude of the eyes. Body scarcely ventricose, supported by a thin, flexible, transparent dorsal lamina, and with natatory organs extended from the sides of the body.

Example, *Sepiola vulgaris*.

Description.—Dr. Grant, in his interesting and beautifully illustrated paper on this species, describes the body or mantle of the specimens obtained on our coast as measuring generally about six lines in length, and as much in breadth, whilst the head measures only four lines in length, and, from the magnitude of the eyes, is equal in breadth with the body. The arms are of unequal lengths, the longest being about an inch long, and the shortest about a line less. The first or dorsal pair are the shortest, the second and fourth equal in length, and a little longer than the first pair; and the third pair the longest. This, Dr. Grant observes, is the order of the comparative lengths of the arms most common in the *naked cephalopods*. The third and fourth arms on each side are connected to each other by a musculo-membranous fold, which extends to about a third of their length, and is covered by the skin and subjacent coloured spots. The arms, which are allied to those of *Octopus* in their length, agree with those of *Loligo* in being provided with numerous long pedunculated suckers, which are globular, the peduncles being thick and conical, and arranged in two irregular rows on each arm. General surface of the body pale reddish; very dark purple spots, rare and small, extend over the mantle and the dorsal surface of the fins, the head and arms, and, partially, over the tentacula, and are interspersed with a few patches of larger size, and of the same deep purple colour. The tentacula, about half an inch in length, are thin and cylindrical to near their termination, where they expand a little, and terminate in a point. They proceed, as in other decapods, from between the third and fourth arms on each side. (*Zool. Trans.* vol. i.)

Dr. Grant has in the same paper described a new species (*Sepiola stenodactyla*) sent from the Mauritius to the Zoological Society by Charles Telfair, Esq. 'Its proportions,' says Professor Grant, 'are massive, short, and broad; and its colour is a deep purplish brown, extending to the point of the arms, and produced by large closely-set spots of that colour. It measures three inches from the base of the body to the point of the arms, being about twice the ordinary length of the European species; the two tentacula themselves measure three inches and three lines in length. The length of the mantle behind is one inch and one line, the length of the head is six lines, and that of the longest arms one inch and three lines. The body measures one inch and one line in breadth; and the breadth of the head across the pupils is one inch. The tentacula extend from within two muscular folds, connecting the third to the fourth pair of arms in front, as in the *Sep. vulgaris*: they are small and cylindrical to near their extremity, where they expand and present a villous surface, but have no suckers developed. The suckers of the arms are large and irregularly crowded, of a spherical form, and placed on long thick peduncles. In place of being in two alternate rows, as in *Sep. vulgaris*, the suckers are here crowded seven or eight deep on the broadest part of the arms; each sucker is provided with a dark-coloured osseous ring at its orifice. The arms are proportionally much thicker and shorter than in *Sep. vulgaris*; and hence they present a much broader inner surface for the attachment of numerous rows of suckers. From this contracted form of the cephalic arms, by which it differs so much from the Euro-



1, 3. Sepiola stenodactyla, back and front views, (reduced).
2. Sepiola vulgaris, back view (nat. size). (Grant, *Zool. Trans.*)

pean species, I have termed it *Sep. stenodactyla.* In some parts of the arms, the crowded arrangement of the suckers is seen to depend on the zig-zag direction taken by the rows of peduncles on each side. The coloured markings on the outer surface of the arms are in the form of transverse bands; in *Sep. vulgaris* they are generally minute detached spots. The white band around the upper margin of the mantle, the lengthened form of the syphon and the position of its valve, the form and the subdorsal direction of the eyes, the shape and position of the dorsal fins, and the rounded termination of the mantle, are like those of the common species. This Indian species however is more than four times the size of any European specimen which I have seen, and the form of the mantle is more ventricose.' (*Ibid.*)

Rossia. (Owen.)

Generic Character.—Body ventricose; two wide, rounded, subdorsal fins; anterior margin of the mantle free. Arms rather short, trihedral; the acetabula pedunculated; the peduncles very short, in two alternating rows at the base of the arms, aggregated in many rows at their point: order of the length of the equal arms, 1, 2, 4, 3. Tentacula equalling the body in length furnished at the apex with many very small pedunculated acetabula. Gladius horny, nine lines in length, a little dilated below.

Example, *Rossia palpebrosa.*

Professor Owen, who established this genus upon a cephalopod brought from the Arctic regions by Captain James Ross, R.N., and taken near the beach at Elwin Bay, Prince Regent's Inlet, on the 29th of August, 1832, states that it differs from *Sepiola* and *Sepioteuthis* in the form, proportions, and position of its lateral fins, and in the extent of its horny dorsal style or *gladius.* In these respects, he observes, it bears a closer affinity to *Sepiola,* but differs from it generally in having the anterior margin of the mantle free in the whole of its circumference; its natural position is therefore, in his opinion, intermediate to *Sepiola* and *Sepioteuthis,* which it connects together, as well by its intermediate size, as by the peculiarities of its structure.

The measurements of the specimen, which, Mr. Owen observes, had shrunk in all its dimensions in consequence of having been macerated in spirit, were—

	Inches.	Lines.
Length from the end of the visceral sac to the end of the longest tentacle . .	5	0
Ditto from the end of the visceral sac to the anterior margin of the mantle . .	1	9
Length from the end of the visceral sac to the interspace of the first or middle pair of dorsal brachia	3	2
Ditto of the tentacle	4	2
Breadth of the body, exclusive of the fins .	1	8
Ditto of the head across the eyes . .	1	3

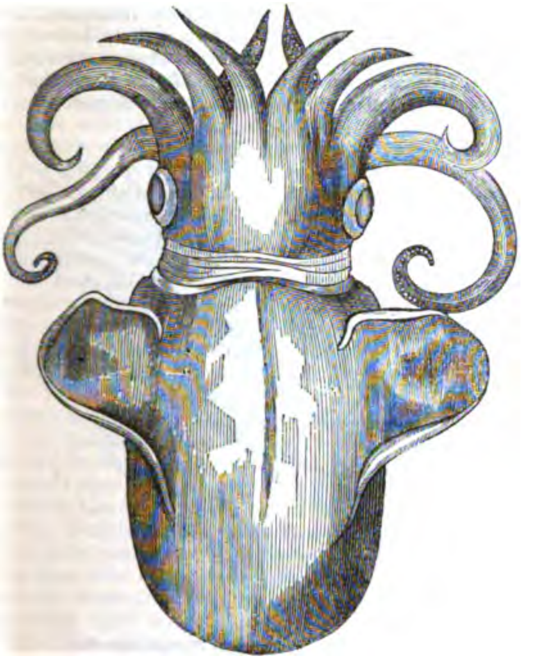
Professor Owen states that the specimen presented a dull dusky-brown colour over the whole of the dorsal and lateral aspects, and over the exterior of the arms. The pigment producing this hue was disposed in minute close-set points. Captain Ross's drawing of the recent animal exhibited a greenish metallic lustre, reflected from these surfaces, slight remains of which were still perceptible in the specimen. The ventral surface was of a light ash-colour. The form of the abdomen or visceral segment of the body was more ventricose than in *Sepiola.* The anterior margin of the mantle projected slightly forwards at the middle of its dorsal aspect, as in *Sepioteuthis,* and was reflected downwards for about half an inch before, being continued upon the back part of the head. There was a transverse groove on either side of the mantle, about a line behind its anterior margin: this part was colourless anterior to the grooves, as in *Sepiola.* The fins were short, semicircular, dorsal in their position, but nearer the sides of the body and placed more forwards than in *Sepiola vulgaris;* the interspace between their origins was to the breadth of the body as 3 to 4, whilst in *Sepiola vulgaris* it was as 3 to 5. They projected laterally from the body with a slight inclination, and measured one inch in length and ten lines in breadth. The arms were proportionately shorter and thicker than in *Sepiola,* more resembling those of *Sepia,* but not having the same relative dimensions as in that genus, *e.g.* the third, and not the fourth pair, was the longest (counting from the dorsal aspect), but the fourth pair was proportionately longer than in *Sepiola.* The measurements were,—

	Inches.	Lines.
First pair	1	0
Second pair	1	3
Third pair	1	9
Fourth pair	1	5

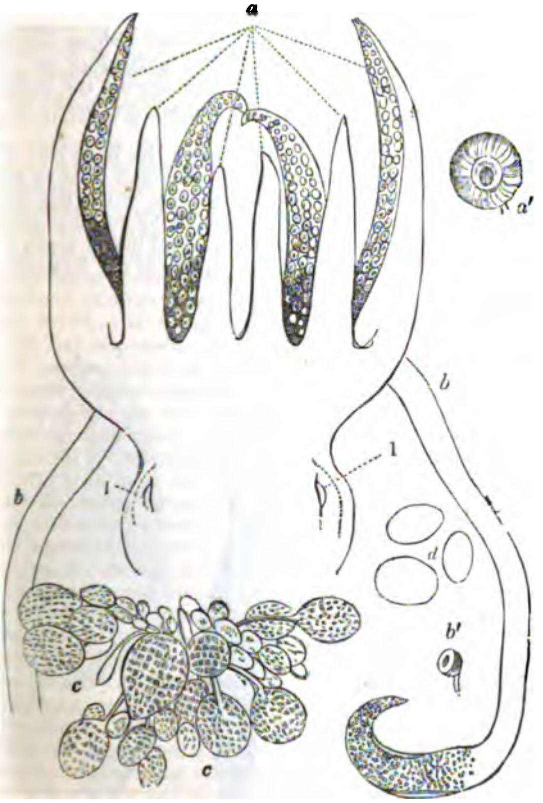
They presented the usual three-sided pyramidal form, with the internal facet beset with the suckers or acetabula. These were of a globular figure, supported by very short sublateral peduncles. Beginning from the base of the arms, the suckers were arranged in a double alternate series; this disposition prevailed along the whole of the first pair, along three-fourths of the second pair, and along about half of the third and fourth pairs of arms, beyond which the suckers were aggregated into irregular transverse rows of from three to five, diminishing in size to the apex of the arm. In this respect, there was an intermediate structure between *Sepiola,* in which the suckers are in a double alternate series along the whole arm, and *Sepia,* in which they are aggregated from the commencement. The horny cup in each acetabulum had the margin entire; and its diameter was equal to one-third of the fleshy sphere in which it was implanted. The tentacles were round, and slightly dilated at their extremities, which were beset for about nine lines by minute and close-set suckers; these diminished in size towards the extremity of the tentacle, and the largest of them did not exceed one-fiftieth of an inch in diameter. The horny cup of these acetabula was proportionately larger than in those of the arms, and their pedicles were longer. A narrow membranous expansion was extended along the sides of the dilated extremities of the tentacle. The tentacles emerged from within the membrane extended between the third and fourth pairs of arms, but this interbrachial fold, though of greater breadth, did not connect the arms together for a greater extent than the membrane between the third and second, or that between the second and first pairs of the legs; but there was no corresponding fold between the ventral pair of arms. In this respect *Rossia* resembled *Sepiola* and *Sepia;* in all of which therefore, Professor Owen observes, the interbrachial membranes have obviously other uses than to protect the tentacles, which can be retracted into a cavity below the base of the arms. Mr. Owen thinks that they probable serve, but in a minor degree than in *Octopus,* as a retropulsive fin. The eyes of the specimen were of large size, forming the usua. convexity on each side of the head; they were however almost completely hidden from the view by the contraction of the lower eye-lid principally; the opening of the fold corresponding to the transparent portion of the integument continued over the eyeball (for, Mr. Owen remarks, the animal cannot be said to possess a true cornea) was of a longitudinal figure and dorsal in its position. In *Sepiola,* he observes, there is a slight fold beneath the eye, corresponding to the largely developed eyelid in *Rossia;* but there is a greater proportionate breadth of the head at this part in *Sepiola.* The siphon, or funnel, extends to within a line of the interbrachial membrane of the ventral pair of arms, resembling in this respect *Sepiola* rather than *Sepia,* or *Sepioteuthis,* where the funnel reaches only half-way between that part and the margin of the mantle. It was depressed and tapered towards the extremity; within the tube, and two lines distant from the end, was seen the small valve, which exists in all the Cephalopods that have locomotive organs adapted for propelling them forwards. On either side of the base of the funnel there was an oblong cartilaginous depression, surrounded by a raised margin, to which a corresponding projection on the inner side of the mantle was adapted. This structure for strengthening the attachment between the mantle and the head is met with, Professor Owen observes, in all the *Decacera,* or Decapods, and in *Ocythöe* (*Argonauta*), but does not exist in *Octopus.* The membranous expansions from the sides of the base of the funnel, corresponding to the '*callottes*' in *Octopus,* extended in *Rossia* round the anal aperture. The rudimentary dorsal shell or gladius was not more than nine lines in length, and one line and a half in breadth at its lower and dilated half; there was a longitudinal mesial ridge on its external surface, and a corresponding groove with lateral ridges on the opposite side: it was of firm texture and brown colour anteriorly, but became thin, soft, white, and cartilaginous at its posterior extremity.

For the interesting details of the anatomy we must refer the reader to the Appendix to Captain Sir John Ross's 'Second Voyage.' The ink-bag was situated between the liver and the muscles which surround the arms, close to which its duct entered the intestine. The ink was black, of the same tint as the China ink.

With reference to the remarkable development of the skin surrounding the eyeball (whence the trivial name *palpebrosa*), by means of which this animal evidently possesses the power of defending the eye, as the pulmonated *vertebrata* do by means of their more regularly-formed eyelids, Professor Owen observes that the utility of the provision, in seas abounding with fragments of ice, is obvious.



Rossia palpebrosa, dorsal aspect, showing the appearance of the eyes while the animal was alive.



Head and arms of Rossia palpebrosa, on the dorsal aspect, taken from the figure where it is laid open to show the internal structure. Here the eyelids (1, 1) are represented closed after death. *a*, the eight arms. *a'*, one of the brachial suckers, magnified. *b*, the two tentacles. *b'*, a tentacular sucker, magnified. *c*, ovisacs in the ovary, appended to filamentary pedicles. *d*, eggs. (Owen, Ross's *Appendix*.)

Sepioteuthis. (De Blainv.)

Generic Character.—Animal elongated, bordered nearly throughout its length by a natatory membrane, which is narrow and lateral; arms sessile and pedunculated, as in the Calamaries, and less enlarged than in the Cuttles; acetabula as in the Calamaries.

Internal support or gladius comparatively wide, but horny and delicate.

Example, *Sepioteuthis sepiacea.*

This species is figured in the article Cephalopoda under the name of *Sepia officinalis*, to which however it bears a very close external resemblance, so close indeed that authors generally place it immediately before that species.

Cranchia. (Leach.)

Generic Character.—Animal furnished with a bursiform sac, which is elongated and rounded posteriorly; aperture narrow; dorsal border not distinct; head less distinct from the body; arms sessile, unequal; tentacles pedunculated, longer, retractile, terminated in a club shape; peduncles without acetabula?; caudal fins circular, touching each other at their origin.

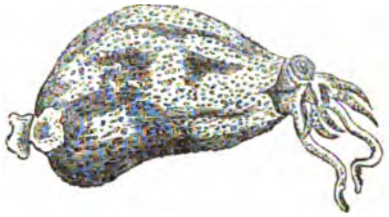
Internal support unknown. (Rang.)

The character as given in the Appendix to Capt. Tuckey's *Narrative*, where the animal was first figured, is—

Body oval, sack-shaped; fins approximating, their extremities free; neck with a frænum behind, connecting it with the sack, and with two other fræna connecting it with the sack before.

Example, *Cranchia Scabra.*

Description.—Sack rough, with hard rough tubercles. (Appendix to Tuckey's *Congo.*)



Cranchia scabra.

Loligopsis. (Lam.)

Generic Character.—Body long and cylindrical, terminated by a pair of conjoined large round fins, forming generally a circular disk; anterior border of the mantle adherent to the back part of the head for a small extent. *Tentacula* very long and slender (frequently mutilated). *Gladius* long, narrowest in the middle, dilated posteriorly.

The *tentacula* of this genus are sometimes enormously long.

Example, *Loligopsis Veranii.* Fér.

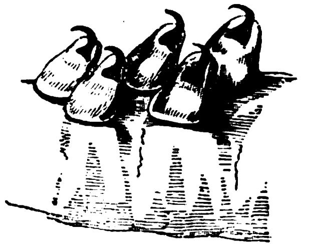
Onychoteuthis. (Lichtenstein.)

Generic Character.—Body and fins as in the genus *Loligo;* ventro-lateral cartilages of the mantle long and narrow; horny hoops of the tentacular, and sometimes of the brachial, acetabula produced into the forms of hooks or claws.

Gladius or internal support long, broadest in the middle.

Example, *Onychoteuthis Banksii.*

Professor Owen, after dwelling on Dr. Roget's accurate description of the mechanism by which the suckers of *Octopus* are worked [Cephalopoda, vol. vi., p. 424], observes that still there are circumstances in which even this remarkable apparatus would be insufficient to enable the cephalopod to fulfil all the offices in the economy of nature for which it was created; and that in those species which have to contend with the agile, slippery, and mucus-clad

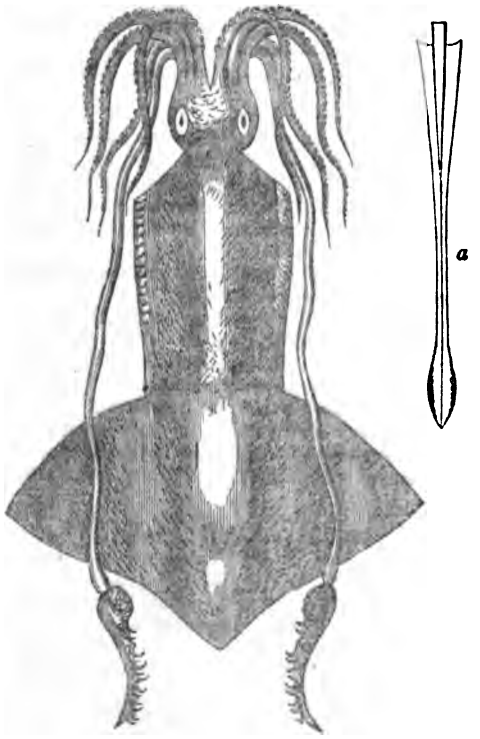


Uncinated suckers of Onychoteuthis, from specimen in spirits in Mus. Coll. Chir. (by permission).

fishes, more powerful organs of prehension are superadded to the suckers. Thus in the *Calamary* the base of the piston is, he remarks, inclosed by a horny hoop, the outer and anterior margin of which is developed into a series of sharp-pointed curved teeth. These, as he states, can be firmly pressed into the flesh of a struggling prey by the contraction of the surrounding transverse fibres, and can be withdrawn by the action of the retractor fibres of the piston. 'Let the reader,' adds the Professor, 'picture to himself the projecting margin of the horny hoop developed into a long, curved, sharp-pointed claw, and these weapons clustered at the expanded terminations of the tentacles, and arranged in a double alternate series along the whole internal surface of the eight muscular feet, and he will have some idea of the formidable nature of the carnivorous *Onychoteuthis*.

'Banks and Solander,' says Professor Owen in continuation, 'in Cook's first voyage, found the dead carcass of a gigantic species of this kind floating in the sea, between Cape Horn and the Polynesian Islands, in 30° 44′ S. lat., 110° 33′ W. long. It was surrounded by aquatic birds, which were feeding on its remains. From the parts of this specimen which are still preserved in the Hunterian Collection,* and which have always strongly excited the attention of naturalists, it must have measured at least six feet from the end of the tail to the end of the tentacles. The natives of the Polynesian Islands, who dive for shell-fish, have a well-founded dread and abhorrence of these formidable cephalopods, and one cannot feel surprised that their fears should have perhaps exaggerated their dimensions and destructive attributes.'

Professor Owen then notices another structure, which adds greatly to the prehensile powers of the uncinated Calamaries:—'At the extremities of the long tentacles, besides the uncinated acetabula, a cluster of small, simple, unarmed suckers may be observed at the base of the expanded part. When these latter suckers are applied to one another, the tentacles are firmly locked together at that part, and the united strength of both the elongated peduncles can be applied to drag towards the mouth any resisting object which has been grappled by the terminal hooks. There is no mechanical contrivance which surpasses this structure: art has remotely imitated it in the fabrication of the obstetrical forceps, in which either blade can be used separately, or, by the interlocking of a temporary joint, be made to act in combination.' (*Cyclopædia of Anatomy and Physiology*, vol. i.)



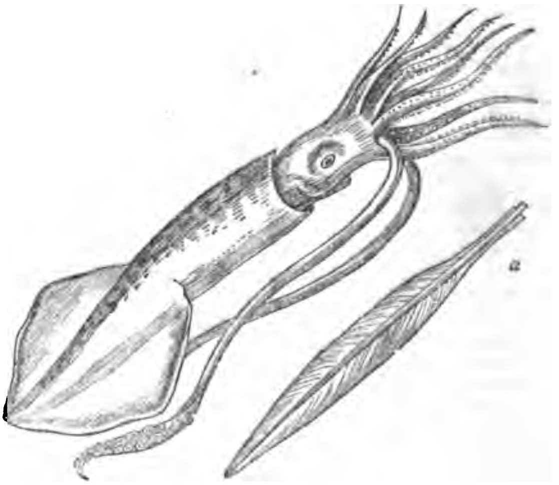
Onychoteuthis Banksii. a, gladius, or dorsal support.

Loligo. (Lam.)

Generic Character.—Body elongated, cylindrical, provided with a pair of rhomboidal or triangular fins, shorter than the body, and terminal, their apices generally converging to a point, and united to the end of the mantle; anterior margin of the mantle free. Horny hoops of the acetabula denticulated. *Gladius* long and narrow. (Owen.)

Example, *Loligo vulgaris*.

Pennant, under the name of *Sepia media*, describes this species, which is the common Calamary or Pen-fish (the latter name being derived from the form of its transparent gladius or support), as having an almost transparent body (which is green but convertible into a dirty brown, confirming the remark of Pliny,* that they change their colour, adapting it, chameleon-like, to that of the place they are in), and large smaragdine eyes. It is common upon our coasts.



Loligo vulgaris. a, its pen or internal support.

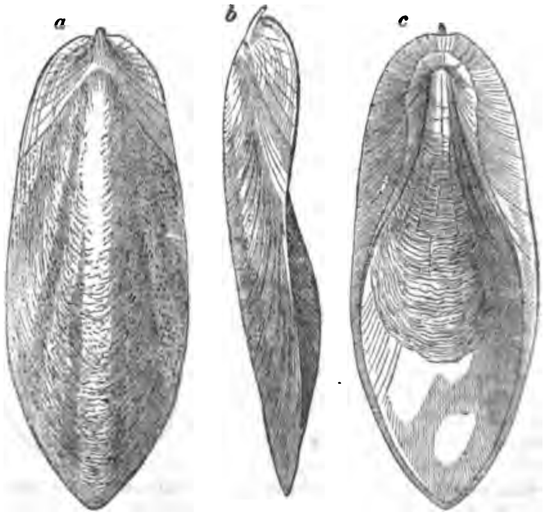
M. de Blainville gives *Loligo vulgaris* as the example of his genus *Pteroteuthis*.

Sepia. (Lam.)

Generic Character.—*Animal* with an oblong depressed body, with two narrow lateral fins extending its whole length; mantle free at its anterior margin; the acetabula supported by horny hoops with the margin entire or very minutely denticulated.

Shell internal, lodged in a sac on the back part of the mantle, composed of an external calcareous apex or *mucro*, of a succession of calcareous laminæ with intervening spaces filled with air, and supported by columns (but not perforated by a siphon), and an internal horny layer, corresponding to the anterior horny sheath in the BELEMNITES. (Owen.)

Example.—*Sepia officinalis*.



Internal shell of Sepia officinalis. a, view of back; b, side view; c, under side.

---

* Mus. Coll. Chir.

* 'Nat. Hist.,' ix. 29.

This is the common Cuttle-fish, so well known on our coasts, and whose shell is so often thrown up by the waves on the beach.

The ink (nigræ succus loliginis*) is common to this and other species of cephalopods. [CEPHALOPODA, vol. vi., p. 425.] This fluid is not only ejected as a defence to colour the water in order to favour the escape of the animal, as was well known to the antients (Oppian, *Halieut.*, iii.; Pliny, *Nat. Hist.*, ix. 29), but as a direct means of annoyance. A gallant officer who was inconsiderately collecting shells in a pair of immaculate white trowsers, came suddenly upon one of the naked cephalopods snugly harboured in a recess in the rock. They looked at each other, and the cuttle, who had his eyes about him, and knew well how to use them, upon seeing the enemy advance, took good aim, and shot so true that he covered the snowy inexpressibles with the contents of his ink-bag, and rendered them unpresentable either in drawing-room or dining-room.

That the juice was used by the antients as ink is evident from many passages: we content ourselves with a reference to that above given, and to the lines in the graphic description of the idler by Persius. (*Sat.* iii., lin. 10, *et seq.*)

The flesh of the naked cephalopods was rather esteemed of old, as it is indeed now in Italy and other countries. Aristotle declares that these animals are in the highest season when pregnant,† and those who wish to taste a cuttle-fish sausage, will find a *receipt* for making that savoury viand in Athenæus. [CEPHALOPODA, vol. vi., p, 425.]

Mr. F. D. Bennett states that the *fe*, or cuttle-fish, is considered a luxury by all classes of the Sandwich Islanders, and that when fresh and well cooked it is an excellent food, and in consistence and flavour not unlike the flesh of a lobster's claw. (*Narrative of a Whaling Voyage round the Globe*, London, 1840.)

Independently of the swimming powers of the naked cephalopods, and their faculty of darting backwards in the water, they can, some of them at least, throw themselves out of the water and take leaps analogous to flights. Thus Pliny says, and not without ground for the assertion, 'Loligo etiam volitat, extra aquam se efferens, quod et pectunculi faciunt sagittæ modo.' (*Nat. Hist.*, ix. 29.) It is not improbable that one of the species, *Loligo Sagitta*, may have received its name from the rapidity with which this leap or flight out of the water is executed.

Mr. F. D. Bennett, who describes the sea as peculiarly animated between the latitudes 28° and 31° N. and the longitudes 154° and 160° W., observed that the ship was constantly attended by such vast numbers of the Albacore, that, when swimming, as is their custom, on the surface of the water, they could be seen as a dense shoal extending several hundred yards on every side of the ship, about which sword-fishes (*Xiphias*) frequently came, 'making destructive onslaughts' on the Albacores. More rarely he noticed the Barracuda, and transient shoals of Bonita. 'Flying-fish and (nearly allied to these in their movements) flying-squid (*Loligo*) were also numerous. During a calm, in lat. 30° N., the flying-squid appeared in larger flights than we had ever before witnessed; persecuted probably by the albacore (which select this tranquil time to descend deep in the water, and to rove far from the ship in quest of food), they rose from the sea in large flocks, leaping over its smooth surface, much in the same manner, and to the same height and distance, as the flying-fish. Many of them were captured by birds during their leaps; and one individual, in making a desperate effort to escape some aquatic pursuer, sprang to a considerable height above the bulwarks of the ship, and fell with violence upon the deck.' In the appendix, the *Flying-Squid* is again noticed. 'The head of this cephalopod,' says the author, 'is a plane circular disk, surrounded by long arms, furnished on their upper surface with many circular suckers, which hold with a tenacious grasp. The eyes are large, very perfectly formed, and lodged in spacious cartilaginous orbits The mouth, like that of most of the cuttle-fish tribe, is horny, and shaped like the beak of a parrot. A slender neck connects the head to the body, and is received into the latter as into a capacious sheath. The trunk is conical, tapering to a point at the tail, smooth, and composed of a dense white cartilaginous structure covered with a delicate membrane or skin, beneath which are deposited the brilliant colours this mollusc often displays. Near the tail is a broad fin-like appendage, which can either be expanded horizontally on either side, or folded neatly upon the abdomen. The interior of the back contains an elastic horny rod, or substitute for the 'sepia bone,' that occupies the same part in some other tribes of the cuttle-fish. It extends the entire length of the body, and is flattened at its anterior extremity, whilst its caudal end is shaped like a cup; the whole bearing some resemblance to the instrument used for tasting wine from casks. This elastic structure and the membranous expansion on each side the tail are apparently the two principal agents employed by the animal in its protracted leaps through the air. Whether the fin-like appendage is also employed in swimming is very questionable.' 'One kind of *Loligo*,' captured in the Pacific Ocean, in lat. 34° N., which measured six inches in its entire length, must, from the description of its hooks, have been an *Onychoteuthis*. This individual leaped from the sea over the high bulwarks of the ship, and alighted on the deck at a time when vast flocks of the same species were seen leaping around, and often striking with violence against the bows of the vessel, the sea being comparatively smooth. It was much injured by the violence with which it struck the deck. Another species with its two long tentacles furnished at the extremities with rows of suckers (*acetabula*) instead of horny hooked appendages, resembling the above in size and form, was obtained in the Pacific. The prevailing colours were silver-white and steel-blue, spread with red spots and tints of violet and purple, a brilliant and very beautiful spot of emerald-green being placed immediately above each eye. Mr. Bennett concludes by stating that they noticed examples of this family of Cephalopoda from the equator to lats. 34° N. and 16° S. in the Pacific Ocean. (*Ibid.*)

The size of the naked cephalopods varies greatly. Some are of very large dimensions, and others—the *Sepiolæ* for instance—very small. Pennant relates that in the Indian Seas they are found of enormous size, and states that a friend of his, long resident among the Indian Isles, and a diligent observer of nature, informed him that the natives affirm that some have been seen two fathoms broad over their centre, and each arm nine fathoms long, adding that when the Indians navigate their little boats, they go in dread of them; and that, least these animals should fling their arms over them and sink them, they never sail without an axe to cut them off. Though there is doubtless exaggeration in some of the accounts relative to colossal cuttle-fishes, there is no doubt that some of the species attain to very formidable dimensions. We have seen the computed length of the *Onychoteuthis* found dead by Sir Joseph Banks; and even in the European seas, some of the *Sepiadæ* are very large. Mr. Swainson (*Malacology*) remarks that he saw many caught on the shores of Sicily, and that two would be a good load, their arms being as thick as those of a man.

We must take with some grains of allowance the stories collected by Denys de Montfort: such as that of Dens, a northern navigator, who, according to Dr. Shaw, avowed that he lost in the African seas three of his men, while they were employed during a calm in scraping the sides of his vessel, by the attack of a monster of this kind, which suddenly appeared, seized them in its arms, and drew them under water in spite of every effort to save them, and that the thickness of one of the creature's arms, which was cut off in the contest, was that of a mizen-mast, whilst the suckers were of the size of pot-lids. Then again, another crew, it was alleged, were similarly attacked off the coast of Angola. A gigantic cuttle-fish suddenly threw its arms across the vessel, and was on the point of dragging it to the bottom, when the crew succeeded in cutting off its arms with swords and hatchets. When their danger was most imminent, they prayed to St. Thomas for aid, and, in gratitude for their deliverance, dedicated, on their return home, a picture representing their perilous encounter, to the saint in his chapel at St. Malo Dr. Hamilton gives an engraving of this adventure in the volume on *Amphibious Carnivora*, in the 'Naturalist's Library,' and beneath it is printed, 'The Kraken, supposed a Sepia or Cuttle-fish (from Denys Montfort).' Dr. Shaw observes that the existence of some enormously large species of the cuttle-fish tribe can hardly be doubted; and that though some accounts may have been much exaggerated, there is sufficient cause for believing that such species may very far surpass all that are generally observed about the coasts of European seas. The last observation may be safely admitted; but the account given by Dr. Shaw of the narrative of Dens affords one of the many proofs that a story rarely loses anything in its progress. That narrative is sufficiently marvellous; but on turning to it as recorded by Denys de Montfort, we find that only two of Dens's men are stated to have been carried off; the third having been rescued, though he died delirious on the night following the encounter. The suckers are described as having been as large as ladles (cueiller à pot), and the arm, at its base, as big as a fore-yard (vergue d'un mât de misaine). In Shaw's lectures the yard is magnified to a mast, and the ladles are promoted to pot-lids. The notion that the celebrated *Kraken* is not to be considered as a wild and groundless chimera, but as either identical with or nearly allied to a colossal cuttle-fish, is supported in Blackwood's 'Magazine,' vol. ii. A writer in the same work, vol. iii., attacks the opinion attempted to be sustained in vol. ii.

---

* Hor. 'Sat.,' iv. 100.

† 'Hist. Anim.,' viii. 30

FOSSIL SEPIADÆ.

Professor Owen observes, that as it is certain that the animals of the *Belemnitidæ* [BELEMNITE] possessed the ink-bag, they must consequently have been invested with a muscular mantle, and we may therefore infer that they resembled the Dibranchiate Cephalopods in their locomotive and respiratory organs, and consequently in the general plan of their organization. In the structure and position of their siphoniferous camerated shell, they are, in his opinion, intermediate to *Spirula* and *Sepia*, and he adds, that as the animal of *Spirula* is proved to be a Decapod, the probability is very strong that the animal of the Belemnite was of the same type. (*Cyclopædia of Anatomy and Physiology.*)

In the secondary series of rocks (oolitic group) we find *Onychoteuthis augusta*, Münst. (*Loligo prisca*, Rüpp.), and a large Sepia (*Sepia antiqua*, Münst.; Rüpp.) in the Jurassic limestone of Solenhofen, commonly called the Solenhofen slate; and the remains of fossil *Loligines*, according to Dr. Buckland, with their ink-bags and ink preserved, in the lias of Lyme Regis. Also *Rhyncholites*, or Sepia beaks, in the last-mentioned formation (De la B.); and in the lias near Bristol. (Miller.)

Professor Buckland, in his interesting 'Bridgewater Treatise,' says, 'Cuvier drew his figures of the recent *Sepia* with ink extracted from its own body. I have drawings of the remains of extinct species prepared also with their own ink; with this fossil ink I might record the fact, and explain the causes of its wonderful preservation; I might register the proofs of instantaneous death detected in these ink-bags, for they contain the fluid which the living *Sepia* emits in the moment of alarm; and might detail further evidence of their immediate burial, in the retention of the forms of these distended membranes; since they would speedily have decayed and have spilt their ink had they been exposed but a few hours to decomposition in water. The animals must therefore have died *suddenly*, and been *quickly* buried in the sediment that formed the strata in which their petrified ink and ink-bags are thus preserved.'

Professor Agassiz, as we have stated [BELEMNITE, vol. iv., p, 173], is of opinion that these fossil ink-bags found in the lias belonged to belemnites. But still Dr. Buckland's argument remains untouched. The organ of sight in the Cephalopods generally, and in the naked group particularly, is extremely well developed [CEPHALOPODA, vol. vi., p. 425], and we therefore have in the remains of the Sepiadæ, which are preserved in the strata abovementioned, additional evidence that the antient seas in which they lived were constituted like those in which the cuttle-fishes and Squids (as the fishermen call the calamaries) now swim.

See further the articles BELOPTERA and BELOSÆPIA.

SE'PIOLA. [SEPIADÆ.]

SEPIOTE'UTHIS. [SEPIADÆ.]

SEPOY, or SIPOY, the name of the native soldier in the East Indies. Bishop Heber derives the word from 'sip,' the bow and arrow, which were originally in almost universal use by the native soldiers of India in offensive warfare. Those Bhiels and Kholees who are employed in Guzerat in the service of the police and in protecting gentlemen's houses and gardens are also called sepoys, and with more propriety, as they still use the bow and arrow. The native soldiers in the pay of the British government now form a large army, well trained in European discipline, of a size somewhat less indeed than European soldiers, but quite as brave, as hardy, and as active, capable of undergoing as much fatigue and of sustaining even greater privations. To the attachment and bravery of this army Great Britain is chiefly indebted for the possession of her Indian empire, and it now secures to her the undisputed sovereignty over a territory vastly more extensive than her own, and separated from her by the distance of nearly half the globe.

Bombay was the first possession which the English obtained in India, but the establishment on that island was for a long time on a very limited scale, and required nothing more than its own garrison and a few companies of native troops, who were peons, subject to little control, to no fixed military law, and who used their native weapons in preference to muskets. The French were the first to set the example of employing natives regularly instructed in European discipline. Labourdonnais, in the siege of Madras in 1746, had 400 sepoys well armed and well trained, besides 400 disciplined negroes from Madagascar, in addition to his European soldiers. A corps of 100 sepoys from Bombay and 400 from Tellichery are mentioned as having joined the army of Madras in 1747, but these were probably only peons and bands of undisciplined natives hired for the occasion. In 1748 a small corps of natives was raised in the neighbourhood of Madras, and trained and disciplined by Mr. Haliburton, a lieutenant. From 1748 to 1766 the sepoys were in separate companies of 100 each, commanded by subadars, or native captains, though under the superintendence of Europeans. In 1766 the companies were formed into battalions of 1000 men each, commanded by European officers, under whom the subadars still retained their rank and influence. In 1796 two battalions were made to constitute a regiment, which continued to be the form till about 1820, since which time each regiment has been made to consist of two battalions of 500 men each.

Bombay, in 1780, during the war with the Mahrattas, had fifteen battalions of sepoys, of 1000 men each, which, at the conclusion of the war, were reduced to six battalions and one of marines. In 1788 there were twelve battalions, which, in 1796, were reformed into four regiments of two battalions each. In 1818 the Bombay establishment consisted of nine regiments of native infantry of two battalions each, one battalion of marines, and a small corps of native cavalry.

The Madras establishment, in 1766, consisted of ten battalions of sepoys, of 1000 men each. In 1770 there were eighteen battalions; in 1784, twenty-eight battalions of infantry and two of cavalry; in 1818, twenty-four regiments of native infantry, of two battalions each, eight regiments of native cavalry, several troops of horse artillery, and a large invalid establishment.

Of the progress of the native army on the Bengal establishment we have no precise details. It may be mentioned however that in 1778, when assistance was required at Bombay, a corps of Bengal native cavalry and a proportion of artillery, amounting to 6600 native troops, 103 European officers, with 31,000 followers, marched from Cawnpoor, on the banks of the Jumna, to Surat, upwards of 800 miles, through Bundelcund, Malwa, and Candeish, where they had to encounter every species of obstacle and opposition. Another force of Bengal native troops, consisting of five regiments, of two battalions of 500 men each, were marched about 1100 miles through Cuttack and the Northern Circars to Madras, where their assistance was required to preserve our power in that quarter.

The pay of the Sepoy is high, two pagodas, or seven rupees, per month, which is double the wages of the class of persons from whom they are generally drawn.

The Indian army in 1840, according to the 'East India Calendar,' was as follows:—

Bombay.

26 regiments of native infantry.
3 regiments of native cavalry.
2 regiments of European infantry.
1 regiment of artillery.
1 corps of engineers.
1 corps of invalids.

Madras

52 regiments of native infantry.
8 regiments of native cavalry.
2 regiments of European infantry
1 regiment of horse artillery.
4 regiments of foot artillery.
1 corps of engineers.
1 corps of invalids

Bengal.

74 regiments of native infantry.
10 regiments of native cavalry.
2 regiments of European infantry
1 regiment of horse artillery.
5 battalions of foot artillery.
1 corps of engineers.
1 corps of invalids.

The native troops in the pay of the British government may therefore be roughly estimated at 152,000 infantry and 21,000 cavalry, the total number, including artillery, engineers, &c., being probably about 184,000.

SEPS. [Scincoideans, vol. xxi., p. 76.]

SEPTEMBER, the ninth month, as the year is now divided by European nations. It consists of 30 days. Etymologically the name is improper, being a Latin term formed of *septem*, seven, and the termination *ber;* and the same impropriety belongs to October, November, and December. The Roman year originally commenced in March; and the English names of the months, which are all Latin terms, appear to have been given to them by the lawyers, whose writings were formerly in Latin, and who supposed the year to commence in March, on which supposition the names are right, September being the seventh, October the eighth, &c., when March is the first. The legal year in England was not made to commence on the 1st of January till the alteration of the style in 1752. Most of the other nations of Europe apply the same or a similar name to this month—German, *September;* French, *Septembre;* Italian, *Settembre;* Spanish, *Septiembre.* In Switzerland September is called *Herbstmonat*, the autumnal or harvest month.

Other appellations were given to this month under some of the Roman emperors. The Saxons called it *Gerstmonath*, or barley-month, gerst being the original Saxon name for barley, which was the chief grain cultivated by the Saxons, and commonly harvested in this month. *Gerste* is still the German name for barley, which name seems to be a corruption of *beerlegh*, a term which the Saxons applied to the grain from its use in making beer.

SEPTUAGE'SIMA. [Sexagesima.]

SEPTUAGINT, or THE ALEXANDRINE VERSION OF THE OLD TESTAMENT, the most antient translation of any part of the Scriptures. It is in the Greek language. The following account of its origin is given in a letter ascribed to Aristeas, an officer at the court of Ptolemy Philadelphus, and repeated by Josephus (*Antiq.*, xii., c. 2) and Eusebius (*Præpar.*, Evang. viii., c. 2-5). When Ptolemy Philadelphus had founded the great library at Alexandria [Ptolemæus II., p. 101], he was anxious to have in it a copy of the laws of the Jews. By the advice of Demetrius Phalereus, his principal librarian, he sent Aristeas and Andreas to Jerusalem, with valuable presents for the Temple, to request the high-priest to send him a genuine copy of the law, and seventy-two elders competent to translate it into Greek, six out of each tribe. The high-priest complied with his request. Upon the arrival of the translators at Alexandria, the king entertained them splendidly, and then had them conveyed to a house prepared for them in the island of Pharos, where, in the space of seventy-two days, they finished a version of the Pentateuch, to the complete satisfaction of Demetrius and Ptolemy, and also of the Jews in Alexandria. Philo, Justin, and Epiphanius repeat this story, but exaggerated by traditions which ascribe a miraculous accuracy to the translation. The name *Septuagint* (the version of the seventy) is derived from the number of the translators. The genuineness of the letter of Aristeas, and consequently the truth of the whole story, is very doubtful, and is now generally rejected. Most critics imagine that the version of the Pentateuch was made during the reign of Ptolemy Soter, and between the years 298 and 285 B.C., for the benefit of the Jews whom Ptolemy had carried into Egypt (B.C. 320), and probably under the patronage of the king; and that the name *Septuagint* is derived from the circumstance of the version having been approved by the Sanhedrim of the Alexandrian Jews. It is evident from the style of the version of the remaining books of the Old Testament, that they were translated by different hands and at different times. That the translators of the Septuagint were Egyptians, is evident from the Coptic words which occur in the version.

Philo says that the Septuagint was translated from the Chaldaic, by which he means the Hebrew Scriptures as they existed after the Captivity. But from certain points of resemblance between the Septuagint and the Samaritan Pentateuch, many eminent critics have concluded that the former was translated from the latter, and not from the Hebrew. It is however quite incredible that, if this had been the case, the Septuagint should have been, as it was, universally received by the Jews.

The character of the version varies greatly. By far the best part is the version of the Pentateuch, which was evidently made by a man well acquainted with both Hebrew and Greek. Next in value is the book of Proverbs, which is for the most part very accurate, and displays much poetical taste. The translation of Ecclesiastes is too literal. The books of Judges, Ruth, Samuel, and Kings appear to have been translated by the same author, and do not contain so many Hebraisms as other parts of the version. In the book of Job many interpolations are made in the narrative, and there are considerable omissions in the poetical parts. The book of Esther, and the Psalms and Prophets, appear to have been translated between 180 and 170 B.C., but in a very inferior manner: indeed a great part of the version of the Psalms is quite unintelligible. Jeremiah is the best translated of the prophets; next come Amos and Ezekiel. The version of Isaiah, which Lowth places one hundred years later than that of the Pentateuch, is the worst of all, except that of Daniel, which differs so much from the Hebrew, that the early Christians rejected it altogether, and substituted the version by Theodotion in its place. The Septuagint contains also the apocryphal books of the Old Testament. [Apocrypha.]

The Septuagint was used not only by the Hellenistic Jews, but by all Jews who understood Greek; and even some of the Talmudists mention it with praise. It is constantly quoted by Josephus, and very frequently by the writers of the New Testament.

Soon after the Christian æra however we find the opinion of the Jews respecting it very much altered, probably in consequence of the use made of it against them by the Christians. They went so far as to institute a solemn fast on the 8th of the month Thebet (December) to execrate the memory of its having been made, and afterwards a new version, that of Aquila, was made for the express purpose of superseding the use of the Septuagint in the synagogues. [Aquila.] The fathers of the Greek church always quote the Septuagint. All the early versions, except the Syriac, were made from it. And thus, through the Vulgate, it was used in the Latin as well as in the Greek church. Its text having become corrupted by frequent transcription, Origen undertook to revise it, and produced his celebrated *Hexapla.* [Origenes.]

At the end of the third and the beginning of the fourth centuries, three recensions of the text of the Septuagint were produced. The first was undertaken by Lucian, a presbyter of Antioch, who suffered martyrdom, A.D. 311. This edition was conformed to the Hebrew text, and was received in the churches from Antioch to Constantinople. The second was edited at the same time by Hesychius, an Egyptian bishop. It is not known whether he followed the Hebrew text or antient MSS. of the Septuagint; but his alterations appear to have been fewer than those of Lucian. His edition was received by the churches of Egypt, and is cited by Jerome as the *Exemplar Alexandrinum.* The third was transcribed by Eusebius and Pamphilus from the text in the Hexapla, with the whole of Origen's critical marks. In process of time these marks became so altered by frequent transcription, that they were at length altogether omitted, so that it is now impossible to distinguish Origen's emendations from the original text. This edition was received by the churches of Palestine, and had a place in all libraries. All the subsequent editions of the Septuagint are founded upon these three recensions.

The principal modern editions of the Septuagint are: 1, The Complutensian, A.D. 1514-1517. [Polyglotts.] 2, The Aldine, Venice, 1518. 3, The Roman, after the Vatican Codex, 1586. 4, The edition of Bos, after the Vatican Codex, with various readings and a critical preface, 1709. Mill's edition, Amsterdam, 1725, is founded on the text of Bos. 5, Grabe's edition, after the Alexandrine Codex in the British Museum, with Prolegomena, Oxford, 1707-1720. 5, Breitinger's edition, reprinted and re-edited from Grabe's, 1730-32. 6, The most valuable and splendid edition is that of Holmes and Parsons, 5 vols. fol., Oxford, 1798-1827. In all these editions, except the last, the version of Daniel is that of Theodotion. The Septuagint version of Daniel was supposed to have been lost till the year 1772, when it was discovered and published at Rome. It was reprinted at Göttingen in 1773 and 1774, and by Dr. Holmes at Oxford in 1805. The best of the smaller editions of the Septuagint are those of Mill, Amst., 1725; Valpy, London, 1819; and Von Ess, Leipzig, 1824. A splendid facsimile of the Alexandrine Codex of the Septuagint has been edited by the Rev. H. H. Baber, 4 vols. fol., Lond., 1816-1820. [ALEXANDRIAN CODEX.]

For an account of the other Greek versions of the Old Testament, see AQUILA; SYMMACHUS; THEODOTION. (The *Introductions* of Horne and Jahn, and the authorities quoted by them.)

SEPU'LVEDA, JUAN GINE'S DE, an eminent Spanish scholar and historian, was born at Pozoblanco near Cordova, in 1490. After pursuing his studies, first in Cordova and then at the university of Alcalá, he embarked for Italy in June, in 1515, and reached Bologna, where he obtained admission into the college founded by cardinal Albornoz. There he made rapid progress in theology and the learned languages under the guidance of the celebrated Pomponazzi (Peter), translated part of Aristotle, and wrote the Life of Cardinal Albornoz: 'De Vita et Rebus Gestis Ægidii Cardinalis Albornotii,' lib. iii., Rome, 1521, fol. Sepulveda afterwards went to Rome, where he found a protector in cardinal Carpi, who gave him a lodging in his palace. Thence he passed to Naples, where he assisted cardinal Caetano in revising the Greek text of the New Testament. In 1529 Sepulveda returned to Rome and entered the service of cardinal Quiñones; but in 1536, having been appointed chaplain and historiographer to Charles V., he quitted Italy and arrived in Spain, where he was entrusted with the education of the eldest son of that emperor, afterwards Philip II. About this time, Bartholomé de las Casas, bishop of Chiapa, so celebrated for his endeavours to alleviate the sufferings of the Indians, was pleading their cause at court with all the zeal and fervour of a true philanthropist. Sepulveda, having been prevailed upon by the enemies of Las Casas to refute his arguments, wrote a book, entitled 'Democrates Secundus, seu de Justis Belli Causis,' &c., in which he undertook to prove that the wars of the Spaniards in America were just, and founded on their right to subdue the inhabitants of a world discovered by them; that it was the duty of the Americans to submit to be governed by the Spaniards on account of their superior knowledge and wisdom; and that if they would not voluntarily acquiesce in the Spanish yoke, they might and ought to be compelled to do so by force of arms. He further declared that his only object in writing that work was to establish the rights of the kings of Castile and Leon over America. This work however was never printed, for when Sepulveda applied to the Royal Council for permission to print it, it was refused, and the book itself was condemned by the universities of Alcalá and Salamanca, to which the case was afterwards referred. Upon this Sepulveda wrote his 'Apologia pro Libro de Justis Belli Causis contra Indos suscepti,' which appeared at Rome in 1550, 8vo.; but the edition was seized by order of Charles V., and but few copies were saved. Sepulveda died in 1574, at the age of 83.

Sepulveda was a man of great learning. Erasmus speaks of him in the 'Ciceronianus,' and classes him among the best writers of his time. Besides his Latin translation of part of Aristotle, which appeared at Paris, 1531, fol., and that of the Commentary of Alexander of Aphrodisias upon the same, which he had previously printed at Rome, 1527, fol., Sepulveda left the following works:—'De Fato et Libero Arbitrio Libri Tres,' Rome, 1526, 4to., being a refutation of Luther's opinions on fate; 'Ad Carolum V. Cohortatio ut factâ cum omnibus Christianis Pace, Bellum suscipiat in Turcas,' Bolonia, 1529, 4to.; 'Antapologia pro Alberto Pio in Erasmum,' Paris, 1531, 4to. (this was written in defence of cardinal Carpi); 'De Ritu Nuptiarum et Dispensatione Libri Tres,' Rome, 1531, and London, 1553, 4to.; 'De Convenientia Militaris Disciplinæ cum Christiana Religione.' In this work, written in the form of a dialogue, and dedicated to the celebrated duke of Alba, the author undertakes to prove that the profession of arms is in harmony with the doctrines of Christianity. It was translated into Spanish by Barba, Sev., 1541, 4to. 'De Appetenda Gloria;' 'De Ratione dicendi Testimonium in Causis Occultorum Criminum,' Vallad., 1538, 4to.; 'De Regno et Regis Officio,' Lerida, 1571, 8vo. A history of the reign of Charles V., another of that of Philip II., and a narrative of the conquests of the Spaniards in Mexico, all three works in Latin, are still inedited. Sepulveda's works were collected and published, with the exception only of his translations, at Cologne in 1602. They have since been reprinted, in 1780, at Madrid, by the Royal Academy of History, in four volumes, folio., with a portrait of the author and an account of his life and writings.

There is another Spanish writer named (SEPULVEDA LORENZO), who flourished about the same time, and gained considerable reputation as a writer of romances. He published 'Romances sacados de Historias Antiguas,' Antw., 1551, 8vo., and 1580, 8vo.; 'Romances sacados de la Historia de España del Rey Don Alonso,' Medina, 1562, 8vo.; Antw., 1580, 8vo.; 'Otros Romances sacados de la Historia y de los Quarenta Cantos de Alonso de Fuentes,' Burgos, 1579, 12mo.; 'Cancionero de Romances,' Vallad., 1577, 12mo.

SEQUESTRATION is a process by which the revenues of an ecclesiastical benefice are received and applied by persons other than the incumbent of it. It issues immediately from the bishop in all cases, but it may be founded upon proceedings commenced either in his own court or in the temporal courts. It is a mandate, in the nature of a warrant, addressed by the bishop to the parties who are to execute it. These are called sequestrators, and in general are the churchwardens of the parish. So far as regards their duties under the sequestration, they are a kind of bailiffs. They collect the fruits of the benefice, and apply them according to the directions they receive in each case. It is said to be most proper for them to receive the tithe in kind. They cannot however maintain an action for the tithes in their own name in any except the spiritual court.

The occasions on which a sequestration is founded on proceedings in the court of the bishop are various. There may be a sequestration where a living is vacant by death; in such case the object of the sequestration is to provide for the expenses of supplying the cure, and to preserve the surplus for the successor. Where the living is so small that no fit clergyman will be at the charge of taking it, the sequestration is sometimes addressed to the curate as well as to the churchwardens. Where the title to a living is in dispute, a sequestration may issue under which some third party collects the fruits, and, after defraying the salary of the curate and other necessary expenses of the benefice, retains the surplus for the party who may appear to be lawfully entitled. There are many occasions also where the bishop acting judicially may sequester a living, as where the parsonage-house is in decay, and the incumbent, after due admonition, which may be made by the archdeacon, fails for a period of two months to repair it Under the statutes 17 Geo. III., c. 53, and 1 and 2 Vic., c. 106, the bishop is also empowered to sequester a living where the incumbent fails to insure the parsonage-house, or to pay the principal and interest of the money raised on mortgage under the authority of those acts. The latter act also gives the bishop the same authority on many other occasions, as where the incumbent has been engaged in trade, contrary to the provisions of that act, or has failed to comply with an order from the bishop enjoining residence, or, in case of non-residence, has failed duly to surrender to the curate the residence house and glebe assigned to him by the bishop under the act, &c. The payment of a curate's salary may also be enforced by sequestration. The statute of Victoria contains a number of regulations as to the application of the revenues collected under the sequestration.

Sequestrations founded on proceedings in the temporal courts occur under the following circumstances:—The sheriff, the ordinary ministerial officer of those courts, has no power to interfere with ecclesiastical revenues. When a judgment therefore has been obtained against a beneficed clergyman, and a writ of levari or fieri facias has issued upon it, addressed to the sheriff within whose bailiwick the benefice is, and the clergyman has no lay property upon which the sheriff can levy, he makes a return that the defendant is a beneficed clerk having no lay fee within his bailiwick. The plaintiff may then sue out a writ of fieri facias, addressed to the bishop, directing him to levy the amount upon the clergyman's ecclesiastical goods. The bishop upon this, by his registrar, issues a sequestration, directing the sequestrators to levy the debt upon the tithes and other profits of the benefice; or the plaintiff may sue out a sequestrari facias, addressed to the bishop. The bishop, under these circumstances, is said to be a kind of ecclesiastical sheriff; and the temporal courts, in so far as relates to his duties as such ministerial officer, have the same power over him as they have over the sheriff, and his duties are analogous. [SHERIFF.] The sequestration ought to be forthwith published by reading it in church during divine service, and afterwards at the church-door. The party obtaining it may, on giving proper security, name his own sequestrators. Under either of those writs the plaintiff is entitled to the growing profits, until the whole sum endorsed upon it is satisfied, even although this should not occur till after the time at which the writ is returnable. The necessary expenses of the sequestration, &c. are also leviable under the writ. The lands are bound from the time of the delivery of it to the bishop. A sentence of sequestration may be appealed against, and during the lawful prosecution of the appeal the incumbent may enjoy the profits. Burn's *Ecclesiastical Law*; Rogers's *Ecclesiastical Law*.)

Sequestration in chancery is a 'writ issuing out of the court, directed to four or more commissioners, empowering them to enter into a defendant's real estates, and to sequester into their own hands not only the rents thereof, but also all his goods, chattels, and personal estate whatsoever, to keep the same until the defendant has fully answered his contempt.' It is the first process against peers or members of parliament, the Warden of the Fleet, or persons in his custody. As regards other persons, it issues upon the occasion of their committing a contempt against the court, by keeping out of the way of the serjeant-at-arms or escaping from his custody, neglecting to put in an answer, failing to perform a decree, &c. A conditional order for a sequestration is obtained by application to the court, founded on an affidavit of the facts. If a sufficient cause is not shown to the contrary, within eight days after service of the order, it will then be made absolute.

A sequestration binds from the time of awarding it, not from the time of execution only. If, before it has been awarded, the defendant has fraudulently conveyed away his land, the sequestration may be awarded against him and his assigns.

A sequestration in mesne process, if it be for a personal duty, determines by the death of the party; or the defendant, by clearing his contempt and paying the costs, may discharge the sequestration. The commissioners under a writ of sequestration have authority to break open doors. Where it is upon mesne process, it may be executed, in the case of land, by making the tenants pay their rent to the sequestrators, or by a sale of goods sufficient to cover the sequestrators' expenses; but the sale must be by the court, and after notice. The sequestrators must account for what they receive, and bring the money into court to be repaid to the defendant on clearing his contempt, subject to their fees. The process of sequestration is said to have been introduced by Lord Bacon. (Com., *Dig.*, tit. 'Chancery,' D 7; Y 4.)

SEQUIN. [MONEY.]

SERA'GLIO, properly *seraï*, the palace of the emperor of Constantinople; in this sense the word is also applied to the houses of foreign ambassadors resident at his court. The seraï of Constantinople stands in a beautiful situation, on a head of land projecting into the sea, formerly called Chrysoceras, or the Horn of Gold, now Seraglio Point. The walls embrace a circuit of about nine miles, including several mosques, spacious gardens, and buildings capable of accommodating 20,000 men. The walls are flanked at intervals by watch-towers, and have several gates opening to the sea or to the city. Its outward appearance from the sea is very fine; but from the land side the domes and gilded cupolas of its various buildings are concealed from the eye by a lofty wall. The principal gate, called Babi Humayum (Sublime Porte), is constantly guarded by a detachment of the body-guard. That part of the building which is occupied by the women of the sultan has been improperly called *seraglio*, and hence the word has become synonymous with *harem*, an Arabic word, meaning 'sacred spot,' or that part of the house where the women and daughters of the Mohammedans reside.

SERAI, a large building for the accommodation of travellers, common in Eastern countries. The word is Persian, and means in that language, 'a palace, the king's court, a large edifice;' hence *karáwán-seraï*, by corruption *caravansarie*, *i.e.* place of rest for caravans. In Turkey these buildings are generally called *khans*, from *khán*, another Persian word, which has a similar meaning. In Tartary and India they are simply called *seraïs*. The erection of these buildings is considered highly meritorious by Hindus as well as Mohammedans, who frequently endow them with rents for their support. [SERAGLIO.]

SERAMPORE is a small town in Hindustan, built on the western banks of the Hoogley river, about 12 miles above Calcutta, in 22° 45′ N. lat. and 88° 26′ E. long. It extends nearly a mile along the river, but is of very small breadth. This town is built in the European fashion, and belongs to the Danes, who however do not derive any advantage from it, as the commerce of Denmark with the East Indies is small, and is mostly concentrated in the town of Tranquebar on the coast of Coromandel. Serampore has acquired some celebrity as being the principal place where the missionaries for converting the natives to the Protestant religion have been established. They have set up a press, in which numerous translations of the Bible have been printed. There is a college for instructing youths in the European and Asiatic languages, in mathematics, and natural philosophy, and also a school for the instruction of the natives, whatever religion they profess. In 1824 this place was almost ruined by an extraordinary inundation of the Hoogley. The inhabitants are about 13,000. The Danes obtained possession of Serampore in 1676. It was taken from them by the English during the war between the two countries, but was restored at the peace of 1814. (Lord Valentia's *Voyages and Travels to India, Ceylon, &c.*; and Bishop Heber's *Narrative of a Journey through the Upper Provinces of India, &c.*)

SERA'PION (Σεραπίων), an eminent physician of Alexandria, in the third century B.C., who belonged to the sect of the Empirici, and who so much extended and improved the system of Philinus, that the invention of it is by some authors attributed to him. (Celsus, 'De Medic.,' lib. i., praefat.)

Dr. Mead, in his 'Dissert. de Numis quibusdam à Smyrnaeis in Medicorum Honorem cusis' (p. 51), believes that he was a pupil of Erasistratus, because his name appears upon a medal discovered at Smyrna, and because the followers of that celebrated anatomist lived in that town; but as the empress Eudocia (Violar. apud Villoison, 'Anecd. Graec.,' tom. i., p. 381) mentions a rhetorician of Ælia Capitolina (Jerusalem) in Palestine who bore the same name, one would have quite as much right (says Sprengel) to reckon Serapion among the rhetoricians, if Hadrian, the founder of the town of Ælia, had not lived much later than the time of Serapion.

Serapion wrote against Hippocrates with much vehemence, and occupied himself almost exclusively with researches into the nature of drugs. (Galen, 'De Subfigur Empiric.,' cap. 13, p. 68, ed. Bas.)

Coelius Aurelianus ('De Morb. Acut.,' lib. ii., cap. 6, p. 84) quotes his book 'Ad Sectas,' finds fault with the severe remedies that he prescribed in 'Angina Pectoris,' and reproaches him with having neglected *dietetics*. (*Ibid.*, lib. iii., cap. 4, p. 195.) One may presume that in those early times a great many superstitious remedies were used for epilepsy; for Serapion, besides castoreum, recommended also the *brain of the camel*, the rennet of the sea-calf, πυτιά φώκης, the excrements of the crocodile, the heart of the hare, the blood of the tortoise, and the testicles of the wild-boar. (Coel. Aurel., 'De Morb. Chron.,' lib. i., cap. 4, p. 322.) Several authors make mention of some other preparations and antidotes, which bear his name, and which are scarcely worth more than those above mentioned. (Celsus, 'De Medic.,' lib. v., cap. 28, sect. 17, p. 307; Aëtius, tetrab. ii., serm. ii., cap. 96, col. 296; Nicolaus Myrepsus, 'Antidot.,' sect. i., cap. 66, col. 375.)

SERAPION, a Syrian physician, called by Wüstenfeld ('Gesch. der Arab. Aerste'), *Yahia Ibn Serapion Ben Ibrahim*, and commonly called Serapion Senior, to distinguish him from another physician of the same name, with whom he is sometimes confounded. Nothing is known of the events of his life, and the century in which he lived is only to be calculated from his being quoted by Rhazes, who died probably A.H. 320 (A.D. 932). We are told by the anonymous author of the 'Arab. Philosoph. Biblioth.,' quoted by Casiri ('Biblioth. Arabico-Hisp. Escur.,' tom. i., p. 261), that 'duo de Re Medica edidit volumina, id est *Collectionem Magnam* Libris XII., et *Collectionem Parvam* Libris VII. comprehensam, utramque Syriacè: quam in Arabicum Sermonem convertere Musa Ben Abrahim Alhodaithi, et Ben Bahlul.' We possess two works that bear his name; one still in MS., called 'Aphorismi Magni Momenti de Medicina Practica

(Uri, 'Catal. Codd. MSS. Orient. Biblioth. Bodl.,' No. 598); the other, entitled *Kunnásh*,[*] has been translated into Latin, and published under the various names, 'Pandectæ,' 'Aggregator,' 'Breviarium,' 'Practica,' and 'Therapeutica Methodus.' Dr. Russell (Append. to 'Nat. Hist. of Aleppo') says that the only MS. of this work that he had seen in the European catalogues was that of the Escurial (Cod. 814), which however contains only a small part of it; and that he had never met with any of this author's works in the East. The object of the work is to collect and put together in an abridged form the opinions of the Greek and Arabic physicians concerning diseases and their treatment. 'As Haly Abbas ('Lib. Reg.,' Prol.) remarks,' says Mr. Adams (Appendix to Barker's ed. of Lempriere, London, 1838), 'he treats of the cure of diseases solely as practicable by medicine and diet, and has entirely omitted *hygiene* and *operative surgery*. The list of the complaints of which he treats is far less complete than those of Rhases, Haly, and Avicenna, and in particular it is remarkable that he makes no mention of *elephantiasis*, *aneurism*, and *diseases of the chest and genital organs;* his description of *small-pox*, as further stated by Haly, is very incomplete.' Dr. Freind remarks ('Hist. of Physic,' vol., ii., p. 42), that he often transcribes out of Alexander Trallianus, an author with whom few of the other Arabic writers seem to have been much acquainted.' A fuller account of Serapion's medical opinions may be seen in Freind (*loc. cit.*), Haller ('Biblioth. Med. Pract.,' tom. i., p. 443), and Sprengel ('Hist. de la Med.,' tom. ii., p. 277).

The first edition of his work mentioned by Choulant ('Handbuch der Bücherkunde für die Aeltere Medicin') is the translation by Gerardus Cremonensis, printed in black letter in double columns, fol., Venet., 1479, by Rainaldus Noviomagensis Alemannus, with the title, 'Jo. fil. Serapionis Opera, s. Breviarium etc. et (Serapionis Junioris) Liber Aggregatus in Medicinis Simplicibus ex transl. Sim. Januensis interprete Abraam Judaeo Tortuosiensi, etc.' The last edition mentioned by Choulant is a reprint of the translation of Andreas Alpagus (which was first published in 1488, fol., Ferrar.), Venet., 1550, fol., with the title, 'Jo. fil. Serapionis Practica,' &c., and with the work of the younger Serapion in the same volume. Albanus Torinus published an edition (Basil., 1543, fol.), with the title, 'Jani Damasceni Therapeutica Methodi Lib. VII.,' &c., which alteration of the author's name has increased the confusion that already existed respecting him. An extract from his work is printed in Fernel's Collection of the Greek, Latin, and Arabic writers 'De Febribus,' Venet., 1576, fol.

SERAPION, commonly called Serapion Junior, to distinguish him from the preceding, an Arabian physician of whom nothing is known. He must certainly have lived after Ibn Wafid (commonly called Albengnefit or Abenguefit), since he quotes him, and as that author died A.H. 460 (A.D. 1068), Serapion may perhaps be placed at the end of the fifth century after the Hegira, or the eleventh after Christ. There remains a work by him, 'De Simplicibus Medicamentis,' of which there is an Arabic MS. in the Bodleian Library at Oxford (Uri, 'Catal. MSS. Orient.,' No. 597), but which has only been published in a Latin translation. 'This is,' says Mr. Adams (Appendix to Barker's Lempriere, Lond., 1838), 'one of the most important works of Arabic medical literature, and contains a useful compendium of all the most interesting information on this head in the writings of Dioscorides and Galen, with some additional remarks by himself and the older Arabic authorities; the most original part of it is the *Introduction*, in which he classifies substances according to their medicinal properties, and gives an ingenious dissertation on their actions. On the whole, he has made very few additions to the articles in the Materia Medica of the Greeks, and indeed sometimes gives to his Grecian masters credit for the discovery of certain medicinal substances, for which it would rather appear that we are indebted to his countrymen. Thus, in his chapter on *Serina*, he quotes Paulus Ægineta, but seemingly by mistake, for no account of this purgative is now to be found in the works of the latter. Where all is mostly unexceptionable, and there is nothing remarkably original, it is difficult to point out any subject which is handled in a more interesting manner than the others. I would refer however to his account of squills: he says that the *Vinum scilliticum* is given as a laxative in fevers, and in dropsy as a diuretic, to remedy indigestion, for jaundice and *tormina* of the belly, for an old cough, asthma, and spitting of blood, and for cleansing the breast of gross humours; and forbids the use of it when there is an ulcer in an internal organ.' There are however abundant proofs of his credulity and love of the marvellous in his accounts of the bezoar (cap. 396, p. 188, a.), diamond (cap. 391, p. 187, b.), asphaltus (cap. 177, p. 147, a.), &c. 'Amber,' says he (cap. 196, p. 150), 'grows in the sea like mushrooms on land. In China there are some persons solely engaged in fishing for this substance. That which floats on the sea is swallowed by the whale, and quickly causes its death. When the animal's body is opened, the best amber is found near the vertebral column, and the worst in the stomach.'

The first edition of this work mentioned by Choulant ('Handbuch der Bücherkunde für die Aeltere Medicin') was published at Milan, 1473, fol. in black letter, with the title, 'Liber Serapionis aggregatus in Medicinis Simplicibus, translatio Simonis Januensis interprete Abraham Judaeo Tortuosiensi de Arabico in Latinum.' The last edition mentioned by him was published at Venice, 1552, fol., with the title, 'Serapion de Simplic. Medicam. Historia Libri VII., Nicol. Mutono interprete.' It has been often printed in the same volume with the work of the elder Serapion, as for a long time they were supposed to be written by the same person.

SERA'PIS (Σάραπις) was an Egyptian divinity. Among the Greek writers who mention him, some consider him to be the same with Osiris; others think that he was the same as Dionysus, Pluto, Ammon, Zeus, or Pan. (Diod., i. 25; Plut., *De Is. et Os.*, p. 361, &c.) The name Serapis is probably of Egyptian origin, and signified, according to Plutarch, 'joy' (χαρμοσύνη). Macrobius (*Sat.*, i. 20) identifies this god with the sun. The impossibility of reconciling the accounts respecting the antient Egyptian Serapis and those respecting a divinity of the same name whose worship became very general at a later period, has led Jablonsky (*Pantheon*, vol. i.) to distinguish two gods of the name of Serapis, an antient and a more recent one. The antient Serapis, according to him, represents the sun in the winter signs of the zodiac; and at the same time the god of the swelling Nile, and as such he bore a calathus on his head to indicate the rich harvest produced by the fertilising inundation of the Nile. He had temples (Serapeia) in several parts of Egypt; the most antient was that of Memphis, but others were erected at Thebes and Alexandria. The form in which the god was represented is described by Macrobius.

The worship of the more recent Serapis was said to have been introduced into Egypt from Sinope in the reign of the first Ptolemæus (Plut., *De Is. et Os.;* Tacit., *Hist.*, iv. 84); it was adopted in several parts of Greece, as at Athens (Paus., i. 18, 4), at Copæ in Bœotia, and at Syracuse. (Cic., *c. Verr.*, ii. 66.) When a regular intercourse between Egypt and Rome became established, some private Romans erected altars to Serapis and other Egyptian deities. But in 58 B.C. the Roman senate forbade the worship of the Egyptian gods, and ordered their altars and temples to be demolished. (Dion Cass., xl. 47.) The people however seem to have been so much taken with the Egyptian gods, that the command of the senate was ineffectual, and new temples were soon erected, so that in the year 50 B.C. the senate issued a second decree that the temples should be demolished. (Dion Cass., xlii. 26; Val. Max., i. 3, 3.) But in 43 B.C. the senate was obliged to allow the building of a new temple of Isis and Serapis in the Circus Flaminius (Dion Cass., xlvii. 15); and henceforth their worship remained unmolested. This temple was magnificently adorned by the emperor Alexander Severus. (Lamprid., *Al. Sev.*, 26.) Serapis was considered by the Romans as the god of the healing art, and he was supposed to cure sick persons if they passed a night in his temple. (Cic., *De Divin.*, ii. 59; Varro, *Fragm.*, p. 276, Bip.) The head of Serapis is represented in many antient works of art; his features are peculiarly mild and soft, but are expressive of a mysterious reserve. On the Egyptian monuments no figure has yet been discovered which might with certainty be regarded as a representation of Serapis. At Alexandria the worship of Serapis was abolished in the reign of Theodosius the Great, by the archbishop Theophilus. (Suidas, *s. v.* Σάραπις.)

---

[*] The word Kunnásh is thus explained in the Kámus: 'Kunnáshat are the roots from which the branches spread themselves.' The meaning of the word here appears to be a book of collections of recipes and observations which a physician makes during the course of his practice. At least in the enumeration of the works of the different physicians, Syrians especially, who are mentioned in the work of Ibn Abi Osaibia, almost every one is said to have composed a Kunnásh. The work is probably derived from a Syriac one which means 'to collect.' (Note by the Rev. William Cureton, in the 'Asiatic Journal.')

SERCQ, or SERK. [Guernsey.]

SERENADE, a word adopted from the French *sérénade*, which is derived from the Italian and Spanish *serenata*, a term formed from the Latin *serenus*, clear, serene. A serenade is properly music performed in the open air on a serene night, but is generally restricted to a musical performance given at night by a lover to his mistress under her window. The giving of serenades is little practised except by the Spanish and Italians, who generally on these occasions use the guitar as an accompaniment to their songs.

SERE'NUS, AULUS SEPTIMIUS, a Roman poet. Some of the antients call him merely Serenus, and others merely Septimius; and from this circumstance it has been inferred by some modern scholars that these two names belong to two individuals (Wernsdorf, *Poet. Lat. Min.*, ii., p. 247, &c.); but Marius Victorinus, Terentianus Maurus, and Sidonius Apollinaris frequently call him by his two names, Septimius Serenus, and therefore decide the question. He was a contemporary of Terentianus Maurus and of Martial (*Epigr.*, i. 87), and must consequently have lived in or shortly after the reign of Vespasian. Of the circumstances of his life nothing is known with certainty. Some modern scholars have supposed that the fifth poem in the fourth book of the *Sylvae* of Statius is addressed to Septimius Serenus, as all that is mentioned of the person addressed in that poem appears to be just what might be expected in a poet like Serenus. But the MS. reading in Statius is not Serenus, but Severus; and consequently the whole biography of Serenus, which has been made up out of that poem, is uncertain in the highest degree. The only thing we know of him is, that he was an extreme admirer of country life; for it is the country with all its charms that forms the subject of his poems, which he published under the title of 'Opuscula Ruralia.' Of these poems only a few fragments have been preserved by the antient grammarians. They are however sufficient to show that Serenus was a lyric poet of very great talents. The poem called 'Moretum,' which has frequently been printed together with the works of Virgil, is ascribed by Wernsdorf to Serenus; and 'Copa,' another work of the same kind, has likewise been attributed to Serenus by some modern scholars. Terentianus Maurus (*De Metris*, p. 2423, Putsch.) mentions another poem of Serenus, which is called 'Falisca,' and which probably contained a description of the country life in the district of the Faliscans. In this poem he used a peculiar kind of verse, consisting of three dactyls and one pyrrhic; and this metre is by Terentianus called *metrum Faliscum*, and the poet himself Faliscus.

Compare the Essay of Wernsdorf on Serenus, in his '*Poet. Lat. Minores*,' ii., p. 247, &c.; and the collection of fragments, including the 'Moretum' and the 'Copa,' in the same vol., p. 264-298.

SERENUS SAMO'NICUS (QUINTUS), sometimes called Sammonicus Serenus, the name of two persons, father and son, who lived in the third century of the Christian æra. The father wrote a number of works in verse, which Geta and Alexander Severus read with pleasure (Spartian., *Vit. Ant. Get.*, p. 136, ed. Paris, 4to., 1603; Lamprid., *Vita Sever.*, p. 186); but he was put to death by order of Caracalla. (Spartian., *Vit. Caracall.*, p. 128. Compare Cassub., in *Script. Hist. Aug.*, p. 290, 428.) The son was tutor to the younger Gordian, to whom he left in legacy his father's rich library, consisting of sixty-two thousand volumes. (Jul. Capitolin., *Vit. Gordian. II.*, p. 235.) We have no means of deciding which of the two is the author of the Latin poem that we possess under this name, entitled 'De Medicina Præcepta Saluberrima;' for while the more antient writers ascribe it to the father, the more modern (*e.g.* Morgagni and Ackermann) consider it to be the work of the son. It consists of eleven hundred and fifteen hexameter lines, divided into sixty-five chapters, which treat of various diseases, with their remedies. Now and then, but very rarely (says Sprengel), does Serenus show that he had reflected on the nature and more remote causes of diseases, as for example when he attributes dropsy to obstructions of the spleen and liver (cap. 27, v. 498). He sometimes gives sound advice upon the treatment of diseases, and even gives his opinion against the incantations employed in the cure of fevers (cap. 51, v. 938). Notwithstanding this, he everywhere shows himself a zealous defender of the prejudices of his time; he affects a particular veneration for the numbers three, seven, and nine, and recommends the use of magical characters. For the cure of the species of intermittent fever called ἡμιτριταῖος, or double tertian, he recommends the use of the famous *Abracadabra*, of which he gives the following description (cap. 52, v. 944, et seq.):—

> 'Inscribis chartæ, quod dicitur ABRACADABRA,
> Sæpius: et subter repetis, sed detrahe summæ,
> Et magis atque magis desint elementa figuris
> Singula, quæ semper rapies, et cetera figes,
> Donec in angustum redigatur litera conum.
> His lino nexis collum redimire memento.'

thus forming an equilateral triangle in this manner:—

A B R A C A D A B R A
A B R A C A D A B R
A B R A C A D A B
A B R A C A D A
A B R A C A D
A B R A C A
A B R A C
A B R A
A B R
A B
A

For further information respecting this magical word, see Du Cange, *Glossar. Med. et Inf. Latin.*, ed. Paris, 1840; Hofmann, *Lex. Univ.*; Sprengel, *Hist. de la Med.*, tom. ii., p. 147; C. Steph., *Dict. Hist.*, &c., p. 8, edit. N. Lloyd; Ger. Jo. Voss., *Op.*, t. 5, p. 24.

The first edition of the Poem of Serenus, according to Choulant (*Handbuch, &c.*), was printed *sine loco et anno*, in 4to., or large 8vo., at Milan, in black letter, before the year 1484. This edition is very scarce, and is said by Panzer (*Annal. Typogr.*, vol. ii., p. 555) to have been printed at Rome. The next edition (containing also Rhemnius Fannius, 'De Ponderibus et Mensuris') is that of Leipzig, 1515, 4to.; the two best are that by Keuchenius, Amstel., 1662, 8vo. (reprinted 1706, 8vo.); and that by Ackermann, Lips., 1786, 8vo. The poem has also been frequently printed with Celsus, and is contained in several collections of medical works, *e.g.* the *Aldine*, Venet., 1547, fol.; that of H. Stephens, Paris, 1567, fol.; and that of Rivinus, Lips., 1754, 8vo.: it is also inserted with copious notes in P. Burmann's 'Poëtæ Latini Minores,' Leid., 1731, 4to. Much historical and critical information is to be found in 'J. Bapt. Morgagni Epistolæ in Serenum Samonicum,' Patav., 1721, 8vo., which are reprinted in several editions of Celsus, and also in 'Morgagni Opuscula Miscellanea,' Venet., 1763, fol. See also C. G. Gruner, 'Variæ Lectiones in Q. Serenum Samonicum, e Codice Vratislaviensi decerptæ,' Jenæ, 1782, 4to., pp. 32; and C. G. Gruner, 'Var. Lect. in Q. Ser. Sam., ex Nicol. Marescalci Enchiridio excerptæ,' Jenæ, 1803, 4to.

SERGELL, JOHANN TOBIAS, a Swedish artist, entitled to a high rank among the sculptors of the last and present century, was born at Stockholm, September 8, 1740. He was originally apprenticed as a stonemason, and was employed among the workmen at the time the royal palace was building, when his diligence and intelligence attracted the notice of L'Archévêque, a French sculptor, who took him to Paris as his pupil in 1756. While in that capital, he assisted his master in modelling the statues of Gustavus Vasa and Gustavus Adolphus; and in 1767 he obtained a travelling pension, and visited Rome, where he continued for about ten years. On L'Archévêque's death in 1778, Gustavus III. bestowed on him the appointment and pension which had been enjoyed by that artist, and afterwards took him with him in his journey to Italy in 1784. One of his earliest works of note was his statue of Othryades, which obtained his reception into the Académie des Beaux Arts at Paris, a masterly performance, now in the royal museum at Stockholm. Among his other single statues, the most celebrated are—Diomedes carrying off the Palladium (now in possession of the earl of Shrewsbury); a Venus Callipyga (in the palace at Stockholm); Ceres with a torch in her hand seeking Proserpine; a Nymph rising from a bath; and a Faun, which last is esteemed his chef-d'œuvre in his works of this class, so masterly is the expression he has thrown into this figure. His principal groups are—Psyche bending over Cupid with her lamp; Oxenstjerna dictating the exploits of Gustavus Adolphus to the Muse of History; and Mars and Venus. Among his works in bronze are a colossal statue of Gustavus III., eleven feet high; and the monument to Des Cartes, executed at the command of that monarch for the Adolph-Frederik's church at Stockholm. The same church also contains what is universally allowed to be not only Sergell's master-piece, but one of the most sublime and admirable productions of modern sculpture, namely, the large bas-relief over the altar representing the Resurrection. The figure of Christ rising from the tomb is beyond all praise—it is superhuman and truly celestial. The sole drawback on the spectator's admiration at contemplating it is that so exquisite a performance should be only modelled, instead of being executed in marble. Among a variety of other works, including several busts of distinguished persons, the poets Bellman and Kellgren, &c., may be mentioned the mausoleum to Linnæus in the cathedral of Upsala.

After suffering from severe attacks of the gout, and also from continued lowness of spirits and despondency, Sergell died at Stockholm, February 26th, 1814. He was never married, consequently left no offspring, at least not legitimate; although Madame d'Ehrenstrom speaks of his son 'M. Gustave de Sergell;' but he left a successor to his talents and his fame in his pupil Bystrom, one of the most eminent sculptors now living.

SE'RGIUS I., a Syrian by birth, succeeded Conon in the see of Rome, A.D. 687. Two candidates for the see, a priest called Theodore and also the archdeacon Paschal, each of whom had numerous partisans, were on the point of coming to blows, when the principal citizens and officers of the garrison, in order to avoid a tumult, proposed to elect Sergius, who had acquired a reputation for piety and learning. The proposal being adopted by many of the clergy, Sergius, escorted by a numerous retinue, was taken to the Lateran church, the doors of which were broken open, and those of the opposite or Theodore's faction, who had fortified themselves in it, being driven out, Sergius was chaired, and Theodore was one of the first to salute him as pontiff. Paschal did the same afterwards, being forced to it by the multitude. Before Conon's death, Paschal had promised a sum of money to the Exarch of Ravenna, who, as the representative of the Byzantine emperor in Italy, had the right of giving or withholding his sanction to the election, and the money had been given for the purpose of securing his consent. The Exarch John came to Rome, and finding that Sergius had been elected by the majority, requested him to pay him what Paschal had promised, and upon Sergius demurring, the Exarch took several valuables from the church of St. Peter. Paschal was accused of sorcery, tried, and sentenced to be degraded and confined in a monastery, where he died. One of the first transactions of Sergius was to baptize Cedwalla, king of the West Saxons, who had come to Rome for that purpose. He also contributed to the diffusion of Christianity in Saxony and other countries by means of missionaries. In 791 the emperor Justinian II. assembled a general council at Constantinople, which being held in a hall of the palace which was surmounted by a dome, 'trulleum,' has been styled 'Concilium in Trullo.' It has also been called Quini-sextum, as being supplementary to the fifth and sixth œcumenic councils, which had published no canons of discipline or religious ceremonies. The council 'in trullo' was purposely assembled to supply this deficiency; one hundred and fifty bishops were present at it, and it passed more than one hundred canons on matters of discipline and ceremonies, six of which being in opposition to the practice of the Western or Roman church, the council was not approved of by Sergius, although his legate who attended the council had concurred in it. One of these canons enacted that married candidates for the priesthood might retain their wives after their ordination. There were also some points of dogma concerning the two natures of Christ and the Virgin Mary, in which the council and the pope did not agree. Justinian, irritated at the opposition of Sergius, sent Zacharias, his protospatarius, or general-in-chief, to Rome with orders to arrest Sergius and bring him prisoner to Constantinople. But the garrison of the Exarch at Rome took the pope's part, and Zacharias was obliged to take refuge in the pope's apartments, from whence he was sent back safely to Greece. A revolution, headed by Leontius, one of his generals, took place at Constantinople soon after, when Justinian was seized, mutilated, and banished to the Crimea, A.D. 695. Leontius did not long enjoy the fruits of his crime, for he was seized himself, and mutilated by Tiberius Apsimerus, who became emperor, and allowed the church of Rome and the pope to remain undisturbed. Sergius occupied himself in restoring the church of St. Peter, which had been greatly dilapidated. He died A.D. 701, and was succeeded by John VI.

SERGIUS II., a native of Rome, was elected to succeed Gregory IV., A.D. 844, and was consecrated without waiting for the approbation of the emperor Lotharius, who sent his son and colleague Louis into Italy with an army. Louis came to Rome, where he was received by the pope and clergy in a friendly manner, and was crowned king of Italy. The soldiers of Louis however committed great devastation in the surrounding country and in the suburbs of the city, but the pope at last induced Louis to withdraw his troops to the north. Soon after the Saracens from Africa came up the Tiber and ravaged the country, plundering the churches of St. Peter and St. Paul, which were outside of the walls, but they could not enter Rome. They then proceeded by the Via Appia to Fondi, which they sacked. Sergius died A.D. 847.

SERGIUS III. was elected A.D. 904, by the Tuscan party, as it was called, because it was headed by Adelbert, marquis of Tuscany, and of which two Roman ladies of licentious character, Marozia and her mother Theodora, were the most influential leaders. They had deposed and imprisoned Christopher, who had imprisoned the preceding pope Leo V., and had forced him to resign his see to him. Sergius had had a son by Marozia, who was afterwards pope by the name of John X. Sergius seems to have been a man of some abilities; his character has been variously represented by different writers. The history of Italy, and especially of Rome, during the tenth century, is extremely obscure, though it is evident by all concurrent testimonies that it was a most profligate age. Sergius died in 913, and was succeeded by Anastasius IV.

SERGIUS IV., a native of Rome, succeeded John XVIII. in 1009. He encouraged the princes of Italy to unite in order to drive away the Saracens, who had occupied several parts of the peninsula. It was in his time that the Normans began to muster in South Italy. Sergius died in 1012, and was succeeded by Benedict VIII.

SERIA'NA, an entirely tropical South American and West Indian genus of the natural family Sapindaceæ, named by Schumacher after Serjeant, a French friar and botanist, but the genus is also and more commonly written Serjania. It is characterised by having four to five sepals. Petals four, each furnished with a scale above the base, those of the lower petals ending in an inflexed appendage. Glands 2 to 4, on the disc. Stamens 8; style trifid; capsule 3-winged, or composed of 3 carpels adnate to the filiform axis. Carpels 1-celled, 1-seeded. The species consist of climbing or twining shrubs with tendrils, and the flowers white, arranged in racemes. Some of them are remarkable for the possession of very poisonous properties. S. triternata is acrid and narcotic, and employed for the purpose of stupifying fish.

SERIES. The mathematical meaning of the word series is, a set of terms, finite or infinite in number, connected together by addition or subtraction, and formed upon some distinct law. If it had been the plan of this work to write treatises on the various branches of pure mathematics, the present article would have been brief, and abounding in references to the articles on algebra and the differential calculus, the most important results of which are expressed in Series; but in a work which, without entering into such full detail, professes to furnish references to the most important detached doctrines of the exact sciences, the present article must extend to some length.

Series may be either finite or infinite in the number of their terms. As to finite series, such for instance as 'x terms of $1 + 2 + 3 + \ldots$,' the only question of importance which generally arises with respect to them is, how to express the sum as a function of the indefinite number of terms, x. On this point we refer to the articles INTEGRATION, FINITE, and SUMMATION: it is with the doctrine of infinite series that the mathematician is more particularly concerned in the present article. Again, as to the manner in which the differential calculus is applied to the development of functions in series, we refer to TAYLOR'S THEOREM.

A series of an infinite number of terms may be either purely numerical, as $1 + 2 + 3 + 4 + \ldots$, in which the symbol $+ \ldots$, or $+$, &c., means that the series is to be carried on for ever, the law of formation of the written terms being continued through all the unwritten ones; or it may contain literal expressions with an obvious law of formation, as in $1+2x+3x^2+\ldots.$ A series of the latter class is reduced to one of the former as soon as any definite value is given to the letters it contains.

An infinite series may be either convergent or divergent, as explained in the article CONVERGENT. The various tests there explained will perhaps serve to settle this point as to the greater number of series actually employed; but the following ('Diff. Calc.,' *Lib. of Useful Knowl.*, pp. 236, 326; we shall refer to this work in the sequel under the letters D. C.) will leave no doubtful case, though its application may sometimes be troublesome.

Let ψx be the xth term of a series $\psi 1+\psi 2+\psi 3+\ldots.$ (thus a^{x-1} is the xth term of $1+a+a^2+\ldots.$; xa^{x-1} of $1+2a+3a^2+\ldots.$), and let $P_0=-x\psi' x:\psi x$, $\psi' x$ being the differential coefficient of ψx. Let a_0 be the limit of P_0 when x increases without limit; then if a_0 be greater than 1, the series is convergent; if a_0 be less than 1 (negative quantity included), divergent; if $=1$, doubtful.

In the doubtful case of the preceding, let $P_1=\log x\,(P_0-1)$, and let a_1 be its limit when x increases without limit. Then if a_1 be >1, the series is convergent; if <1, divergent; if $=1$, doubtful. In this doubtful case examine $P_2=\log\log x\,(P_1-1)$, if which let the limit be a_2. Then if $a_2>1$, the series is convergent; if <1, divergent; if $=1$, doubtful; and so on. In brief, take the set of quantities

$$P_0=-x\frac{\psi' x}{\psi x},\ P_1=\log x\,(P_0-1),\ P_2=\log\log x\,(P_1-1)$$

$$P_3=\log\log\log x\,(P_2-1),\ \&c.\ \&c.;$$

make x infinite; then, according as the first of these which differs from unity is greater than or less than unity, the series is convergent or divergent. If it be more convenient to write $1:\phi x$, instead of ψx for the xth term of the series, then P_0 must be $x\phi' x:\phi x$, instead of $-x\psi' x:\psi x$. Nor need ψx be the xth term; it may stand for the $(x+n)$th term, n being constant. For example, let the series be $(\log 1)^a 1^{-b}+(\log 2)^a 2^{-b}+(\log 3)^a 3^{-b}+\ldots.$: we have here

$$\psi x=\frac{(\log x)^a}{x^b},\ -x\frac{\psi' x}{\psi x}=b-\frac{a}{\log x}=P_0.$$

When x is infinite, $P_0=b$; so that the series is convergent when $b>1$, and divergent when $b<1$, but doubtful when $b=1$. In this last case P_1 is easily seen to be $-a$; whence the series is convergent if a be negative, and numerically >1; and divergent when numerically <1. But when $a=-1$, we have $P_2=\log\log x\times 0=0$ in all cases; and 0 being <1, the series is then divergent. Thus the first three of the following series are convergent, and all the rest divergent.

$$S\frac{(\log x)^{10}}{\sqrt{x^3}},\ S\frac{(\log x)^{100}}{\sqrt[100]{x^{101}}},\ S\frac{(\log x)}{\sqrt[6]{x^7}},\ S\frac{1}{x\,(\log x)},$$

$$S\frac{1}{\sqrt{x}.(\log x)^{1000}},\ S\frac{1}{\sqrt[3]{x^2}.(\log x)^{1000}},\ S\frac{1}{x(\log x)^2}.$$

By the symbol $S\phi x$ is meant the series $\phi x+\phi(x+1)+\phi(x+2)+\ldots$; but when a number is written beneath S, as in S_x, it indicates the value of x in the first term of the series. Thus $S_4 x$ stands for $4+5+6+\ldots.$, $S_a\log x$ stands for $\log a+\log(a+1)+\ldots.$ Some such abbreviation is most wanted in an article of reference, in which compression is desirable; but the student should write his series at more length until he is well accustomed to them. An examination of the preceding series will make it appear singular that the first three should be convergent, and the last three divergent; but so it is, beyond all question.

A divergent series is, arithmetically speaking, infinite; that is, the quantity acquired by summing its terms may be made greater than any quantity agreed on at the beginning of the process. Such is evidently the case with $1+2+4+\ldots.$, or $S_0 2^x$. Nevertheless, as every algebraist knows, such series are frequently used as the *representatives of finite quantities*. It was usual to admit such series without hesitation; but of late years many of the continental mathematicians have declared against divergent series altogether, and have asserted instances in which the use of them leads to false results. Those of a contrary opinion have replied to the instances, and have argued from general principles in favour of retaining divergent series. Our own opinion is, that the instances have arisen from a misunderstanding or misuse of the series employed, though sufficient to show that divergent series should be very carefully handled; but that, on the other hand, no perfectly general and indisputable right to the use of these series has been established *à priori*. They always lead to true results when properly used, but no demonstration has been given that they must always do so.

Before however we proceed to reason upon them, we must distinctly understand what we mean by an *infinite* series. Some persons cannot imagine an infinite series, except by means of successions of finite terms: thus they have no other idea of $1+2+4+8+\ldots$, except as something of which the conception is a pure result of the successive consideration of 1, $1+2$ $1+2+4$, $1+2+4+8$, &c. If they can get no further than this, that is, if at no stage of their contemplation can they treat $1+2+4+\ldots$ as anything more than carried to some enormous number of terms, with a right to carry it further; we can then concede to them the right to object, in the manner described, to the use of a divergent series, though we think it possible that even in this case an answer might be given to the objection. But if there be any who can with us carry their notions further, and treat the series as *absolutely endless*, in the same manner as we are obliged to conceive time and space to be absolutely endless, looking upon the result not as to its arithmetical value, but as to its algebraical form and capability of being the object of algebraical operations—we then think that we have those with whom the question of divergent series can be argued on something like a basis of demonstration. They may arrive at the final idea by means of the successions which the first class of thinkers say *must end somewhere*; but they answer, that this is no more true than that space must end somewhere: if it be granted that we are capable of conceiving a straight line extended without limit, with equal parts set off throughout its total infinite length, it must equally be granted that we might suppose one term of a series written at each and every point of subdivision. To this issue the question might be brought, namely, the alternative of allowing the conception of the infinite series, or of denying that of the infinite straight line. And it must be remarked that the considerations by which we limited the use of the word INFINITE in that article do not apply here, for we are not reasoning upon any supposed* attainment of the other end of the straight line, but upon ideas derived from a process of successions carried on during such attempt as we can make in our thoughts towards that attainment.

This being premised, let us now consider the series $1+a+a^2+a^3+\ldots$ *ad infinitum*, the last words being used strictly in the above sense, without reference to any particular value of a, and only as an object of algebraical operation. To what finite function of a is this an algebraical equivalent in all matters of operation? Let us consider first merely results of operation, without any question as to whether the series operated on have values or not, or whether expressions which appear to be the same as far as operations are concerned, are to be the same in value or not, when any difficulty arises as the value of either. We assume those five rules of operation and their consequences, on which [OPERATION] the technical part of algebra is founded. If we then call the preceding series P, we find that P and $1+aP$ are the same series. If then $P=1+aP$, we find $P=1:(1-a)$, a result which is certainly not true in any arithmetical point of view, when $a>1$; for in such a case the series is infinite, and the finite expression negative. Leaving this, let us assume, for trial, if the reader pleases, the equation $1:(1-a)=S_0 a^x$; in this change a into $1:a$, and add, which gives

$$\frac{1}{1-a}+\frac{a}{a-1}=1+S_1a^x+1+S_1a^{-x}$$

or $1+S_1(a^x+a^{-x})=0$, a result which is again perfectly incongruous in an arithmetical point of view. At full length it is

$$1+a+\frac{1}{a}+a^2+\frac{1}{a^2}+\ldots.=0$$

To test this curious result, by operations merely, call it

---

* Indeed it is only a phraseological attainment of infinite magnitude which is used in the article cited: when we *say* that $a=b$ if x be infinite, we mean that a and b never cease to approach each other as long as the value of x increases.

ϕa, and multiply $A + Ba + Ca^2 + \dots$ by it: the result, by common rules, will be found to be

$$(A + B + C + \dots)\,\phi a = (A + Ba + \dots)\,\phi a;$$

a result which agrees perfectly with $\phi a = 0$, and with no other supposition whatsoever.

A great many other instances might be given, in which the use of $\phi a = 0$ makes sense, so to speak, of results in the formation of which ϕa has been used. And it is generally admitted that divergent series are found to make sense, in the same manner, of almost every result in the formation of which they are used; and also that when such results happen themselves to be free of divergency, there is very rarely any distinction, as to either truth or clearness, between them and the results of ordinary algebra; insomuch that the objection of those who would avoid them altogether, as usually stated, amounts, so far as operations are concerned, to the assertion that they *sometimes* give false results.

If we then compare the position in which we stand with respect to divergent series, with that in which we stood a few years ago with respect to impossible quantities, we shall find a perfect similarity. The divergent series, that is, the equality between it and a finite expression, is perfectly incomprehensible in an arithmetical point of view; and so was the impossible quantity. The use of divergent series has been admitted, by one on one explanation, and by another on another, almost ever since the commencement of modern algebra; and so it was with the impossible quantity. It became notorious that such use generally led to true results, with now and then an apparent exception, which most frequently ceased to be such on further consideration; this is well known to have happened with impossible quantities. In both cases these apparent exceptions led some to deny the validity of the method which gave rise to them, while all were obliged to place them both among those parts of mathematics (once more extensive than now) in which the power of producing results had outrun that of interpreting them. But at last came the complete explanation of the impossible quantity [NEGATIVE AND IMPOSSIBLE QUANTITIES], showing that all the difficulty had arisen from too great limitation of definitions; and almost about the same time arose that disposition among the continental writers, of which we have spoken above, namely, to wait no longer for the explanation of the true meaning of a divergent series, but to abandon it altogether. But why should the divergent series, of all the results of algebra which demand interpretation, be the only one to be thrown away without further inquiry, when in every other case patience and research have brought light out of darkness?

As far as the matter has yet gone, very little has been done towards the interpretation of a divergent series independently of its involvement, or function from which it is developed. When this involvement is known, and the series deduced from it, there are means of stopping the divergency, by arresting the development at any given point, and turning the remainder not into a further development, but into a finite form. Thus if ϕx, a given function of x, should give a divergent series $A_0 + A_1 x + \dots$, all that part of the development which follows $A_n x^n$ may be included in

$$\int_0^x \phi^{(n+1)}(x-v)\, v^n dv \;:\; 1.2.3.\dots n.$$

This will be proved in TAYLOR'S THEOREM, and it is a result of great importance, because it gives the means of removing all the doubtful points of divergent series from the ordinary branches of mathematics.

Next to the question of convergency or divergency, comes that of continuity or discontinuity. We are not here speaking of continuity of value, but of form. A series is continuous when for all values of x it represents the same function of x. Thus $S_0 x^n$ or $x^0 + x^1 + x^2 + \dots$, is in all cases the development of $(1-x)^{-1}$, whether it be convergent or divergent. Those even who reject divergent series altogether, though they would call this series, when $x > 1$, a false or inadmissible development of $(1-x)^{-1}$, would not, though they reject it, look upon it as possible to arise from any other function. But the series

$$S_1 (-1)^{n+1} \frac{\sin. n\theta}{n} \text{ or } \sin. \theta - \frac{\sin. 2\theta}{2} + \frac{\sin. 3\theta}{3} - \dots$$

is discontinuous; for certain values of θ it represents one function, and for other values another. When θ is any multiple of π [ANGLE] it is $=0$; when θ falls between $-\pi$ and $+\pi$, it is $\frac{1}{2}\theta$; when θ falls between π and 3π, it is $\frac{1}{2}\theta - \pi$, &c.; in fact, it stands for $\frac{1}{2}\theta - m\pi$, where m is to be so taken that $\frac{1}{2}\theta - m\pi$ shall fall between $-\frac{1}{2}\pi$ and $+\frac{1}{2}\pi$ Again, the series

$$S_0 \frac{a^n x}{(1+a^n x)(1+a^{n+1}x)} = \frac{1}{(a-1)(x+1)} \text{ or } \frac{x}{(1-a)(x+1)}$$

according as $a > 1$ or < 1: and when $a=1$, it is infinite. Remember that by calling a series infinite we do not merely mean that it is divergent, for a divergent series may be the development of a finite quantity; thus $1+2+4+\dots$ is a development of -1 from the form $(1-2)^{-1}$. But we mean that the *arithmetical value* of the function developed is infinite when we say that the series is infinite.

Discontinuity of form may be in many cases avoided by an extension of the modes of algebraical expression. Thus if we write down the expression

$$\frac{1}{a-1}\left\{\frac{1}{x+1} - \frac{1}{a^k x+1}\right\}$$

and consider k as having a very great value, the second term will be very small or very near to unity, according as a is >1 or <1. If we introduce the symbol a^∞ as representing ∞ when $a>1$, and 0 when $a<1$, we have, on putting ∞ for k, the representation of both forms of the preceding series in one. We shall now proceed to point out some of the principal modes of transforming series into others, or deducing others from them, so far as this is done without interfering with the developments in Taylor's THEOREM.

1. If ϕx can be developed into $a + a_1 x + a_2 x^2 + \dots$, then $ab + a_1 b_1 x + a_2 b_2 x^2 + \dots$ can be developed as follows (D. C., p. 239). Let the last be ψx, and from b, b_1, b_2, &c. [DIFFERENCE] form Δb, $\Delta^2 b$, &c.; then

$$\psi x = b\phi x + \Delta b.x\phi' x + \frac{\Delta^2 b}{2} x^2 \phi'' x + \frac{\Delta^3 b}{2.3} x^3 \phi''' x + \dots$$

where $\phi' x$, $\phi'' x$, &c. are the successive differential coefficients of ϕx. If b, b_1, &c. be values of a rational and integral function of n, denoted by b_n, the preceding is not an infinite series, but a finite expression. We have not room for examples, and it is to be remembered that this is an article of reference. Particular classes of instances are

$$b + b_1 x + \dots = \frac{b}{(1-x)} + \frac{\Delta b.x}{(1-x)^2} + \frac{\Delta^2 b.x^2}{(1-x)^3} + \dots$$

$$b + nb_1 x + n\frac{n-1}{2} b_2 x^2 + n\frac{n-1}{2}\frac{n-2}{3} b_3 x^3 + \dots =$$

$$(1+x)^n \left\{ b + n\Delta b \frac{x}{1+x} + n\frac{n-1}{2}\Delta^2 b \left(\frac{x}{1+x}\right)^2 + \dots \right\}$$

$$b + b_1 x + b_2 \frac{x^2}{2} + b_3 \frac{x^3}{2.3} + \dots = \epsilon^x \left(b + \Delta b x + \Delta^2 b \frac{x^2}{2} + \dots \right)$$

the preceding is a case of a more general theorem (D. C., p. 565) from which the following may also be deduced:—

$$b + b_1 x + \dots = \frac{b}{1+mx} + \frac{\nabla b.x}{(1+mx)^2} + \frac{\nabla^2 b.x^2}{(1+mx)^3} + \dots$$

$\nabla b = b_1 + mb$, $\nabla^2 b = b_2 + 2mb_1 + m^2 b$, &c. By this theorem many divergent series may be converted into convergent ones, or the convergency of convergent series may be increased.

2. Let $r = \sqrt{(1 - 2\cos\theta.x + x^2)}$, $\tan\phi = \dfrac{x\sin\theta}{1 - x\cos\theta}$.

Then $b + b_1 \cos\theta.x + b_2 \cos 2\theta.x^2 + b_3 \cos 3\theta.x^3 + \dots =$

$$\cos\phi\frac{b}{r} + \cos(\theta+2\phi)\frac{\Delta b.x}{r^2} + \cos(2\theta+3\phi)\frac{\Delta^2 b.x^2}{r^3} + \dots$$

and $b_1 \sin\theta.x + b_2 \sin 2\theta.x^2 + b_3 \sin 3\theta.x^3 + \dots =$

$$\sin\phi\frac{b}{r} + \sin(\theta+2\phi)\frac{\Delta b.x}{r^2} + \sin(2\theta+3\phi)\frac{\Delta^2 b.x^2}{r^3} + \dots$$

3. Let ϕx be a rational and integral function of x; then

$$\phi x + \phi(x+1).a + \phi(x+2).a^2 + \dots = \frac{1}{1-a}\phi x +$$

$$\frac{a}{(1-a)^2}\phi' x + \frac{a+a^2}{(1-a)^3}\frac{\phi'' x}{2} + \frac{A_3}{(1-a)^4}\frac{\phi''' x}{2.3} + \dots$$

$A_3 = a + 4a^2 + a^3$, $A_4 = a + 11a^2 + 11a^3 + a^4$

$A_5 = a + 26a^2 + 66a^3 + 26a^4 + a^5$, &c.

$A_6 = a + 57a^2 + 302(a^3 + a^4) + 57a^5 + a^6$.

This must lead to a finite expression for the series, and is frequently the shortest way of obtaining it.

4. Let $z=\varepsilon^{\theta\sqrt{-1}}=\cos\theta+\sqrt{-1}\,.\,\sin\theta$

and $\phi x=a+a_1x-a_2x^2+\ldots\ldots$

$$\frac{1}{2}\left\{\phi(zx)+\phi\left(\frac{x}{z}\right)\right\}=a_0+a_1\cos\theta\,.\,x+\ldots\ldots$$

$$\frac{1}{2\sqrt{-1}}\left\{\phi(zx)-\phi\left(\frac{x}{z}\right)\right\}=a_1\sin\theta\,.\,x+\ldots\ldots$$

the series resembling those in (2). Further varieties will appear in TAYLOR'S THEOREM.

5. If $\phi(0)+\phi(1)\,.\,x+\phi(2)\,.\,x^2+\ldots$ be the development of a perfectly continuous function of x, and if ϕn be a function which never becomes infinite for any real value of n, positive or negative; then the same function may be also developed into $-\phi(-1)\,.\,x^{-1}-\phi(-2)\,.\,x^{-2}-\phi(-3)\,.\,x^{-3}-\ldots$ (D. C., p. 560).

6. If $\phi x=a_0+a_1x+a_2x^2+\ldots\ldots$ and if $\rho_1,\rho_2,\ldots\rho_n$ be the n *nth* ROOTS of unity, then (D. C., p. 319)

$$a_0+a_nx^n+a_{2n}x^{2n}+\ldots=\frac{\phi(\rho_1x)+\ldots+\phi(\rho_nx)}{n}$$

$$a_1x+a_{n+1}x^{n+1}+\ldots=\frac{\rho_1^{n-1}\phi(\rho_1x)+\ldots+\rho_n^{n-1}\phi(\rho^nx)}{n}$$

$$a_2x^2+a_{n+2}x^{n+2}+\ldots=\frac{\rho_1^{n-2}\phi(\rho_1x)+\ldots+\rho_n^{n-2}\phi(\rho_nx)}{n}$$

and so on. Also if we make ρ_1, ρ_2, &c. the nth roots of -1, and use the same results, only altering the multipliers, into ρ_1^{2n-1}, &c., ρ_1^{2n-2}, &c., we have the sums of the same series with the terms alternately positive and negative.

7. One of the simplest modes of actually finding a finite expression for a series, finite or infinite, the coefficients of which are values of a rational and integral function, is the continual multiplication by $1-x$, which must at last produce a finite expression. It must be remembered that multiplication by $1-x$ may be performed by letting the first coefficient remain, and diminishing every other coefficient by its predecessor. Thus $a+bx+cx^2+ex^3+\ldots\ldots$ multiplied by $1-x$ gives $a+(b-a)x+(c-a)x^2+(e-a)x^3+$. And a finite series must be supposed to be continued *ad infinitum* with vanishing coefficients. For example, it is required to find a finite expression for $1^3+2^3x+3^3x^2+\ldots\ldots$; write this as in the first line, and make successive multiplications by $1-x$, as in the following lines:—

$$\begin{array}{l}
1+8x+27x^2+64x^3+125x^4+\ldots\\
1+7x+19x^2+37x^3+\ 61x^4+\ldots\\
1+6x+12x^2+18x^3+\ 24x^4+\ldots\ldots\\
1+5x+\ 6x^2+\ 6x^3+\ \ 6x^4+\ldots\ldots\\
1+4x+\ \ x^2+\ 0x^3+\ \ 0x^4+\ldots\ldots
\end{array}$$

After four multiplications, then, by $1-x$, the series becomes $1+4x+x^2$; whence its value is—

$$\frac{1+4x+x^2}{(1-x)^4}$$

The rule for doing this is to take the successive differences of the coefficients, as in the article DIFFERENCE, with this addition, that the first term of every line is to be carried on, and made the head of the next line. Thus to find $(n+1)^3x^n+(n+2)^3x^{n+1}+\ldots\ldots$ we must proceed as follows:—

$$\begin{array}{l|r|r|}
(n+1)^3 & n^3+3n^2+\ 3n+\ 1 & n^3+3n^2+3n+\ 1\\
(n+2)^3 & 3n^2+\ 9n+\ 7 & -n\ +6n+\ 6\\
(n+3)^3 & 3n^2+15n+19 & 6n+12\\
(n+4)^3 & 3n^2+21n+37 & 6n+18\\
(n+5)^3 & 3n^2+27n+61 & 6n+24
\end{array}$$

$$\begin{array}{r|l}
n^3+3n^2+3n+1 & n^3+3n^2+3n+1\\
-2n^3-3n^2+3n+5 & \ \ -3n^3-6n^2+4\\
n^3\qquad\qquad\quad +6 & +3n^3+3n^2-3n+1\\
6 & -\ n^3\\
6 & \ \ 0
\end{array}$$

whence the numerator required is $(n^3+3n^2+3n+1)x^n-(3n^3+6n^2-4)x^{n+1}+(3n^3+3n^2-3n+1)x^{n+2}-n^3x^{n+3}$, and the denominator is $(1-x)^4$.

Independently of the modes of deriving series obtained from Taylor's Theorem, and of which we are to speak elsewhere, there are two modes of forming them which deserve attention. The first depends upon the numbers called the differences of nothing [NOTHING, DIFFERENCES OF]; the second on those called NUMBERS OF BERNOULLI.

By the first of these any function of ε^x can be expanded in powers of x.

$$f\varepsilon^x=f1+f(1+\Delta)\,0\,.\,x+f(1+\Delta)0^2\,.\,\frac{x^2}{2}+\ldots$$

Here $f(1+\Delta)0^n$ is a symbol of the calculus of operations [OPERATION], which expanded is—

$$f1\,.\,0^n+f'1\,.\,\Delta0^n+\ldots\ldots+f^{(n)}1\,\frac{\Delta^n\,0^n}{2\,.\,3\ldots n}$$

it being unnecessary to go further, because $\Delta^m0^n=0$ whenever m is greater than n. (D. C., 307.)

The numbers of Bernoulli occur first in the development of $(\varepsilon^x-1)^{-1}$, a series the importance of which can only be estimated by its use in SUMMATION. Taking the numbers from the article cited above, or making

$$B_1=\frac{1}{6}\ ,\quad B_3=\frac{1}{30}\ ,\quad B_5=\frac{1}{42}\ ,\quad B_7=\frac{1}{30},\ \text{\&c.}$$

$$\frac{1}{\varepsilon^x-1}=\frac{1}{x}-\frac{1}{2}+\frac{B_1x}{2}-\frac{B_3x^3}{[4]}+\frac{B_5x^5}{[6]}-\ldots$$

$$\frac{1}{\varepsilon^x+1}=\frac{1}{2}-\frac{3B_1x}{2}+\frac{15B_3x^3}{[4]}-\frac{63B_5x^5}{[6]}+\ldots\ldots$$

where $[n]$ means $1\,.\,2\,.\,3\ldots\ldots n-1\,.\,n$.

We shall now give a number of series which are not of very frequent use, but which may sometimes be sought in a work of reference. Under the last predicament we can never suppose that any of the following developments would come : $(1+x)^n$, ε^x , a^x , $\log\,(1+x)$, $\log\dfrac{1+x}{1-x}$, $\sin x$, or $\cos x$. Some terms are given, and $\pm\ldots\ldots$ is omitted to save room.

$$\tan x=x+\frac{x^3}{3}+\frac{2x^5}{15}+\frac{17x^7}{315}+\frac{62x^9}{2835}+\frac{1382x^{11}}{155925}$$

$$\cot x=\frac{1}{x}-\frac{x}{3}-\frac{x^3}{45}-\frac{2x^5}{945}-\frac{x^7}{4725}-\frac{2x^9}{93555}$$

$$\sec x=1+\frac{x^2}{2}+\frac{5x^4}{24}+\frac{61x^6}{720}+\frac{277x^8}{8064}$$

$$\text{cosec}\ x=\frac{1}{x}+\frac{x}{6}+\frac{7x^3}{360}+\frac{31x^5}{15120}+\frac{127x^7}{604800}$$

$$\sin^{-1}x^*=x+\frac{1}{2}\frac{x^3}{3}+\frac{1\,.\,3}{2\,.\,4}\frac{x^5}{5}+\frac{1\,.\,3\,.\,5}{2\,.\,4\,.\,6}\frac{x^7}{7}$$

$$\tan^{-1}x^*=x-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}$$

$$\log\frac{x}{\sin x}=\frac{x^2}{6}+\frac{x^4}{180}+\frac{x^6}{2835}+\frac{x^8}{37800}+\frac{x^{10}}{467775}$$

$$\log\frac{1}{\cos x}=\frac{x^2}{2}+\frac{x^4}{12}+\frac{x^6}{45}+\frac{17x^8}{2520}+\frac{31x^{10}}{14175}$$

$$\log\frac{\tan x}{x}=\frac{x^2}{3}+\frac{7x^4}{90}+\frac{62x^6}{2835}+\frac{x^8}{2700}+\frac{32x^{10}}{467775}$$

These logarithms are the Naperian logarithms, as is always the case in analysis, unless the contrary be expressed (as it is usual to say, but it really never happens):

$$\frac{1}{\log.\,(1+x)}=\frac{1}{x}+\frac{1}{2}-\frac{x}{12}+\frac{x^2}{24}-\frac{19x^3}{720}+\frac{3x^4}{160}-\frac{863x^5}{60480}.$$

We must again remind the reader that the symbol +, &c., or −, &c., is throughout omitted to save room.

There is one property of series which deserves particular notice (D. C., pp. 226 and 649) as creating a most remarkable distinction between those which have all their terms positive, and those which have them alternately positive and negative. The former, even if the terms diminish without limit, are not necessarily convergent; thus $1+2^{-1}+3^{-1}+\ldots$ is divergent. But if the terms be alternately positive and negative, and diminishing without limit, the series is always convergent, and the error made by stopping at any term is less than the first of the terms thrown away. And the remarkable part of the property is that this last is true, even if the series become divergent, by having its terms increasing without limit, instead of diminishing; so that if the terms diminish for a time, and then begin to increase, the portion of the series during which the diminution takes place may be made use of in approximating to its arithmetical value. That is, if A_1, A_2, &c. be all positive quantities, and if the infinite series $A_1 - A_2 + A_3 - \ldots$ be carried as far as A_n, the error is less than A_{n+1}, whatever the law of the terms may be, or however rapidly they may afterwards increase. Let us take, for instance,—

---

* In these series the angle is less than a right angle, positive or negative.

$$1 - \frac{2}{x} + \frac{2.3}{x^2} - \frac{2.3.4}{x^3} + \frac{2.3.4.5}{x^4} - \ldots.$$

Let x be ever so great, the rapid increase of the numerators must still make this series ultimately divergent. Nevertheless, if x be considerable, the first terms diminish so rapidly that, with the aid of the above theorem, a good approximation may be made to the arithmetical value of the function from which the series was derived. Let $x = 100$, whence the series becomes—

$$1 - \cdot02 + \cdot0006 - \cdot000024 + \cdot00000120 - \ldots.$$

After the hundredth term the terms will begin to increase, and more and more rapidly; but the theorem enables us, when $x = 100$, to make the following assertions; first, 1 is too great, but not by so much as ·02; 1 − ·02, or ·98, is too small, but not by so much as ·0006; ·98 + ·0006, or ·9806, is too great, but not by so much as ·000024; ·9806 − ·000024, or ·980576, is too small, but not by so much as ·00000120; ·980576 + ·00000120, or ·9805772, is too great, but not by so much as the next term; and so on. It were to be wished that a complete proof of this theorem could be given, which has not been done hitherto, though it has been shown to be true in all the most important classes of series.

SERINAGHUR, *Srinaghur*, a town of Hindustan, in the presidency of Bengal and province of Gurwal, of which it is the capital. It is about 140 miles north-east from Delhi, in 30° 13′ N. lat. and 78° 45′ E. long. It was formerly the residence of the raja of Gurwal, and was a place of considerable commercial importance, but it has much declined, the greater part of the merchants having abandoned it and established themselves at Almora. The air is unwholesome, and it is subject to frequent earthquakes, one of which destroyed the palace of the raja. The town consists of one long principal street, in which there is a bazaar, and a few other streets, which are narrow and dirty. In 1821 there were about 560 houses. The town stands on the left bank of the Alakananda, an affluent of the Ganges, and the river is crossed by a bridge of ropes 240 feet long. On the opposite side is a Hindu temple, which is frequented by a great number of pilgrims.

SERINGAPATAM (*Sri-Ranga-Putana*), a town and fortress of Hindustan, in the presidency of Madras and province of Mysore, is situated on a small but beautiful and fertile island in the river Cavery, in 12° 25′ N. lat. and 76° 44′ E. long. The fortress is at the western extremity of the island. The streets of the town are narrow, crooked, and dirty, but there are several palaces and a great number of pagodas and mosques. The palace formerly inhabited by the sovereigns of Mysore is very extensive, but it is now in a ruinous condition. It has large gardens, with garden-houses and pavilions, and a splendid mausoleum built by Hyder Ali, under which are interred the remains of Hyder and his son Tippoo Saib. The other chief public buildings are—the principal mosque, the Indian temple of Sri-Ranga, the arsenal, and the cannon-foundry; there is a handsome bridge over one of the branches of the Cavery. The fortress is occupied by a garrison of British troops.

In 1610 the raja of Bijanaghur obtained possession of Seringapatam, which for a long time before had been an important fortress, and made it the capital of Mysore. It was extended by his successors, and continual additions were made to the fortress. Under Hyder Ali and his son Tippoo Saib it became a place of great wealth and importance, and the inhabitants are said to have amounted to 150,000.

Tippoo Saib, in 1789, having seized upon the territory of the raja of Travancore, Great Britain, who was in alliance with the raja, and bound by treaty to assist him, declared war against Tippoo, who then abandoned Travancore, and retired to Seringapatam. The English concluded a treaty of alliance with the Nizam, June 1, 1790, and with the Mahrattas, July 7. Lord Cornwallis took Bangalore by assault, and advanced against Seringapatam. On the 5th of May, 1791, he obtained a victory which made him master of the approaches to the fortress, but the want of provisions and the delay of assistance promised by the Mahrattas compelled him to return to Bangalore. On the 5th of February, 1792, Lord Cornwallis, in conjunction with the Nizam and the Mahrattas, again arrived before Seringapatam, which was invested, and the siege pushed with vigour till February 12, 1792, when Tippoo, finding himself reduced to extremity, accepted the conditions imposed upon him, and by a treaty, signed March 18, 1792, relinquished one half of his territory, paid a very large sum as indemnity, and delivered up his two sons as hostages for the fulfilment of the treaty. The territories ceded were divided into three equal portions, one of which was given to the Nizam, one to the Mahrattas, and one to Great Britain. Tippoo, in 1798, desirous of regaining his territories, entered into a negociation with the governor of the Isle of France, from whom he received a body of troops, and also sent an embassy to request assistance from Shah Zemaun, king of Cabul. Great Britain, regarding these demonstrations as a declaration of hostilities, concluded another treaty with the Nizam, and war was again declared against Tippoo. On the 30th of April, 1799, Seringapatam was invested by the united armies of General Harris and General Stuart. On the 4th of May the fortress was carried by assault, Tippoo himself being slain while fighting with desperate valour, together with 8000 men. Tippoo Saib, who was exceedingly avaricious, had accumulated immense treasures in his palace, consisting of money, jewels, plate, rich stuffs, &c., all of which were taken possession of by the conquerors. His remains were interred with military honours in the mausoleum of his father. (*L'Art de vérifier les Dates.*)

After the death of Tippoo Saib, the city of Mysore was made the capital of the province of Mysore, instead of Seringapatam. In 1800 the population of Seringapatam had fallen to 20,000, and in 1820 to 10,000.

SERJEANT, or SERGEANT, is a non-commissioned officer in a troop of cavalry or in a company of infantry. The duties of serjeants are to drill or instruct in discipline the recruits of a regiment; and on parade they act as markers or guides in the performance of the evolutions. The serjeants of infantry are now armed with muskets like the rest of the troops. In each company, when a battalion is in line, a covering serjeant is always stationed behind the officer commanding the company; when the ranks take open order, and that officer advances before the front rank, the serjeant steps into his place; but upon the ranks being closed, he falls again to the rear. Four or six serjeants are charged with the important duty of guarding the colours of the regiment: they constantly attend the officers who carry them, and are called colour-serjeants. One serjeant in each troop or company is appointed to pay the men; also to keep the accounts relating to their allowances, the state of their necessaries, &c.

The name of sergens or servientes was, in the armies of France during the reign of Philip Augustus, applied to gentlemen who served on horseback, but were below the rank of knights; and also, as a general term, to the infantry soldiers who were furnished by the towns. There was, besides, a body of troops consisting of 150 or 200 men of rank, who were called sergens d'armes, and were instituted by the prince just mentioned for his protection, when in the East, against the subjects of the chief of the Assassins. (P. Daniel, *Hist. de la Milice Fr.*, liv. iii., ch. 7, and liv. ix., ch 12.)

Corresponding to this corps was the body of serjeants-at-arms, which was instituted in England by Richard I., and appointed to guard the royal tent in complete armour. At first it consisted of twenty-four men, but the number was afterwards increased. Being accused of extortion and oppression, the parliament made several applications to the king that their number might be diminished, and in the reign of Edward IV. the desired reduction took place. (Grose, *Mil. Antiq.*, vol. i., p. 199.)

In the reign of Philip and Mary the serjeant-major of the army was an officer whose post corresponded to that of the modern major-general; and the serjeant-major of a regiment was a field-officer, who would now be designated the major. At present the serjeant-major is an assistant to the adjutant, and keeps the roster for the duties of the serjeants, corporals, and privates. The quartermaster-serjeant is one who acts immediately under the quartermaster of a regiment in all the details relating to the quarters of the officers and men, the supplies of food, clothing, &c.

SERJEANT, or **SERGEANT** (*Serviens*). This term, in its original signification, has long become obsolete. It would however be difficult to trace the connection between the different officers to whom the term is now applied without going back to their common type.

The terms serviens and servicium appear to have been applied at first to all servants of the public, or of the crown, as the head of the state, and to the service rendered by them as an acknowledgment or render for the lands held by such service. Rent paid by a tenant to his landlord is still distinguished by the name of rent-service [Rent] from other annual payments charged upon land, &c. The word 'serjeant' comes to us from 'sergent,' into which the French had modified the Latin 'serviens.' The word serjeanty, in French 'sergenterie,' was formed from 'sergent,' but was always used with reference to a particular species of service.

The complete development of the feudal system which followed the Norman conquest, was greatly facilitated by those political struggles which terminated in placing large portions of the lands of the kingdom in succession at the disposition of the crown. The forfeited lands of the revolted English were granted by the Conqueror to his followers with few exceptions, subject to the performance of personal services regulated by the quantity of the land granted and the rank and qualification of the grantee. The services ordinarily reserved upon grants by the crown, and upon those made by inferior grantors to their military followers, were of a military character. Where the grant was to hold by the service of a knight's fee, or of two or half a knight's fee, &c., without expressing the nature of the service to be performed, the party was said to hold by knight's service, *per servicium militare* [Knight's Service]; but where some *particular* service was to be performed by the tenant, or by some duly qualified person provided by him—as, to be an earl or baron of the realm, to lead the king's host, to assist in the defence of a certain castle, to wind a horn upon an invasion, &c.—the tenure was called tenure by serjeanty (*per serjeantiam*), and the grantee became a tenant by serjeanty, and would be a serjeant (*serviens*). Whilst the two tenures were always distinguished by the two appellations of 'serjeantia' and 'servicium militare,' the term 'serviens' or 'serjeant' was applicable to a tenant belonging to either class who had not taken upon himself the order of knighthood.

As the tenant by serjeanty was commonly distinguished by some title derived from the nature of his service—as earl, baron, constable, marshal, treasurer, &c.—the name 'serjeant' was usually applied, not to those who held in serjeanty, but to those who held *per servicium militare* generally, and had not been knighted. Thus in 1348 the four knights impannelled on a grand assize were told by the judge that they should elect no serjeants whilst they could find suitable knights (M. 22 Edw. III., fo. 18); and in 1352 the four knights, not being able to elect twelve other knights, were allowed, by the assent of parties, to elect of the most wealthy serjeants (H. 26 Edw. III., fo. 57, pl. 12). (These two cases have been strangely misunderstood by Dugdale and others, as if they related to an exemption of serjeants-at-law from the burthen of serving upon a grand assize.) So, an ordinance was made in parliament in the reign of Edward III. (1362), by which the return of lawyers to parliament, as knights for counties, was prohibited, on the ground that they acted with a view rather to the benefit of their clients than to that of the public, and the elections were directed to be made of knights and of serjeants of the most value. The term serjeant is also applied to those inferior military tenants, in the grant of a subsidy in 1379, in which serjeants and franklins of the county are assessed at 6*s.* 8*d.*, or 3*s.* 4*d.*, according to their estate, whilst serjeants at law are assessed at a fixed sum of 40*s.*, being twice the amount of the assessment of barons of the realm. (3 *Rot. Parl.*, 58.)

The serjeant holding *per servicium militare*, if possessed of sufficient land, was however bound, when called upon, to take upon himself the obligations attendant upon the order of knighthood. The tenant, or expectant tenant of such an estate, who wished to qualify himself for the creditable discharge of knightly duties, usually entered upon a course of training in the capacity of esquire to some knight, into whose service he was induced to enter by considerations arising from family connection, tenure, or friendship, of from the opinion entertained of his military fame. Although from the time of the Conquest down to the latter end of the reign of Edward III. all military tenants who had not been knighted are designated 'serjeants,' we find that after the first years of the reign of Richard II. the term serjeant, as applied to the unknighted tenant by knight's service, disappears, and is succeeded by the 'esquire,' a term previously used not to designate a class of persons occupying a certain rank, but an office actually performed. (*Abb. Rot. Origin.*, 209, b.) The services of the serjeant of the fourteenth century, and those of his successor, the esquire of the fifteenth, were alike estimated as equal to one half of the service of a knight bachelor, or one-fourth of the service of a knight-banneret.

A special service of a military character, to be performed by the tenant or his sufficient deputy, was not less noble than the ordinary knight's service, and was sometimes called chivalerian serjeanty, but more commonly grand serjeanty. It is said indeed by Littleton (s. 153) to be a greater and more worthy service than the other. But any service, military or civil, which was to be performed by the tenant or his deputy to the king himself, was, on account of the dignity of the king's person, accounted a grand or chivalerian serjeanty. Thus in the Germanic body, the offices of arch chancellor, arch-treasurer, arch-butler, &c. of the empire, attached to particular electorates, were of equal dignity with that of arch-marshal of the empire held by another elector; and in England the civil office of lord high treasurer, &c., the military office of lord high constable, &c., and the mixed office of lord high steward, &c., and that of earl, or baron, by tenure, are, or were, all equally held by grand serjeanty.

Lands held by serjeanty, on account of the entire nature of the service, could not lawfully be aliened or divided. This however was by a species of connivance frequently done in fact. The course was for the crown to issue a commission to fix a rent upon the alienated serjeanty, or the divided portions. By this process tenancies in serjeantry gradually became nearly extinct before the abolition of military tenures. Sometimes, upon the escheat or forfeiture of a serjeanty, the lands were granted by the crown, to hold by knight's service, whereby the special service of the serjeanty was lost.

Where the services reserved upon the tenure bore some relation to war, but were required neither to be executed personally by the tenant or his deputy, nor to be performed to the person of the king, as the payment of rent in spurs, arrows, &c., the tenant was said to hold by *petty* serjeanty, which was a socage tenure, having the same ignoble or non-military incidents as a tenure upon which an annual rent in money, corn, &c. was reserved, though considered to be of a somewhat more dignified character.

The tenant in serjeanty was bound either to perform the special service himself or to provide a person competent to discharge it. Sometimes, the land having descended to or been acquired by a citizen or a burgess, the service was considered of too great dignity to be performed by the tenant upon whom the duty of the serjeanty had thus devolved; in which case he was required to appoint a competent substitute. It happened more frequently however that the service to be performed was below the serjeant's rank, in which case it was permitted and expected that the service should be performed by deputy. This became so much a matter of course, that we find lands held in serjeanty commonly described as held by the service of procuring (per servicium inveniendi) persons to do the duty. This frequently happened with regard to the inferior offices relating to the administration of the law, as in the ordinary case of a tenure by the service of finding bailiffs itinerant. With respect to this particular appointment and some few others, the name itself was transferred from the appointer to the appointee, and the designation of serjeant was given to the person by whom the service of the serjeanty was actually performed. Hence our serjeants-at-mace, and other similar officers in Normandy and in England. In like manner, the sheriff being the ballivus of the county, that is, the person into whose custody or bailiwick the county is *bailed* or delivered, the inferior officers whom he employs have acquired the name of bailiffs. However humble the nature of the service may have been, the tenant was bound to perform it in person, in case no substitute could be obtained.

Among the civil services the performance of which was provided for by the creation of serjeanties, one of the most important was the administration of justice. Both in Normandy and in England numerous grants of lands were made, to which grants the obligation to discharge certain judicial or ministerial duties was annexed in lieu of the ordinary knight's service. In both countries it would appear that all counties, as well as the more important cities and boroughs, were placed under an officer of the crown who held lands by the tenure of administering justice in criminal matters. This local judge was in England called the king's serjeant (serviens regis), or the serjeant of the county, city, or borough; sometimes (stat. Westm. I., c. 30) serjeant in fee; sometimes capitalis serviens of the county (*Rot. Pat.*, 236) or of the hundred (*Testa de Nevil*, 409 d).

Lands held by this tenure are commonly described in antient records as lands held per serjeantiam tenendi (sometimes custodiendi) placita coronæ. It appears from Bracton, fol. 157, that this officer (the king's serjeant) had a concurrent jurisdiction with the sheriff, and that their records were equally incapable of being controverted. These serjeants had officers under them, who, taking the denomination of serjeant from the hereditary officer whose authority was in part delegated to them, were in counties known by the name of serjeants of the sword, sergens de l'espee, servientes ad spatam, and in cities and boroughs, by the name of serjeants-at-mace, servientes ad clavam. In the course of time, as charters were obtained, the citizens and burgesses acquired the right of choosing their own magistrates; and the king's officer, the serjeant, was superseded by the municipal officers, the mayor and aldermen. It is said that Norwich had no magistrate, except the king's serjeant, until the seventeenth year of king Stephen. (Stow, 214; Spelman, *Gloss.*) It sometimes happened that after the incorporation of the city or town, the serjeant continued to be the judicial officer *de facto*, sitting as assessor to the municipal magistrates. This was the case at Oxford. (*Harleian MSS.*, 298, fol. 56.) In London the office appears to have been retained; but a charter of 12 Edw. II. gave to the citizens the privilege of electing their *common serjeant*.

In counties the king's serjeant, as a judicial officer, may be traced to a much later period; and although the office is now become obsolete, and its principal functions have for centuries devolved upon the justices of the peace, proclamation is still made upon the execution of every commission of gaol delivery, inviting all persons to inform this officer of any treason, felonies, or misdemeanors committed by the prisoner at the bar.

Where the criminal jurisdiction of a particular district was annexed to a grant of land to a subject, the jurisdiction, though imposed as a condition and a burthen, was called a franchise [FRANCHISE], inasmuch as it excluded the ordinary power of the officers of the crown. The grantee was said to hold in frank serjeanty, en franche sergenterie; and in respect of the lands attached to the office, this serjeanty was in Normandy sometimes called une sergenterie glèbée. For the actual administration of justice, the tenant usually delegated his judicial authority as serjeant to an officer of his own, who was therefore called *his* serjeant, or the serjeant of the district (*Mad. Exch.*, 103; *Testa de Nevil*, 389), or serjeant of the peace for the district. (Cowell, *Interpr.*) Hence, the steward of a private leet, or of a manor to which a leet is attached, to whom the lord always delegates his judicial power, is sometimes designated as serviens sive senescallus. (4 Co., *Rep.*, 21.) Latterly, indeed, it has been considered that a tenure by serjeanty could only be created by, and held under, the crown. (Co. Litt., 108 a.) This was not the case however in the time of Henry III., as appears by Bracton (35 b.).

The tenure, by which lands were held by a 'serjeant of the county,' or 'serjeant in fee,' was a serjeanty belonging to that class which was called grand serjeanty, as being connected with the administration of justice. Edmund, earl of Lancaster, brother of Edward I., died seised 'de magna sergeantia totius comitatus de Derby.' (*Calend. Inquis. post mortem*, 136 b.)

But the serjeants of counties were neither the only nor the most numerous class of serjeants-at-law. The main branch of that body remained in attendance upon the king. Their duty was to assist in the proceedings of the Aula Regia, the great court of justice of the realm, as assessors to the chief justiciar, and as advocates for the suitors, who being generally unacquainted with the language in which the proceedings of the court were carried on, were seldom able, and were never permitted, to plead their own causes. (1 *Rot. Parl.*, 4 a; 2 *Rot. Parl.*, 140.) Upon the breaking-up of the Aula Regia into the several courts which now occupy Westminster Hall, the serjeants-at-law became the justices of the courts of King's Bench and Common Pleas, and acted as advocates for the suitors, when not appointed to those offices, and when removed from them. While not employed in judicial stations, they were called serjeant-countors, servientes-narratores, and banci narratores, countor (narrator) being a term derived from the Norman 'conteurs,' persons whose office it was to conduct the causes of litigants in court, the verb 'conter' being applied indifferently to the pleadings on the part of the plaintiff and those on the part of the defendant.

It does not distinctly appear whether any grants of land were annexed to the office of serjeant-countor; if not, it is probable that the Conqueror, or some of his early successors, considered the fees receivable by the serjeant-justices and the serjeant-countors as equivalent to a grant of lands, and as constituting a serjeanty not attached to a tenure of land, or a serjeanty in gross. However this may be, the kings exercised the right of creating both serjeant-justices and serjeant-countors. The appointment of serjeant-countor has, from the earliest period, been effected by the royal mandate under the great seal; by writ, where the party to whom it was addressed was required to serve the king and his people in the Aula Regis, and afterwards in the courts of Westminster Hall; by letters-patent, with respect to serjeants in Ireland. Under this appointment, the serjeants were the sole public pleaders. They were the only persons in the state entrusted with the exercise of the ordinary judicial functions, and even now no person can be appointed a justice of the Queen's Bench or Common Pleas, who is not of the degree of the coif, that expression being derived from the peculiar species of cap which was, and still is, the distinguishing dress of serjeants-at-law. The barons of the Exchequer, who were formerly merely officers of revenue, are not required to be taken from amongst the serjeants; but unless they be of the degree of the coif, they are not qualified to act as justices of assize. Though not only all the serjeants on the circuit, but also the king's counsel, and occasionally other barristers, are included in the commissions of oyer and terminer and gaol delivery, and assist in the trying of prisoners when the judges are pressed for time, or if it is thought desirable to relieve the county from the expense arising from the detention of prosecutors and witnesses, the name of no person who is not a serjeant can be inserted in the commission of assize, to which the power of trying civil causes at nisi prius is annexed by 13 Edw. I., st. i., c. 30. Hence all civil actions at the assizes, which are not tried by one of the ordinary judges, can be tried only before a serjeant.

Much obscurity however still hangs over the origin of the connection between the terms serjeant and countor. It has been suggested that upon the introduction of the Norman conteurs into England, they were formed into a lay brotherhood, somewhat analogous in form to the religious communities by which they were surrounded; that the members of this brotherhood were admitted by royal authority, and employed in different capacities as judges and advocates about the Aula Regia; and that they probably derived their adjunct title of servientes from the nature of their employment, and from the circumstance of their appointment being conferred by the crown, and of its being considered that the services which they rendered were of equal dignity and importance with services reserved upon those tenures by grand serjeanty to which administration of justice was attached, and the tenants of which were in strict propriety denominated serjeants.

Upon the calling of every parliament, the judges and serjeants are summoned by writ to give their attendance. Their principal duty appears to have been to assist the lords in the trials of petitions. ('Rot. Parl.' *passim.*) The writ of summons issues to the judges, not as judges, but as serjeants; and if a baron of the Exchequer be not a serjeant, as was formerly often, and still may be, the case, he is not summoned. No serjeants have been required to attend of late years, except judges and king's serjeants, but formerly other serjeants were also summoned.

Whilst the Aula Regis constituted one court, a second class of advocates was little needed; and upon that court being afterwards divided into different sections or branches, no inconvenience appears to have been felt, as all the different sections of the court equally followed the person of the king. But when, in the reign of Edward I., the regulation for holding common pleas, that is, all *civil* actions, in some certain place to be appointed by the crown, was put in force, parties who had business in the court of King's

Bench, the jurisdiction of which, except occasionally as a court of appeal, was then almost confined to criminal matters, or in the court of Exchequer, the jurisdiction of which related to matters of revenue, or in the court of Chancery, were put to inconvenience for want of advocates, as often as the king, whose progresses these courts still followed, happened to be distant from the place (usually Westminster Hall, and seldom elsewhere, after the reign of Edward III.) at which the court of Common Pleas sat. To remedy this inconvenience, and at the same time to relieve parties from the burthensome duty of appearing in person in the court of Common Pleas, an ordinance was made in Parliament, in 1292, by Edward I., by which the king directed the selection of a number (fixed provisionally at 140) from the higher class of legal students to act both as attorneys in the stationary court of Common Pleas, and as advocates in the comparatively few cases which then required their assistance in the ambulatory courts of the King's Bench, Chancery, and Exchequer. No distinction is made in the ordinance between attorneys and apprentices, and the 140 appear to have acted indiscriminately (2 *Rot. Parl.*, 96) as attorneys and as advocates, as their services happened to be required. Complaints were however still made in Parliament (1364-5) of the prejudice arising to parties implicated in proceedings in the two latter courts, from being unable to procure the assistance of serjeants; and it was prayed, though unsuccessfully, that on this ground these courts might also be made stationary.

A petition of the Commons in 1343, that parties to suits in the Marshalsea might be allowed to plead their own causes in that court, in order that they might not be delayed for want of serjeants, had met with a more favourable reception, and the permission was granted by an act of parliament (2 *Rot. Parl.*, 140), which act was not in print till the parliament rolls were published at the commencement of the present century. It was a punishable contempt of the court for a person to interfere as advocate without possessing a legal title to the office. (*Abb. Placit. in Dom. Cap. Westm.*, 137.)

It is stated in the article Barrister that serjeants and apprentices at law were supposed by Dugdale to be the same persons. Dugdale relies upon the circumstance that in the second year of Henry VI. an apprentice was heard in the court of Common Pleas, where serjeants alone practised. But Dugdale was mistaken in supposing that the apprentice acted as an advocate in that court; for upon reference to the Year-Book (M. 2 H. 6, fol. 5, pl. 3), it will be seen that this apprentice was merely sent by the Exchequer into the Common Pleas to ask the opinion of the judges and serjeants in the latter court upon a point of law then depending in the Exchequer; upon which the judges of the Common Pleas consulted the serjeants, and the point was debated by judges and serjeants indiscriminately. The apprentice took no part in the discussion, but carried back the result to the Exchequer, upon which that court acted. It has also been supposed that Plowden and Carrel, who are spoken of as apprentices in 4 Eliz. (1562), were at that time serjeants. With respect to the former, the mistake arose from the circumstance that a writ issued to Plowden and eleven others, in October, 1558, calling upon them to be made serjeants in Easter following. Mary dying in November, 1558, the writs abated. In 1559 fresh writs were issued by Elizabeth to seven of the eleven, but the names of Plowden and four others, as may be seen in Dugdale, were omitted. Plowden therefore remained an apprentice as before, and he is properly so designated in 4 Eliz. (1562). With respect to Carrel also, we have no distinct proof that he ever took the degree of serjeant, though it seems not improbable that he was often commanded so to do. John Carrel received a writ requiring him to take the degree of a serjeant in 1540, and again in 1552 and 1554. In what manner he was excused on these occasions, and whether he paid more attention to Mary's commands than he had done to those of her father and brother, or whether indeed the Carrel apprentice in 1562 was the same person with John Carrel, the serjeant thrice elect, does not appear.

The ordinance of Edward I. authorised only students who had reached the rank of 'apprentices at law' to practise as advocates in those courts in which the assistance of serjeants could not constantly be obtained; but as the practice of these courts increased, it was found necessary, in the reign of Elizabeth, to allow persons of less standing than apprentices to act both as advocates and as attorneys.

Students who, though not yet apprentices at law, had been admitted to argue fictitious cases at the mootings in their respective inns of court, were allowed to practise as advocates in the ambulatory courts of common law and equity. Advocates of this third class were called utter-barristers, because in arguing their moot cases by way of preparation for real forensic debates they were placed at the outer or uttermost end of the form on which they sat, and which was called the 'barr.' (Stow; Waterhous; Dugdale; Herbert, 'Antiq. Inns of Court,' 176.) The junior students, who sat in silence on the inside, were called inner-barristers. But the latter term has long been abandoned, and is sunk in the more general designation of student; in consequence of which the term utter-barrister has also given place to that of barrister, and the student who is admitted to that degree is said to be 'called to the bar.' This call however consists merely in the presiding bencher's saying, 'I publish you a barrister of this Society.'

The mere students, formerly called inner-barristers, confine themselves to study, or, when they consider themselves qualified, practise as conveyancers, special pleaders, or equity draftsmen, in which capacity they are recognised by the legislature, being required to take out annual certificates from the stamp-office. For nearly the last twenty years students practising as certificated special pleaders have been allowed to practise as advocates before judges sitting in their private chambers at Serjeants' Inn, for the summary despatch of matters of pleading and practice, &c.

Shortly after the permission given to barristers to practise as advocates, we lose sight of the order of apprentices. Though usual, it was never perhaps absolutely necessary that a student should become an apprentice in order to qualify him for being called to the degree of the coif; and when it ceased to be required as a title to practise as an advocate, there was no longer any motive for taking the degree of an apprentice.

The result of these inquiries seems to be, that from the Conquest to the 20 Edw. I. (1292), serjeant-countors were the only advocates; that from 1292 to the latter end of the sixteenth century, apprentices were allowed to practise in certain courts; that towards the close of the sixteenth century, the apprentices were supplanted by a more numerous class of junior students called utter-barristers and afterwards barristers; and that from the middle of the eighteenth century, mere students were at any time after their admission, and immediately upon their admission, allowed to practise as certificated conveyancers or certificated special pleaders; and that such special pleaders have latterly been allowed to practise as advocates before judges when administering justice in their private chambers; which latter practice may be thus explained:—The business to be disposed of by the courts at Westminster having far outgrown the machinery provided for its despatch, many acts of parliament have directed that certain judicial acts shall be done by the court 'or any judge thereof.' The consequence of these provisions, and of a practice existing before, of referring minor questions and cases of a pressing nature, to be disposed of by a single judge, has been that a most important part of the judicial business of the country, instead of being discussed, as formerly, in open court before a full bench, and with the assistance or in the presence of an intelligent bar, is commonly disposed of by a single judge in a private room, without any assistance except that which he can derive from the attorney's clerks on each side who attend the summons. It not unfrequently happens that a most abstruse point of special pleading, involving the fate, and sometimes the real merits of the cause, and which in the reign of Edward VI. would have been argued by learned serjeants and *sad* apprentices at the bar, and afterwards debated publicly on the bench, is disposed of in five minutes, and without appeal, at chambers by a judge who has never practised this branch of the law, and who would when at the bar have shrunk from the responsibility of expressing an opinion on the most ordinary question connected with the science of special pleading. It was therefore quite natural that judges should be glad to avail themselves at chambers of the assistance of special pleaders; and in order to prevent the abuse of the indiscriminate invitation given by the legislature to all persons, though students only of a day's standing, who are members of an inn of court, to take out licences to practise as special pleaders, &c., the benchers or governing members of some of the inns of court now require that upon the admission of a student, he shall engage not to practise as a special pleader, &c., till he be of sufficient standing to be called to the bar.

The serjeants are however the only advocates recognised in the court of Common Pleas. In that court they retain their right of exclusive audience. This privilege extends to trials at bar, but not to trials at nisi prius, either at the assizes or at the sittings in London and Middlesex.

Attempts have been made to place the court of Common Pleas upon the same footing in this respect as the other courts at Westminster. A suggestion to that effect was made by Sir Matthew Hale, in his 'Considerations touching the Amendments of the Law.' In 1755 it was proposed by Sir John Willes, then chief-justice of the Common Pleas, that the court should be opened to all barristers. The judges met, and, after much discussion, expressed their opinion against the plan, which was strongly opposed by Lord Hardwicke. The bill was not brought into parliament, and the scheme was dropped.

The following representation with respect to the abolition of the exclusive right of the serjeants to audience in the court of Common Pleas was made by the Commissioners on Courts of Common Law, in their first Report, 1829:—'There can be little doubt that such abolition of the exclusive privilege would soon be followed by the entire annihilation of this very antient rank, the advantage of which to the profession at large appears to us to be considerable. It consists in its enabling gentlemen of certain standing and character in the profession, who conceive themselves to have pretensions to advancement (especially on the circuits), but who are not honoured with appointments as your majesty's counsel, to obtain, upon their own application, and without special favour, a certain precedence, and an exclusive right of audience in one court, attended with the relinquishment of general practice in others.

'This change of position is often attended with the most beneficial effects to the professional interests of the persons concerned, of which it would not be difficult to cite satisfactory or even splendid examples.

'With respect to the public, one inconvenience certainly appears to result from it, viz., that on motions for new trials on issues arising in the court of Common Pleas, barristers* not having the rank of sergeant, though they may have been engaged on the trial of those issues, are excluded from audience. Where no sergeant has been employed at the trial, which on the circuits is of frequent occurrence, this operates as a considerable grievance; and the exclusion of the only persons who have any personal knowledge of what passed upon the proceeding under review, gives rise to just dissatisfaction.

'We are therefore of opinion, that upon such motions, if the cause has been tried on the circuit, the barristers engaged on such trials, though without the rank of sergeant, should have audience in the court of Common Pleas; and as a compensation to the gentlemen of the coif, we recommend the abolition of an established professional usage, which precludes any sergeant, though he may not be one of your majesty's sergeants, from opening the pleadings upon the trial of a cause at *nisi prius*.

'That usage rests on no reasonable foundation. Upon a trial at the bar of the court of Common Pleas, the pleadings are opened by the junior sergeant; and the present usage is attended with this public inconvenience, that it obliges the plaintiff, though desirous perhaps to employ a sergeant as his junior counsel, to confer that employment on some barrister of lower rank. But with the exception that has been stated, we do not think that the privilege which is enjoyed by the sergeants is in any respect objectionable; for the easy access to the rank sufficiently protects the public from all the evils which attend monopoly, and at the same time secures to the court of Common Pleas the advantage of a distinct bar. Of this advantage we have already expressed our opinion. The distraction occasioned by the engagements of counsel in several courts is prejudicial in various ways. The interest of the suitor is liable to be affected by the absence of his counsel at critical periods of his case; additional counsel are often retained, and consequent expense incurred, for the purpose of securing the presence of one who is fully instructed. Both these inconveniences are experienced, as we are informed, in a great degree, in Ireland, where it is usual for the counsel to practise in all the courts, and not a little in the courts of equity in this country; and the business in the court is often deranged, and its dispatch not unfrequently delayed, by the endeavours to accommodate the order of proceeding to the convenience of counsel, and by the necessity of reverting to matters which have passed in his absence.

'So long therefore as all barristers possessed of due qualifications, and willing to devote themselves to the practice of the Common Pleas, are enabled to obtain your majesty's writ calling them to the degree of sergeant, we believe that the character of the court for the satisfactory transaction of business will be better sustained by the continuance than by the abolition of the exclusive privilege.

'If access to the coif were less easy than it now is, the case indeed would be different; and supposing the difficulty in obtaining your majesty's writ to be increased, the effect might be to limit the number of practitioners in the court of Common Pleas in a manner which might operate very prejudicially to the public. The opinion above expressed proceeds therefore on the assumption that the present liberality on this subject is founded on an acknowledged principle of utility, and will continue to be observed.

'By way of further encouragement however to barristers to resort to the court of Common Pleas, we recommend that, in addition to the advantage proposed to be given to junior sergeants of opening pleadings, your majesty's sergeants should forbear to sign pleading, or to transact any other business from which your majesty's counsel in other courts, according to established usage, refrain.

'The principle of requiring counsel to elect some one court as the place of their regular practice, for the purpose of establishing an appropriate bar in each court, is necessarily applicable to such counsel only as obtain rank. But much inconvenience is likewise often experienced from the absence, during the trial of causes, of the junior counsel who have prepared the pleadings, and advised upon the case and evidence. To them the minuter details of fact, and the authorities upon which the action has been commenced, or the defence founded, are generally more fully known than to the leading counsel, who often receive their instructions a short time only before the trial. It is a very common though an inconvenient practice, for counsel, having engagements in different places at the same time, to place their briefs in the hands of their friends, who represent them at the trial of causes. But in such cases the counsel entrusted with the briefs, for want of previous acquaintance with the cases, are little able to afford assistance either to the judge or the leading counsel.

'It can hardly be expected, nor is it perhaps to be wished, that junior barristers should confine their practice to a single court; and it may be impossible for them to anticipate the course of business by which their attendance upon a particular cause in one court may be prevented by their unexpected detention in another. But we are of opinion that no gentleman at the bar ought to accept a brief in any cause upon which he has not good reason to be assured that he shall be able personally to attend.

'The permission to open pleadings proposed to be given to junior sergeants will tend materially to obviate the inconvenience above mentioned. But we think it right to call to notice an antient rule of the court of Common Pleas, of Hilary term, in the 14th year of King James the First, by which it is provided, "That if any sergeant or counsellor-at-law shall take any fee to be of counsel with any, and to be with him at any time certain for any cause, and shall not attend the same cause accordingly, that then, upon complaint made or information thereof given to the judges of that court where the cause shall be depending, or any of them, the judges by their discretion shall give order for the repayment and satisfaction thereof to the client."

'We think it very desirable that the principle of this rule should be honourably observed.'

In April, 1834, while the Central Criminal Court bill was in the House of Lords, a clause was introduced for opening the court of Common Pleas. This clause was withdrawn from the engrossment before the bill was sent to the Commons. But on the 24th of April, in that year, a royal warrant issued, ordering and directing that the right of practising, pleading, and audience in the court of Common Pleas should cease to be exercised exclusively by the serjeants-at-law, and that barristers-at-law should have and exercise equal right and privilege with them of practising, &c. in that court. The warrant professed to give to such of the serjeants then in practice as were not king's serjeants, and had not patents of precedence, *as an especial mark of royal favour*, precedence over any king's counsel who might be thereafter appointed. This warrant was filed in the court of Common Pleas on the 25th April, 1834; from which time, until January, 1840, it was acted upon by the court. During this period no persons applied for the coif, except those who had received an intimation that they were to be made judges.

---

* The term 'barrister' is here used, as it sometimes is by the legislature, in its popular sense, as applicable to all persons practising at the bar of a court f law or equity, not including advocates in courts conducted according to the or canon law, but not confined, as from the derivation of the term might aps be inferred, to the class formerly known as 'utter-barristers.'

On the accession of Queen Victoria, in 1837, a petition was addressed to her majesty by the queen's serjeants and two other serjeants who had not availed themselves of the clause of precedence contained in the warrant of April 24, 1834, suggesting that the warrant was illegal, and praying that the legality of that document and the expediency of the alteration might be duly investigated. The illegality of the warrant was asserted upon the prescriptive rights of the serjeants, coeval with the existence of the courts themselves. The circumstance that the warrant did not purport to be countersigned by the secretary of state or by any other responsible officer was also relied on. On the score of expediency it was alleged that the convenience of a fixed and resident bar in each court for the satisfactory despatch of business was known to all who regularly attended courts of justice; that to effect the object by any arrangement amongst the practitioners had been found to be impossible; that the interruption and loss of time to the court, and the delay and embarrassment of business, were the subject of general complaint; whereas by the legal constitution of the court of Common Pleas these inconveniences had been avoided as long as the exclusive right of audience of the serjeants in that court had been upheld. A memorial was at the same time presented to the lord chancellor, in which it was submitted that such an alteration could only be made by act of parliament.

The petition being referred to the judicial committee of the privy council for their advice, the question of the legality of the warrant was argued before the lords of the council on the 10th of January, 1839, and again on the 2nd of February following. A strong opinion was expressed by their lordships as to the illegality of the warrant, but the court separated without coming to any conclusion as to the advice which should be tendered to the crown.

In June, 1839, a bill was brought into the House of Lords, 'To regulate the course of proceeding in the court of Common Pleas, so far as relates to the practice and hearing of counsel therein in term time.' The object of this bill was to authorize the court of Common Pleas to hear barristers-at-law upon motions arising out of trials at the assizes. The bill passed the Lords, but was not moved in the Commons.

In November, 1839, a motion was made in the court of Common Pleas by Wilde, as the senior practising serjeant, that the exclusive right of audience of the serjeants-at-law for practising in that court, which had been suspended by that court in obedience to the warrant of 1834, should be restored; and at the close of Hilary term, 1840, the right of being heard as counsel and of signing pleadings in causes depending in the Common Pleas, was declared by the court to belong exclusively to the serjeants-at-law. It was however stated that, in order to prevent inconvenience to the suitors, the court would hear other counsel in causes in which they were actually engaged at the time the opinion of the court was thus pronounced.

Serjeants had formerly not only *exclusive audience* in the Common Pleas, but had also in all other courts *pre-audience* over all other advocates. They are addressed by the judges as brothers, by which title they speak to and of one another.

Though the king was represented in each of his courts at Westminster by one or more persons as his attorney and solicitor-general in one or all of those courts, no one formerly pleaded as *counsel* for the crown except serjeants. In the patent of a king's serjeant, he was appointed by the king 'Serviens Noster ad legem, et Narrator pro Nobis in curiis Nostris, in quibuscunque negotiis Nos tangentibus.' Afterwards when the king's attorney, as it usually happened, was an apprentice, he was allowed not only to appear as attorney, but to plead as advocate for the crown in those courts in which apprentices were permitted to practise, and when so employed he claimed and exercised, for the benefit of the crown, a right of pre-audience over serjeants pleading for ordinary clients in those courts. Afterwards the attorney-general exercised a right of pre-audience even when not engaged for the crown. Other king's counsel appear to have obtained pre-audience over the serjeants by a similar course of proceeding; but the king's serjeants still retain pre-audience over all other counsel except the attorney-general and solicitor-general; and even over the attorney-general, the senior of the king's serjeants, distinguished by the appellation of 'the king's antient serjeant,' retained his precedence until 1814, when Sir Samuel Shepherd, the king's antient serjeant, being appointed solicitor-general, instead of vacating his office of serjeant, as had always before been done in such cases, obtained a warrant from the Prince-Regent giving to the attorney-general and solicitor-general perpetual pre-audience of the whole bar. In the reigns of Mary, Elizabeth, and James I., several persons were degraded, or discharged, from the degree of serjeant-at-law in order to capacitate them for accepting the office of solicitor-general, as it is not unusual now for barristers to apply to be disbarred for the purpose of enabling them to practise as solicitors or attorneys to private suitors.

The pre-audience acquired, in comparatively modern times, by the attorney-general and solicitor-general and the other king's counsel over the serjeants in the courts of Westminster Hall, has not otherwise affected the rank or position of the latter. At the coronation of Queen Elizabeth it appears to have been finally settled that in the royal procession (in which those of inferior rank walk first) 'the attorney and solicitor-general walk immediately before the barons of the Exchequer, and immediately after the serjeants-at-law, who follow the knights-bannerets, bachelor-knights, masters of the chancery, clerks of the court, &c.' (Egerton *Papers*, 60.)

The serjeants formerly occupied three inns, or collegiate buildings, for practice, and for occasional residence, situate in Chancery Lane, Fleet Street, and Holborn. The last, called Scroop's Inn, has long been abandoned, and since the burning down of Serjeants' Inn, Fleet Street, in the middle of the last century, that site has also been deserted by the serjeants, who have now no other building than Serjeants' Inn, Chancery Lane, which has been lately rebuilt. Here all the common-law judges have chambers, in which they dispose in a summary way, and with closed doors, of such matters as the legislature has expressly entrusted to a single judge, and of all business which is not thought of sufficient magnitude to be brought before more than one judge, or which is supposed to be of a nature too urgent to admit of postponement.

The inn contains, besides accommodations for the judges, chambers for fourteen serjeants, the junior serjeants while waiting for a vacancy being dispersed in the different inns of courts.

In Serjeants' Inn Hall the judges and serjeants, as members of the Society of Serjeants' Inn, dine together during term-time. Out of term the hall is frequently used as a place for holding the equity and revenue sittings of the court of Exchequer.

Formerly very splendid and expensive entertainments were given by the new serjeants upon their reception into the order. About a century ago this custom was discontinued, and instead of festivities at their joint expense, each serjeant paid 100*l.* to the Treasurer of the Society of Serjeants' Inn upon his admission as a member of that Society, into which the new serjeants are elected almost as a matter of course. The payment is now raised to 350*l.* The practice of giving gold rings to the queen and the great officers of state and others still continues, though the number has been lately reduced. These rings, with the robes and other expenses, raise the 350*l.* to something less than 500*l.* The peculiar dress of the serjeants-at-law, besides their distinctive coif, consists in four species of robes. In term time the gown of black cloth is worn on ordinary occasions. On holidays the serjeants appear in court in purple (violet coloured) gowns. When they go in state to St. Paul's, they wear scarlet gowns, as also when they attend the House of Lords, if the king be present, and when they dine at Guildhall on lord mayor's day. At nisi prius they appear in black silk gowns, which, as being at hand, they generally wear when called upon to try causes or prisoners on the circuit, though for the latter purpose the scarlet gown, always accompanied with a *sentence cap*, is understood to be the appropriate costume.

The creation of serjeants was antiently attended with numerous ceremonies, a description of which may be seen in the last chapter of Herbert's 'History of Inns of Court.' Some practices belonging to an age of greater simplicity than the present, are still retained in those cases where the writ to the serjeant elect issues *in term-time*. But by a late statute, 6 Geo. IV., cap. 95, persons receiving writs, issued *in vacation*, commanding them to appear in the Court of Chancery and to take upon themselves the estate and dignity of a serjeant-at-law, are, upon appearing before the lord chancellor and taking the oaths usually administered to persons called to that degree and office, declared to be serjeants-at-law sworn, without any further ceremony.

Another class of serjeants is that of serjeants-at-arms, whose number is limited, by statute 13 Rich. II., cap. 6, to thirty. Their office is to attend the person of the king, to arrest offenders, and to attend the lord high steward when sitting in judgment upon a peer. Two of these serjeants-at-arms by the king's permission attend the two houses of parliament. In the House of Commons, the office of the serjeant-at-arms (as he is emphatically called) is to keep the doors of the house, and to execute such commands, especially touching the apprehension of any offenders against the privileges of the Commons, as the house through its Speaker may enjoin. From these serjeants-at-arms the present regimental serjeants are probably derived.

The third field-officer in a regiment, now the major, was formerly called the serjeant-major [Major], a term now applied to a much inferior officer. In the Spanish service the major is still so designated.

In some offices about the royal person the principal officer of the department is distinguished by the appellation of serjeant, as the serjeant-surgeon, &c.

Many of the documents referred to in the present article are printed at length in the Appendix to Manning's 'Serviens ad Legem,' which is a report of the argument before the Privy Council in 1839.

Serjeants and other counsel are engaged to assist a party in a cause either by the delivery of a brief in that cause or by giving a retainer or retaining fee. A retainer, if for a particular cause, and for a particular stage of that cause is called a common retainer, and it now consists in the payment of the sum of one guinea and the delivering of a paper endorsed with the name of the cause and of the court, and the words 'Mr. Serjeant A (or 'Mr. B'), retainer for the plaintiff' (or for the defendant). A general retainer is where a retaining fee of five guineas is given to counsel to engage the assistance of that counsel in all causes in which the party retaining may be concerned in the courts which the counsel retained attends. A special retainer is where a large fee is given to counsel to plead in a particular cause on a circuit on which he does not usually practise. This fee, which, for the leading counsel, cannot be less than 300 guineas, besides the expense of posting with four horses to and from the place of trial, is given and received partly with a view to remunerate the counsel for the inconvenience of leaving other engagements to come to a strange circuit, and partly for the purpose of preventing any unnecessary interference with the business of the regular practitioners of the particular court into which he is brought, in cases which are not of great importance. Both the common and the special retainer amount to an engagement on the part of the counsel to accept the brief of the party retaining, and to refuse any brief offered by the adverse party, and on the part of the client, to deliver a brief to the counsel retained in case the cause is entered for trial, whether a trial takes place or not. A general retainer merely renders it imperative on the counsel retained to accept no brief or retainer from the adversary of the party retaining, until he has first ascertained that it is not the intention of the latter to require his services in the particular cause. The general retainer continues in force during the joint lives of the retaining client and the counsel retained, unless the engagement be cancelled by the former, who is at liberty at any time to renounce his title to the services of the counsel retained. In the case of a common or a special retainer, the contract can be put an end to only by the concurrent act of counsel and client.

In cases of importance, counsel are generally retained before the action is actually commenced; and it often happens that for want of sufficient information as to the form of the intended proceedings, or from carelessness, the cause is not described in the retainer with sufficient accuracy. When this is the case, the retainer is void, and the counsel is bound to accept the retainer of the adverse party, if tendered before the mistake has been corrected. The sufficiency of the first retainer becomes frequently the subject of dispute between the litigant parties, which dispute, if not arranged between themselves, is generally settled not by the counsel to whom the retainer is given, but by some other leading counsel.

In former times it was usual, particularly for great persons and public bodies, especially for religious corporations, to grant annuities pro consilio impenso vel impendendo.

SERJEANT-AT-ARMS. [Serjeant. (Law.)]

SERJEANT-AT-MACE. [Serjeant. (Law.)]

SERJEANTY. [Serjeant. (Law.)]

SERK. [Guernsey.]

SE'RLIO, SEBASTIA'NO, an Italian architect, whose writings are considered of authority in matters of art, was born at Bologna in 1475. The study of Vitruvius inspired him with an eager desire of obtaining greater insight into the practice of the antients, by examining and making drawings of what remained of their structures,—at that time the only method by which any knowledge of them could be acquired; for although many buildings were then to be seen in a perfect state in comparison with what they are at present, that advantage was counterbalanced by there being no accurate delineations published for the instruction of those who could not visit the edifices themselves. After staying some time at Pesaro, Serlio proceeded to the Venetian States, where he employed himself in examining and measuring the amphitheatre and bridges at Verona. He subsequently visited both Vicenza and Venice; erected a theatre in the former city, and in the other made designs for the church of San Francesco delle Vigne. During his residence in the last-mentioned city, he became acquainted with Sanmicheli, Sansovino, and other architects of note; and he himself would doubtless have found employment there, being noticed by the Doge Andrea Gritti, if his passion for exploring antiquities had not induced him to pass over to Pola, of whose amphitheatre and other Roman remains he was the first to publish any architectural account. On his return he examined those of Ancona, Spoleto, &c., and afterwards those of Rome, many of which are introduced as illustrations, but certainly not as embellishments, in his work on architecture, they being there represented in most coarsely drawn and executed woodcuts. It was while he was at Rome that he composed his treatise on the five orders, for a copy of which he was complimented by Francis I. with three hundred gold crowns. Invited to France by that monarch in 1541, he was there appointed architect at the palace of Fontainebleau, and was also commissioned to undertake the court of the Louvre, but generously declined in favour of Lescot, whose designs he recommended to be adopted as being superior to his own. After the death of his royal patron he retired to Lyon, where he remained for some time in exceedingly straitened if not in indigent circumstances; but he returned again to Fontainebleau, and died there in 1552. His reputation rests chiefly upon his writings, 'Opere di Architettura, Libri Sei,' which display more study and learning than taste; and which, highly as they were at one time esteemed, possess little real value at the present day.

SERMON, a form of the Latin *sermo*, which denotes a discourse of any kind, and even common talk or conversation. It is now however applied only to a discourse of a particular kind, namely, one delivered to an assembly of persons who are gathered together for purposes of devotion, or in the character of a Christian and religious congregation. Nor is any address delivered on such occasions properly a sermon, though the word is very loosely used, and addresses delivered on such occasions, which can hardly be called sermons, are not unfrequently so denominated; but it seems to be essential to a sermon that it shall be a discourse grounded on some particular passage of holy Scripture which more or less influences the preacher in the whole of his discourse. This passage is called the *text*, that is, it is the portion of the *text of Scripture*, of which the sermon is the long paraphrase and commentary, with suitable application and exhortation intermixed or appended.

This we believe to be the true idea of the word sermon, as contradistinguished from other words denoting discourses or addresses, and the most antient sermons are of this structure; and of this structure are also a great proportion of the sermons which are delivered in the churches and other places of Christian assembly. When the text is used merely as a motto, or when there is no reference to any particular portion of Scripture, the discourse may be very good and very edifying, but it is not properly a sermon.

The sermons delivered in the English church before the Reformation were very short, probably seldom requiring more than ten minutes for the delivery of them. Many specimens remain in manuscript, but few are generally accessible by having been printed. Perhaps the most remarkable and the most easily consulted are the sermons at the opening of each parliament, of which there are notices in the printed rolls.

But with the Reformation a great change in this respect took place; and in many cases the ministers of religion came to consider themselves rather as persons whose peculiar duty it was to exhort and preach, than to conduct the devotions of a Christian assembly and to minister the sacraments. The consequence of this was that the sermons ran out to a most inordinate length, and assemblies were gathered together rather for the purpose of listening to them than of entering into the devotions of the church; and the term 'preaching minister' was invented to designate those ministers who changed the nature of their office, from one which was instituted for the administration of the Christian ordinance and the assisting the people in their devotions, to one which was of teaching, if not exclusively, yet principally. It was not very unusual in the seventeenth century for congregations to listen to sermons which occupied one, two, or even three hours in the delivery. Many of these sermons are in print, and may therefore be now read and judged of.

There is a singular work by a minister of the French Reformed church at Charenton, Monsieur Claude, entitled 'An Essay on the Composition of a Sermon.' This was translated by Robert Robinson, a Baptist minister at Cambridge, who has illustrated the rules by numerous quotations from English sermon writers. This translation is in two volumes, 8vo., 1779.

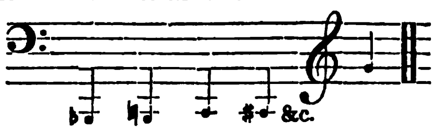
SE'ROLIS. [ISOPODA, vol. xiii., p. 52.]

SEROUS MEMBRANES. [MEMBRANE.]

SERPENS (the Serpent), a constellation which is astronomically distinguished from OPHIUCHUS, but not mythologically, being the serpent carried by the Serpent-bearer. The windings of the figure bring it in contact with Aquila, Ophiuchus, Libra, and Hercules.

Character. Not in Bayer ( )	No. in Catalogue of		Magnitude.	Character. Not in Bayer ( )	No. in Catalogue of		Magnitude.
	Flamsteed. (Piazzi.)	Astron. Society.			Flamsteed. (Piazzi.)	Astron. Society.	
	1	1696	7	ρ	38	1809	5
	3	1727	6½	γ	41	1819	3
	4	1729	6		43	1834	6
	5	1736	6	π	44	1832	4
	6	1743	6	(g^1)	45	1843	6
	7	1745	7	(g^2)	46	1844	6
τ^1	9	1748	6		47	1846	6
	10	1751	6		48†	1855	6
	11	1761	6	σ	50	1873	5
δ	13	1767	3		51‡	1883	6
A^1	14	1772	6	ν	53	1985	4
τ^3	15	1771	6	ξ	55	2019	4
	16	1775	7	o	56	2028	5
τ^5	18*	1776	6	ζ	57	2061	5½
τ^6	19*	1783	6	η	58	2109	3
χ	20	1784	6	d	59	2124	6
ι	21	1785	5	c	60	2129	6
τ^7	22	1786	6	e	61	2139	6
ψ	23	1789	6		62	2184	6
a	24	1791	2		63	2188	3
A^2	25	1794	6		64	2193	6
τ^8	26	1793	6		(156)	2018	6½
λ	27	1795	4		(188)	2031	7
β	28	1796	3		(212)	1817	6
μ	32	1799	4	θ^2	(222)	1822	6
ω	34	1802	6		(237)	2189	5
κ	35	1801	4		(281)	2050	7
b	36	1804	6		(293)	2051	6
ϵ	37	1803	3				

SERPENT, a musical instrument, a long conical tube of wood covered with leather, having a mouth-piece, ventages, and keys, and bent in a serpentine form; hence its name. The compass of the serpent is from B flat below the base staff, to G, the treble clef line, including every tone and semitone between these extremes. Or—



The use of this is confined to military bands, though it might have been rendered valuable in the orchestra. The ophecleide however, an instrument applicable to the same purposes, but of far superior utility, has already obtained a place in the concert-room, and will, most probably, soon supersede altogether its antient and imperfect precursor [OPHECLEIDE.]

SERPENTA'RIA. [ARISTOLOCHIA.]

SERPENTINE, a rock regarding whose origin geologists have differed and perhaps still somewhat disagree in opinion. MacCulloch, in his 'Treatise on Rocks,' p. 243, denies that it is ever really stratified: in the same work, p. 652, he allows that important fact, from personal examination of a large tract in the island of Uist. It is described as an irregularly overlying mass in the Lizard district of Cornwall, as a dyke at Portsoy, and as nodular aggregations in the granite of Aberdeenshire. The relation in which it stands to diallage rock (a compound of diallage and felspar) is very intimate, both in the Alps, in the Shetland Isles, and in Cornwall. In fact the composition of these rocks is scarcely more different than may be seen between largely crystallised and fine-grained greenstone. Veins and masses of trap on passing through or being in contact with limestone not unfrequently change the nature of that rock near the junction, and either fill it with serpentinous lines or masses, or produce therein asbestic or steatitic admixtures. It is a very common circumstance among the primary limestones to find light green veins and strings of serpentine, and in the Pyrenees calcareous rocks comparatively of very recent date are similarly altered.

SERPENTS, or **OPHIDIANS**, an order of REPTILES without feet, and consequently, as Cuvier observes, more deserving of the name of *reptiles* than any other order.

ORGANIZATION.

Cuvier's second family (the first being the *Anguians*) [BLINDWORM; JAVELIN SNAKE; SAURIANS], or that of the *True Serpents*, comprehends the genera which have no sternum nor any vestige of a shoulder-blade, but whose ribs still embrace a great part of the circumference of the trunk, and the body of whose vertebræ are also articulated by means of a convex surface which is received into a socket or concavity of that vertebra which succeeds it. They want the third eyelid and the *tympanum;* but the *ossiculum auditûs* exists under the skin, and its shaft or handle (so to speak) passes behind the tympanic bone. Many have vestiges of a posterior member under the skin, and the extremity of this rudiment of a limb shows itself externally in the form of a small hook. [BOA, vol. v., pp. 22, 27.]

Those serpents to which the names of *Doubles Marcheurs* or *Amphisbænidæ* [AMPHISBÆNA and TYPHLOPS] have been given, have the lower jaw carried, as in the CHELONIANS and SAURIANS, by a tympanic bone which is articulated directly with the cranium, the two branches of that jaw soldered anteriorly, and those of the upper jaw fixed to the cranium and the intermaxillary bone, so that their mouth cannot be dilated, as in Cuvier's next tribe (the Serpents properly so called), and their head is of uniform size with their body; a form and structure which enable them to make progress equally well in both directions, head or tail foremost. The bony frame of the orbit is incomplete backwards, and their eye is very small. Their body is covered with scales, the anus very near its extremity, the trachea long, and the heart placed very far backwards. Of this tribe no venomous species are known.

The Serpents, properly so called, have the tympanic bone, or pedicle of the lower jaw, moveable, and nearly always suspended to another bone analogous to the mastoïdian, attached to the cranium by muscles and ligaments which permit its mobility: the branches of this jaw are not united to each other except by ligaments, nor are those of the upper jaw united to the intermaxillary bone in any other manner, so that they can be more or less separated, a conformation which gives these animals the power of dilating their mouth to such an extent as to enable them to swallow bodies larger than themselves. Their palatine arches participate in this mobility, and are armed with pointed teeth curved backwards,—the most marked and constant character of this tribe. Their trachea is very long; their heart situated very far backwards; and the greater number have only one very long lung, with the vestige of a second. These Serpents, says Cuvier in continuation, are divided into *venomous* and *non-venomous;* and the former are subdivided into *venomous with many maxillary teeth,* and *venomous with isolated fangs.* In the *non-venomous,* the branches of the upper jaws are furnished throughout their length, as well as those of the lower jaw and of the palatine branches, with fixed teeth which are not pierced: there are therefore four nearly equal rows of these teeth in the upper part of the mouth, and two in the lower. [PYTHON, vol. xix., p. 175.] Those which have the mastoïdian bones comprised in the cranium, the orbit incomplete backwards, and the tongue thick and short, much resemble the *Amphisbænidæ* in the cylindrical form of their head and body, and have, Cuvier observes, been united to the *Orvets* [ORVET], in consequence of the smallness of their scales.

---

* These stars are τ^2 and τ^3 of Flamsteed.
† More properly in Hercules than in Serpens.
‡ This star is really 24 Herculis.

The *venomous serpents* with isolated fangs present a very peculiar structure in their organs of manducation. Their superior maxillary bones are very small, carried on a long pedicle analogous to the external pterygoïd apophysis of the sphenoïd bone, and very moveable: here is fixed a pointed tooth, pierced with a small canal which gives issue to a liquor secreted by a considerable gland situated under the eye. It is this liquor which, when shed into the wound made by the bite of the serpent, carries havock into the body of the wounded animal, and produces effects more or less fatal according to the species which has inflicted the wound. This fang is concealed in a fold of the gum when the serpent does not wish to use it; and there are behind it many germs destined to fix themselves in their turn in order to replace it, if it should be broken in the wound it makes. Naturalists, Cuvier remarks, have named these teeth *crochets mobiles,* or moveable fangs, but it is, properly speaking, the maxillary bone that moves: that bone carries no other teeth, so that, in the venomous serpents, only two rows of palatine teeth are seen in the roof of the mouth. All the venomous species bring forth their young alive, in consequence of the egg being hatched internally before it is laid, whence their general name of *Vipers,* a contraction of *Vivipares.*

These deadly serpents with isolated fangs, though they present external characters of the same nature as the preceding group, have, the greater number of them at least, very dilatable jaws and a very extensible tongue. Their head, wide behind, has generally a ferocious aspect, which announces in some degree their malevolent nature. [VIPERIDÆ.]

A third tribe has the jaws organised and armed nearly as in the non-venomous serpents, but the species have the first of their maxillary teeth greater than the others, and pierced so as to conduct the venom in the same manner as is effected in the venomous serpents with isolated fangs. Such are the *Bungari* and *Hydri.* [HYDRUS; PELAMYS.] (*Règne Animal.*)

The serpents, with one exception (*Deirodon,* to which we shall presently more particularly call attention), subsist on living prey; and, whether non-venomous or venomous, have their teeth, as might be expected, admirably constructed and arranged for the purpose of securing their prey and assisting in deglutition.

Professor Owen, in his valuable and copiously illustrated *Odontography,* observes that the order *Ophidia,* as it is characterised in the system of Cuvier, requires to be divided into two sections according to the nature of the food and the consequent modification of the jaws and teeth. Certain species, he observes, which subsist on worms, insects, and other small invertebrate animals, have the tympanic pedicle of the lower jaw immediately and immoveably articulated to the walls of the cranium; the lateral branches of the lower jaw are fixed together at the symphysis, and are opposed by the usual vertical movement to a similarly complete maxillary arch above: these, as we have above seen, belong to the genera *Amphisbæna* and *Anguis,* Linn. The rest of the Ophidians, observes the Professor, which form the typical members, and by far the greatest proportion of the order, prey upon living animals, frequently of much greater diameter than their own; and the maxillary apparatus is, as we have also above seen, conformably and peculiarly modified to permit of the requisite distention of the soft parts surrounding the mouth and the transmission of the prey to the digestive cavity.

But the mechanism by means of which this distention is accomplished, and which is in fact a dislocation of adapted parts which return to their original positions when the act of deglutition is accomplished, requires, to be well understood, a more particular description than the general account above given, and we proceed to that presented by Professor Owen, as the best and clearest known to us.

The two superior maxillary bones have, he observes, their anterior extremities joined by an elastic and yielding fibrous tissue with the small and single intermaxillary bone: the symphysial extremities of the lower maxillary *rami* are connected together by a similar tissue, allowing of a still wider lateral separation. The opposite or posterior extremity of each ramus is articulated to a long and moveable vertical pedicle formed by the tympanic or quadrate bone, which is itself attached to the extremity of a horizontal pedicle formed by the mastoïd bone, so connected as also to allow of a certain yielding movement upon the cranium. The palatine and pterygoïd bones have similarly loose and moveable articulations, and concur with the other dentigerous bones of the mouth in yielding to the pressure of large bodies with which the teeth may have grappled.

Professor Owen first describes the dental peculiarities of the true serpents, which, as he remarks, swallow their food whole, whether they prey on living animals, as is the case in almost every species, or feed on the eggs of birds, as does *Deirodon scaber,* O. (*Coluber scaber,* Linn.). With the exception of this and some congeneric species, in which the teeth of the ordinary bones of the mouth are so minute as to have been deemed wanting, the maxillary and premandibular bones in all true Ophidians are, he observes, formidably armed with sharp pointed teeth; there is on each side of the palate a row of similar teeth supported by the palatine and pterygoïd bones: in the great Pythons and some species of Boa, he adds, the intermaxillary bone also supports teeth. But whatever be their position, all the teeth, according to the Professor, present a simple conical form, the cone being long, slender, and terminated by an acute apex, and the tooth is either straight, or more commonly bent a little beyond the base, or simply recurved, or with a slight sigmoïd inflection. Thus the teeth are adapted for piercing, tearing, and holding, not for dividing or bruising. Certain teeth in some species are traversed by a longitudinal groove, as above noticed, for conveying an acrid saliva into the wounds which they inflict; in others, two or more teeth are longitudinally perforated for transmitting venom: these poison-fangs, he remarks, are always confined to the superior maxillaries, as we have already stated, and are generally placed near the anterior extremity of those bones.

Professor Owen proceeds in the first instance to notice the serpents whose teeth are all simple and solid, where the pulp which occupies the basal cavity is calcified.

In the genus *Deirodon* (*Anodon* of Dr. A. Smith) the teeth of the ordinary bones of the mouth are so small as to be hardly perceptible, and they are so soon lost, that the animal has been described as toothless, whence Dr. Smith's name, which had already been appropriated to a genus of fresh-water *conchifera.* [NAIADES, vol. xvi., p. 63.] The office of this serpent is to keep down the increase of the smaller birds by preying on their eggs, and, as we shall presently see, the apparent defect is in reality one of those beautiful instances of adaptation of structure to the exigencies of the case to which every naturalist has so often to advert. 'If,' says Professor Owen, 'the teeth had existed of the ordinary form and proportion in the maxillary and palatal regions, the egg would have been broken as soon as it was seized, and much of its nutritious contents would have escaped from the lipless mouth of the snake in the act of deglutition; but, owing to the almost edentulous state of the jaws, the egg glides along the expanded opening unbroken, and it is not until it has reached the gullet, and the closed mouth prevents any escape of the nutritious matter, that the shell is exposed to instruments adapted for its perforation. These instruments consist of the inferior spinous processes of the seven or eight posterior cervical vertebræ, the extremities of which are capped by a layer of hard cement, and penetrate the dorsal parietes of the œsophagus; they may be readily seen, even in very young subjects, in the interior of that tube, in which their points are directed backwards. The shell being sawed open longitudinally by these vertebral teeth, the egg is crushed by the contractions of the gullet, and is carried to the stomach, where the shell is no doubt soon dissolved by the gastric juice.'

The same author observes that the simple teeth, 'dentes solidi,' as they are termed in herpetology, are of equal length in a few species of non-venomous serpents: in the Pythons, Boas, and Lycodons they are, he remarks, larger towards the forepart of the mouth; but in some Colubers and Tropidonotes the situation of the larger teeth is reversed. In *Dryophis* and *Psammophis* there are, he observes, a few very long teeth at the middle, and again at the posterior part of the maxillary series. In *Xenodon*, *Coronella*, and many species of *Homalopsis*, the posterior part of each jaw is, he states, provided with a large and simple tooth, which is long and compressed in the *Xenodon*.

Professor Owen describes the teeth of the *Boa Constrictor* as slender, conical, suddenly bent backwards and inwards above their base of attachment, with the crown straight or very slightly curved, as in the posterior teeth. The intermaxillary bone is described as supporting four small teeth; whilst each superior maxillary bone has eight much larger ones, which gradually decrease in size as they are placed farther back: in each premandibular bone are eight or nine teeth of similar size and proportions. Wide intervals separate these teeth, and from these intervals other teeth similar to those *in situ* have been detached. The base of each of the above teeth is described as extended transversely, compressed antero-posteriorly, and as anchylosed to a shallow alveolus, extending obliquely across the shallower alveolar groove. Professor Owen points out that an affinity to the Lizard tribes is manifested by the greater development of the outer as compared with the inner wall of the alveolar furrow. [SAURIANS.] The palatine teeth, of which there are three or four in each palatal bone, are as large as the superior maxillaries, and similarly attached: the pterygoïd teeth, five or six in number, which, Mr. Owen remarks, complete the internal dental series on the roof of the mouth, are of smaller size, and gradually diminish as they recede backwards; and he observes that in the interspaces of the fixed teeth in both these bones, the places of attachment of the shed teeth are always visible, so that the dental formula, if it included the vacated with the occupied sockets, would give a greater number of teeth than are ever in place and in use at the same time. The intermaxillary bone is, he informs us, edentulous in the smaller species of Boa.

The dentition of the great Java Python (*Python Amethystinus*) is figured after Cuvier in the article PYTHON, and Professor Owen takes his figure from the same authority, observing that the intermaxillary bone is represented as supporting four teeth; the superior maxillary being armed with eighteen teeth, but of these, the three which are situated on the inner side of the anterior part of the outer row are the successors of those teeth to which they are contiguous. No serpent, he remarks, has a double row of fixed and serviceable teeth implanted on the same bone. The palatine bone supports six teeth: the remaining eight teeth of the series are continued upon the pterygoïd bone. The premandibular element of the lower jaw carries eighteen teeth. Mr. Owen observes that in the Tiger Python (*Python Tigris*) the teeth are less numerous than in the great Python. The intermaxillary bone exhibits the places of attachment of four teeth, but Mr. Owen rarely found more than two in place: these in their size and curvature resemble the posterior teeth of the maxillary series. In each superior maxillary bone there are about twelve teeth, which gradually diminish in size as they recede backwards: the number of sockets is eighteen. On each palatine bone are six sockets, and, generally, four teeth in place; eight sockets on each pterygoïd bone, and five teeth in place. Professor Owen observes that the mode of fixation of all these teeth corresponds with that in the *Boa Constrictor*, and that their direction prevents the escape of the prey in which they are once fixed; while the separate and independent movement of each half of both upper and lower jaw, and of the dentigerous bones of the palate, allows of the different series of teeth being successively withdrawn, and implanted in a more advanced position in the prey, which is thus gradually drawn into the gullet, without the retaining force being unduly relaxed during any part of the engulphing process. The teeth seem to be more numerous, or there is a greater number in place at one time, he remarks, in the young, than the old individuals of *Python Tigris:* he counted fourteen superior maxillary and fifteen premandibulars in place on each side of the mouth, in an individual of this species six feet in length. The inner alveolar border is rather higher than the outer one in the palatine bones. The pterygoïd teeth are continued along the middle of the inferior surface or towards the outer side of those bones, whilst in the smaller colubriform serpents they are placed on the inner margin of the pterygoïds.

The teeth of both the Python and the Boa consist, according to the same author, of a body of firm dentine coated by a layer of cement, which is extremely thin upon the crown, but becomes thicker towards the expanded and attached base of the tooth. The calcigerous tubes radiate, he tells us, according to the ordinary course from the central pulp cavity to the periphery of the tooth: the superior and central tubes proceed in the axis of the tooth; those nearest to them incline outwards, deviating from the axis as they recede from the point of the tooth, until they run at right angles to the axis, which course they maintain throughout a great proportion of the tooth. Their primary curvature is slight, with the concavity directed towards the tooth their secondary undulations are faint and regular through seven-eighths of their course, but the tubes become bent in stronger and less sinuous curves in the rest of their extent, where alone they divide dichotomously, the terminal branches frequently inosculating in loops the convexity of which is directed outwards. These sinuous terminations of the calcigerous tubes give, he observes, a very peculiar appearance to the dentine of the Python, which, viewed by transmitted light in their sections by a low power, seems, at first sight, to be invested by a thick layer of some distinct tissue.

Professor Owen then adverts to the character detected by Retzius—the transmission from the lower or concave side of the main calcigerous tubes in the dentine of the Python, of numerous, minute, parallel, and nearly straight branches, directed obliquely outwards and downwards; and he informs us that the structure of the external layer of cement can only be examined in sections taken from near the base of the tooth, as its extreme thinness in the crown causes it to appear merely as a clear line bounding the peripheral loops of the calcigerous tubes. He adds that it appears to be more readily detached from the dentine where it is thickest, at the base of the tooth, and that it is a clear substance, in which the calcigerous cells are simple, very minute, and inconspicuous. Under the head *Coluber*, we are informed that the solid teeth of the smaller non-venomous serpents correspond in structure with those of the Python and Boa. In the *Eryx Turcicus* the largest and longest teeth are placed at the anterior part of the series, and they diminish as they recede backwards—the usual disposition: but in the common snake (*Natrix torquatus*) these proportions are reversed, and the largest of the maxillary teeth are situated at the posterior part of the series; whereas the teeth of *Coluber filiformis* are equal and small in size.

Dryinus, DENDROPHIS, and *Heterodon* are characterised by the disproportionate length of the last maxillary tooth; but *Dryinus nasutus* has, Professor Owen remarks, one tooth in the middle of the maxillary series as long as that which terminates it. The colubers, he observes, like other true serpents, have two longitudinal rows of teeth on the roof of the mouth, extending along the palatine and pterygoïds; the genus Oligodon appearing to form the sole exception to this rule. M. Duvernoy noticed a few small teeth on the transverse bone or external pterygoïd, as well as on the internal pterygoïd, in *Dryinus nasutus*.

Conducting us now towards the poisonous serpents, Professor Owen calls attention to the fact that in certain genera of non-venomous serpents, as *Dryophis*, *Dipsas*, and *Bucephalus*, in which the superior maxillary teeth increase in size towards the posterior part of the bone, the large terminal teeth of the series are traversed along their anterior and convex side by a longitudinal groove. In the *Bucephalus Capensis* the two or three posterior maxillary teeth present this structure, and are much larger than the anterior teeth or those of the palatine or premandibular series; they add materially therefore, he observes, to the power of retaining the prey, and may conduct into the wounds which they inflict an acrid saliva, but they are not in connection with the duct of an express poison-gland. The long grooved fangs are either firmly fixed to the maxillary bones, or are slightly moveable, according to their period of growth; they are concealed by a sheath of thick and soft gum, and their points are directed backwards. The sheath always contains loose recumbent grooved teeth, ready to succeed those in place.

In most of the Colubers, we are informed, each maxillary and premandibular bone includes from twenty to twenty-five teeth: they are less numerous in the genera *Tortrix* and *Homalopsis*, and are reduced to a still smaller number in the poisonous serpents, in the typical genera of which the short maxillary bone supports only a single perforated fang.

The transition to the poisonous serpents, which was begun in the *Bucephali*, and allied genera with grooved maxillary teeth, is, according to Professor Owen, completed by the poisonous serpents of the genera *Pelamys*, *Hydrophis*, *Elaps*, *Bungarus*, and *Hamadryas*, which latter genus, as its cervical integument can be expanded into a hood, constitutes an immediate link between the *Bungarus* and *Naja*.

The structure of the venom-fangs of serpents, and the machinery by which their deadly agency is brought to bear against those who are so unfortunate as to be the objects of their attacks, are so interesting, and the subject is so clearly treated by Professor Owen, that we should be doing injustice to his descriptions if they were not given in his own words, which we proceed to lay before our readers, only omitting certain notes and the references to the plates. The whole work should be carefully studied by the general physiologist, as well as by those who make the teeth their particular study.

'The superior maxillary bone diminishes in length with the decreasing number of teeth which it supports: the transverse or external pterygoid bone elongates in the same ratio, so as to retain its position as an abutment against the shortened maxillary, and the muscles implanted into this external pterygoid style communicate through it to the maxillary bone the hinge-like movements backwards and forwards upon the ginglymoid articulations, connecting that bone with the anterior frontal and palatine bones. As the fully developed poison-fangs are attached by the same firm basal anchylosis to shallow maxillary sockets, which forms the characteristic mode of attachment of the simple or solid teeth, they necessarily follow all the movements of the superior maxillary bone; when the external pterygoid is retracted, the superior maxillary rotates backwards, and the poison-fang is concealed in the lax mucous gum, with its point turned backwards: when the muscles draw forward the external pterygoid, the superior maxillary bone is pushed forwards, and the recumbent fang withdrawn from its concealment and erected.

'In this power of changing the direction of a large tooth, so that it may not impede the passage of food through the mouth, we may perceive an analogy between the viper and the lophius; but in the fish the movement is confined to the tooth alone, and is dependent on the mere physical property of the elastic medium of attachment. In the serpent the tooth has no independent motion, but rotates with the jaw, whose movements are governed by muscular actions. In the fish the great teeth are erect, except when pressed down by some extraneous force; in the serpent the habitual position of the fang is the recumbent one, and its erection takes place only when the envenomed blow is to be struck.

'The peculiar structure of the poison-fang was first described by Fontana, as it exists in the viper, and subsequently received additional elucidation by Mr. Smith's careful examinations of the fangs of the Hydrus, Naja, and Crotalus, and by Mr. Clift's illustrative drawings appended to Mr. Smith's paper. A true idea of the structure of a poison-fang will be formed by supposing the crown of a simple tooth, as that of a boa, to be pressed flat, and its edges to be then bent towards each other, and soldered together so as to form a hollow cylinder open at both ends. The flattening of the fang, and its inflection around the poison-duct, commence immediately above the base, and the suture of the inflected margins runs along the anterior and convex side of the recurved fang; the poison-canal is thus in front of the pulp-cavity. The basal aperture of the poison-canal is oblique, and its opposite outlet is still more so, presenting the form of a narrow elliptical longitudinal fissure, terminating at a short distance from the apex of the fang.

'The character most commonly adduced from the dental system, as distinguishing the venomous from the non-venomous serpents, is, that the former have two, the latter four rows of teeth in the upper jaw; the two outer or maxillary rows being wanting in the venomous species, and their place being supplied by the single poison-fang. The exceptions to this rule are however too numerous for its value as a distinguishing character in a question of such practical moment as the venomous or non-venomous properties of a serpent. In all the family of marine serpents the poison-fang is only the foremost of a row of fixed maxillary teeth. In the *Hydrophis striatus* there are four teeth, and in *Hydrophis schistosa* five teeth, behind the venom-fang, of rather smaller size than it; the two-coloured sea-snake (*Pelamys bicolor*) has also five maxillary teeth in addition to the perforated one. The poison-fang in this genus is relatively smaller than in the venomous serpents of the land, but presents the same peculiar structure. The poison-gland presents a correspondingly small development; it is pyriform, and its structure, according to Dr. Cantor,[*] is minutely cellular; it is covered by the aponeurotic expansion of the *articulo-maxillaris*, and transmits a straight duct horizontally to the basal opening of the venom-fang. It is a curious fact that the smaller non-venomous teeth of the poisonous serpents all present a trace of the structure of the functional venom-fang, being more or less deeply grooved along the convex anterior side; and in the hydrus this groove commences by a depression analogous to the oblique basal aperture of the poison-canal in the true fang.

'The colubriform poisonous serpents of the land have comparatively short venom-fangs, but they are larger than those of the pelagic serpents; and behind the venom-fangs there are likewise some smaller grooved teeth in the maxillary bones: there are three such teeth in the *Bungarus Pama*, and five in the *Bungarus annulatus*. In the *Hamadryas*, or great hooded poisonous tree-snake of India, the venom-fang is relatively as large as in typical poisonous serpents, but three or four smaller grooved teeth are implanted behind it on the maxillary bone.

'In the most deadly venom-snakes, as the viper (*Berus*), the puff-adder (*Vipera*), the asps or hooded snakes (*Naja*), the rattle-snakes (*Crotalus*), the sophias and fer-de-lance (*Trigonocephalus*), the poison-fangs acquire their largest size, and are associated only with their successors. These are clustered in greater or less number behind them, presenting the same structure, but of a size proportionate to their degree of development, and further differing in being loosely imbedded in the thick and wide mucous gum, which likewise conceals the fixed and functional fang in its ordinary position of retraction and repose. This fang is more strongly curved backwards than the ordinary teeth, but its acute and slender apex is frequently bent slightly in the contrary direction, as in the rattle-snake.

'The mechanism by which the short maxillary bone and the poison-fang are rotated backwards and forwards upon the ginglymoid joint that connects the maxillary with the præfrontal and palatine bones has already been noticed; and as some description of the secreting apparatus to which the peculiar modification of the venom-fang is subservient might here be expected, I have selected for its illustration the accurate figure which Professor Muller has given of the salivary and poison glands in the *Trigonocephalus lanceolatus*, in his great work on the glandular system.[†]

'The poison-glands occupy the sides of the posterior half of the head; each consists of a number of elongated narrow lobes, extending from the main duct which runs along the lower border of the gland upwards and slightly backwards. Each lobe gives off lobules throughout its extent, thus presenting a pinnatified structure; and each lobule is subdivided into smaller secerning cæca, which constitute the ultimate structure of the gland. The whole gland is surrounded by a double aponeurotic capsule, of which the outermost and strongest layer is in connection with the muscles by whose contraction the several cæca and lobes of the gland are compressed and emptied of their secretion. This is then conveyed by the duct to the basal aperture of the poison-canal of the fang. We may suppose, that as the analogous lachrymal and salivary glands in other animals are most active during particular emotions, so the rage which stimulates the venom-snake to use its deadly weapon must be accompanied with an increased secretion and great distension of the poison-glands; and as the action of the compressing muscles is contemporaneous with the blow by which the serpent inflicts its wound, the poison is at the same moment injected with force into the wound from the apical outlet of the perforated fang.

---

[*] 'Zool. Transactions,' vol ii., p. 304.

[†] 'De Glandularum Secernentium Structura Penitiori,' fol., tab. vi., fig. 1, p. 55.

'The duct which conveys the poison, although it runs through the centre of a great part of the tooth, is nevertheless, as we have seen, really on the outside of the tooth, the canal in which it is lodged and protected being formed by a longitudinal inflection of the parietes of the pulp-cavity or true internal canal of the tooth. This inflection commences a little beyond the base of the tooth, where its nature is readily appreciated, as the poison-duct there rests in a slight groove or longitudinal indentation on the convex side of the fang; as it proceeds it sinks deeper into the substance of the tooth, and the sides of the groove meet and seem to coalesce, so that the trace of the inflected fold ceases in some species to be perceptible to the naked eye; and the fang appears, as it is commonly described, to be perforated by the duct of the poison-fang.

'From the real nature of the poison-canal, it follows that the transverse section of the tooth varies in form in different parts of the tooth; at the base it is oblong, with a large pulp-cavity of a corresponding form, with an entering notch at the anterior surface; farther on, the transverse section presents the form of a horse-shoe, and the pulp-cavity that of a crescent, the horns of which extend into the sides of the deep cavity of the poison-fang. A little beyond this part the section of the tooth itself is crescentic, with the horns obtuse and in contact, so as to circumscribe the poison-canal; and along the whole of the middle four-sixths of the tooth the section shows the dentine of the fang enclosing the poison cavity, and having its own centre or pulp-canal, in the form of a crescentic fissure situated close to the concave border of the inflected surface of the tooth. The pulp-cavity disappears, and the poison-canal again assumes the form of a groove near the apex of the fang, and terminates on the anterior surface in an elongated fissure.

'If the end of each inflected fold of cement in the tooth of the *Labyrinthodon* were dilated sufficiently to contain a tube, that tooth might convey the ducts of fifty poison-glands deeply imbedded in its substance, and yet all of them actually on the outside of the tooth itself: it is the existence of a single fold of the same kind, but more simple, inasmuch as it is straight instead of wavy, which forms the complication of the viper's fang subservient to the completion of its peculiar offensive weapon.

'The venom-fangs of the viper, rattle-snake, and fer-de-lance are coated only with a thin layer of a subtransparent and minutely cellular cement. The disposition of the calcigerous tubes is obedient to the general law of verticality to the external surface of the tooth. Since the inflected surface of the tooth can be exposed to no other pressure than that of the turgescent duct with which it is in contact, the tubes which proceed to that surface, while maintaining their usual relation of the right angle to it, are extremely short, and the layer of dentine separating the poison-tube from the pulp-cavity is proportionally thin. The calcigerous tubes that radiate from the opposite side of the pulp-cavity to the exposed surface of the tooth are disproportionately long.

'The pulp-cavity, following the form of the tooth itself, presents in a transverse section of this part the form of a fissure describing four-fifths of a circle; the fissure is widest at the middle and at the two extremities; the exterior calcigerous tubes, in quitting the pulp-cavity, form a graceful curve, the convexity being turned towards the nearest horn of the crescent; at the middle of the pulp-fissure the tubes proceed straight to the opposite surface; and at the two extremities of the crescent the central tubes are nearly straight, while the lateral ones radiate in graceful curves which become bolder as they diverge from the central and and straighter tubes. Throughout the greater part of the tooth the calcigerous tubes describe their various inflections in a plane transverse to the axis of the tooth; but towards the apex they begin gradually to rise from that plane; and as the pulp-cavity reassumes, with the tooth itself, the simple conical form beyond the termination of the poison-canal, the calcigerous tubes extend to equal distances from the linear remnant of the pulp-cavity, which has again passed to the centre of the tooth, and those tubes which are continued from its extremity pass to the apex of the fang in a line parallel with the axis of the tooth. The calcigerous tubes present secondary curvatures of a slightly wavy character, which become more marked and irregular near their termination. In whatever part of the section an entire tube could be clearly traced to its termination, it formed an anastomotic loop at the periphery of the dentine with an adjoining tube. The calcigerous tubes present a diameter of the $\frac{1}{10000}$th of an inch, and they are separated by interspaces equal to four of their own diameters. Each calcigerous tube gives off many primary branches in its course, but is rarely seen to divide dichotomously until it begins to form its irregular sinuosities near the periphery of the tooth. In the transverse section figured, the primary branches were sent off from the concave side of the tube, at an acute angle with the trunk; the secondary smaller and more numerous branches proceed from the same side of the main tube or of its primary branches, at a less acute angle, into the clear uniting substance; they are remarkably parallel with each other and straight. In old poison-fangs the pulp-cavity or fissure is obliterated by ossification of the remains of the pulp.

'The external layer of cement is very thin where it covers the crown of the tooth; it is best seen at the line of union of the co-adapted margins of the inflected tooth. At this part the cement is more abundant in the viper's tooth, and its transparency permits a bristle inserted into the poison-canal to be seen through it. The layer which coats the inflected surface of the fang is thinner than the outer one, which, from its transparency, has been regarded as enamel. There is however no trace of true enamel upon the teeth of the poisonous serpents, any more than upon those of the innocuous species. The cells of the cement are more minute and inconspicuous in the poison-fang than in the simple teeth of the Python and Boa.

'The teeth of all Ophidians are developed and completed in the original seat of the tooth-germs in all animals, viz. the mucous membrane or gum covering the alveolar border of the dentigerous bones. This gum presents the same lax tissue and is as abundantly developed as in the Pike, Lophius, and many other fishes, in which it likewise serves as the nidus and locality for the complete development of the teeth.

'The primitive dental papilla in the common harmless snake very soon sinks into the substance of the gum and becomes enclosed by a capsule. As soon as the deposition of the calcareous salts commences in the apex of the papilla, the capsule covering that part becomes ossified and adherent to the dentine, and the tooth begins to pierce and emerge from the gum, before its mould, the pulp, is half completed. Fresh layers of cells are successively added to the base of the pulp, and converted by their confluence and calcification into the tubular dentine, until the full size of the tooth is attained, when its situation in the gum is gradually changed, and its base becomes anchylosed to the shallow cavity of the alveolar surface of the bone.

'In the posterior part of the large mucous sheath of the poison-fang, the successors of this tooth are always to be found in different stages of development; the pulp is at first a simple papilla, and when it has sunk into the gum the succeeding portion presents a depression along its inferior surface, as it lies horizontally, with the apex directed backwards; the capsule adheres to this inflected surface of the pulp. But how the cylindrical cavity of the dilated fold is occupied in the loose growing poison-fang, and by what contrivance it is brought into the same relation with the severed duct of the poison-gland as the displaced fang which it succeeds, is not yet clearly understood.'

For the description of the teeth of the *Amphisbænians* and *Anguians*, see SAURIANS, vol. xx., p. 456.

From the consideration of the teeth we proceed to that of the other

Organs of Nutrition.—The *os hyoïdes* in the Ophidians bears a strong resemblance to that of some species of Saurians (IGUANA, *Draco* (DRAGON), *Lophyrus*, for instance); but the anterior part is double, and the two long osseous filaments which form it terminate in pointed cartilages, which introduce themselves, parallel, into the fleshy tissue of the tongue, and are separated by the hypoglossal muscle. The modifications of the muscles of the jaws are varied and admirably adapted to the purpose assigned to them. Some are appointed to work the venom-fangs by carrying forward the external pterygoïd and superior maxillary bones; others again are employed in the separation, approximation, and adjustment of the mandibular bones and the whole of the maxillary articulation; nor are those which act upon the tongue and *os hyoïdes* less complicated; whilst the peculiar muscles which come from the vertebræ and ribs all assist in the process of deglutition. The mobility of the tongue of the serpents must have struck every observer, and they have been seen to lap water with it. Serpents cannot be said to have any true pharynx; for the nostrils, as well as the glottis, open in the mouth, and the œsophagus commences immediately after the termination of the jaws; and is capable of great extension, so as to be capable of receiving prey of a very large diameter entire. The stomach is a continuation of the œsophagus, and the intestines are very short and with but little flexure. The vent or cloaca opens by a transverse slit towards the end of the abdomen, above the origin of the tail, which is often very long. The liver consists of only one lobe of an elongated form, placed on the right, or in the mesial region, in front of the long œsophagus, and accompanies the stomach, furnishing distinct hepatic and cystic canals. The bile is greenish or brown, and the cystic canal comes direct from the liver. The spleen is not large, and is situated on the right near the insertion of the *ductus choledochus*. The *pancreas* is situated immediately under the junction of the intestine with the stomachal sac beneath the peritoneum.

The absorbent powers of the intestines of serpents are great. MM. Duméril and Bibron advert to the state of their dejections as a proof of this. They offer, to use their expression, the dry extract of the animal entire, of which only the parts that could not be liquefied remain unaltered, and absolutely in the same situation that they occupied in the carcass of the animal before it had passed through the whole length of the digestive tube. If, for instance, a rat has undergone this process, one may recognise in the dry and shapeless mass the place occupied by the muzzle of the animal, the long whiskers of its cheeks, the down which covered the delicate cartilages of its ears, the hairs of various lengths and colours which correspond with those of the back, the belly, and, above all, the tail; and, finally, even the claws, which remain in their pristine state of integrity. All that was flesh or soft matter in the body has been completely absorbed; the earthy salt, nevertheless, which gave, by means of its union with the gelatine, consistence to the bones, still indicates by its presence, and especially by its colour, the place they occupied. Dissolution, compression, and absorption have done their work upon this desiccated mass, which still however contains the elements of nourishment for the larvæ of the insects of the family *Dermestidæ*.

In the fæces of the Python which lately devoured its companion in the garden of the Zoological Society of London, there were entire scales of the digested serpent.

No. 508, *Mus. Coll. Reg. Chir.* (*Physiological series*) exhibits the stomach of a water-snake (*Pelamys bicolor*, Daud., *Anguis platurus*, Linn.) laid open to show its internal longitudinal rugæ and the gradual contraction of the pylorus. The gall-bladder, pancreas, and part of the small intestine are also preserved. 508 A, the œsophagus and intestine of a Python, is noticed in that article. A portion of the intestinal canal of *Python Tigris*, showing the elongated pointed *cæcum*, the orifice by which the cæcum communicates with the ileum, and the plaited valvular production at the lower part of that orifice, is preserved in the same museum (No. 671 A). The anterior part of the liver of a rattlesnake (*Crotalus horridus*) (No. 802) shows the termination of the vena portæ and vena hepatica: the former is seen on one side of the liver, of small size, having expended itself in deep-seated branches destined to supply the materials for the biliary secretion; the latter is seen on the opposite side of the liver, of large size, increasing by the reception of superficial branches, which bring back the blood not immediately required for the function or nutrition of the viscus. No. 802 A is the entire liver of a *Python* injected, showing more distinctly than the preceding specimen the characters peculiar to the two systems of veins, the arterial structure of the coats of the vena portæ, and the granular texture and general form of the liver. No. 812 D is the pyloric end of the stomach and commencement of the intestinal canal, together with the extremity of the liver, hepatic duct, gall-bladder, and cystic ducts, pancreas, and spleen of *Boa Scytale*. Professor Owen, who made this preparation, bserves that in the Ophidian reptiles the gall-bladder is situated at a distance from the liver, in close connexion with the duodenum. This preparation shows the consequent length of the hepatic duct. The cystic duct is seen to be single at its commencement, and afterwards to divide into numerous branches, which, together with the hepatic duct, penetrate the pancreas in their course to the intestine. (*Catalogue*, vol. i.)

Circulation and Respiration.—There is no great difference between the heart of serpents and that of Saurians. In *Mus. Coll. Reg. Chir.* (No. 917 B), the heart of a *Python Tigris* is prepared to show the internal structure as well as the outward form. Professor Owen, who made this preparation, observes that the blood of the general system is collected into a large elongated sinus, formed by the union of the inferior with the right superior cava. The left superior cava winds round the back of the left auricle, receives the coronary veins, and terminates in the lower part of the orifice, which leads from the above sinus to the right auricle. This orifice is protected by two semilunar valves. The whole of the inner surface of the auricle, with the exception of these valves and the opposite valve of the foramen ovale, is reticulated with delicate muscular fasciculi. The left auricle receives the blood from a single pulmonary vein, and has a similar reticulated muscular structure: there is no valve at the termination of the vein in this auricle. The blood enters the posterior or aortic division of the ventricle by two crescentic apertures, which are each provided with a single semilunar valve, extended from each side of the septum of the auricular orifices. The irregular form and small size of the aortic chamber is displayed by the removal of the posterior parietes of the ventricle. On the opposite side the pulmonary chamber is exposed; and the Professor remarks in continuation, that it is of a larger size, of a more regular oval form, and with a smoother surface. The fleshy septum, extending from the base of the ventricle to the space between the roots of the pulmonary and systemic arteries, is incomplete at its upper and anterior part, and there leaves a communication between the pulmonary and aortic chambers: these also, he remarks, intercommunicate by several round apertures of different sizes near the apex of the ventricle, which serve to thoroughly blend together the two kinds of blood before they are expelled thus mixed along the three arteries which separately arise from the ventricles. In this preparation the origins of the pulmonary artery and left aorta only are shown, and they are each provided with a pair of semilunar valves. The carotid arteries are given off from the right aorta, which afterwards unites with the left aorta at some distance below the heart. The gland analagous to the thymus gland is also preserved: its structure is cellular. White bristles are passed through the systemic veins, sinus, and auricle; and a black one through the pulmonic vein and auricle. The two branches of the pulmonary artery which go to the two separated lungs are distinguished by black bristles, which also indicate the situations of the two ductus arteriosi. (*Catalogue*, vol. ii.)

The mode of respiration in the serpents is thus:—the glottis, which has two lips, and represents a very simple larynx, opens in the mouth behind the sheath of the tongue; by means of the muscles of the os hyoïdes, which push it, it is raised so as to be presented in a dilated state behind the back nostrils. The vacuum caused by the action of the ribs in the belly tends to dilate the lung, which, through the medium of the trachea, immediately admits the air which is introduced during an inspiration: this is slow, continuing for some seconds. This air, when it has performed its office, and has been deprived of its oxygen, is expelled in the same manner, but by an inverse mechanism, which is entirely due to the action of the muscles which tend to approximate the ribs to each other. When it is expelled rather briskly, a sort of vibration or hissing is heard. The respiration being voluntarily accelerated or retarded, the chemical and vital actions which result from it must be naturally excited or abated by that cause. (Dum. and Bibr.)

In *Mus. Coll. Reg. Chir.*, No. 1088, is the anterior part of a snake (*Coluber Natrix*) with the ventral parietes removed to show the single lung *in situ*. It is a simple elongated sac, with the parietes, composing its anterior fourth, highly vascular and spongy, for effecting the respiratory change in the blood; but gradually assuming a thin membranous and slightly vascular structure, to serve as a reservoir of air. No. 1089 is a longitudinal section of the lung of a water-serpent (*Pelamys bicolor*, Daud.), showing the continuation of the tracheal canal along the lung, for the passage of air to the lower or posterior part of the respiratory cavity. No. 1090 is a similar section from the lower part of the lung of the same snake. No. 1091 is a longitudinal section of the lung of a rattle-snake (*Crotalus horridus*), showing the delicate reticulation of its internal surface, and the termination of the tracheal canal, which is continued down the ventral side of the lung. A longitudinal section of the respiratory portion of the lung of a *Pseudo-boa* (Oppel) is prepared in No. 1092, showing its reticular structure, and the gradual diminution of the thickness and vascularity of the parietes as it recedes from the trachea, which here terminates at once at the commencement of the lung. No. 1093 is a portion of the lung of the same serpent, minutely injected, and affording a beautiful example of the honeycomb structure of the parietes of the respiratory sac. No 1093 A is noticed in the article Python.

As annexed to the faculty of respiration, it will be expected that something should be said relative to the voice of serpents, whose *hissing* has become proverbial. MM. Duméril and Bibron state that they hardly think that these reptiles can, as has been said of some colubers, produce hissings (sifflemens) or piercing sounds (sons bien aigus); for although their lungs have great capacity, and can furnish air for a long time, MM. Duméril and Bibron state that they could never hear more than a sort of blowing (soufflement) such as would result from the rapid issue of a current of air through a simple pipe—that of a quill for instance. White, however, who was a very good observer, in speaking of the faculty which snakes have of 'stinking *se defendendo*,' remarks, in his 'Selborne,' that he knew a gentleman who kept a tame snake, which was in its person as sweet as any animal, while in good humour and un alarmed; but as soon as a stranger or a dog or cat came in, *it fell to hissing*, and filled the room with such nauseous effluvia as rendered it hardly supportable. These offensive emanations came, no doubt, from the fetid anal glands, which seem, as White observes, to be given to certain serpents as a defence. We, at one time, narrowly watched the habits of serpents, pythons in particular, and have seen them excited in various ways; but we never remember to have heard them hiss, in the popular acceptation of the term.

Urinary System.—The serpents have no urinary bladder. In *Mus. Coll. Reg. Chir.*, the preparation numbered 1181 is the posterior part of a *Coluber*, with the ventral parietes of the abdomen removed to show the kidneys *in situ:* they are elongated lobulated glands, and the left is situated about one-fourth its length nearer the anus than the right. For the form in which the urine is voided, and the analysis of it, see Boa, vol. v., p. 23, note.

Generative System.—Serpents are oviparous, and ovoviviparous. [Reptiles, vol. xix., p. 404.] The prolific fluid is discharged directly from the cloaca of the male into that of the female, and the conjunction of the two individuals is facilitated and maintained by means of the two erectile appendages which come out of the lateral parts of the cloaca of the male, and are beset with spines or small rough hooks, destined to be retained in the corresponding parts of the female. In *Mus. Coll. Reg. Chir.*, No. 2417, is a preparation of the posterior part of the body of a snake (*Coluber Natrix*, Linn.) with the ventral integuments dissected off from the abdomen and tail, to show the testes and two intromittent organs *in situ.* The testes are small slightly compressed oblong bodies, situated anterior to the kidneys, the right about an inch in advance of the left, corresponding to the difference in the relative position of the kidneys: the intromittent organs, which consist almost wholly of a preputium, or invertible sheath, and a small glans, are retracted within their subcaudal cells; bristles are inserted into the outlets of these receptacles, and pass into the cavities of the inverted preputia. The muscles which retract the penes and invert the sheaths, are exposed, as they pass backwards to their origins from the inferior spines of the caudal vertebræ. No. 2418 is the termination of the abdomen and the tail of a large coluber, in which the left preputial sheath is laid open, showing the intromittent organ in the retracted state; and the right preputium everted, the glans protruded, and the long retractor muscle dissected. The urethral groove and retroverted papillæ on the preputial membrane and glans may be noticed in both the penes. The termination of the rectum in the cloaca, and its vascular lining membrane, are displayed by injection: below the rectum are shown the terminal orifices of the ureters, into which bristles are inserted. In No. 2419, the whole thoracic abdominal cavity of a rattle-snake (*Crotalus horridus*) is laid open, and the viscera are exposed *in situ.* The testes present a more elongated form, and are situated nearer to the anterior extremities of the kidneys than in the *natrix;* but the chief difference in respect to the generative apparatus is manifested in the structure of the intromittent organs: these appear to be double on each side, from the great development of the bifurcations of the glans penis; those of the right side are here protruded; the left bifurcate penis is retracted, the preputium inverted, and its retractor muscle displayed *in situ.* No. 2420 is a coluber (*Elaphis quadrilineatus*, Bonap.), with the two penes everted and protruded, showing the urethral grooves, the large retroverted papillæ on the preputial vascular membrane which constitutes the body of the penis, and the small flattened wrinkled processes which beset the glans. No. 2421 is another coluber (*Periops Hippocratis*, Bonap.), with the penes inverted; bristles are placed in the outlets of the preputial sheaths.

We have above stated that the true serpents have no urinary bladder. No. 2422, in the same museum, is a slow-worm or blind-worm (*Anguis fragilis*), with the ventral parietes of the abdomen dissected off, and the viscera displayed *in situ.* The testes are situated a little anterior to the dilated rectum, the right in advance of the left; their peritoneal capsules, which are somewhat collapsed, present a brownish tinge. The small allantoïd bladder which distinguishes the *Angues* from the true *Serpentes* is here preserved; the right penis is retracted, the left protruded; the retractor muscles of both are displayed.

No. 2707 of the same collection is part of the body of a Viper (*Vipera Berus*, var. *nigra*, Daud.), with the ventral parietes of the abdomen removed, and the female organs of generation, the gall-bladder, intestine, and kidneys exposed *in situ.* The right ovarium commences immediately behind the gall-bladder; it consists of an elongated thin membranous sac, containing about twenty visible elliptical ovisacs in different stages of development, and arranged in a single longitudinal series. The left ovarium commences opposite the termination of the right; the anterior extremity of each oviduct is opposite the middle of its corresponding ovary the commencement of the tube is disposed in a few wavy folds; the rest is continued straight to the cloaca, in the anterior part of the interspace between the intestine and kidneys; the latter may be distinguished by their regularly lobulated structure; like the ovaries, they are situated unequally, the right being placed more forwards than the left. No. 2708 is a similar preparation from a coluber in which the ova in the ovaria are in an advanced state of development; the ovisac nearest the expanded anterior orifice of the left oviduct is near the period of discharging its contained ovum, and the longitudinal line is discernible which indicates the place of the future rent by which it would have escaped. The cloaca is laid open; a bristle is placed in the termination of the rectum, behind which may be observed the semilunar fissure in which the oviducts terminate, and the bilobed prominence on which the ureters open. No. 2709 shows the urinary and female organs of a Rattle-snake (*Crotalus horridus*). The ovaria, like most of the other viscera of the serpent tribe, are characterised by their great length; and the ovisacs are for the most part developed in a simple or longitudinal series. The ovaria are connected with the beginning of the oviducts by a broad duplicature of peritoneum. Each oviduct commences by a wide fissure with entire margins; its tunics, at first delicate and semi-transparent, increase in thickness as the tube contracts; the course of the oviduct is at first slightly wavy for a short extent, and is then straight, and its terminal portion is suddenly dilated. The internal membrane of the oviduct, prior to this dilatation, is disposed in minute parallel longitudinal rugæ. The termination of the rectum is seen anterior to that of the oviducts: the ureters communicate with the cloaca behind them; a bristle is passed through one of these tubes. No. 2710 exhibits the cloaca and terminations of the rectum, oviducts, and ureters, with the two anal pouches of a large species of coluber. The rectum is laid open, showing the transverse valvular fold which separates its termination from that of the oviducts; bristles are inserted into each of these, and also into the ureters, which terminate in the prominence behind the vulval fossa. No. 2711 is the cloaca of a water-snake (*Pelamys bicolor*), with the terminations of the rectum, ureters, and oviducts. The following quotation from the Hunterian MSS. is appended to the description of the preparation :—'The water-snake has two oviducts, two ovaria, two kidneys, which are placed near the lower part of the abdomen, with ureters about two inches long. The form of the anus is different from either that of the Lizard or the Newt, but it seems to be a mixture of both. It terminates in two lips like the Newts, but which are in a deep sulcus, having a semicircular edge opposing them. If this had the broad thin scale covering the whole, it would be somewhat similar to the Lizard or Snake.' (*Catalogue*, vol. iv.)

The males and females during coition are intertwined with each other, bearing a near resemblance, as MM. Duméril and Bibron observe, to their representation in the caduceus of Mercury.

The shell of the egg in the oviparous serpents, although cretaceous, is soft, like the eggs of the common hen, when she has not enough calcareous matter in her aliments, called soft eggs. They are often more than thirty in number, and are connected by a sort of viscous matter which coagulates and joins them in a kind of chain, as is well known to those who have found the eggs of our British common snake in dunghills. Their colour is ordinarily yellowish or greyish white. The yolk or vitellus is absorbed by the embryo; and an abdominal cicatrice indicates the umbilicus in the young.

Brain, Nervous System, and Senses.—The cranium of the Serpents is small in proportion to the other parts, elongated, and narrow; the internal cavity is small. The surface of the brain is nearly smooth and without sinuosities or circumvolutions. The lobes are distinct, and the whole mass is elongated. The mass of the spinal marrow, compared with the brain, is much more voluminous than the latter. The anterior lobes are rather slender, and the nerves destined for the sense of smelling are elongated, and, as it were, pediculated.

Touch.—This sense can hardly exist in a high state of development among the reptiles of this order; though there is, no doubt, a sufficient degree of it to regulate the progression of the animal, and to indicate to the constricting serpents and those which live in trees the nature of the surfaces with which their bodies are brought into contact.

Taste.—The tongue in serpents is nearly always cylindrical, deeply bifid at its free extremity, and very narrow. It can be protruded from the mouth, and rapidly vibrated in all directions, and is always moist. The sheath into which it is received can be elongated or contracted. As an organ of taste it cannot be very susceptible. The prey is swallowed entire, and under circumstances which give little or no opportunity for the gustatory exercise of the tongue. The lower-jaw, tongue, and larynx of a snake are preserved in *Mus. Coll. Reg. Chir.*, No. 1459.

Smell.—The evidence derived from the structure of this organ, and from their habits, does not justify the conclusion that the sense of smelling is very acute in serpents.

Hearing.—In the serpents there is no external auditory meatus, nor any appearance of a tympanum; but there is a guttural canal which leads from the pharynx to the tympanic cavity, and there may be observed a single ossiculum auditûs, which is elongated and widened at its two ends. In other respects the internal ear is organised like that of the Saurians. Such a structure does not indicate the enjoyment of a very acute sense of hearing, and the 'deaf adder' is become almost proverbial; but that serpents have a perception of sounds, sufficient at least to warn them of the approach of their enemies or their prey, and something more, may be concluded from the attention that many of them pay to musical sounds. [NAIA, vol. xvi., p. 61.]

Sight.—The eyes of the serpent are generally very small, and there is a remarkable peculiarity in the disposition of those organs, for the transparent cornea apparently forms part of the skin and epidermis with which it is detached at each moult. There is no appearance of a tunica conjunctiva; but on dissection it has been found behind the cornea, and occupies the place of eyelids; the sac which this mucous membrane forms receives the tears, and conducts them into the nostrils. There being no eyelid, the eye of the serpent always appears to be fixed and on the watch. The sac above mentioned permits the globe of the eye however to be moved under the anterior part or epidermic cornea. Some serpents, *Trigonocephali* and *Crotali* for instance, have above the eye external cavities, which have been considered as lachrymatory sinuses, like those of the Ruminants: their only analogy however appears to be that of locality, for they receive no tears, and their cavity is always dry. Vision, excepting for some time previous to the change of skin or moult, when it is evidently less perfect, seems to be sufficiently acute in this order.

Progression.—Serpents can creep, glide, grasp, suspend themselves, erect themselves, leap, dart, bound, swim, and dive. Their creeping is a laterally sinuous motion; but their structure forbids their progression by vertical undulations, as they are often represented in the older books of natural history, and frequently on the stages of theatres. Such are the figures of the Basilisk or COCKATRICE, and the *Draco apteros* in Aldrovandus and Jonston. Their multitudinous vertebræ and ribs, and the prodigious force of their innumerable muscles, compensate for their want of limbs. All the vertebræ are, so to speak, of the same form from the articulation of the head to the coccyx; and are so connected, both with the ribs and with each other, as to ensure the greatest possible quantity of progressive and constrictive power.* [BOA, vol. v., pp. 20, 21, 22.]

Geographical Distribution.—Cold latitudes do not agree with the true serpents; it is in warm climates that their numbers, their venom, and their volume attain their maximum.

SYSTEMATIC ARRANGEMENT.

The general arrangement of this order will be found under the article REPTILES. We shall here confine ourselves to the more particular details given by modern zoologists.

According to Baron Cuvier, the Ophidians consist of the genus *Anguis* (slow-worms), the *True Serpents*, and the *Naked Serpents*.

Of the *True Serpents* the first division comprises the *Doubles Marcheurs* (*Amphisbæna* and *Typhlops*). The second division, the Serpents properly so called.

The Serpents properly so called are separated into the *non-venomous* and *venomous*.

Under the *non venomous* are arranged the following genera:—*Tortrix*; *Boa*, with the subgenera *Scytale*, Mer., *Erix*, and *Erpeton*; *Coluber*, with the subgenera *Python*, *Cerberus*, *Xenopeltis*, *Heterodon*, *Hurria*, *Dipsas*, *Dendrophis*, *Dryinus*, *Dryophis*, *Oligodon*; *Acrochordus*.

The *venomous Serpents* are subdivided—1st, into those with simple fangs; 2nd, those with fangs accompanied by other teeth.

1st. Simple fangs. *Crotalus*, with the subgenus *Trigonocephalus*; *Vipera*, with the subgenera *Naia*, *Elaps*, *Micrura*, *Platura*, *Trimeresura*, *Oplocephalus*, *Acanthophis*, *Echis*, and *Langaha*.

2nd. Fangs accompanied by other teeth. *Bungarus*; *Hydrus*, with the subgenera *Hydrophis*, *Pelamys*, and *Chersydrus*.

The *Naked Serpents* consist of the genus *Cæcilia*.

The *Cæciliæ*, says Cuvier, are so called because their extremely small eyes are nearly hidden under the skin, and sometimes are wanting altogether. Their skin is smooth, viscous, and furrowed with folds or annular wrinkles. It is naked in appearance only; for on dissection scales are found in its thickness, which are entirely formed, although delicate, and disposed regularly in many transverse rows between the wrinkles of the skin. Their head is depressed; their anus round, and nearly at the end of the body. Their ribs are much too short to embrace the trunk. The articulation of the body of their vertebræ is effected by facets in the form of hollow cones filled with a gelatinous cartilage, as in the fishes, and as in some of the last Batrachians, and their cranium is united to the first vertebra by two tubercles, as in the Batrachians. The maxillary bones cover the orbit, which is only pierced in the form of a very small hole, and the bones of the temples cover the temporal fossa, so that the head presents above a continuous osseous buckler. Their os hyoïdes, composed of three pairs of arches, lead to the belief that, in early youth, they have supported branchiæ. Their maxillary and palatine teeth are arranged in two concentric lines, as in *Proteus*, but are often sharp and curved backwards, as in the serpents properly so called. Their nostrils open at the back of the palate, and their lower jaw has no moveable pedicle, whilst the tympanic bone is enclosed with the other bones in the cranium.

The auricle of their heart is not divided sufficiently deeply to be regarded as double; but their second lung is as small as it is in the other serpents. Their liver is divided into a great number of transverse foliations; vegetable matters, earth, and sand are found in their stomach and intestines. The only ossiculum auditûs is a small plate on the fenestra ovalis, as in the salamanders.

---

* In the article BOA (p. 25), the danger to which the keepers of constricting serpents expose themselves by holding the prey towards the snake is alluded to. Whilst we are writing this, an account of the perilous situation in which a keeper at the Surrey Zoological Gardens was placed by this dangerous habit is just come under our notice

Some have the muzzle obtuse, the skin loose, the folds very strongly marked, and two small cilia (*cils*) near the nostrils. (*Règne Animal.*)

The *Cæciliadæ* appear to be intermediate between the *Ophidians* and *Batrachians*; hence the expressive name, *Batrachophidii*, to which order this family is referred by the Prince of Canino. [Siphonops.]

Mr. Swainson makes the *Ophides* consist of the following families and genera:—

1. Hydrophidæ. (Sw.) *Water-Snakes.*

Genera. *Hydrus*, *Pelamys*, *Chersydrus*, *Acrochordus*, *Herpeton*, and *Pseudo-Boa.*

2. Crotalidæ. *Poisonous Snakes.*

Genera. *Crotalus*, with subgenus *Caudisona*. *Tisiphone*, with subgenus *Craspedocephalus*. *Cophias*, with subgenus *Trigonocephalus*. *Cerastes*, with the subgenera *Cerastes*, *Berus*, *Echis*, and *Acanthophis*. *Naia*, with the subgenera *Naia*, *Sepedon*, and *Elaps*. *Platurus*, with the subgenera *Trimesurus* (Trimeresurus?) and *Oplocephalus*.

3. Coluberidæ.

Genera. *Coluber*, with the subgenera *Coluber* and *Heterodon*. *Spiletes*. *Xenodon*, with the subgenus *Oligodon*. *Erpetodryas*. *Hurria*. *Liophis*, with the subgenera *Calamaria*, *Brachyorrhos*, *Lycodon*, *Xenopeltis*, *Scytale*, *Dryinus*, *Passerita*, and *Leptophis*. *Amblicephalus*. *Dipsas*, with the subgenus *Cerebus* (Cerberus?). *Boa*, with the subgenera *Boa* and *Eunectes*. *Python*, with the subgenera *Cenchrus*, *Python*, *Gongylophis*, and *Erix*.

The fourth family consists of the Anguidæ, or *Slow-worms*, and the fifth of the Amphisbænidæ, or *Blind-worms*.

The Prince of Canino places the *Ophiosauridæ*, *Anguidæ*, and *Typhlopidæ* under his fifth order of Reptiles, *Saurii*.

His sixth order, *Ophidii*, consists of the following families and subfamilies:—*Erycidæ*, with the subfamilies *Erycina* and *Calamarina*. *Boïdæ*, with the subfamilies *Boïna* and *Pythonina*. *Acrochordidæ*, with the subfamily *Acrochordina*. *Colubridæ*, with the subfamilies *Colubrina*, *Dipsadina*, *Dendrophilina*, *Natricina*. *Hydridæ*, with the subfamily *Hydrina*. *Naiidæ*, with the subfamilies *Bungarina* and *Naiina*. *Viperidæ*, with the subfamilies *Crotalina* and *Viperina*.

In his seventh order, the *Saurophidii*, the Prince places the *Chirotidæ*, with the subfamily *Chirotina*; and the *Amphisbænidæ*, with the subfamilies *Amphisbænina* and *Trogonophina*; and in his second subclass (*Dipnoa*), sec. 4th (*Batrachia*), order 8th (*Batrachophidii*), he places the family *Cæciliadæ*, with its subfamily *Cæcilina*. (*Amphibia Europæa.*)

Mr. G. R. Gray, in his last arrangement, makes the *Ophidia* the second order of the Reptiles, and thus subdivides it·—

A. *Venenosa.*

Fam. 1. Crotalidæ.

a. Crotalus; *Uropsophus*; *Caudisona*. *b. Cenchris*. *c. Trigonocephalus*. *d. Bothrops*; *Trimesurus?*; *Tropidolæmus*; *Atropos*; *Megaru* (Megæra?). *e. Lachesis.*

Fam. 2. Viperidæ.

a. Cerastes; *Echis*. *b. Daboia*; *Clotho*. *c. Sepedon*. *d. Pelias*; *Vipera*. *c. Acanthophis.*

B. *Innocua.*

Fam. 3. Colubridæ.

a. Coronella; *Lycodon*; *Herpetodryas*; *Coluber*; *Psammophis*; *Tropidonotus*; *Heterodon*. *b. Calamaria*; *Rhinostoma*; *Elaps*; *Bungarus*; *Platura*. *c. Naja*; *Hamadryas*; *Xenodon*. *d. Dendrophis*; *Dryophis*; *Llangaha*; *Telescopus*; *Bucephala*. *c. Dipsas.*

Fam. 4. Boidæ.

a. Boa; *Eunectes*; *Epicrates*; *Xiphosoma*. *b. Python*; *Liasis*. *c. Gongylophis*; *Eryx*; *Clothonia*. *d. Ilysia*; *Cylindrophis.*

Fam. 5. Hydridæ.

a. Pelamys; *Lapemis*. *b. Hydrus*; *Liopala*; *Aturia*; *Hydrophis*. *c. Acrochordus*; *Chersydrus*; *Erpeton*; *Bitia*. *d. Homalopsis*; *Helicops*; *Hydrops*; *Hypsirina.*

Mr. Gray makes the *Amphisbænia* his fifth order, and arranges under it the following families:—

Fam. 1. Trogonophidæ.

Trogonophis.

Fam. 2. Chirotidæ.

Chirotes.

Fam. 3. Amphisbænidæ.

a. Amphisbæna; *Anops*; *Blanus*. *b. Lepidosternon*; *Cephalopeltis*. (*Synopsis of the Contents of the British Museum*, 1840.)

Fossil Serpents.

Professor Owen, in a paper published in the 'Transactions of the Geological Society of London' (vol. vi., 2nd series), describes some fossils found in the London clay referrible to an order of reptiles which appears to have been very sparingly represented in the Fauna of former periods of the history of the earth.

Vertebræ, observes the Professor, joined enarthrodially by a deep anterior transversely oblong cup and a corresponding prominent posterior ball, and further articulated by two projecting flat oblique processes, wedged like the carpenter's tenon into a mortice excavated in the anterior oblique processes of the succeeding vertebra; supporting moreover, on either side of the fore-part of the body, an oblong convexity for the moveable articulation of the rib,—belong unequivocally to a reptile of the Ophidian order.

Professor Owen then states that there is a group of about thirty vertebræ of this description, with a number of long and slender ribs having expanded concave vertebral extremities, cemented irregularly together by a mass of indurated clay, among the fossils left by John Hunter, and now in the museum of the Royal College of Surgeons; and that a portion of the spinal column of apparently the same species of serpent, measuring 18 inches in length, and including 28 vertebræ, and a smaller group of 7 vertebræ, and a few detached ones, are in the museum of Mr. Bowerbank. The whole of these specimens are from the Isle of Sheppey.

The vertebræ in each specimen are described as presenting the same conformation and nearly the same size, and as being as large as those of a *Boa Constrictor* ten feet in length. They belong, it is stated, to the ordinary dorsal or costal series, but differ from the vertebræ of both *Boa* and *Python* in their superior length, as compared with their breadth and height. The ridge continued from the lower anterior to the lower posterior processes on each side is stated to be less developed in the fossil Ophidian. The oblique processes themselves do not extend so far outwards; and the spinous process is narrower in its antero-posterior extent, but longer.

Professor Owen observes, that in the first two of the above-mentioned differences the fossil agrees with the Linnæan genus *Coluber* and its subgenera, but differs from the *Crotalus*; in the remaining points it differs from *Crotalus*, *Coluber*, *Najia*, and *Trigonocephalus*. The long and comparatively narrow spine, the outward and backward prolongation of the upper angle of the posterior oblique processes, the uniform convexity of the costal protuberance, the uneven or finely wrinkled external surface of the superior arch of the vertebra, are characters which distinguish the Ophidian vertebræ described by Professor Owen from those of any other genus of the order with which he had been able to compare them; and he therefore proposes to designate the species provisionally by the name of *Palæophis toliapicus*. The ribs, as in all land-serpents, were hollow.

In some respects, as the configuration of the under surface of the body of the vertebræ, and in the anterior tubercle upon this surface, Mr. Owen found that the fossils agreed with the *Boæ* and *Pythons* more nearly than with the *Colubers*, in which the under surface of the abdominal vertebræ are traversed by a median longitudinal ridge; and he observes that in none of the differences above noted can there be inferred any obstacle to the practice of the same arts of entrapping and modes of destroying a living and struggling prey. The largest of these Ophidiolites in Mr. Bowerbank's collection exhibits a portion of the vertebral column suddenly bent upon itself, and indicating the usual lateral flexibility of the spine.

'If,' says Professor Owen in conclusion, 'we may suppose the species to have had the same number of vertebræ as the existing Boas, it must have exceeded eleven feet in length, and such dimensions would indicate that the species was not provided with poison-fangs. Serpents of these dimensions exist, in the present day, only in warm or tropical regions, and their food is by no means restricted to animals of the cold-blooded classes. The remains of birds and Mammalia are those which are most commonly found in the alimentary canal of such as are brought to this country dead; and living birds or quadrupeds also constitute the favourite food of the Pythons and Boas of similar dimensions, which are exhibited in our menageries. If therefore there had not been obtained direct evidence of both birds and mammals in the London clay, I should have felt persuaded that they must have co-existed with serpents of such dimensions as the species of which the dorsal vertebræ are here described.' (*Description of some* Ophidiolites (Palæophis toliapicus) *from the London Clay at Sheppey, indicative of an extinct species of Serpent.*)

Professor Owen has also informed us that, since the above was written, a small *Palæophis* has been discovered in the Eocene sand underlying the red crag of Suffolk, where the remains of the fossil monkey were found, and that he has examined vertebræ of another species of *Palæophis* in the collection of Mr. Dixon at Worthing, from the Eocene (London) clay at Bracklesham, which must have belonged to a Boa-like serpent upwards of 20 feet in length.

SERPI'CULA (from *serpo*, to creep, on account of the creeping habits of the species), a small African and Indian genus of plants of the natural family of Halorageæ. The genus is characterised by being monœcious. The male flowers have the calyx small, quadripartite. Petals 4. Stamens 4 to 8. Styles 4, sterile. The female flowers have the calyx-tube adnate to the ovary, limb small, quadripartite. Petals and stamens wanting. Ovary 4-celled. Ovules and styles 4. Nuts brittle, 1-celled, 1-seeded. The species form herbaceous creeping branched plants, with axillary flowers, the males being pedicellate, and the female aggregated and almost sessile, though they are but little known. The plants of this genus are not possessed of any remarkable properties, but they must not be confounded with the Serpicula now Hydrilla verticillata of Roxburgh, which belongs to the natural family of Hydrocharideæ, and which is used in India in refining sugar, in the same way that clay is employed in other countries. A layer of the plant being spread upon the surface of the sugar, water is allowed slowly to percolate through the mass.

SERPUCHOW. [MOSCOW.]

SE'RPULA. [TUBICOLIDÆ.]

SERPU'LIDÆ. [TUBICOLIDÆ.]

SERRA'NUS, a genus of fishes nearly allied to the perches, but readily distinguished by their possessing only one dorsal fin and seven branchiostegous rays. The preoperculum is dentate, and the operculum has one or more angular projections.

This genus contains many species, and these appear to be most numerous in the seas of temperate or warm climates.

Cuvier restricts the term *Serranus* to those species which have no apparent scales on either of the jaws. Of this section two species are found off the British coast (*Serranus cabrilla*, Cuv. and Val.; and *S. Couchii*, Yarrell), and the Mediterranean yields several.

Those species of the great genus Serranus in which both jaws and the muzzle are provided with scales, have the subgeneric title *Anthias*. A very beautiful species of this section is found in the Mediterranean, the *Anthias sacer*; it is of a brilliant red colour, and has yellow bands on the sides of the head. The third dorsal ray is much elongated; the ventral fins are long, and the lobes of the tail-fin are produced into long filaments.

Another section of the Serrani is termed *Merra* by Cuvier. The species of this section have no scales on the upper jaw, but the lower jaw is provided with small scales. The *Merra gigas*, an inhabitant of the Mediterranean (which has been found on the British coast), is about three feet in length, and of a brown colour clouded with deep-brown. Many of the species are dotted with various colours; some are longitudinally and others transversely striped.

SERRAVALLE. [NOVI.]

SERTO'RIUS, QUINTUS, was a native of Nursia, in the country of the Sabines. He lost his father very early, but his mother bestowed great care upon his education, and the son in return for her kindness entertained for her through life the most tender affection. After his education was completed, he tried his fortune at Rome as an orator, and thereby acquired considerable influence. (Plut., *Sert.*, 2; Cic., *Brut.*, 48.) But he soon turned his attention to military affairs, and the first time that he distinguished himself was during the campaign of Marius against the Cimbri and Teutones. At the end of this campaign he was sent to Spain as tribune under the praetor Didius, and spent the winter in the Celtiberian town of Castalo. Here again he attracted much attention by his courage and prudence After his return to Rome, when the Marsic war was breaking out, he was made quaestor of Gallia Circumpadana and commissioned to levy troops, which he (Plut., *Sert.*, 4) accomplished with the greatest success, but his exertions caused him the loss of one of his eyes. (Plut. and Sallust., *ap. Gell.*, ii. 27.) On his return to Rome he was a candidate for the tribuneship of the people, but was defeated by the party of Sulla. Sertorius now joined the party of Cinna and Marius, not because he approved of their proceedings, but because he detested the ruling aristocrats. After the Marian party was defeated and Marius himself driven from Italy, Cinna and Sertorius raised fresh troops in Italy and held out against their opponents. When Marius returned from Africa (87 B.C.) and took bloody vengeance upon his enemies, Sertorius was the only one of the party who showed moderation how much he was in earnest in this matter is evident from the fact that after the death of Marius he put to death 4000 slaves who had been the body-guard of Marius and had perpetrated every possible crime against the citizens. (Plut., *Sert.*, 5.) When Sulla returned to Italy in 83 B.C., and Sertorius saw that all would be lost, and that the consuls Scipio and Norbanus paid no regard to his advice, he contrived to be made proconsul of Spain, and went to his province, where he hoped to prepare a refuge for his friends if they should be defeated in Italy. (Plut., *Sert.*, 6; Appian, *Civil.*, i. 108.) In Spain he began his new career, in which he displayed prudence and courage tempered with humanity. Spain had hitherto, with few exceptions, been preyed upon by avaricious governors. Sertorius listened to the just complaints of the natives, and attempted to blend them with the Romans as much as possible. The great among the Spaniards were gained by his affability, and the poor by his reduction of taxes. At the same time he carried on his preparations for the approaching war with the utmost energy, and kept both Romans and Spaniards in constant exercise. When he heard that Sulla was in possession of Rome, and that his own party was defeated, he sent Julius Salinator with 6000 heavy-armed troops to take possession of the passes in the Pyrenees. About the same time C. Annius, a Sullanian general, arrived at the Pyrenees, but tried in vain to effect a passage. Salinator was treacherously slain and his army dispersed, and Annius now crossed the Pyrenees. Sertorius, who was too much weakened by this event to offer any resistance, retreated to New Carthage, and, accompanied by a few faithful followers, he cruised for a time in the Mediterranean. He made a landing in Africa, where he aided one of the native princes, and defeated Paccianus, one of the generals of Sulla. After having had an encounter with a large fleet of Annius, and after having escaped from a very heavy storm, he again landed in Spain near the mouth of the river Baetis. Here he heard an account of the delightful climate of the Insulae Fortunatae (the Canary Islands), and was greatly inclined to withdraw thither and to spend the remainder of his life in quiet. (Plut., *Sert.*, 8, 9.) His men however involved him in another military undertaking in Africa, and his great success induced the Lusitanians, who were oppressed by cruel and rapacious governors of the Sullanian party, to invite Sertorius to the supreme command among them. This invitation came just at the moment when he was considering whither he should retire. (Plut., *Sert.*, 10.) Sulla was now dead, and Sertorius, being at such a distance from Rome and little acquainted with the real state of affairs there, conceived new hopes of ultimate success, and gladly accepted the invitation. On his appearance in Lusitania, the Romans as well as the Spaniards immediately declared for him. He now began to make war upon four Roman generals who were in possession of the greater part of Spain, and had great armies at their command. Sertorius defeated Cotta near Mellaria in a sea-fight, and Aufidius in Baetica, while his legate conquered Domitius and L. Manlius. Thoranius, a legate of Metellus, was likewise defeated. About this time Sertorius was joined by Perperna with the numerous remains of the Marian party, and Metellus Pius, who had the command in Baetica, was gradually driven to such extremities [METELLUS], that L. Lollius came to his assistance from Gaul, and the senate at Rome thought it necessary to send Pompey with a large force to support Metellus. [POMPEIUS, p. 382.]

As soon as Sertorius had firmly established himself in Spain, he formed the design of uniting the Romans and Spaniards in such a manner that the Spaniards should have all the advantages of Roman civilization without losing their national character. At Osca, the modern Huesca in Catalonia, he established a kind of academy, into which he received the sons of distinguished Spaniards, and had them instructed in Greek and Roman literature. The admirable discipline of this establishment, the manner in which the youths were dressed, for he gave them the Roman *bulla* and the *prætexta* (which only the sons of noble Romans used to wear), the prizes which were distributed among them, and the promise that these young men should one day be Roman citizens and be invested with high honours—all these things were in the highest degree flattering to the parents of the youths, and could not fail to gain for Sertorius the affections of the nation. It was a custom of the young warriors among the Spaniards to gather around a favourite general, to accompany him everywhere, and to vow not to survive him. The number of men who became in this manner attached to Sertorius was greater than had ever been known before. (Plut., *Sert.*, 14.) Sertorius also worked upon the imagination of the Spaniards: he had a tame white fawn which accompanied him everywhere, and which he said was the gift of Diana. The Spaniards thus looked up to him almost as a being of a higher order, who had intercourse with the gods. It may be that this was, as Plutarch thinks, a piece of imposition upon the credulous Spaniards, but we have no reason to suppose that Sertorius himself did not share the belief of the Spaniards on this subject. (Comp. *Gellius*, xv. 22.) His object was to establish an independent power, or to raise a new Roman republic in Spain. For this purpose he formed a senate of 300 members, consisting partly of exiled Romans, and partly of distinguished Spaniards (Appian, *Civ.*, i. 108; Plut., *Sert.*, 22), and also appointed several officers analogous to those of Rome. Sertorius was with the Romans and Spaniards the object of love and admiration. Perperna had observed this state of things, ever since his arrival in Spain, with secret jealousy and envy. He would have liked to carry on the war against Metellus in his own name; but when the news came that Pompey was advancing, his own soldiers compelled him to join Sertorius, and to submit to him.

On the arrival of Pompey in Spain, many towns declared for him, and among others Lauron, though it was at the time besieged by Sertorius. Pompey hastened to its assistance, but could do nothing, and was obliged to look on while Sertorius razed the town to the ground. (Plut., *Sert.*, 18; Appian, *Civil.*, i. 109.) The first great battle with Pompey was near Sucro. Metellus here defeated that part of the army which was commanded by Perperna, and put him to flight; but Sertorius, who commanded another division of the army, wounded Pompey, and compelled him to retreat. A second battle was fought in the plains of Saguntum, in which Pompey was again defeated, and compelled to withdraw to the Pyrenees. It was in the summer of the year 74 B.C. that Mithridates sent ambassadors to Sertorius, to propose an alliance, and to offer money and ships, on condition that all the countries of Asia which he had been obliged to surrender should be restored to him. Sertorius concluded the alliance, and encouraged the king again to take up arms against Rome, but he scrupulously avoided doing his own country more harm than his own safety required. (Plut., *Sert.*, 23; Appian, *De Bell. Mithrid.*, 68.) This alliance, owing to the events which followed it, had few or no results.

Pompey, in the meanwhile, was reinforced by two legions from Italy; and he and Metellus again advanced from the Pyrenees towards the Iberus. In this campaign, though many of the soldiers of Sertorius began to desert, no great advantages were gained by Pompey or Metellus, and the former was no more successful in the siege of Pallantia, than both together in that of Calaguris. Metellus, despairing of victory over Sertorius in an honourable way, offered to any Roman citizen who should kill Sertorius one hundred talents and 20,000 acres of land. If the murderer should be an exile, Metellus promised that he should be allowed to return to Rome. The whole summer of the year 73 B.C. passed without any great battle, though the Roman party seems to have gained some advantages.

The dishonourable conduct on the part of the Romans, and the increasing desertion in the army of Sertorius, as well as the manifest envy of others about his own person, produced a change in the conduct of Sertorius also he lost his confidence in those who surrounded him, and punished severely wherever he found reason for suspicion. While he was in this state of mind, he committed one act which will ever be a stain on his otherwise blameless character: the young Spaniards assembled at Osca, who were in some measure his hostages, were one day partly put to death, and partly sold as slaves. The immediate cause of this is unknown, but the effect produced on the Spaniards may easily be conceived. In addition to all this, Perperna now found an opportunity of giving vent to his hostile feelings. He formed a conspiracy of some Romans who served under Sertorius, and in order to gain associates among the Spaniards, and provoke them still more against Sertorius, the conspirators inflicted severe punishments for slight offences, and exacted heavy taxes, pretending that they were only executing the commands of Sertorius. Desertion and insurrection among the Spaniards were the natural results. According to Appian, several of the conspirators were discovered and put to death, but Plutarch does not mention this circumstance. Perperna at last, seeing no possibility of attacking Sertorius, as he never appeared without an armed body-guard, invited him to a repast, ostensibly given on account of some victory gained by one of his lieutenants. At this repast he was treacherously murdered by the conspirators (72 B.C.), and Perperna placed himself at the head of his army. [POMPEIUS, p. 302.]

Such was the end of one of the noblest characters that appear in the pages of Roman history during the last century of the republic. The war which he had carried on in Spain was not directed against his country, but only against a party who wished to annihilate him. How little he was actuated by any hostile feeling towards the republic itself may be seen from the statement of Plutarch (*Sert.*, 22), that after every victory which Sertorius gained, he sent to Metellus and Pompey, offering to lay down his arms, if they would but allow him to return to Rome, and to live there in peace and retirement, declaring that he would rather be the obscurest person at home than a monarch in exile. As long as his mother lived, it was principally in order to comfort her old age that he wished to return to Italy; but she died a few years before her son, to his great grief. If we regard Sertorius as a general, it was surely no vulgar flattery that his contemporaries compared him with Hannibal. The details of his wars in Spain are very little known, for the account of Appian (*Civil.*, i. 108-114) is excessively meagre and incoherent; and Plutarch, in writing the life of Sertorius, had other objects in view than to present to his readers a clear description of his military operations. Appian says that the war in Spain lasted eight years, which is incorrect, whether we date the commencement of the war from the time when Sertorius left Italy in the consulship of Scipio and Norbanus (83 B.C.), or from the time that he was invited by the Lusitanians to take the command (78 B.C.).

SERTULA'RIA, a Linnæan genus of Polypiaria, now the type of the numerous family. [SERTULARIÆA and POLYPIARIA.]

SERTULA'RIDÆ, one name of a family of Polypiaria, including the genus Sertularia of Linnæus. [POLYPIARIA.]

SERTULARIÆA, De Blainville's name for the family of Polypiaria, founded on the Linnæan genus Sertularia. [POLYPIARIA.]

SERUM, the name given to the essentially liquid part of the blood, and also to the fluid secreted by certain membranes in the human body, such as the pericardium, pleura, peritoneum, &c., which are thence denominated 'Serous.' The serum of the blood, which separates from the crassamentum during the coagulation of that liquid, has a pale, straw-coloured, or greenish-yellow colour, is transparent when carefully collected, has a slightly saline taste, and is somewhat unctuous to the touch. It has a specific gravity of 1·027 to 1·030 at 50°. It usually constitutes about three-fourths of the blood, the pressed coagulum forming about one-fourth. It has a slight alkaline reaction with test-paper, slowly reddening turmeric, and rendering the blue of violets green: the readiest test of its alkalinity is litmus-paper reddened by acetic acid, to which it immediately restores the blue colour. This is owing to the presence of soda, which some chemists believe to be combined with carbonic acid, and others with albumen: the last opinion is the more probable, since serum, when agitated with carbonic acid, absorbs that gas in considerable quantity. Like other albuminous liquids, it is coagulated by heat, acids, alcohol, and all other substances which coagulate albumen. When the serum is heated to about 150°, it becomes a soft solid, coagulating into a translucent mass, which, upon the continuance of heat, becomes more opaque; and upon being subjected to gentle pressure, gives out a small quantity of a yellowish alkaline liquid, which has been termed 'serosity.' This contains, according to Dr. Bostock, about 1-50th of its weight of animal matter, together with a little chloride of sodium. Of this animal matter, a portion is albumen, which may easily be coagulated by means of galvanism; but a small quantity of some other principle is present, which differs both from albumen and gelatine. (*Med. Chir. Trans.*, ii. 166.) The composition of the serum, according to the analysis of Lecanu, may be seen from his analysis of the blood, abstracting the colouring matter and fibrin, which are foreign to it. The following table exhibits the results of two careful analyses:—

Water	780·145	785·590
Fibrin	2·100	3·565
Colouring matter	133·000	119·626
Albumen	65·090	69·415
Crystalline fatty matter	2·430	4·300
Oily matter	1·310	2·270
Extractive matter soluble in water and alcohol	1·790	1·920
Albumen combined with soda	1·265	2·010
Chloride of sodium	8·370	7·304
Chloride of potassium		
Carbonates of potash and soda		
Phosphates of potash and soda		
Sulphates of potash and soda		
Carbonates of lime and magnesia	2·100	1·414
Phosphates of lime, magnesia, and iron		
Peroxide of iron		
Loss	2·400	2·586
	1000·000	1000·000

The late Dr. Marcet found that 1000 parts of the serum of human blood are composed of—water 900 parts; albumen, 86·8; muriate of potash and soda, 6·6; muco-extractive matter, 4; carbonate of soda, 1·65; sulphate of potash, 0·35; and of earthy phosphates, 0·60. This result agrees very nearly with that obtained by Berzelius, who states that the extractive matter of Marcet is lactate of soda united with animal matter. (*Med. Chir. Trans.*, iii. 231.)

The fluid secreted by serous membranes in general, such as the pericardium, pleura, and peritoneum, is very similar to lymph. According to Dr. Bostock, 100 parts of the liquid of the pericardium consist of—water 92 parts; albumen, 5·5; mucus, 2; and chloride of sodium, 0·5. The serous fluid exhaled within the ventricles of the brain in *Hydrocephalus internus* is composed, in 1000 parts, of—water 988·3; albumen, 1·66; muriate of potash and soda, 7·09; lactate of soda and its animal matter, 2·32; soda, 0·28; and animal matter soluble only in water, with a trace of phosphates, 0·35. (Berzelius, in *Med. Chir. Trans.*, vol. iii., p. 252; Turner's *Elements of Chemistry;* and Brande's *Manual of Chemistry.*)

SERVAL. [Tigers.]

SERVAN, ST. [Malo, St.]

SERVANDO'NI, JEAN JE'RÔME, was born at Florence in 1695, but he may be reckoned among the artists and architects of France, as he established himself in that country, where he signalized himself by his extraordinary talents. His first instructor in painting was Panini, under whom he became an expert artist in landscape and architectural scenery, and many of his productions of that period are preserved in various collections. He afterwards applied himself to architecture under De Rossi. After passing some time at Lisbon, where he was employed as scene-painter and in getting up the performances of the Italian opera, he proceeded to Paris in 1724, and was engaged in a similar capacity. He had now opportunities of exercising his talents on the most extensive and even prodigal scale, and he not merely improved the former system of theatrical decoration, but produced an entirely new species of it, in which the scenic illusion and effect were aided by machinery, and heightened by every possible artifice. For the reason assigned elsewhere [Scene-Painting] the fame of his achievements of this class is now merely traditional, but if we may believe the testimony of contemporaries, they must have been most extraordinary. Among the most celebrated of them was the representation of the fable of Pandora (at the Tuileries in 1738), and of the Descent of Æneas into the Infernal Regions. These and other scenic exhibitions, as they may properly be denominated, were received with enthusiasm by the public, nor were they least of all admired by those who were capable of appreciating the poetical invention and the profound classical study displayed by the artist. Even in his most magnificent architectural fancies Servandoni never outraged probability by exhibiting mere gorgeous chimeras, as many others have done, all his compositions of the kind being as regularly planned as if intended for execution.

As may be supposed, his talents were greatly in request upon all extraordinary public festivities, and he directed those which took place at Paris, in 1739, in honour of the marriage of Philip V. of Spain with the Princess Elizabeth. Unfortunately such triumphs are so exceedingly fugitive and ephemeral, that however much they may contribute to an artist's fame, they are attended with no benefit to art itself. It would have been more to the advantage of art, if Servandoni had been afforded the opportunity of realising some of his projects for the improvement or embellishment of various parts of the capital, including one for an extensive *place* or amphitheatre for public festivals, surrounded with arcades and galleries capable of containing twenty-five thousand persons. The chief structure executed by him is the façade which he added to the church of St. Sulpice at Paris, erected by Oppenord. Although not altogether unexceptionable, this work, begun about 1732, is greatly superior to almost every other of its kind of the same period. Unlike the frittered and unmeaning frontispieces with which it was then the custom to mask the exterior of churches, the façade of St. Sulpice possesses a certain degree of simplicity and harmony. The arrangement of the loggia formed by the Doric order below, where the columns are coupled, not in front, but one behind the other, is good, and combines lightness with solidity; but this merit is in a great measure counteracted by the intercolumns of the second order being filled in with arcades and piers, whereby that portion is rendered more solid and heavier in appearance than the one below.

Servandoni died at Paris in 1766, leaving, instead of a splendid fortune, as was expected, scarcely any property at all behind him; for though he might easily have amassed wealth, he was too great a votary of pleasure to put any restraint upon his habits of profusion, nor was economy a word admitted into his vocabulary, or even understood by him.

SERVANT, one who has contracted to serve another. The person whom he has contracted to serve is styled master. Servants are of various kinds; apprentices [Apprentice], menial or domestic servants who reside within the house of the master, servants in husbandry, workmen or artificers, and clerks, warehousemen, &c. From the relation of master and servant a variety of rights and duties arise. Some of these are founded on the common law, and some on special statutory enactments.

A contract of hiring and service need not be in writing unless it be for a period longer than a year, or for a year to commence at some future time. If in writing, it is not liable to any stamp duty, unless it apply to the superior classes of clerks, &c. To all such contracts the law attaches an implied undertaking on the part of the servant faithfully and carefully to serve the master, and to do his lawful and reasonable commands within the scope of the employment contracted for; on the part of the master, to protect and fairly remunerate the servant. This implied undertaking to remunerate may be rebutted by circumstances showing that it never was contemplated, as where it appears that the servant merely came on trial, or where a party has brought to England a person who was his slave abroad. In all hirings where no time of duration is expressed, except those of menial servants, it is a rule of law that the contract shall continue for a year. In the case of menial servants it is determinable by a month's warning, or the payment of a month's wages. Servants in husbandry can only be discharged or quit the service upon a quarter's notice. This rule as to time may of course also be rebutted by any circumstances in the contract inconsistent with its existence. In the case of immorality, or any kind of offence amounting to a misdemeanor committed during the time of the service, or of continued neglect, or determined disobedience, a servant may be immediately discharged. If the servant is a menial, he is nevertheless entitled to wages for the time during which he has served. But in other cases, where the contract is entire for a year, the wages cannot be apportioned, and the service having been determined before the expiration of the time contracted for, in consequence of the fault of the servant, he is not entitled to claim wages for any portion of the time during which he has served. The contract still continues to exist, notwithstanding the disability of the servant to perform his duties from illness, and he is therefore still entitled to receive his wages. The master however is not bound to pay the charges incurred by medicine or attendance upon his sick servant. In case the goods of the master are lost or broken by the carelessness of the servant, the master is not entitled to deduct their value from the wages of the servant, unless there has been a special contract between them to that effect. His only remedy is by an action at law against the servant. Where a master becomes bankrupt, the commissioners are authorised, on proof that they are due, to pay six months' wages to his clerks and servants. If the wages for any longer period are due, they must be proved for like other debts under the fiat. If a servant has left his service for a considerable time without making any demand for wages, it will be presumed that they are paid. A master may chastise his apprentice for neglect or misconduct, but he will not be justified in striking any other description of servant. Servants who steal or embezzle their master's goods are subject to a greater degree of punishment than others who commit those crimes. [LARCENY.] Masters are not compellable to give a character to servants who leave their employment. If they choose to do so, and they give one which is false, they may be liable to an action at the suit of the servant; but in order to recover in such an action, the servant must prove that the character was maliciously given for the purpose of injuring him. If the master, merely for the purpose of confidentially communicating, *bonâ fide* state what he believes to be the truth respecting a servant, he is not responsible for the consequences of his communication.

By a great variety of statutes, the provisions of which are collected and explained in Burn's *Justice*, tit. 'Servants,' a special jurisdiction is given to magistrates over servants in husbandry, and also in many classes of manufactures and other employments. None of these rules of law apply to menial servants. The object of them, as relates to servants in husbandry, is to compel persons not having any ostensible means of subsistence, to enter into service, to regulate the time and mode of their service, to punish negligence and refusal to serve, to determine disputes between masters and servants, to enable servants to recover their wages, and to authorise magistrates under certain circumstances to put an end to the service.

Those statutes which relate to servants in manufactures and other employments prohibit the payment of wages in goods, and provide for their payment in money, and for the regulation of disputes concerning them. They also contain various enactments applicable to the cases of workmen, &c. absconding, neglecting or mismanaging their work, injuring or embezzling the materials, tools, &c. entrusted to them, and fraudulently receiving those entrusted to others. With respect also to this class of servants, magistrates have authority to put an end to the contracts of hiring and service. The 6 Geo. IV., c. 129, provides for the cases of combinations among masters and workmen relative to wages, times of working, &c.; and 9 Geo. IV., c. 31, for those of conspiracies and assaults for the purpose of attaining such ends.

By reason of the relationship which exists between a master and a servant, and the protection which is thereby due from the former to the latter, a master is not held to be guilty of the offence of maintenance, though he maintain and support his servant in an action brought by him against a third party. When a servant is assaulted, his master is justified in assisting his servant, and repelling the assault by force, although he himself be not attacked; and under similar circumstances a servant may justify an assault committed in defence of his master. A master is answerable, both civilly and criminally, for those acts of his servant which are done within the scope of his employment. Thus a master is indictable if a servant commit a nuisance by throwing dirt on the highway; and a bookseller or newsvender is liable, criminally as well as civilly, for libels which are sold by his servant in his shop. This liability of the master does not release the servant from his own liability to punishment for the same offence. The servant is also liable when he commits a trespass by the command of his master. A master, although liable civilly for any injuries arising from the negligence or unskilfulness of his servant, is not responsible for the consequences of a wilful act of his servant done without the direction or assent of the master. In such case the servant alone is liable. Where a servant may be considered to be in the employment of two persons, difficulties have sometimes occurred in determining which person is responsible in the character of master for damages done to third persons by the servant. The following is an instance:—When a coachman is sent by the owner of horses let out for the purpose of drawing a private carriage, and afterwards, while driving the hirer in his private carriage, the coachman does some damage to a third party; in this case it has been held that the owner of the horses was liable; and it seems but reasonable that he who possessed the power of selecting and discharging the servant should be responsible for his acts. Where a servant makes a contract within the scope of his employment, what he does will be binding on his master, just as if he had expressly authorised the servant. But in all cases where there is no express evidence of the delegation of the master's authority, there must be facts from which such delegation can be inferred. Where a servant obtains goods for his master, which the master uses, and he afterwards gives money to the servant to pay for them, the master will be liable to pay for them, even though the money should have been embezzled by the servant. If a coachman go in his master's livery to hire horses, which his master afterwards uses, the master will be liable to pay for them, though the coachman has received a large salary for the express purpose of providing horses; unless indeed that fact were known to the party who let out the horses. If a master is in the habit of paying ready money for articles furnished to his family, and gives money to a servant, on a particular occasion, for the purpose of paying for the articles which he is sent to procure, the master will not be liable to the tradesman if the servant should embezzle the money. Where articles furnished to a certain amount have always been paid for in ready money, and a tradesman allows other articles of the same character to be delivered without payment, the master will not be liable, unless the tradesman ascertains that the articles are for the master's own use. Where a tradesman, who had not before been employed by a master, was directed by a servant to do some work, and afterwards did it without any communication with the master, it was held that the master was not liable, though the thing upon which the work was done was the property of the master.

By the contract of hiring and service the master obtains a right to the service of the servant. Any one therefore who interferes with that right does him an injury for which he is responsible in an action for damages. A master may be deprived of the services of a servant, either by some hurt done to the servant, or by his being enticed out of the service. An action therefore may be brought by a master where a servant has received some personal injury disqualifying him from the discharge of his duties as a servant, as where he has been disabled by the overturn of a coach, the bite of a third person's dog, &c. The action by a parent against the seducer of his daughter is of this class, and purports to be brought to recover the damages incurred by the parent for the loss of his daughter's services; and although in practice the damages are never really measured by the injury occurring from the mere loss of service, still from the form of the action, the only one which can be brought in such case, it is necessary to give some slight evidence of services performed. Any kind of assistance in domestic offices is sufficient. [PARENT AND CHILD.]

In order to succeed in an action for enticing a servant out of his service, the master must prove that the party enticing away the servant knew of the previous engagement at the time when he enticed him away, or that he has refused to restore the servant upon subsequent application. This action is maintainable where the servant is hired to do work by the piece, as well as where the servant is hired for a definite time. But no action lies for inducing a servant to quit his service at the period when the definite time for which he was hired expires, although the servant had no previous intention of quitting the service at such period: neither will an action lie against a party for enticing away a servant, if the servant has paid to the master the penalty stipulated for by the agreement of hiring and service in case of his quitting his master's service. Where a servant has been enticed away from the service, an action lies against him for his breach of contract, as well as against the party who has enticed him away.

It is not inconsistent with the duty of the servant of a tradesman to solicit his master's customers to give him business after he shall have left the service of his master. Where a workman discovers a new invention during the time of his service, the invention is the property of the servant, unless perhaps he were especially hired for the purpose of making new inventions.

By the statute 32 Geo. III., c. 56, 'for preventing the counterfeiting the certificates of the characters of servants,' magistrates are empowered, upon information being laid before them, to inflict certain penalties and punishments upon parties who personate masters and give false characters with servants; and also upon those who, though they really have been masters, wilfully make false statements in writing, as to the time and particulars of the service or the character of the servant, and also upon those who personate servants or falsely state that they have been in particular services, or deny that they have been in such employments as they really have filled. Independently of the provisions of this statute, a person who wilfully gives a false character with a servant is liable to an action at the suit of the party who has been induced by the false character to employ the servant, for any damages which he may suffer in consequence of employing him. Thus where one was induced by a false character to employ a servant who afterwards robbed him to a large amount, and was convicted of the robbery, the master was held to be entitled to recover to the extent of his loss from the party who gave the false character.

Formerly a settlement was gained by residence in a parish under a contract of hiring and service for a year, but by the Poor Law Amendment Act no settlement can for the future be gained by such means. [POOR.] (Bl., *Com.*, book i., c. 14; Burn's *Justice*, tit. 'Servants.')

SERVE'TUS, MICHAEL (whose family name was Reves), was born at Villanueva in Aragon, in the year 1509. He was the son of a notary, who sent him while young to the university of Toulouse in order to study the law, instead of which however he appears to have devoted his attention principally to theology during the three years which he spent in that city.

In his twenty-first year he quitted Toulouse, and journeying into Italy in the suite of Quintana, confessor to the emperor Charles V., was present at the coronation of that monarch at Bologna, in February, 1530. The death of Quintana soon left him at liberty to travel into Switzerland and Germany, where he became acquainted with many of the reformers. In the course of 1530 he took up his residence at Basle, and there he first broached those opinions which afterwards drew down upon him the persecution of Calvin. He probably met with few persons who were disposed to embrace his notions, for, in the course of the same year, or early in 1531, he left Basle and went to Strasburg. His stay in Strasburg however was short, since he lived at Haguenau in Alsace during the printing of his treatise on the doctrine of the Trinity. This, his first work, was published by a bookseller of Basle in 1531, but the opinions which it contained were so contrary to those usually received, that the man feared to print it at Basle, and procured its publication at Haguenau, the name of which place appears on the title-page. In the following year Servetus wrote a second treatise, in the form of dialogues, on the same subject; in which he corrected some errors in his former work, but without retracting any of the opinions.

We are unacquainted with the exact time when Servetus quitted Haguenau, but we next find him at Lyon, where he remained three years, occupying himself principally with the study of medicine. It is probable that during this time he supported himself by correcting the press, and by other literary labours, among which was the publication of an improved edition of Pirkheimer's translation of Ptolemy's Geography, which appeared in the year 1535. On leaving Lyon he visited Paris, where he took the degree of M.A., and afterwards of doctor of medicine. He was likewise admitted a professor of the university, and delivered lectures on the mathematics. He was in Paris in 1537, in which year he published an essay on syrups, the only medical work that he wrote, but his ungovernable temper involved him in disputes with the medical faculty, which compelled him to leave the city. It is most likely that he again returned to Lyon, for in 1540 we find mention of him as practising medicine, in the immediate neighbourhood, at the village of Charlieu. His attempt to obtain practice there seems to have been unsuccessful, and taking up his abode once more in Lyon, he supported himself by correcting the press for the Frellons, the printers. He likewise superintended a new edition of the Bible, which was published in 1542, and the notes which he added afforded materials to strengthen the charge of heresy afterwards brought against him.

In the year 1543, Pierre Palmier, archbishop of Vienne in Dauphiné, meeting with Servetus at Lyon, induced him to return with him to his see. Servetus devoted himself to the practice of medicine in this place, where he remained until his trial for heresy ten years afterwards. Theology however was still a favourite pursuit with him, and for many years he carried on a controversial correspondence with Calvin, in the course of which he sent him a portion of a manuscript containing many of the opinions which subsequently appeared in his 'Christianismi Restitutio.' Their private correspondence, never very friendly, degenerated by degrees into quarrelling, and at length into scurrility; and Servetus having replied to a violent letter of Calvin concerning his own opinions, by sending a list of what he called errors and absurdities in Calvin's 'Institutes,' the latter angrily broke off all communication with him. In the same year, 1546, Calvin wrote to Farel and Viret, saying, that if ever Servetus came to Geneva, he would take care that he should not escape in safety. He is stated by Bolsec even to have denounced Servetus to Cardinal Tournon as a heretic; and the same authority adds that the cardinal laughed heartily at one heretic accusing another.

Servetus, in a letter to one of his friends, had expressed the presentiment that he should suffer death for his opinions; and he did not publish the 'Christianismi Restitutio' without taking every precaution to conceal the fact of his being the author. He had endeavoured to get the work published at Basle, but no bookseller would undertake the dangerous engagement, and he eventually had it printed at Vienne in 1553, but without his own name or that of the printer, or even the date, or name of the place.

The work caused a great sensation; but the author would have remained unknown, had not Calvin recognised in the style, and in the abuse of himself, the hand of Servetus. He immediately procured one William Trie, a citizen of Lyon, but a recent convert to the reformed religion, and then resident at Geneva, to write letters to the authorities of the former city, containing many serious imputations against Servetus, and charging him with having written the 'Christianismi Restitutio.' The archbishop of Lyon, Cardinal Tournon, whose diocese, from its proximity to Geneva, was peculiarly exposed to the influence of heresy, no sooner received this intelligence than he wrote to the governor-general of Dauphiné, acquainting him with what he had heard concerning Servetus. In consequence of the suspicion thus thrown upon him, Servetus was arrested and imprisoned, but he would in all probability have been acquitted for want of evidence against him, had not Calvin, through the medium of Trie, forwarded to the Inquisition at Vienne a portion of manuscript and several private letters which he had received from Servetus. Mr. Scott, in his 'History of Calvin and the Swiss Reformation,' London, 1833, chap. xi., endeavours to extenuate the guilt of the reformer, and denies that these letters were produced on the trial. That in this however, as in some other of his statements, Mr. Scott is mistaken, appears from the fact that in the condemnation of Servetus by the Inquisition of Vienne, 'letters and writings addressed to Mr. J. Calvin' are especially mentioned.

Servetus escaped from prison, where he had not been strictly guarded, but was burnt in effigy at Vienne, on June 17, 1553. He fled to Geneva, in which town he kept himself closely concealed, but was arrested, through Calvin's influence, on the day before that on which he was about to start for Zürich on his way to Italy. He was arrested contrary to law, the city of Geneva having no authority over him, who was merely journeying through it: when in prison, he was treated with the greatest cruelty; and he was denied the assistance of counsel. His private papers, and a volume of Calvin's 'Institutes,' in which he had made some notes with his own hand, were brought in evidence against him. Calvin's own servant, one La Fontaine, appeared as the accuser, Calvin not caring to submit to the lex talionis of Geneva, which imprisoned the accuser as well as the accused; though, in direct opposition to this law, La Fontaine was released after being only one day in prison. Servetus was brought to trial on August 14, 1553; and on that day, and on several days following, he was examined publicly before his judges. Calvin drew up the articles of accusation, in which the calumnies against himself are alleged as part of the crime of Servetus; and further he reserved to himself the office of disputant upon theological subjects with the prisoner. Many of the charges against him were frivolous and vexatious in the extreme, but it is certain that he did not anticipate so severe a sentence as was passed upon him; for when, on August 26, the vice-bailiff of Vienne, having come to Geneva, requested that Servetus might be given up to him in order to undergo the sentence passed upon him by the Inquisition, he threw himself at the feet of his judges, begging that they would rather try him, and pass on him whatever sentence they might think fit.

On September 1, Servetus was called before his judges and ordered to be ready to reply in writing to a set of written charges which Calvin was instructed to draw up. On September 15 he wrote a touching letter, complaining of the harsh treatment he had undergone, begging that his case might speedily be decided, since he had been already detained five weeks in prison, and appealing from the private hatred of Calvin to the decision of the council of two hundred. This appeal however was rejected, and Servetus was furnished with a copy of the charges against him drawn up by Calvin. To these he sent in a brief written answer, and it does not appear that after September 15 he defended himself in open court, where he was much inferior to Calvin as a disputant. Calvin's refutation of Servetus's reply greatly exasperated him; he did not attempt any regular answer to it, but contented himself with adding a few notes in the margin grossly abusive of Calvin.

It was now secretly determined in the council of Geneva to put Servetus to death, but the matter being one of great importance, and Servetus having appealed to the judgment of others, it was thought advisable to send copies of his works and of the evidence against him to the clergy of the four Protestant cantons of Zürich, Basle, Berne, and Schaffhausen, and to ask their opinion concerning his guilt. These letters were dispatched about the end of September: the reply from Zürich was received on October 2; that from Basle and from Schaffhausen on October 18, and the date of the arrival of the answer from Berne is not stated. They all concurred in condemning the writings of Servetus, but did not recommend that the author should be put to death, though Calvin chose to put that construction on their replies. As soon as these answers had arrived, the council was once more convened, and sentenced Servetus to be burned to death by a slow fire. Servetus had one friend in the council, Amadæus Gorrius by name, who in vain endeavoured to obtain a pardon for him, or at least that his case should be brought before the council of two hundred; but the violence of Calvin and his party prevailed. Calvin however did attempt to obtain for him the favour of a less painful death, though without success. Accordingly, on October 27, 1553, Servetus was brought to the stake, and his sufferings are stated to have been unusually severe and protracted. No act of barbarity perpetrated by the Roman Catholics ever surpassed the burning of Servetus, in which Calvin appears to have been actuated by private hatred quite as much as by religious fanaticism, and in which he filled all the parts of informer, prosecutor, and judge.

The works of Servetus have had an adventitious value imparted to them by their extreme rarity. With the exception of the short essay on Syrups, published while Servetus was at Paris, they are theological and metaphysical treatises on the most abstruse subjects, such as the doctrine of the Trinity. Mr. Hallam is of opinion that the notions of Servetus concerning the Trinity were not Arian, but rather what are called Sabellian. The 'Restitutio Christianismi' contains a passage which has led some to say that Servetus well nigh discovered the circulation of the blood, and that consequently the merits of our illustrious countryman Harvey are small. Such however is by no means the case. Servetus knew that the septum of the heart is not perforated, but that the blood in the right ventricle communicates with that in the left through the medium of the pulmonary artery, and the circulation through the lungs. But though he formed a perfectly correct conception of the pulmonary circulation, he was quite ignorant of the greater circulation, or of the existence of any means by which blood from the left ventricle is returned to the right; nor does he appear to have seen the necessity for any such provision.

The authorities from which the above Life of Servetus has been compiled are Allwoerden, 'Historia Michaelis Serveti,' Helmstadii, 4to., 1727; the 'Biographie Universelle;' and the notices furnished by Mr. Hallam, in his 'Introduction to the Literature of Europe,' vol. i., p. 507, and vol. ii., p. 107. The famous passage relating to the circulation is given entire by Dutens, 'Origine des Découvertes attribuées aux Modernes,' 4to., London, 1796, p. 163.

SERVIA, a principality newly constituted under an hereditary prince, tributary to the Ottoman sultan, but which was an integral part of the Turkish empire till the beginning of the present century. The boundaries of Servia are, on the north the Austrian territories of the Bannat and Slavonia, on the east Valachia and Bulgaria, on the south Rumili, and on the west Bosnia, from which it is separated by the Drina, an affluent of the Save. The length of Servia from east to west is about 170 English miles, and its breadth about 100 miles. It lies entirely in the basin of the Danube, which river runs along its northern boundary, and is joined by the Save, which divides Servia from Austrian Slavonia, and afterwards by the Morava, which crosses the centre of Servia from south to north, receiving numerous affluents; those on its western or left bank come from the Mounts Stalatz, an offset of the Dinaric Alps which divide the waters of the Morava from those of the Drina, and those on its eastern bank from the Bulgarian mountains, which are offsets of the Balkan range. Servia is a country of mountains and valleys, in great part covered with antient forests. The country has excellent pastures, in which are reared numerous herds of cattle. The population of Servia is roughly reckoned at about half a million of inhabitants, who are mostly of the Greek or Eastern church. The Servians are a branch of the great Slavonian race, and their language is one of the most polished dialects of the Slavonian. [SLAVONIAN LANGUAGE AND LITERATURE.] Travellers have observed a resemblance between the appearance of the Servians and the natives of the Swiss highlands. The country is in a state of progress.

The principal towns of Servia are—1, Semendria, or Sant Andriya, situated at the confluence of the Jessava with the Danube, a fortified town with about 12,000 inhabitants, and the residence of the archbishop-primate of Servia, and the place of assembly of the senate; 2, BELGRADE; 3, Zabatz, or Schabacz, near the Save, a fortified town; 4, Usicza, near the borders of Bosnia, a town of 6000 inhabitants, carrying on a considerable trade; 5, Vallievo, a place much frequented for its markets; 6, Kragojewatz, a small town in the centre of Servia, where a diet of the representatives of Servia proclaimed, in 1830, Milosch and his heirs princes of Servia. The superior court of justice of the principality sits at Kragojewatz, which is also the common residence of the prince.

Prince Milosch has opened a wide road across Servia from Nissa on the frontiers of Rumili to Belgrade.

The county of Servia under the Roman empire formed the province of Mœsia Superior. It was invaded by the Goths under the emperor Valens, and some centuries later by the Servi, a tribe of Slavonians, to whom were allotted some grounds south of the Danube by the emperor Leo VI., in order to oppose them to the Bulgarians, who threatened the very existence of the empire in the tenth century of our æra. By degrees the Servians encroached also upon the territories of the empire, and in the twelfth century the emperor Manuel Comnenus was obliged to fight against them in order to check their incursions. During the subsequent decay of the Eastern empire, and its conquest and partition by the Latins, the Servians established themselves firmly in the country of Mœsia, forming an independent principality under a prince styled Despotes, in the same manner as the neighbouring Slavonian states of Bosnia and Croatia. Murad I., sultan of the Ottomans, married a daughter of the Despotes of Servia; but several years after, the Servians, Hungarians, and other Christian nations near the Danube, alarmed at the progress of the Turks in Albania, collected a large force under Lazarus, Despotes of

Servia, and marched against Murad, who met the Christian army in the plain of Cossowa, near the frontiers of Albania, A.D. 1389, and defeated it with dreadful slaughter, but was himself killed. Lazarus was taken prisoner and killed by the Turks in revenge for the death of their own sultan. In the following century sultan Murad II., who had married the sister of George, Despotes of Servia, turned his arms against his brother-in-law about the year 1440, overran Servia, took the fortress of Semendria, and obliged George to take refuge at Ragusa, from whence he made his way to Hungary, where he joined the gallant Hunnyades, and through his assistance recovered part of his territories. At last Mohammed II., after taking Constantinople, finally conquered Servia, which he annexed to his empire, with the exception of Belgrade, which was bravely defended by the Hungarians under Hunnyades, and was only taken, in 1522, by Solyman the Great. Servia continued a province of the Turkish empire till 1717, when Prince Eugene, at the head of an Austrian army, took Belgrade and conquered a part of Servia, which was ceded by the sultan to Austria by the peace of Passarowitz, 1718. But in the subsequent war of 1739, the Austrians, being worsted by the Turks, lost Servia, and gave up Belgrade also by treaty. Marshal Laudon retook Belgrade in 1788, but Austria gave it up again to the sultan by the peace of Szistova in 1791.

About the year 1804 the Servians, availing themselves of the revolt of Passwan Oglu, pasha of Widin, rose in arms throughout the country against the Porte. They chose for their leader George Petrowitsch, surnamed Kara, or the 'black,' a countryman who, having taken a part in a former unsuccessful insurrection in 1787, had fled into the Austrian territories, and served in the Austrian army in the campaign of 1788-9. After the peace in 1791 Kara George had returned to his country and resumed his profession of herdsman and grazier. He was stern and taciturn, but courageous and robust. In January, 1806, two numerous Turkish armies, one from Bosnia under Bekir Pasha, and the other from Nissa in Rumili under Ibrahim, pasha of Scutari, entered Servia. Kara George had no more than 10,000 men, but they were determined, and knew well the country and the intricacies of its forests. He kept in check both armies, and in the month of August defeated the Pasha of Bosnia, and drove him back across the Drina with great loss. He then turned rapidly against the Pasha of Scutari, who proposed a truce. But the truce not being ratified by the Porte, George surprised and took Belgrade, except the citadel, which surrendered in 1807. Servia was now free from the Turks. A sort of military government was formed, consisting of the wayvodes, or chief proprietors of the various districts, each of whom was at the head of a body of cavalry formed of his tenants and friends. The wayvodes assembled once a year, about Christmas, at Belgrade, to deliberate, under the presidentship of Kara George, upon the affairs of the country. A senate of twelve members, one elected by each district of Servia, constituted the permanent executive. Mutual jealousies and dissensions soon broke out between the principal wayvodes and Kara George. The latter, in order to strengthen his power, undertook the invasion of Bosnia in 1809, whilst Russia was at war with the Porte. He proved unsuccessful, and was obliged to retire into Servia, protected by a diversion made by a Russian corps on the side of the Danube. In 1810 he defeated Curschid Pasha, who had advanced from Nissa with 30,000 men, and soon after he routed another army from Bosnia, and drove it back across the Drina. He availed himself of these successes to obtain from the diet of 1811 more ample powers, and a sort of ministry, which resided continually near his person. The Porte proposed to acknowledge Kara George as Hospodar of Servia, on condition that the Turks should garrison all the fortresses and keep the arsenals and arms. It was easy for persons acquainted with Ottoman policy to foresee what would be the results of such an arrangement. The negotiations lasted till 1813, when the news of the success of Napoleon in Germany freed the Turks from the fear of Russia, and stimulated them to make a last effort against Servia. Two Turkish armies advanced, drove before them some Servian corps, and carried several strongholds. Kara George, losing on a sudden his firmness, crossed the Danube and took refuge in the Austrian territories, where he was confined in a fortress in which he died some years after. Universal discouragement followed, and the Turks occupied the whole country and entered Belgrade. Servia became again a pashalik. The wayvode Milosch Obrenowitsch alone kept up the insurrection about Jagodino, in the southern districts, but was at last obliged to accept the amnesty offered by the pasha for himself and followers. The Turks however having contrived to get into their hands the leaders of this last insurrection, shot a number of them, regardless of the amnesty, and empaled thirty-six of them at Belgrade, in front of the pasha's palace, in 1815. Milosch himself had the good luck to escape; he ran to the mountains, and the insurrection began afresh. Having assembled the Heyduks, a kind of Slavonian Klephts, and the fugitives and emigrants of the former insurrection, he attacked the kiaya, or lieutenant of the pasha, who had advanced against him from Belgrade at the head of 10,000 men. The kiaya was defeated with the loss of his artillery and baggage. The pasha came out of Belgrade with the rest of his troops, and was likewise defeated, and obliged to retire to Keupri under an escort given him by Milosch. Curschid, pasha of Bosnia, sent another army under his lieutenant Ali, who was defeated, taken prisoner, and sent back to his master with presents. Milosch afterwards went himself to the camp of Curschid Pasha to undertake negotiations of peace. The only article upon which they could not agree was that Milosch wished the Servians to remain armed, to which the pasha would not consent. When Milosch rose to mount his horse, the pasha's janizaries fell upon him, but Ali, who had been so generously treated by Milosch, interposed, representing that Milosch had come spontaneously and under a safe conduct, which ought not to be broken. Ali's firmness saved Milosch, who was allowed to depart. The negotiations continued; Servian deputies were sent to Constantinople, and at last a firmaun of peace came, appointing another pasha friendly to the Servians. Belgrade and the other fortresses were to remain in the hands of the Turks, but the Servians retained the administration of the country, their senate, and they alone taxed themselves.

Milosch restored with some modification the constitution established by Kara George. He created a provincial administration; every district or knef has its kneven or civil officer, and every great division or province has its obar-kneven, all of whom are paid by the treasury. Judicial courts are established in the various districts, and a court of appeal sits at Kragojewatz for the whole principality. A code, based mainly on the French code, has been compiled. The clergy are subject to the same laws and amenable to the same courts as the laity, and they receive a salary from the state. Elementary schools have been established in the various districts. Every able-bodied man is a soldier, and has his own arms. Belgrade has a small Turkish garrison, and is the residence of a pasha, who has no direct authority in the affairs of the country. Servia pays a fixed amount of tribute to the Porte, which is yearly delivered by the prince into the hands of the pasha. The natives of Servia are allowed to trade all over the Ottoman empire, when furnished with Servian passports. Such is the settlement of the affairs of Servia since 1830.

(Balbi; La Martine, *Voyage en Orient*, 1833; Pirch, *Reise in Servien in* 1829.)

SERVICE. (Law.) [SERVANT.]

SERVICE, the name given in English cathedral music to the *Te Deum* and *Jubilate*, the *Magnificat* and *Nunc Dimittis*, the *Cantate Domino* and *Deus Misereatur*, collectively or separately; and sometimes applied, very erroneously, in our concert books, to the whole or portions of the mass.

SERVITES, or Servants of the Blessed Virgin, a religious order first instituted in Tuscany, A.D. 1233, by seven Florentine merchants. This order, though subjected to the rule of St. Austin, was nevertheless erected in commemoration of the most holy widowhood of the blessed Virgin, for which reason its monks wore a black habit, and observed several rules not practised in other monasteries. Benedict, bishop of Florence, having given his approval to the institution of this order, pope Clement VI. granted it a bull of confirmation in 1266. Innocent V. took measures to abolish it; but dying before he had completely effected his intentions, it was again taken under papal protection by Honorius IV. in 1286. In the fifteenth century Martin V. and Innocent VIII. declared that the Servites formed a fifth mendicant order.

Toward the close of the sixteenth century it was found that the Servites had fallen off from their early strictness;

and in 1593 the order was re-established in its original austerity in the hermitages of Monte-Senario, where the reformed brothers took the title of *Servites-Eremites*. This order continues to exist in Italy.

Father Paul Sarpi, the well-known author of the 'History of the Council of Trent,' was a Servite.

(Mosheim, *Eccles. Hist.*, 4to., Lond. 1765, vol. i., p. 653; *Hist. des Ordres Religieux*, par M. Henrion, 8vo., Brux., 1838, p. 171-173.)

SERVITOR. [Sizar.]

SE'RVIUS TU'LLIUS, the sixth king of Rome, reigned from 578 to 534 B.C. The history of his birth was handed down by tradition in three different ways. The most marvellous and probably the most antient legend represents him as the son of Ocrisia, a slave of Queen Tanaquil, and of a god, who according to some was Vulcan, but according to others, one of the household-gods of the royal family. (Ovid, *Fast.*, vi. 625, &c.; Dionys., iv., p. 207. Sylburg.) A second legend describes his mother as a slave of the Etruscan town of Tarquinii, and his father as a client of Tarquinius Priscus; and Servius himself, according to the same account, was in his youth a slave. (Cic., *De Republ.*, ii. 21.) The third account, which however seems to be merely an arbitrary interpretation of the second, made with the intention of giving to the story a somewhat more probable appearance, represents Servius Tullius as the son of a man of the same name, who was of royal descent, lived at Corniculum, one of the Latin towns, and was slain when his native place was taken by the Romans. His wife Ocrisia, then in a state of pregnancy, was conveyed to Rome and assigned to Queen Tanaquil, who, considering her rank, soon restored her to liberty and treated her with great regard. (Liv., i. 39; Dionys., iv., p. 206.) Ocrisia was delivered of a son whom she called Servius Tullius, after the name of her husband. One day, continues the story, when the boy was asleep, his head was seen surrounded with flames. The queen, being informed of the wondrous sight, said that the child was destined to do great things, and forbade the flames to be extinguished; when the child awoke, the flame disappeared. He was henceforth brought up and educated as the king's own child. If in the course of his education he became, as Cicero supposes, acquainted with the affairs of Greece, this would in some measure account for the analogy between the constitution of Solon and that which Servius afterwards gave to the Romans. Fortune, who had so signally favoured Servius in his childhood, continued her partiality for him, raised him to the highest honours that man can attain, and even made him the object of her love. (Ovid, *Fast.*, vi. 570, &c.) He made a grateful return by dedicating to her a temple outside of the city. (Varro, *De Ling. Lat.*, v., p. 56, ed. Bipont.)

When Servius Tullius had grown up to manhood, he distinguished himself in several battles against the Etruscans and Sabines, and he was also a useful counsellor in the affairs of the administration. The king not only rewarded his services with the hand of one of his daughters, but in his old age frequently entrusted him with the management of his private as well as public affairs, and in the discharge of these duties Servius evinced such wisdom and justice, that he soon became the favourite of the people. When the king was murdered by the sons of Ancus Marcius, and Tanaquil concealed his death from the people, they willingly submitted to the regency of Servius, whom the king was said to have appointed to govern in his stead until his recovery, which probably means that he was appointed custos urbis (præfectus urbi) in which capacity he had a right to hold the comitia for a new election, as he afterwards did (*populum consuluit de se*). When the death of the king became known, Servius was, as Livy (i. 41) says, made king by the senate, but without a decree of the populus; but according to Cicero and Dionysius (iv., p. 218), he found his chief support in the populus, who gave him the imperium by a lex curiata. The sons of Ancus Marcius, seeing their hopes frustrated, went into exile, and Servius Tullius, to prevent any hostile feeling on the part of Lucius and Aruns Tarquinius, the sons of his predecessor, gave them his two daughters in marriage. The inconsistency of this part of the legend with chronology has been pointed out by Niebuhr.

After Servius had thus established himself on the throne, he made a successful war against the Veientines and some other Etruscan towns, which Dionysius represents as a war with all Etruria. This is the only war which is said to have occurred during his reign, which, like that of Numa Pompilius, was a reign of peace. The most memorable events of the reign of Servius Tullius are his fortification and extension of the city [Rome, vol. xx., p. 100, &c.], and the new constitution which he is said to have given to the Roman state. Several of the Latin towns already belonged to Rome, and had grown up with it into one nation, and this nation was leagued with the other independent Latins. Servius effected a federal union among these nations, and induced the Latins, who had hitherto held their general meetings at the fountain of Ferentina, to build at Rome, on the Aventine, a temple of Diana, as the common property of the Latins and Romans. The Latins agreed, and this was on their part a tacit acknowledgement of the supremacy of Rome. (Liv., i., 45; Dionys., iv., p. 230.) The Sabines appear to have likewise been included in this confederacy, and to have joined the Latins and Romans in the worship at the common sanctuary of Diana; for the story is, that a Sabine attempted to gain the supremacy for his own nation: he possessed among his cattle a cow of extraordinary size, and the soothsayers declared that the government should belong to that nation whose citizen should sacrifice this cow to Diana on the Aventine. He therefore took the animal at an opportune time to Rome. But the Roman priest, who had been informed of the prophecy, reprimanded the Sabine for attempting to sacrifice with unclean hands, and bade him go down to the Tiber and wash them. The Sabine obeyed, and the Roman in the meanwhile sacrificed the cow to Diana. According to Livy it was not until this time that the populus unanimously declared Servius their king.

But although Servius was the favourite of the people, a storm was gathering over his head, which ultimately terminated his life in the tragic manner so inimitably described by Livy (i. 47). Lucius Tarquinius, the son of Tarquinius Priscus, had never given up the hope of occupying the throne of his father; and stimulated by Tullia, the wife of his brother Aruns, he agreed with her to murder his wife and his brother, and to unite himself with her, that thus they might be able the more energetically to prosecute their ambitious and criminal designs. Lucius, now urged on by his unnatural wife, one day appeared in the senate with the badges of royalty. As soon as the aged king heard of the rebellious act, he hastened to the curia, and rebuked the traitor, but he was thrown down the stone steps of the curia, and on his way home he was murdered by the servants of his son-in-law. His body was left lying in its blood. Tullia, the wife of Lucius, anxious to learn the issue of his undertaking, rode in her chariot to the curia; but her more than brutal joy at his success induced even Tarquin to send her home. On her way thither she found the corpse of her father, and ordered her servant to drive over it. The place where this took place was ever after termed the Vicus Sceleratus (Ovid, *Fast.*, vi. 598; Dionys., iv., p. 242; Varro, *De Ling. Lat.*, iv., p. 44.)

Such are the legends which were current among the Romans about Servius Tullius; and although they may be based on some historical groundwork, yet in the form in which they are handed down they are little more than fiction. The existence of a king, Servius Tullius, cannot however be denied. The Etruscan traditions, as we learn from an antient inscription (ap. Gruter, p. DII.) which contained a speech of the emperor Claudius, stated that Servius, originally called by the Etruscan name of Mastarna, was a follower of Cæles Vivenna; and that after being overwhelmed by disasters, he quitted Etruria with the remains of the army of Cæles, and went to Rome, where he occupied the Cælian hill, and afterwards obtained the kingly power. (See Niebuhr, *Hist. of Rome*, i., p. 381, &c.) But it is not improbable that this version of the story merely arose from the circumstance of Servius being received at Rome among the Luceres or Etruscans (Göttling, *Gesch. d. Röm. Staats*, p. 231), for two other legends describe him as a Latin; and the whole spirit of his legislation seems to warrant the conclusion that the man who devised the constitution ascribed to him could not have been an Etruscan, but must have been a Latin. How much of the tragic story of his death may be historical cannot be decided, nor is it of great importance. This however seems to be clear, that at the end of the career of Servius a counter-revolution took place, which frustrated all the beneficial workings of his new constitution, and showed its fruits in the tyrannical rule of his successor.

The constitution of Servius Tullius was always looked upon by the Romans as the basis of their civil and political institutions; and there is no doubt that in subsequent ages much more was attributed to him than he actually did, and that the plebeians in particular considered him as the great protector of their order, who had granted them almost all the rights which they afterwards regained one by one in their unwearied struggles with the patricians. What Servius actually did for the Romans has been the subject of much discussion among the continental scholars ever since the time that Niebuhr's work appeared. We shall only give a sketch of the constitution of Servius, and refer our readers to the best modern works on the subject.

Servius is said to have commenced his legislation by dividing the public land which was taken from the Latins among those citizens (of course plebeians) who, owing to their poverty, were compelled to work for wages; and by sanctioning, through the Comitia Curiata, about fifty laws relating to contracts and injuries (*νόμοι συναλλακτικοὶ καὶ περὶ τῶν ἀδικημάτων*: Dionys., iv., p. 218), which were probably intended to regulate the relations between the two estates. He divided the city, with the exclusion of the Capitoline and Aventine, into four regions, three of which answered to the three original townships or tribes of which Rome consisted. All the plebeians who dwelled in any of these regions formed a tribus; so that all the plebeians of the city were divided into four local tribes (tribus urbanæ). Their names were Tribus Suburana, Palatina, Esquilina, and Collina; and these tribes continued to the time of Augustus. The plebeians who inhabited the country around and subject to Rome, were divided into twenty-six local tribes (tribus rusticæ), which are sometimes also called regions. This division of the country plebeians is not mentioned by Livy at all; and Dionysius found different and contradictory accounts of it, but he preferred the statement of Fabius Pictor, who mentioned the twenty-six rustic tribes. The subject however might still seem to be involved in difficulties, inasmuch as Livy (ii. 16) states that, in the year 495 B.C., the whole number of tribes was only twenty-one. This difficulty however is removed by the plausible conjecture of Niebuhr (i., p. 416, &c.), that in the war against Porsenna Rome lost a third of its territory—that is, ten regions or tribes; so that there remained only twenty, to which, after the immigration of the gens Claudia with its numerous clients, the twenty-first tribe (tribus Claudia, afterwards tribus Crustumina) was added. The names of the sixteen rustic tribes which continued to exist after the war with Porsenna are: tribus Æmilia, Camilia, Cluentia, Cornelia, Fabia, Galeria, Horatia, Lemonia, Menenia, Papiria, Pollia or Publilia, Pupinia, Romilia, Sergia, Veturia, and Voltinia. (Niebuhr, i., p. 419; Göttling, p. 238.) To these were added, in 387 B.C., the tribus Stellatina, Tromentina, Sabatina, and Arniensis; in 357 B.C., the tribus Scaptia; in 318 B.C., the tribus Ufentina and Falerina; in 301 B.C., the tribus Terentina and Aniensis; and lastly, in 241 B.C., the tribus Velina and Quirina. The number of tribes thus amounted to thirty-five, and it was never increased. The number of thirty tribes instituted by Servius Tullius was equal to that of the patrician curiae; both divisions however existed independent of each other, the one comprehending only the patricians, and the other the plebeians. The clients were probably not contained in the Servian tribes. (Niebuhr, i., p. 421; Walter, *Gesch. d. Röm. Rechts*, p. 30, note 5.) Göttling (p. 236) assumes the contrary, but his arguments are not convincing. The division of the plebeians into a number of local tribes was nothing beyond a regular organization of the body of the plebes, of which they had indeed been in need; but it did not confer any other rights upon them than what they possessed before. At the head of each tribe, in the city as well as in the country, was a tribune (*φυλαρχος*), who was appointed by the members of his tribe. He had to keep a register of all his tribesmen, and he levied the troops and taxes in his tribe. The plebeians now held their own meetings according to their tribes, as the patricians held theirs according to their curiae. The tribes had also their common festivals: those of the city were called the Compitalia, and those of the country the Paganalia.

The first step by which Servius promoted the liberty of the people was the institution of judices for private actions, which had formerly been part of the jurisdiction of the kings. (Dionys., iv., p. 228, &c.) These judices were, according to the supposition of Niebuhr (i., p. 428; comp. Göttling, p. 241, &c.), the court of the Centumviri, for which three members were chosen from every tribe. The number of the court however would then be only ninety. But see *Dict. of Greek and Roman Antiq.*, under 'Centumviri.'

But the chief part of the Servian constitution was his census, according to which he divided the whole body of Roman citizens, both the patricians, with their clients, and the plebeians, into five classes. The first class comprised those whose property amounted to at least 100,000, or, according to others, at least to 110,000, 120,000, or 125,000 asses. [As.] (Liv., i. 43; Dionys., iv., p. 221; Plin., *Hist. Nat.*, xxxiii. 3; Gellius, vii. 13; Cic., *De Republ.*, ii. 22.) The second class included those who had at least 75,000 asses; the third, those who had at least 50,000; the fourth class, those who had at least 25,000; and the fifth class, those who had at least 12,500, or, according to Livy, 11,000 asses. The members of each of these classes were divided into juniores, or men from seventeen to forty-five years old; and seniores, or men from forty-five to sixty years. The latter, though they had still to perform military service, remained at Rome for the protection of the city; while the former went out into the field, and served in the regular armies. All had, according to their higher or lower census, to equip themselves with a more or less complete suit of armour. All public burdens for the maintenance of the state and the armies were distributed among these classes, in such a manner that the heaviest duties fell upon the wealthiest, who had at the same time practically the greatest influence in public affairs. All Romans whose property did not come up to that of the fifth class were kept apart from the classes Dionysius indeed says that they were formed into a separate class. They were however subdivided into capite censi and proletarii: among the former were reckoned all those who possessed no more than 375 asses, and among the latter those who possessed from 375 to 1500 asses. These two divisions were exempt from the tributum, and, with few exceptions, also from service in the army; but they had to pay a head-tax. It is a very ingenious supposition of Niebuhr, that all those who possessed more than 1500 asses, but less than the census of the fifth class, formed the accensi and velati in the Roman army, that is, a class of reserves who went into the field without arms, and stepped into the places of those who had fallen, whose armour they also took. All the citizens who were comprised in the classes were called assidui or locupletes, in contradistinction to the rest. (Cic., *De Republ.*, ii. 22; Gellius, xvi. 10.)

After the taxation and the military duties of the Romans were thus regulated by the census, Servius proceeded to determine their rights by the same standard. For this purpose he subdivided each of the five classes into centuries, each of which was to have a vote (suffragium) in the great national assembly which they were to form (comitia centuriata, or comitiatus maximus). The number of centuries however was not the same in all classes: the first class, though the smallest in numbers, received the greatest number of centuries or suffrages, in order that those who had to bear the heaviest burdens might also have the greatest influence in public affairs. The first class was thus divided into eighty centuries; the second, third, and fourth classes into twenty centuries each; and the fifth class into thirty centuries. The whole number of centuries thus amounted to one hundred and seventy. This division was made with a view to form the Roman army, and the whole number of centuries represented the Roman citizens as a military body. Hence half the number of centuries in each class consisted of the seniores, and half of the juniores. The seniores, though fewer in numbers, had thus equal influence with the juniores, so that all political power was distributed with a due regard to age as well as to property. (Gellius, xv. 27.) But to these one hundred and seventy centuries, five others were added, independent of the census, partly to give them a compensation for the active part which their members took in the army; partly, perhaps, that they might be the means of forming a majority in cases where opinions were equally divided between the seniores and juniores. The first two additional centuries were the centuriæ fabrorum, which Livy describes as being assigned to the eighty centuries of the first class, and Dionysius as belonging to those of the second class. Cicero assigns the fabri to the first class, but only as one century. The difficulty arising from these different accounts may be removed by the supposition that of the two centuries of the fabri, one was assigned to each of the first two classes; and if this supposition be correct it is highly probable that the three other additional centuries, viz. those of the accensi, cornicines, and liticines or tubicines, were likewise assigned one to each of the three last classes. Dionysius says that the five additional centuries were, like the one hundred and seventy others, divided into seniores and juniores.

These one hundred and seventy-five centuries formed the whole body of infantry in the Roman army. The cavalry was likewise represented by a number of centuries. Twelve centuries of equites existed before the time of Servius [Rome, vol. xx., p. 104], and to these he added six new ones. Dionysius speaks as if Servius had created eighteen new centuries of equites; and Livy (provided the reading in i. 43, be correct), forgetting the six centuries of equites made by Tarquinius Priscus, states that Servius made twelve new centuries in addition to the existing six. The twelve centuries of equites which existed previous to the legislation of Servius, belonged to the patricians, and had their dignity as equites independent of the census, though they naturally belonged to the wealthiest class. The six new centuries of Servius were formed of the wealthiest plebeians of the first class, and were called the sex suffragia, as they had six votes in the assembly of the centuries. (Göttling, p. 253, &c.) Cicero reckons all the eighteen centuries of equites as belonging to the class which had the highest census, whereas Dionysius seems to distinguish between those equites who belonged to the first class, and the patrician equites. The only distinction between these two classes of equites in the comitia centuriata was that the patricians gave their vote before the plebeian equites. We do not know whether there were any other distinctions. They were however in so far placed on a footing of equality, that all of them received a horse from the state (equus publicus), or money to purchase one, together with an annual sum for its support, which sum was raised by a tax on the unmarried women, widows, and orphans (see hordearium).

The whole body of the Roman people who performed service in the army, and had a right to vote in the great assembly, was thus contained in one hundred and ninety-three centuries, of which one hundred and eighty-one had been newly created. The eighty centuries of the first class, together with the six suffragia of plebeian equites and one century of fabri, formed a decided majority in the comitia centuriata, for they amounted to eighty-seven centuries; whereas all the other classes together had only eighty-four centuries. The votes in the great comitia, which were always held in the Campus Martius, were first given by the twelve centuries of patrician equites; next came the six suffragia of plebeian equites; and then the centuries of the several classes, beginning with those of the first class. If therefore the equites and the centuries of the first class agreed among themselves in the comitia, a question was decided at once, without being put to the vote of the remaining centuries. The centuries of the last classes thus had in theory equal rights in their comitia with those of the first class; but practically they seldom exercised these rights, as in most cases the majority was manifest, before a question came to be put to their vote. The comitia of the centuries now received the rights which, until then, had been the exclusive possession of the curiæ, that is, to decide on peace and war, to elect the kings, and subsequently the chief magistrates of the republic; and to pass new laws or abolish old ones. (Dionysius, iv., p. 224.) But the assemblies of the curiæ still existed. New laws were not often brought before the centuries, on account of the firm adherence to antient usages; and whenever they were brought before them, it could only be done after they had obtained the sanction of the senate. The election of a king was confined to those candidates who were proposed by the senate through an interrex; and such an event could not happen frequently, as the office of the king was for life. It was a further check upon the comitia centuriata, that when a question was decided by them, it still required the sanction of the comitia curiata; so that in point of fact the patricians, in the senate and their comitia curiata, possessed a very great preponderance over the commonalty. The only advantage therefore which Servius had given to the plebeians was, that the wealthy members of their order had an opportunity of meeting the patricians on a footing of equality, and the way to this honour was of course open to every plebeian. As we are not informed that Servius Tullius admitted any of the plebeians into the senate, it seems to have been his intention to exclude them from all the offices which were in the exclusive possession of the patricians. This shows at the same time the improbability of the story according to which Servius intended to resign his royal dignity, and to appoint two consuls, one of whom should be a plebeian. Niebuhr is inclined to think that almost all the rights which the plebeians acquired in the course of time, had been originally granted to them by the constitution of Servius Tullius, and that they had been deprived of them during the reign of Tarquinius Superbus. But this theory seems to be supported rather by the stories which in subsequent ages became current of the good king Servius, than by what must be considered as historically established in regard to his constitution. Nothing is more natural than that the benefits which Servius actually conferred upon the plebeians should in after-times, when they were abolished, have been greatly magnified, as if he had placed the plebes on a footing of perfect equality with the patricians.

Respecting the reign and constitution of Servius Tullius, the reader may, besides the work of Niebuhr, consult Huschke, *Die Verfassung des Königs Servius Tullius, als Grundlage zu einer Römischen Verfassungsgeschichte entwickelt*, Heidelberg, 1838, 8vo., a work which is more based on speculation than on an accurate examination of the antient authorities; Zumpt, *Ueber Abstimmung des Römischen Volkes in Centuriat Comitien*, Berlin, 1837, 4to.; Göttling, *Geschichte der Römischen Staatsv.*, p. 230-267; Walter, *Gesch. d. Röm. Rechts*, p. 29-37; Rubino, *Ueber den Entwickelungsgang der Römisch. Verf. bis zum Höhepunkt der Republik*, vol. i., Marburg, 1839, 8vo.; Hüllmann, *Römische Grundverfassung*, Bonn, 1832, 8vo., and, by the same author, *Ursprünge der Römischen Verfassung durch Vergleichungen erlaütert*, Bonn, 1837, 8vo.

SE'RVIUS, MAU'RUS HONORA'TUS, a Roman grammarian. The time at which he lived is not quite certain, for some writers place him in the reign of Valentinian, and others in that of Hadrian; but it is almost beyond doubt that he lived towards the close of the fourth century, perhaps in the reign of Theodosius I. (Macrob., *Sat.* i. 2.)

The principal works of Servius are his Commentaries on the Æneid, the Georgics, and the Eclogues of Virgil. These commentaries are not only useful for a correct understanding of the poems of Virgil, but they are rendered still more valuable to us by the vast stores of learning which their author possessed; they contain information on a variety of subjects connected with the history, antiquities, and religion of the Romans, and of which we should otherwise be totally ignorant. Many valuable fragments of other writers, whose works are now lost, are preserved in the commentaries of Servius. It is however to be lamented that these commentaries have come down to us in a very interpolated condition, so that they cannot be used without great caution. Besides these commentaries, we possess of Servius three smaller grammatical works: 'In Secundam Donati Editionem Interpretatio;' 'De Ratione Ultimarum Syllabarum Liber ad Aquilinum;' and 'Ars de Pedibus Versuum, sive de Centum Metris.'

The commentaries on Virgil are printed in several of the early editions of this poet; but the best modern editions are that of Burmann, in his edition of Virgil, and a separate one by H. A. Lion, under the title 'Servii Mauri Commentarii in Virgilium; ad fidem cod. guelferbyt. aliorumque recens. et potior. var. lect. indicibusque copiosiss. instruxit, &c.;' Göttingen, 1825-26, 2 vols. 8vo. Compare Burmann, 'Præfat. ad Virg.,' p. ******; Heyne, 'De Antiquis Virg. Interpret.,' p. 536, &c.; Fabricius, 'Biblioth. Lat.,' i., p. 319. The three smaller works of Servius are printed in 'Putschii Grammatici Latini.'

SE'RVIUS SULPI'CIUS RUFUS. [Sulpicius.]

SE'SAMUM (σήσαμον), a genus of plants of the natural family Sesameæ, sometimes called Pedalineæ, containing only few genera and species. The name Sesamon occurs in Greek authors. (Herod., i. 193; iii. 117; Xenophon, *Anab.*, i., c. 2.) *Simpsen*, or *Simsem*, is the Egyptian and Arabian name of one of the species, remarkable for the quantity and quality of the oil expressed from its seeds, which is employed as an article of diet in Eastern nations, on which account the seeds form an article of commerce from India and Egypt in the present day. The genus Sesamum is distinguished by having a 5-parted calyx; corol with a short tube; bell-shaped throat; and the limb quinquifid, somewhat bilabiate. Stamens four, didynamous, with the rudiments of a fifth stamen. Stigma bilamellate. Capsule oblong, 4-celled, 2-valved. Seeds numerous. The species, though now cultivated in many countries, are supposed to have been originally natives of India. They form annual plants, with opposite and alternate leaves, and axillary solitary flowers. The species are by some considered to be five in number, that is, S. orientale, indicum, luteum, laciniatum, with S. radiatum, said to be a native of Guinea. Others consider them all to be varieties of one species. These are cultivated in various countries, but especially in India, Egypt, and Syria. They have also been taken to the West Indies, where the plant is called banglo and oil-plant. Sesamum seeds are sometimes added to broths, frequently to cakes by the Jews, and likewise in the East. The oil which is expressed from them is bland, and of a fine quality, and will keep many years without becoming rancid, and is often used in India as a salad oil. It is known by the name of Sesamum and of Ginglie oil; also *til ke tel*, or *meetha tel*, that is, sweet oil. The leaves of the plant are mucilaginous, and employed for poultices. Of the seeds, two varieties are known in commerce, one white and the other black. The former is called *saffed* (or white) *til* in India. Of this the plant is smaller and straighter, with fewer branches and leaves, and is not so common as the *kala* (or black) *til*. Of this the plant is more spreading and leafy; also larger, being sometimes four or five feet high, with the lower leaves three-lobed, and the upper entire. The kala til, or black sesamum seed, must not be confounded with another, to which the same name is applied, as this is the seed of one of the Compositæ, sometimes called Vesbesina sativa, but, more correctly, Guizotia oleifera. Of til seed there was exported from Calcutta of bazar maunds (each 82lbs.), in 1837, 18,559, and in 1839, 38,537; and of til or teel seed oil, 1354 and 3513¾ maunds in the above years. Sesamum seed is also imported into this country from Egypt, and is said to be generally of a finer quality; but there is no reason why India should not produce and export the finest, if care is taken in the selection of the seed for cultivation, and in the subsequent cleaning and packing, in which Indian products are usually defective.

SESBA'NIA, a genus of plants of the natural family of Leguminosæ, which is so named from the Arabic name of the species which is indigenous in Egypt. The rest are found in the equinoctial parts of the world, but the most remarkable in India. The genus is characterised by having a 5-cleft or 5-toothed calyx. The standard of the corol roundish, larger than the keel, which is obtuse, 2-edged at the base. Stamens diadelphous (9 and 1), with the sheath auricled at the base. Legume elongated, slender, torulose, many-seeded. The species form shrubs or herbs with abruptly pinnate leaves, many pairs of leaflets, cauline stipulas lanceolate, and the petiole ending in a bristle point. Flowers axillary, racemose, usually yellow.

S. ægyptiaca, the Egyptian species, found also in India, forms a small and very elegant tree; its wood is employed in making the best charcoal for gunpowder. *S. cannabina*, the *Dhanchi* of Bengal, is not found wild. It is cultivated on account of the fibres of its bark, which are coarse, but more durable than some other substitutes for hemp, especially when exposed to wet, and are therefore generally employed for the drag-ropes and other cordage about fishing-nets.

The soil in which it is grown is generally low and wet, and does not require much preparation, as the plant is hardy and rapid in growth; this renders it advantageous to cultivate, especially as it is considered a meliorating crop. The time of sowing is when the soil has been moistened by the fresh showers in May. About thirty pounds of seed are allowed to an acre. The crop is ready to cut in September and October, though the fibre does not suffer if left standing till the seed is ripe in November. The process of steeping and cleaning the fibre is similar to that required for *sun* (*Crotalaria juncea*). The general produce of an acre is from one hundred to one thousand pounds of ill-cleaned fibre. The current price is somewhat less than that of *Paat* (*Corchorus olitorius* and *capsularis*). The expense of cultivation, including land-rent, is about nine rupees.

SE'SIA, VAL DI, or VALSESIA, a province of the continental Sardinian states, is also called in the administrative language 'Provincia di Varallo,' from the name of the head town. It consists principally of an alpine valley, about 30 miles long, and from 10 to 15 wide, through which runs the river Sesia, which has its source at the foot of Mount Rosa, and flowing first east, and then south-east, leaves the highlands and enters the plain of Vercelli to join the Po. The province of Val di Sesia is bounded on the north by the Swiss canton of the Valais, from which it is separated by the lofty group of Mount Rosa, west by the provinces of Aosta and Ivrea, south by those of Biella and Novara, and east by that of Pallanza. The population amounts to 35,000 individuals, distributed among 45 parishes or communes. The principal town, Varallo, with about 2700 inhabitants, has an old collegiate church, remarkable for a beautiful altar-piece by Gaudenzio Ferrari, a native painter of the sixteenth century, and a pupil of both Leonardo da Vinci and Raffaello, who is little known, though he deserves to be known. A sanctuary on a neighbouring hill, called 'il Sacro Monte,' is much frequented by pilgrims. It consists of a succession of chapels, forty-two in number, containing a series of fresco paintings and of sculptures, which represent the life of our Saviour. Many of the paintings are by Gaudenzio Ferrari, and his pupils Stella and Luini; others are by Fiammenghino, Morazzone, and Bargnola. The whole is very interesting, but unfortunately the frescoes are decayed through neglect. The engraver Bordiga at Milan has published plates of those by Ferrari in his work, 'Notizie intorno alle Opere di Gaudenzio Ferrari, Pittore e Plasticatore,' 4to., Milan, 1821. A convent of Franciscan friars is at the foot of the hill, and the church is also adorned with paintings by Ferrari. The plan of the sanctuary was traced by Father Bernardo Caimo of Milan, who had been guardian of the convent of the Sepulchre at Jerusalem in the 15th century. Fobello, a small town in the mountains, about ten miles from Varallo, is remarkable for the comeliness of the women. Borgosesia, a town of 2500 inhabitants, on the high road from Varallo to Vercelli and Novara, carries on considerable traffic. The nature of the soil, and the habits of the people of the Val di Sesia are similar to those of the neighbouring valleys of Novara. [NOVARA, VALLI DI.] Many of the men leave their country to seek for subsistence by various trades in other countries, and some return home with money, to spend their old age where they were born. The Val di Sesia retained its independence during the middle ages till 1415, when the people voluntarily paid allegiance to Filippo Maria Visconti, duke of Milan, on the condition of not being subject to any taxation or personal service without their consent. They retained this privilege under the Spanish governors of Lombardy till the war of the Spanish succession, when the Val di Sesia was given to the house of Savoy. The people even now seldom have recourse to the judge who resides at Varallo; but if any dispute occurs, arbitrators are appointed, called by the name of Biederslonti, 'loyal men,' to whose judgment the parties submit. (Bertolotti, *Peregrinazioni*.)

SESO'STRIS (Diodorus calls him Sesoosis, sometimes he is called Ramses the Great), the greatest of the early kings of Egypt. He is the third king of the twelfth dynasty of Manetho, and, according to Herodotus (ii. 102), the successor of Moeris; but Diodorus (i. 53) places him seven generations after Moeris. The exact time of his reign is uncertain, but the most common opinion is that it was about the year 1500 B.C. What has been handed down to us as the history of Sesostris, contains such exaggerated accounts of his military exploits, that we must suppose the achievements of several kings, who perhaps bore the same name, to be ascribed to one. There is however no reason to doubt his personal existence, and as his history serves to explain many of the remains of Egyptian art and architecture, it will be necessary to relate the antient traditions.

The father of Sesostris had all the male children who were born in Egypt on the same day with Sesostris educated with his son, and gave them a regular military training, that they might become attached to their king and be enabled to endure with him all the hardships to which they might be exposed during his career as a conqueror. (Diod., i. 53.) His first expedition was during the lifetime of his father, into Arabia, which he conquered. Hereupon, though still a young man, he was sent by his father into the countries west of Egypt, and made himself master of the greater part of Libya. After the death of his father, when he came to the throne, he determined to realize a prophecy according to which he was to become master of the whole inhabited earth. But before he set out, he endeavoured to secure the good will of the Egyptians, for he is represented as king of all Egypt. He divided the country into 36 districts (νομοί), each under the government of a nomarch. He then raised an army of 600,000 foot, 24,000 horse, and 27,000 beasts of burden, giving the command of its numerous subdivisions to those warriors who had been educated with him, and whose number was above 1700. To these men he also assigned the best portions of the land (Diod., i. 54), for he is said to have divided the whole country into equal parts, and to have assigned one to every Egyptian. (Herod., ii. 109.) His first attack was directed against the Æthiopians, who were subdued, and compelled to pay annual tribute, consisting of ebony, gold, and ivory. He then sent out a large fleet of 400 long ships, the first that were built in Egypt. This fleet sailed down the Red Sea, and round the whole coast of Asia as far as India, and all the nations on the coasts were conquered. Sesostris in the meanwhile traversed Asia with an army, and penetrated as far as the eastern bank of the Ganges, nay, even to the coasts of the eastern ocean. (Comp. Plin., *Hist. Nat.*, vi. 34.) When all Asia was thus rendered subject to him, he returned in a north-western direction, and reached Scythia on the banks of the Tanais. Traces of the conquests of Egyptian kings in India are still visible on some Egyptian monuments. (*Egyptian Antiquities*, vol. i., p. 391.) Prosecuting his plan, the king crossed the Tanais, and marched through Thrace, where however he met with great difficulties, partly from want of provisions and partly from the difficult nature of the country, and he therefore ceased carrying his conquests any farther. In all countries which he had conquered he is said to have erected columns with Egyptian inscriptions recording his conquests; in some places he erected his own statue, four cubits and one foot high, for such was his own natural stature. The columns erected in Palestine, and two figures of the king cut into the rocks in Ionia, were seen by Herodotus (ii. 106) himself, and in Æthiopia they appear to have been known in the days of Strabo (xvii., c. 1, p. 420; xvi., p. 386, ed. Tauchnitz).

This vast campaign had lasted nine years, and the king, after having settled the tributes to be paid to him, collected his prisoners and spoils, and returned to Egypt. On his arrival at Pelusium he was nearly burned in his tent with his wife and children, through the treachery of his brother, whom he had entrusted with the regency of Egypt during his absence. The happy escape of the king and four of his children, for two were burnt, was ascribed to Hephæstus, the great god of Memphis, and the king afterwards dedicated in his temple of that city statues of his wife and himself, each 30 cubits high, and statues of his children, each 20 cubits high; and each of these statues was made of one solid block of stone. (Herod., ii., 107 and 110; Diod., i. 57.) After he had punished his brother, he adorned the temples of the gods with magnificent presents, and rewarded his warriors according to their desert. At this time Egypt was in a state of the highest prosperity, and the inhabitants enjoyed a kind of golden age. The king himself however continued in his restless activity. In each town of Egypt he raised a temple to the greatest local divinity. But in the execution of these, as well as his other great works, he did not employ his Egyptians, but the prisoners of war whom he had brought with him to Egypt. The Babylonian captives, unable to endure the hardships imposed upon them, gathered together and took possession of a fortified place on the Nile, from whence they carried on a war with the Egyptians: at last however the Babylonians were not only pardoned, but received the place which they occupied as their settlement, and henceforth they called it Babylon. Sesostris surrounded many cities of his kingdom with high mounds to protect them against the inundations of the Nile, and many traces of such mounds are still visible (*Egypt. Ant.*, i., p. 45); he also intersected Egypt north of Memphis with numerous canals, which carried off the superfluous water of the Nile, facilitated the intercourse of his subjects, and were a protection against foreign invaders. Another protection of Egypt, especially against the Syrians and Arabs was a wall, 1500 stadia in length (according to Diodor., i. 57), which extended from Pelusium to Heliopolis; but the actual distance is only about seventy-five geographical miles in a straight line, and modern travellers have found that the wall runs past Heliopolis. To the principal divinity of the city of Thebes Sesostris dedicated a magnificent ship of cedar-wood, 280 yards long. The last of his great works were two obelisks of hard stone, each 120 cubits high, on which he recorded the greatness of his power, the amount of tribute which he received, and the number of conquered nations. In the reign of Augustus an obelisk 116 feet high, and said to have been erected under Sesostris, was conveyed to Rome and set up in the Campus Martius. (Plin., *Hist. Nat.*, xxxvi. 14.)

All the subject kings and princes appeared every year at stated times in Egypt before Sesostris with presents, and he travelled with them in a sort of triumph through his country. On all other occasions he treated them with great respect, but when they approached a temple or a city, he made them, four at a time, draw his chariot. (Diod., i. 58; Plin., *Hist. Nat.*, xxxiii. 15.) After Sesostris had reigned 33 years, or, according to Manetho, 66 years, he was seized with blindness, and put an end to his life. (Compare Wilkinson's *Manners and Customs of the Antient Egyptians*, i., p. 63, &c. and 99, &c., who places the epoch of Sesostris about the year 1355 B.C.)

SESQUIALTER, the name of a stop on the organ, containing three ranks of pipes, thus giving three pipes to each organ key, which are tuned in different but harmonic intervals. Sometimes the *Mixture* stop is considered as part of the Sesquialter, in which case the latter is said to contain five ranks of pipes, all tuned in harmonic intervals.

SESSA. [LAVORO, TERRA DI.]

SESSION, KIRK, is the lowest judicatory in the system of the Church of Scotland, having jurisdiction only over a single parish. There is, or ought to be, a kirk session in every parish, composed of the minister, who is *ex-officio* moderator or chairman, and of the lay elders, who must be at the least two in number. The moderator, as in all the other Scottish church courts, has only a casting vote. Meetings of the kirk session may be called at any time by the minister; but they are commonly held at stated intervals, such as once a week or once a fortnight. It is not unusual for the session to meet on the Sunday after divine service. It would rather appear from the 'First Book of Discipline' (eighth head), that the nomination or election of elders was originally in the congregation; but the modern practice is for the session to supply vacancies in, and to make additions to, its number by its own selection, only submitting the names to the congregation, that any legal objections may be made and inquired into by it; and in cases where there happens to be no session in existence, one is appointed by the presbytery. In some of the largest town parishes there are as many as fifty or sixty elders; but in most cases the number does not exceed five or six. In country parishes the elders, or at least those of them who do the duties of the office, are commonly respectable tradesmen, shopkeepers, or mechanics, although persons of higher station occasionally get themselves appointed, principally with a view to qualifying themselves for seats in the General Assembly or the other church courts. The law however is, that an elder must be resident in the parish at least six weeks in the year. He is elected for life, or so long as he remains qualified to hold the office. Every kirk session is represented by an elder both in the presbytery and the synod; the same member being deputed to both courts, and holding his commission for six months. The elders sent to the Assembly, like the other members of that supreme court (except the representatives of the royal burghs and the universities), are nominated by the presbytery. The kirk session may be regarded as the council of the minister, who, strictly speaking, is scarcely authorized to perform any act in the administration of the spiritual affairs of the parish, beyond officiating in the services of religion, without the concurrence of his elders. In practice however the clergyman very rarely encounters any opposition in the kirk session. The ordinary business of the session is to exercise spiritual discipline within the parish, by inquiring into scandals, and punishing delinquencies, which is done by suspension from the benefit of church ordinances, by public or private rebuke, and by pecuniary fines (exacted of course, like submission to the other penalties, only as the price of restoration to communion with the church, for the session has no power to force any person even to appear on its summons). The evidence in all cases that come before the session (at least after the inquiry has fairly commenced) is taken upon oath, and is, or ought to be, carefully recorded by the session-clerk, who is a paid officer, not necessarily a member of the court. There is in most cases an appeal from the judgment of the kirk session to the presbytery; and some graver offences can only be tried by the presbytery even in the first instance. The distribution of the ordinary collections made at the church door for the support of the poor, is also in the hands of the kirk session; and the management of all other funds and assessments allotted to the same purpose is conjointly in that body and in the heritors or landed proprietors of the parish. Indeed the heritors are also by law entitled to a voice, although the right is seldom exercised, even in regard to the management of the weekly collections at the church door. In royal burghs the management of the poor is vested solely in the magistrates; but they usually devolve the greater part of the business upon the kirk session.

(Principal Hill's *View of the Constitution of the Church of Scotland;* Dr. Alexander Hill's *Practice in the several Judicatories of the Church of Scotland;* Dunlop's *Treatise on the Law of Scotland relative to the Poor*; *Report, with Minutes of Evidence, from Select Committee of the House of Commons on Church Patronage, Scotland,* 1834.)

SESSIONS. A session is the period during which any court of law sits for the transaction of judicial business; but the term Sessions is commonly used to denote the meeting of the justices of a county, or other district which has a separate commission of the peace, for the execution of the authorities conferred by the crown by that commission and others created by act of parliament.

County Sessions.—The commission of the peace issued by the crown for the purpose of creating county magistrates, consists of two branches. The former, relating to the powers to be exercised by justices individually and separately, has been already set forth. [JUSTICES.] The second branch of the commission creates the powers of the justices when assembled in sessions. It is as follows:—'We have also assigned you, and every two or more of you (of whom any one of you, the aforesaid A. B., C. D., E. F., &c. we will shall be one), our justices, to inquire the truth more fully, by the oath of good and lawful men of the aforesaid county, by whom the truth of the matter shall be better known, of all and all manner of felonies, poisonings, inchantments, sorceries, arts magic, trespasses, forestallings, regratings, ingrossings, and extortions whatsoever, and of all and singular other crimes and offences, of which the justices of our peace may or ought lawfully to inquire, by whomsoever, and after what manner soever, in the said county done or perpetrated, or which shall happen to be there done or attempted, and also of all those who in the aforesaid county in companies against our peace, in disturbance of our people, with armed force, have gone or rode, or hereafter shall presume to go or ride, and also of all those who have there lain in wait, or hereafter shall presume to lie in wait, to maim, or cut, or kill our people; and also of all victuallers, and all and singular other persons, who in the abuse of weights or measures, or in selling victuals, against the form of the ordinances and statutes, or any one of them, heretofore made for the common benefit of England, and our people thereof, have offended or attempted, or hereafter shall presume in the said county to offend or attempt, and also of all sheriffs, bailiffs, stewards, constables, keepers of gaols, and other officers, who in the execution of their offices about the premises or any of them, have unduly behaved themselves, or hereafter shall presume to behave themselves unduly, or have been or shall happen hereafter to be careless, remiss, or negligent in our aforesaid county and of all and singular articles and circumstances, and all other things whatsoever, that concern the premises, or any of them, by whomsoever, and after what manner soever in our aforesaid county, done or perpetrated, or which hereafter shall there happen to be done or attempted, in what manner soever; and to inspect all indictments whatsoever so before you or any of you taken or to be taken, or before others late our justices of the peace in the aforesaid county made or taken, and not yet determined; and to make and continue processes thereupon against all and singular the persons so indicted, or who before you hereafter shall happen to be indicted, until they can be taken, surrender themselves, or be outlawed; and to hear and determine all and singular the felonies, poisonings, inchantments, sorceries, arts magic, trespasses, forestallings, regratings, ingrossings, extortions, unlawful assemblies, indictments aforesaid, and all and singular other the premises, according to the laws and statutes of England as in the like case it has been accustomed, or ought, to be done; and the same offenders and every of them, for their offences, by fines, ransoms, amerciaments, forfeitures, and other means, as according to the law and custom of England, or form of the ordinances and statutes aforesaid, it has been accustomed, or ought, to be done, to chastise and punish.

'Provided always, that if a case of difficulty upon the determination of any of the premises, before you, or any two or more of you, shall happen to arise, then let judgment in no wise be given thereon before you or any two or more of you, unless in the presence of one of our justices of the one or other bench, or of one of our justices appointed to hold the assizes in the aforesaid county.

'And therefore we command you, and every of you, that to keeping the peace, ordinances, statutes, and all and singular other the premises, you diligently apply yourselves; and that at certain days and places which you, or any such two or more of you as is aforesaid, shall appoint for these purposes, into the premises ye make inquiry, and all and singular the premises hear and determine, and perform and fulfil them in the aforesaid form, doing therein what to justice appertains, according to the law and custom of England, saving to us the amerciaments and other things to us therefrom belonging.

'And we command, by the tenor of these presents, our sheriff of ——— that at certain days and places, which you, or any such two or more of you as is aforesaid, shall make known to him, he cause to come before you, or such two or more of you as aforesaid, so many and such good and lawful men of his bailiwick (as well within liberties as without) by whom the truth of the matter in the premises shall be the better known and inquired into.

'Lastly, we have assigned to you the aforesaid A. B., keeper of the rolls of our peace in our said county; and therefore you shall cause to be brought before you and your said fellows, at the days and places aforesaid, the writs, precepts, processes, and indictments aforesaid, that they may be inspected, and by a due course determined as is aforesaid.

'In witness whereof we have caused these our letters patent to be made. Witness ourself, at Westminster,' &c.

The words 'of whom any one of you the aforesaid A. B., C. D., E. F., &c. we will shall be one,' constitute the quorum clause, so called because when the commission was in Latin, the clause ran '*quorum* A. B. vel C. D. vel E. F., &c. unum esse volumus.'

The statute 1 Mary, sess. 2, c. 8, s. 2, prohibits sheriffs from exercising the office of justice of the peace during the time that they act as sheriffs. They might otherwise be called upon to act in the same matter both as judges and officers,—to execute, as sheriffs, precepts which they had issued as justices. It has been supposed that where a justice is elected coroner, he is discharged of his authority of justice. But if he be created a duke, archbishop, marquess, earl, viscount, baron, bishop, knight, judge, or serjeant-at-law, his authority as justice of the peace remains. (1 Edw. VI., c. 7.) By 5 Geo. II., c. 18, s. 2, attorneys, solicitors, and proctors are prohibited from acting as justices of the peace for any county during the time that they continue in practice.

A meeting of the justices held for the purpose of acting judicially for the whole district comprised within their commission constitutes a court of general session of the peace. By 12 Rich. II., c. 10, sessions are required to be held in every quarter of the year, or oftener if need be. The four sessions so held are styled courts of general quarter-session of the peace, or, in common parlance, 'quarter-sessions.' By different statutes the quarter-sessions are directed to be held at uniform periods. The times at which they are directed to be held are, the first week after the 11th of October, the first week after the 28th of December, the first week after the 31st of March, the first week after the 24th of June. Though the justices act irregularly in omitting to convene the quarter-sessions at the prescribed periods (except the April sessions, in respect of which power is expressly given to the justices to alter the time to any day between the 7th of March and the 22nd of April), sessions held as quarter-sessions in other periods of the quarter are legal quarter-sessions. When the business to be transacted at a court of quarter-sessions is not completed before the time at which it is thought desirable for the justices to separate, the court is usually adjourned to a subsequent day; so where there is reason to expect that new matters will arise which it will be desirable to dispose of before the next quarter-sessions Two justices, one of them being of the quorum, may at any time convene a general session of the peace; but at such additional session no business can be transacted which is directed by any act of parliament to be transacted at quarter sessions.

Both general sessions and general quarter-sessions are held by virtue of a precept under the hands of two justices requiring the sheriff to return a grand jury before them and their fellow-justices at a day certain, not less than fifteen days after the date of the precept, at a certain place within the district to which the commission extends, and to summon all coroners, keepers of gaols and houses of correction, high constables, and bailiffs of liberties [FRANCHISE] within the county.

Persons bound to attend at the sessions are:—First, all justices of the peace for the county or district. Secondly, the custos rotulorum of the county, who is bound to attend by himself or his deputy, with the rolls of the sessions. Thirdly, the sheriff by himself or his under-sheriff, to return the precept and lists of persons liable to serve on the grand or petty jury, to execute process, &c. Fourthly, the several coroners of the county or district. Fifthly, the constables of hundreds or high constables. Sixthly, all bailiffs of hundreds and liberties. Seventhly, the keepers of gaols, to bring and receive prisoners. Eighthly, the keeper of the house of correction, to give in a calendar and account of persons in his custody. Ninthly, all persons returned by the sheriff as jurors. Tenthly, all persons who have entered into a recognizance to answer charges to be made against them, or to prosecute or give evidence upon charges against others.

Persons summoned on grand or petty juries ought to be males between 21 and 60 years of age, who are possessed of 10*l.* a year in lands or rents, or 20*l.* a year in leaseholds for an unexpired term or terms of 21 years or more, or who are householders, rated to the poor on a value of not less than 20*l.* (in Middlesex 30*l.*) or who occupy houses containing not less than fifteen windows, and who are not peers, judges of the superior courts, clergymen, Roman Catholic priests, dissenting ministers following no secular employment but that of schoolmasters, serjeants, or barristers-at-law, doctors or advocates of civil law actually practising, officers of courts actually exercising the duties of their respective offices, coroners, gaolers or keepers of houses of correction, members or licentiates of the college of physicians actually practising, members of the royal colleges of surgeons in London, Edinburgh, or Dublin, and actually practising, certificated apothecaries actually practising, officers in the army or navy in full pay, pilots licensed by the Trinity House, masters of vessels in the Buoy and Light service, pilots licensed by the lord warden of the Cinque Ports or under any act of parliament or charter, household servants of the crown, officers of the customs or excise, sheriffs' officers, high constables, or parish clerks.

The justices in sessions have criminal jurisdiction, to be exercised partly according to the rules of common law and partly in a course prescribed by different acts of parliament; they have also jurisdiction in certain civil matters created by different statutes; they have an administrative power in certain county matters; and they have power to fine and imprison for contempt.

I. The criminal jurisdiction of justices in sessions, according to the course of common law, enables them to try felonies and those misdemeanors which are not directed by any statute to be tried in a summary way. It has been said that they have no jurisdiction in cases of perjury and forgery; but this opinion seems to have arisen from the circumstance that at common law these crimes were only misdemeanors, and the authority of the justices extended only to such misdemeanors as were specially mentioned in their commission, or which came within the description of trespasses; and though most species of forgery have since been made felony, the opinion that courts of quarter-sessions have no jurisdiction in cases of forgery is still commonly entertained.

The jurisdiction given by the commission of the peace, in respect of felonies, is expressed in very general terms, and in former times numerous executions for felony took place at the quarter-sessions. The practice during the present and the greater part of the last century has been however not to try at the sessions persons charged with capital crimes, but to leave them for trial by the judges at the assizes.

Previously to the 6 and 7 Will. IV., c. 114, it was in the discretion of the magistrate before whom the depositions were taken, whether he would allow them to be inspected; even the party accused had no right to demand a copy of the depositions, though in cases of treason or felony he was entitled to demand a list containing the names of the witnesses for the prosecution. But by that act (s. 3) 'all persons held to bail or committed to prison for any offence, are authorised to require and have, on demand, from the person who has the lawful custody thereof, copies of the examinations of the witnesses respectively upon whose depositions they were held to bail or committed to prison, on payment of a reasonable sum for the same, not exceeding three-halfpence for each folio of ninety words; subject to a proviso, that if such demand be not made before the day appointed for the commencement of the sessions at which the trial of the person on whose behalf such demand is made is to take place, such person is not to be entitled to have any copy of such examination of witnesses, unless the person to preside at such trial be of opinion that such copy may be made and delivered without delay or inconvenience to such trial. The chairman is however authorised to postpone the trial on account of such copy of the examination of witnesses not having been previously had by the party charged:' and by sec. 5, all persons under trial are authorised, at the time of their trial, to inspect, without fee or reward, all depositions (or copies thereof) which have been taken against them, and returned into the court before which such trial is had.

A prisoner or defendant, charged with a felony or a misdemeanor, cannot have the assistance of counsel to examine the witnesses, and reserve to himself the right of addressing the jury. But if he conduct his defence himself, and any point of law arises which he professes himself unable to argue, the court will hear it argued by counsel on his behalf.

II. The quarter-sessions have an original jurisdiction in all matters required to be done by two or more justices, except in cases in which a power is given of appealing to the sessions.

III. Statutes which give summary jurisdiction to one or more magistrates, in most cases allow their decision to be brought before the sessions by way of appeal. Notice of appeal is generally required, and the court is precluded from entertaining any objections not specified in the notice. Subject to this restriction, the case is heard as if the question were raised for the first time. Upon the hearing of an appeal in which several counsel are employed, the course of practice usually is this:—the senior counsel for the respondent (the party resisting the appeal) states his case in accordance with the decision appealed against. The witnesses and documents in support of that case having been produced and examined, the second counsel for the respondent addresses the court, and remarks upon the evidence which has been given. The senior counsel for the appellant then addresses the court; and if no evidence is produced on the part of the appellant, the case is closed, and the order, conviction, or other matter appealed against is confirmed or discharged, according to the view which the majority of the justices present at the moment of the decision take of the case, they being the judges in cases of appeal, both as to the law and the fact. Where however questions of difficulty in matter of law present themselves upon the hearing of an appeal, the party against whom the sessions decide frequently applies for leave to state a special case for the decision of the court of King's Bench: the majority of the justices may either grant or reject the application; and if no special case be stated, the judgment of the quarter-sessions upon an appeal, or upon any other matter in which they proceed in a course prescribed by statute, different from the course of the common law, cannot be reviewed by any other court. Where the quarter-sessions act as a court of criminal jurisdiction under the powers given by the commission, and according to the course of common law, a writ of error lies upon the judgment of the sessions to the court of King's Bench, and from that court to the Exchequer Chamber, and ultimately to the House of Lords.

IV. The quarter-sessions have jurisdiction over the appropriation of the county stock, an annual fund raised principally by county rates. This part of the business of the court is usually disposed of before any other, and in practice the first day of the sessions is exclusively devoted to what is called 'the county business.'

V. In common with other courts of record, justices of the peace, whether assembled in sessions, or sitting as individual magistrates, may vindicate their authority by fining and imprisoning for contempt. No superior court can inquire into the existence or non-existence of the fact which has been so treated as a contempt, or into the reasonableness of the fine imposed or imprisonment awarded. The court of quarter-sessions has however no power of punishing contempts or other offences committed by one of their own body.

The justices being assembled in sessions elect a chairman. A panel, or list of persons returned to serve on the grand-jury, being called over, twenty-three, if so many appear, are sworn to inquire of the truth of the matters which will be brought before them, and not to disclose what is brought before them. If twenty-three do not appear, the court may proceed with a smaller number; but nothing can be done by the grand-jury without the concurrence of twelve of its members, and it is not usual to take less than thirteen, though twelve may be sworn, if, after waiting a reasonable time, more do not attend. Those persons in the panel who do not answer to their names are liable to be fined; and where it is thought desirable to ensure full attendance in future, the whole panel is called over for the purpose of discovering and punishing all the defaulters. The grand-jury being sworn, the royal proclamation against vice and immorality is read by the clerk of the peace. The chairman delivers his charge to the grand jury, in which, as he is in possession of the depositions taken when the prisoners were committed, he calls their attention to such cases as appear to present any difficulty, and explains such points of law as are necessary for their guidance. The grand-jury then retire to their room to receive such bills of indictment as may be brought before them.

When the business of the sessions is such as to be likely to occupy one court more than three days, it is usual to appoint a second chairman to preside in a separate court, under the authority of 59 Geo. III., c. 28. The bills of indictment for offences to be prosecuted at the sessions being prepared, the witnesses in support of the charge are sworn in court. The bills of indictment on parchment, with the names of the witnesses indorsed thereon, are taken to the grand-jury, who call in and examine the witnesses in succession, no other person being present. The examination being concluded, if a majority consisting of not less than twelve are of opinion that the charge is supported by the evidence, the bill of indictment is indorsed 'a true bill,' or the indorsement may state that the bill is true in such and such parts, and not true in others, or the grand-jury may themselves strike out or alter any part of the bill, and return it in its corrected form as a true bill generally. If a majority of the grand-jury think that the party is not guilty, or if the number that think him guilty be less than twelve, they indorse 'not a true bill;' though in the latter case the old form of indorsement, 'ignoramus' (we do not know), seems to be more correct. It not unfrequently happens that grand-jurors return 'a true bill' where the evidence which has been brought before them is such as merely to raise in their minds a strong suspicion of the guilt of the party accused, acting under an impression that it is not their duty to try the guilt of the party, and that the inquiry which has taken place in the grand-jury room is in the nature of a precognition little differing from the preliminary examination which takes place before a magistrate, who is bound to commit or to require bail if a probable cause of guilt be made out. By the common law of England, a man is not liable to punishment until the fact charged against him has been found to be true by the oath of twelve men (whether grand-jurors, leet-jurors, or jurors impanelled to try an issue in a civil cause involving a charge of crime), nor until such finding has been afterwards confirmed by the verdict of twelve others, forming the petty-jury, or by the confession of the party by pleading guilty in open court. The judgment of the court ought in strictness perhaps to be considered as founded upon the presentment of the grand-jury, and the proceedings which take place before the petty-jury may be said to be less a trial of the guilt or innocence of the prisoner than a trial of the truth or falsehood of the indictment. The grand-jury are sworn to inquire, not whether the accused ought to be put upon his trial, but whether the matter in respect of which they are to make their presentment, contained in the bill of indictment, which directly and unequivocally asserts that a crime has been committed by the party, is or is not true. To return a bill as true upon less evidence than that which, if uncontradicted, would be satisfactory proof of guilt, seems to be at variance with an oath to present the whole truth and nothing but the truth. There appears to be no substantial distinction between a finding by the grand-jury that the party has committed the offence charged, and a verdict of 'guilty' pronounced by a petty-jury. The finding of a true bill where the evidence is not sufficient to convict, is a wrong to the party accused. On the other hand, the justice of the country is not unfrequently defeated by forcing on a criminal charge to its final decision at a time when evidence sufficient to show the real character of the transaction has not been obtained; and by the inconsiderate haste of grand-juries in finding bills, the most atrocious crimes have not unfrequently obtained a total exemption from punishment. (8 Howell, *State Trials*, 821, 836, 838; Burn's *Justice*, 'Indictment V.')

The bill, being indorsed, is brought into court by the grand-jury, and delivered to the clerk of the peace, who reads the indorsement with the name of the prisoner and the nature of the charge. By finding the bill to be true, either generally or in part, the grand-jury are become indictors, and the party charged the indictee; but these terms are nearly obsolete. The indictee is brought to the bar by the gaoler if in custody, or if out on bail, he comes of his own accord in discharge of his bail. He is then arraigned, and the trial proceeds in the same manner as at the assizes. [Trial.] If the prisoner be found not guilty, he is immediately set at liberty, unless there be some other matter before the court upon which he ought to be detained. If a verdict of guilty be returned, the sentence is pronounced by the chairman, such sentence, where the amount of punishment attached to the offence is not fixed, being first determined by the opinion of the majority of the justices present.

The sessions cannot be held without the presence of two justices at least; nor can they be adjourned by one justice, though two or more may previously have been present. Every act done as an act of sessions, before two justices have met, or after two have ceased to be present, is void.

The crown may grant a commission of the peace not only for an entire county, but also for a particular district within the county. In order however to exclude the interference of the county justices in the particular district, it is necessary either to introduce into the commission of the peace for the particular district a clause excluding the jurisdiction of the county magistrates, which is called a nonintromittant clause, or to grant a new commission to the county magistrates excluding the particular district. If the former, which is the usual course, be taken, the county magistrates may still hold their sessions within the particular district, though they can exercise no jurisdiction in respect of matters arising within the district.

Petty and Special Sessions.—A meeting held by justices for the transaction of magisterial business arising within a particular district forming a subdivision of the county or district comprised in the commission of the peace, is called a petty session; and if the meeting be convened for some particular or special object, as the appointment of overseers of the poor, of waywardens, of examiners of weights and measures, &c., it is called a special session. A meeting of magistrates cannot legally act as a special session, unless all the magistrates of the particular division are present, or have had reasonable notice to attend.

Borough Sessions.—The Municipal Corporation Act (5 & 6 Wm. IV., c. 76) directs that the recorder of any city or borough to which a separate court of quarter-sessions is granted under the provisions of that act, shall be the sole judge of such court [Recorder], leaving the ordinary duties of magistrates out of sessions to be performed by the justices of the peace appointed by the crown for such city or borough. The recorder is required to hold a court of quarter-sessions once in every quarter of a year, or at such other and more frequent times as he may think fit, or as the crown may direct. Borough quarter-sessions are not however, like county quarter-sessions, appointed to be held in particular weeks. In case of sickness or unavoidable absence, the recorder is authorised, with the consent of the town council, to appoint a barrister of five years' standing to act as deputy recorder at the next session, but no longer. In the absence of the recorder and of any deputy recorder, the court may be opened and adjourned, and the recognisances respited, by the mayor; but the mayor is not authorised to do any other judicial act. Where it appears to the recorder that the sessions are likely to last more than three days, he may appoint an 'assistant-barrister' of five years' standing to hold a second court, for the trial of such felonies and misdemeanors as shall be referred to him, provided it has been certified to the recorder, by the mayor and two aldermen, that the council have resolved that such a course is expedient, and the name of the intended assistant-barrister has been approved of by a secretary of state.

Every burgess of a borough (or citizen of a city), having a court of quarter-session (unless exempt or disqualified otherwise than in respect of property), is liable to serve on grand and petty juries. Members of the town-council, and the justices of the peace, treasurer, and town-clerk of the borough, are exempt and disqualified from serving on juries within the borough; and they and all burgesses of boroughs having separate quarter-sessions are exempt from liability to serve on petty juries at the county sessions.

Under the 105th section of the Municipal Corporation Act, the recorder has jurisdiction in respect of all crimes cognizable by courts of quarter-session in counties; but he is expressly restricted from making or levying any rate in the nature of a county rate, or granting any licence to keep an inn, &c., and from exercising any of the powers vested in the town-council. Other matters required by statute to be done at quarter-sessions, and not expressly transferred to the town-council, devolve upon the recorder, as the appointment of inspectors of weights and measures, &c. Persons imprisoned in a borough gaol by county magistrates, under 6 and 7 Will. IV., cap. 105, may be tried at the borough sessions for offences committed out of the borough.

All criminal jurisdiction, which, before the passing of the Municipal Corporation Act, existed in any borough to which no court of quarter-sessions has since been granted, is taken away by the 107th section of that act.

SESTE'RTIUS, a Roman coin, which originally consisted of 2½ asses, as the name implies, *sestertius* being a contraction of *semis tertius, the third a-half*, which is the Roman way of expressing *two and a half*. The sestertius belonged both to the brass and silver coinage; and in both it was of the same value, namely, one-fourth of the denarius. This value agreed with its value in asses so long as the denarius consisted of 10 asses. But at an early period the as was reduced in value, and 16 asses made equal to the denarius [As], and then the sestertius, its value with reference to the denarius remaining the same, became of course equal to 4 asses. On Mr. Hussey's computation the value of the denarius after the reduction was 8½*d.* and therefore the sestertius was worth 2⅛*d.* After the time of Augustus the denarius was reduced to the eighth of an ounce, and was worth 7½*d.*, and therefore the sestertius was worth 1⅞*d.* The sestertius of the brass coinage was made of the same metal as the As.

The Romans generally reckoned sums of money in sestertii, although the coin used in making payments was commonly the denarius. Large sums they reckoned by *sestertia*, that is, sums of *a thousand sestertii*. It is very important to attend to the phrases used in such computations. The coin itself was called *sestertius*, or *sestertius nummus*, or simply *nummus*. The sum of a thousand sestertii was expressed by *mile sestertii*, or *M. sestertium*, or *M. nummi*, or *M. nummum* or *nummorum*, or *M. sestertii nummi*, or *M. sestertium nummum*. The singular *sestertium* is never used for a thousand sestertii, but the plural *sestertia* is used for all multiples of a thousand sestertii, up to a thousand; sometimes the word *millia* (thousands) is used instead of *sestertia;* sometimes neither word is expressed; and sometimes *nummum* is added. Thus 600,000 sestertii, or 600 sestertia, might be expressed by any of the following phrases: *sescenta sestertia*, *sescenta millia*, *sescenta* alone, or *sescenta sestertia nummum*. Sums of 1000 *sestertia* and upwards were expressed by the numeral adverbs with the termination *ies*, which implies that the number to which it is affixed is to be multiplied by 100. Thus *decies*, *undecies*, *duodecies*, *vicies tricies*, *tricies*, *quinquies*, stand respectively for, 1000, 1100, 1200, 2000, 3000, 3500 sestertia. These forms are however sometimes varied. Thus Cicero (*in Verr.*, ii. 1, 39) uses *quaterdecies* for 1400, and *decies et octingenta millia* for 1800 sestertia. When two such adverbs come together, if the larger is first, they must be added together; but if the smaller is first, they must be multiplied. Thus we have in a passage of Suetonius (*Aug.*, 101), *millies et quingenties* for 150,000 sestertia, and immediately afterwards *quaterdecies millies* for 1,400,000 sestertia. (In the latter case, care must be taken not to reckon the termination *ies* twice over in multiplying; it is not 1400×100,000, but 14×1000×100).

The symbol HS or IIS is often used both for *sestertii* and for *sestertia*. It stands for *libra libra semis* (two pounds and a half). When applied to *sestertii* its meaning is clear enough, since the as was originally a pound (*libra*) of brass. When applied to *sestertia* it meant, according to Gronovius (*Pec. Vet.*, i. 4, 11), two pounds and a half of silver, which he calculates to have been originally equal to 1000 sestertii, and therefore to have represented that value ever after. It is often difficult to determine whether the symbol HS stands for *sestertii* or *sestertia*. When the numeral is written in cypher, and has a line over it, it stands for the adverb in *ies*, and the HS means *sestertia:* thus, HS. $\overline{\text{CCCC}}$ is *quadringenties*, or forty thousand *sestertia*. Sometimes the numeral is found with the singular of *sestertium*, as *sestertii decies*, or *sestertio decies* Gronovius explains these forms, and also the use of *sestertium* with the adverb in *ies* (which he considers to be, in this case, an accusative singular), by understanding with them the word *pondus*, a pound (of silver), according to which *sestertium* in these forms means two pounds and a half of silver, or 1000 sestertii. Hence if these forms are used with a numeral in cypher, they mean the number of *sestertia* represented by the adverb in *ies* of that numeral. Thus *sestertio X* is *decies* or 1000 *sestertia*.

According to the value given above for the *sestertius*, the *sestertium* was worth 8*l.* 17*s.* 1*d.*

The word *sestertius* is often used indefinitely for any very small sum. (Hussey *On the Antient Weights and Money*, c. x., § 1, 3, 6.)

SESTI'NI, DOME'NICO, born at Florence about 1750, studied classical literature, and applied himself chiefly to archæology. About 1774 he went to Sicily, where the Prince of Biscari retained him for his librarian and keeper of his rich cabinet of antiquities at Catania. In 1778 Sestini proceeded to Constantinople, where he became tutor to the sons of Count Ludolfi, the Neapolitan ambassador at the Porte. He made several journeys with his pupils through various provinces of the Ottoman empire. He was afterwards employed by Sir Robert Ainslie, the English ambassador at the Porte, to collect medals for him. Subsequently he went with Mr. Sullivan as far as Bushir, and returned to Constantinople in 1782. The published narratives of his journeys are:—1, 'Lettere scritte dalla Sicilia e dalla Turchia à diversi amici in Toscana,' 7 vols., 12mo., translated into French at Paris in 1809; 2, 'Lettere Odeporiche,' 1785, translated into French under the title of 'Voyage dans la Grece Asiatique, à la Péninsule de Cyzique, à Brusse et à Nicée,' with a Flora of Mount Olympus, Paris, 1789; 3, 'Viaggio da Costantinopoli à Bucharest,' Rome, 1794,; 4, 'Viaggio da Costantinopoli à Bassora e ritorno,' also translated into French; 5, 'Viaggi ed Opuscoli Diversi,' 8vo., Berlin, 1807. This work contains the account of a journey made by the author in 1781, from Vienna to Rukschuk by the Danube, and from thence by Varna to Constantinople; an account of the sect of the Yezidis, which was afterwards inserted by Sylvestre de Sacy, in his 'Description du Pachalik de Bagdad;' a treatise on the 'murex' of the antients, &c.; 6, Viaggio Curioso, Scientifico, Antiquario, per la Valachia, Transilvania, ed Ungheria sino à Vienna,' Florence, 1815; 7, 'Agricoltura Prodotti e Commercio della Sicilia,' of which only one volume was published, at Florence, 1777.

From Constantinople Sestini returned to Italy, where he published several of his works. He sailed again for the Levant in 1793, and went to Salonichi, where he became acquainted with Cousinery, the French consul and antiquarian; he thence returned to Tuscany, and from Tuscany to Germany. He resided many years at Berlin, which he left after the battle of Jena. He then repaired to Paris, and in 1810 he returned to Florence, where he was appointed antiquarian to the grand-duchess Elise, Napoleon's sister. After the restoration in 1814 he was appointed by the grand-duke Ferdinand honorary professor in the university of Pisa. He afterwards repaired to Hungary, where he remained some time occupied in arranging the rich collection of medals of Count Wiczay at Hederwar, of which Father Caronni, a Barnabite and an antiquarian, who went over part of the same ground as Sestini, but was inferior to him in judgment and experience, had published an imperfect catalogue in 1812. The present grand-duke of Tuscany, Leopold II., appointed Sestini to the office of royal antiquarian, and after his death, which took place at Florence in 1832, he purchased his valuable library and numerous MSS., among the rest his great work on numismatics, 'Sistema Numismatico,' 14 vols. fol.

Among the published works of Sestini on his favourite science of numismatics, which he illustrated by means of geography, and *vice versâ*, the following deserve especial mention:—1, 'Classes generales Geographiæ Numismaticæ, seu Monetæ Urbium, Populorum, et Regum, ordine geographico et chronologico dispositæ secundum systema Eckelianum,' 4to., Leipzig, 1797, a work more complete than those of Eckel, Lipsius, and Pinkerton. In the first part Sestini gives a series of medals of more than a 1000 cities, and of 240 sovereigns; and in the second is a list of cities to which Goltz and Ligorio have attributed apocryphal medals, and of many more to which medals have been erroneously distributed and misapplied; 2, 'Considerazioni sulla Confederazione degli Achei,' with plates of all the medals of the confederate cities; 3, 'Relazione su i Moderni Falsificatori,' in which he exposes the tricks of those who coin medals which they pass for antient; 4, 'Descriptio Nummorum Veterum ex Museis Ainslie, Bellini, Bonducca, Borgia, Casoli, Cousinéry, Gradenigo, San Clemente, von Schellersheim, Verità,' &c., fol., Leipzig, 1796; 5, 'Descrizione degli Stateri Antichi, illustrati colle Medaglie,' 4to., Florence, 1817; 6, 'Lettere Numismatiche,' 9 vols., published at different periods, and containing many valuable dissertations, such as upon Armenian coins, upon the æra of the Arsacidæ, upon a rare set of medals of Ptolemy, son of Juba II., upon a medal of Aëropus III., king of Macedonia, &c.; 7, 'Descrizione di alcune Medaglie Greche del Museo Fontana,' 3 vols. 4to., Florence. 1822-9; 8, 'Descrizione di alcune Medaglie Greche del Museo del Barone di Chaudoir,' 4to., 1831; 9, 'Catalogus Nummorum Veterum Musei Arigoniani, dispositus secundum sistema geographicum,' fol.; 10, 'Descrizione delle Medaglio Greche e Romane del fú Benkowitz;' 11, 'Illustrazione d'un Vaso di Vetro con edifizi e leggende;' the vase was found at Populonia near Piombino; 12, 'Dissertazione intorno al Virgilio di Aproniano, codice piezioso della Laurenziana;' this is an account of a MS. copy of Virgil on parchment, which exists in the Laurentian or Medici library at Florence, written by a certain Apronianus, who is supposed to be Turcius Rufius Asterius Apronianus, who was consul A.D. 494; 14, 'A Catalogue, with illustrations, of the valuable Museum Hederwar in Hungary,' in 3 vols.

Sestini ranks among the first numismatists of any age or country. He was in correspondence with the most learned of his contemporaries, and was intimate with Eckel, Neuman, Cardinal Borgia, Cousinery, and others; and was member of the academies of Paris, Petersburg, Munich, &c. (*Necrologia di Domenico Sestini*, in the *Antologia* of Florence, July, 1832.)

SESTOS (Σηστός), the chief city of the Thracian Chersonesus, was situated on the Hellespont. In very remote times it was under the same government as Abydos, which was on the opposite Asiatic coast. [ABYDOS.] Theopompus says that Sestos was a small but well-fortified town, which was connected with the port by a wall (σκέλος) of two hundred feet, in length apparently; and that, owing to its position, and the current from the Propontis, it commanded the channel. At the close of the great Persian war, some Persians under Oeobazus and Artayctes took refuge in Sestos on hearing of the approach of the Greeks towards the Hellespont. The town was besieged by the Athenians, and the inhabitants, after being reduced to the greatest straits by famine, opened the gates. Artayctes, who had escaped from the city before the surrender, was caught and crucified. The capture of Sestos (B.C. 479) terminated this great campaign, which was signalized by the victories of Salamis, Plataea, and Mycale; and with this event the history of Herodotus closes. (Strabo, p. 591; Herod., ix. 121; Thucyd., i. 89.)

SESTRI. [SPEZIA.]

SESTRI DI LEVANTE. [CHIAVARI.]

SESTRI DI PONENTE. [GENOA.]

SET-OFF, in Law, is the amount of the debt due to a defendant from a plaintiff, which the defendant is entitled to set off in answer either to the whole or part, as the case may be, of the plaintiff's demand. At common law, if the plaintiff was indebted to the defendant in an ascertained sum in respect of the same transaction concerning which the action was brought, the defendant was entitled to deduct at the trial so much from the plaintiff's demand. But if the debt due from the plaintiff accrued in respect of another transaction, the defendant had no such power; and he was either compelled to bring an action against the plaintiff for what was due to him, or, if he wished to avail himself of his cross-demand without bringing another action, to apply after the action had been commenced against him to a court of equity for the purpose of adjusting the claims of himself and the plaintiff. To obviate the expense and inconvenience of such a course, it was enacted by 2 Geo. II., c. 22, s. 13, that 'where there are mutual debts between the plaintiff and defendant, or if either party sue or be sued as executor or administrator, where there are mutual debts between the testator or intestate and either party, one debt may be set against the other; and such matter may be given in evidence upon the general issue, or pleaded in bar, as the nature of the case shall require, so as at the time of pleading the general issue, where any such debt of the plaintiff, his testator or intestate, is intended to be insisted on in evidence, notice shall be given of the particular sum or debt so intended to be insisted on, and upon what account it became due; or otherwise such matter shall not be allowed in evidence upon the general issue.' To remove the doubts which existed whether under this statute debts of a different nature could be set off against each other, it was afterwards, by the statute 8 Geo. II. c. 24, s. 4, enacted and declared, 'that by virtue of the said clause mutual debts may be set off against each other, either by being pleaded in bar or given in evidence on the general issue in the manner therein mentioned, notwithstanding that such debts are deemed in law to be of a different nature; unless in cases where either of the said debts shall accrue by reason of a penalty contained in any bond or specialty; and in all cases where either the debt for which the action has been or shall be brought, or the debt intended to be set against the same hath accrued or shall accrue by reason of any such penalty, the debt intended to be set off shall be pleaded in bar; in which case plea shall be shown how much is truly and justly due on either side: and in case the plaintiff shall recover in any such action or suit, judgment shall be entered for no more than shall appear to be truly and justly due to him, after one debt being set off against the other as aforesaid.'

Upon these enactments is founded the whole law on the subject, and the defendant may avail himself of his set off in actions of debt, covenant, and assumpsit for the non-payment of money, provided the subject-matter of the set off is a liquidated, that is, an ascertained sum, due and recoverable at the time of the commencement of the action, and might have been the subject of any one of the kind of actions above named. A claim for damages not ascertained cannot be set off, even although they relate to the subject-matter of the action itself. For instance, in an action for goods delivered, the defendant cannot set off the loss which he has suffered by their non-delivery at the proper time, &c. There must also be an entire mutuality between the debt sued for and the set off. Thus a debt due from the plaintiff together with other parties cannot be set off against a debt due to the plaintiff alone; nor can a debt due to the defendant personally be set off to a demand against him as executor, &c.: and the rule of law is the same for the converse of these cases. It is consistent with this rule that when an action is brought by or against a trustee, a set off may be made of money due to or from the party for whom he is trustee.

A plea of set off must describe the debt intended to be set off with the same certainty and particularity as would be necessary in a declaration, which indeed such a plea in several respects much resembles. If for instance a plea of set off contains several parts stating distinct debts, these are analogous to distinct counts in a declaration, and one may be sustained although the others may not. The same degree of certainty has been required in a notice of set off. But by a general rule of Hilary term, 4 Will. IV., which orders that 'set off and mutual credit must be pleaded,' it should seem that notice of set off is now abolished. (Montagu *on Set Off;* Tidd's *Practice;* Chitty *on Pleading*.)

By the Bankrupt Act (6 Geo. IV., c. 16, s. 50) it is enacted 'That where there has been mutual credit given by the bankrupt and any other person, or where there are mutual debts between the bankrupt and any other person, the commissioners shall state the account between them, and one debt or demand may be set against another, notwithstanding any prior act of bankruptcy committed by such bankrupt before the credit given or the debt contracted by him; and what shall appear due on either side on the balance of such account, and no more, shall be claimed or paid on either side respectively, and every debt or demand hereby made provable against the estate of the bankrupt, may also be set off in manner aforesaid against such estate· provided that the person claiming the benefit of such se off had not, when such credit was given, notice of an act o bankruptcy by such bankrupt committed.' Various questions have arisen under this clause, with respect both to the words 'mutual credit' and 'debt or demand.' The 'debt' must be an ascertained sum at the time of the bankruptcy. If it is a debt arising in respect of some dealings, such as consignments, the amount of which is not ascertained at the time of the bankruptcy, but is ascertained afterwards, such debt is not a 'debt' within the meaning of the act of parliament.

SETA'RIA, a genus of Grasses containing a few species cultivated as corn-grains in some countries. The genus is named from *seta*, a bristle, on account of the bristly nature of the involucrum. The species are found in both the hot and temperate parts of the world. The genus nearly corresponds in character with Panicum, under which it is sometimes included, but it is also combined with Pennisetum. It is characterised by having the spikelets 2-flowered, supported by two or more bristles. The lower valve is the smallest. The lower flower is neuter or male, with the valves of the corol coriaceous and indurated, awnless, the lower one embracing the other, petaloid scales very obtuse and subfalcate. Germen emarginate. Seed included within the persistent glumes.

The species are found both in the hot and temperate parts of the world. Two are indigenous in England, *S. verticellata* and *S. viridis*, and called bristle-grass. The first is found also in India and America; birds are partial to the seed of the latter. *S. Germanica* is cultivated in Hungary as food for horses, and is preferred for this purpose to many other grasses. *S. italica* is cultivated in Italy and other parts of Europe, sometimes called millet (*Panicum Miliaceum*) and employed for the same purposes. It may be distinguished by the name of Italian millet; though it has, no doubt, been introduced from Eastern regions, perhaps from India, where it is extensively cultivated as one of their dry or small grains, and forms an article of diet with the natives. It is called *kora* and *kungnee*, and is the *sumak* of the Arabs. It requires an elevated, light, and tolerably dry soil. It is sown in June and July, and the harvest gathered in September; the produce being about fifty-fold in a favourable season. A second crop may be had from the same ground, between September and the end of January.

SETON. [Issue.]

SETTER, the name for that variety of the Dog which partakes of the characters of the Pointer and Spaniel, *Canis familiaris Index* of Caius.

The setter is less liable to be foot-sore than the pointer; but is generally considered more difficult to break. When however a well-broken well-bred setter is hunted frequently, no dog trained to the gun does his work better or is more staunch. The breed originated in all probability between the large English spaniel and the Spanish pointer.

This variety possesses a high degree of intelligence, and is capable of the strongest attachment. Mr. Bell's account of a favourite of this breed is so interesting that we give it in his own words:—

'By far the most interesting, and, if I may so employ the term, amiable animal I have ever known, was a bitch of this kind, formerly belonging to my father, which he had from a puppy, and which, although never regularly broke, was the best dog in the field that he ever possessed. The very expression of poor Juno's countenance was full of sensibility and affection. She appeared to be always on the watch to evince her love and gratitude to those who were kind to her; and the instinct of attachment was in her so powerful, that it showed itself in her conduct to other animals as well as to her human friends. A kitten which had been lately taken from its mother was sent to us, and, on Juno's approach, showed the usual horror of the cat towards dogs. But Juno seemed determined to conquer the antipathy, and, by the most winning and persevering kindness and forbearance, advancing or receding as she found the waywardness of her new friend's temper required, she completely attached the kitten to her; and as she had lately lost her puppies, and still had some milk left, I have often seen them lying together before the fire, the kitten sucking her kind foster-mother, who was licking and caressing her as her own offspring. She would also play with great gentleness with some tame rabbits of mine, and would entice them to familiarity by the kindness of her manner; and so fond was she of caressing the young of her own species, that when a spaniel bitch of my father's had puppies, of which all excepting one were destroyed, Juno would take every opportunity to steal the remaining one from its mother's nest and carry it to her own, where she would lick and fondle it with the greatest tenderness. Poor Busy, the mother, also a good-tempered creature, as soon as she had discovered the theft, hastened of course to bring back her little one, which was again to be stolen on the first favourable opportunity until at length the two bitches killed the poor puppy between them, as they were endeavouring each to pull it from the other; and all this with the most perfect, mutual, good understanding. Juno lived to a good old age, an unspoiled pet, after her master had shot to her for fourteen seasons.' (*British Quadrupeds.*)

SETTLE. [Yorkshire.]

SETTLEMENT. A settlement, in the most general sense of the word, is a disposition of property of any kind made for certain purposes by the owner, who, in relation to such disposition, is called the settlor or grantor. A settlement in this sense may be made either by deed or by will, but the term is most commonly applied to such settlements only as are made by a deed.

A consideration is not necessary for the validity of a deed at law. Though a deed may in many cases be void as against strangers for want of consideration, it is valid as between the parties. [Deed.] Settlements by deed therefore may be either made upon valuable or good consideration, or they may be purely voluntary.

The most important species of settlements, to which indeed, in strict legal language, the term is exclusively applied, are marriage settlements; and these may be either such as are made previous to and in consideration of marriage, or subsequent to it.

Settlements of property are frequently made by will, with reference to an existing or future marriage. The forms and provisions contained in such instruments are of course often very similar to those in deeds made for like purposes. But dispositions of this kind are to be regarded in all respects as wills, and are governed by the same rules as other instruments of the like nature. [Will.]

Settlements in consideration of marriage include not only such as are actually made and executed before marriage, but also such as are executed after marriage in pursuance of articles in writing drawn up and signed before marriage.

1. First, as to the specific performance of articles and agreements to settle property:—

In Equity no regard is paid to the form of marriage articles, and the construction of them depends entirely upon the intentions and objects of the parties.

When the intended husband and wife are both of full age at the time of the marriage, they are of course competent to enter into any agreement for the settlement of their respective estates, and all such agreements will be enforced in Equity; but if the parties are one or both of them minors at the time, the case is different.

When the husband is adult and the wife a minor, if the subject be real estate of the wife, the husband will be bound by the articles in respect of his marital interest in the lands; that is, for the estate which he takes during the joint lives of himself and his wife, and as tenant by the curtesy if he survive her and there have been issue of the marriage: but the wife will not be bound by them; and, if she die during infancy or after attaining majority, but without having confirmed the settlement in the mode prescribed by the law for disposition of real estate by married women, her heir will take the property unfettered by the articles. Again, if, in the case supposed, the property be personalty of the wife (which, in the absence of a settlement, would become the property of the husband), the articles will be valid as respects both husband and wife, being, in effect, the settlement of the husband. And this is true also as to chattels real and *choses in action* which become reducible into possession during the coverture; but, as to property already settled to the separate use of the wife, and *choses in action* which do not, in event, become reducible into possession during the coverture, the wife will not be bound by the articles.

If a male infant marry an adult female, he is bound by the articles entered into by her for the settlement of her estate, and must execute them when he comes of age, whatever be the nature of the property: but as to his own estate he will not be bound by them.

When the husband and wife are both minors at the time of the marriage, the articles are absolutely null as respects them, unless confirmed after the attainment of majority. In such a case a confirmation of the articles by the wife must be express, and made in the same manner as any other alienation of property by a married woman; but confirmation on the part of the husband will often be implied from circumstances, such as the acceptance by him of any property under the articles.

It has sometimes been thought that the consent of parents or guardians, and the sanction of the Court of Chancery, might give effect to settlements of their property by infants, which would not have been otherwise binding; but it may now be considered as settled that there is no foundation for such a doctrine.

Marriage is regarded by the law as a valuable consideration, and will support a covenant entered into by a third party to settle property upon the husband and wife and their issue, whether the settlor be one under a natural obligation to make a provision, as in the case of a parent, or merely a stranger; and such a covenant will be enforced not only against the settlor himself, but against his heir, devisee, or personal representative.

Settlements made after marriage, when no valuable consideration, that is to say, no consideration in money or property, is given for them, are generally called, in contradistinction to those made upon marriage, voluntary settlements, and the persons who take under them are called volunteers; though, as such settlements may have good considerations to support them, the application of the term is not always strictly accurate. By a good consideration, as distinguished from a valuable one, is here meant that love and affection which is naturally supposed to subsist between near relations, such as parents and children, brothers and sisters, uncles and nephews or nieces.

Specific performance of voluntary covenants to settle property will be enforced in Equity only in favour of those persons for whom the covenantor is under a natural and moral obligation to provide, that is to say, in favour of his wife or children, but not in favour of any other class of volunteers. If however any valuable consideration has really been given either by the person who, by himself or his representative, claims execution of the articles, or by a third person, in favour of the object of the limitation, specific performance will be decreed, and no objection can be made on account of want of relationship between the parties: and, for this purpose, it is sufficient if the fact of a consideration being given can be inferred from the circumstances. Though a person whose claim is not supported by a good or valuable consideration cannot himself compel the execution of articles in his favour, he may yet have the benefit of a suit instituted by another, for in decreeing specific performance the court executes the entire articles, though they may embrace limitations to persons in whose favour it would not have originally interfered.

2. Next, as to the validity of marriage-settlements against creditors and purchasers.

Marriage being a valuable consideration, the circumstance of the settlor being indebted, or even insolvent, at the time of the execution of the settlement, can have no effect on its validity, even though the persons who have the benefit of the settlement should have full notice of such insolvency. A conveyance or assignment of property in consideration of marriage stands on the same ground with a sale for money, which is not affected by the insolvency of the vendor. If however the settlor be a trader, and a fiat in bankruptcy has issued against him prior to the execution of the settlement upon which he is afterwards duly found a bankrupt, such settlement, like all other conveyances of the bankrupt under the same circumstances, will be void; and it would seem that a settlement must in all cases be void as respects the wife, if she had notice of a prior act of bankruptcy, and a fiat issues within twelve calendar months after such act of bankruptcy. (2 & 3 Vic., c. 29, and 2 & 3 Vic., c. 11, s. 13.)

The marriage consideration does not extend or give the character of purchasers to all persons in whose favour limitations may have been introduced into the settlement. In relation to any other persons than the husband and wife and the issue, the settlement is, it seems, to be considered as voluntary, and subject therefore to the rules applicable to voluntary gifts and covenants.

Settlements made after marriage, it is obvious, can derive no support from the consideration of marriage, and their validity or invalidity must therefore depend upon other circumstances.

A postnuptial settlement by the husband, of any species of property made in consequence of a valuable consideration moving either from the wife herself, who gives up an interest that she possesses in property over which she has a disposing power, or from her relations or friends, is good against all persons whatsoever, if the consideration be not so inadequate as to raise the presumption of fraud. And even in case of inadequate consideration, the settlement, it seems, will be good to the amount of the consideration. It is sufficient if the consideration, though not paid, is properly secured. Contemporaneous settlements will in general be presumed to have been made in consideration of each other; and it seems that parole evidence of consideration is admissible, though none appear upon the instrument itself.

The statute 13 Eliz., c. 5, enacts that 'all conveyances, &c. of lands and tenements, goods and chattels, made of malice, fraud, covin, collusion, or guile, for the intent or purpose of delaying or defrauding creditors and others of their just and lawful actions, suits, debts, &c., shall be deemed and taken (only as against those persons, their heirs, successors, executors, &c.) to be clearly and utterly void, frustrate, and of none effect; any pretence, colour, feigned consideration, expressing of use, or any other matter or thing to the contrary notwithstanding.' But the act is expressed not to extend to any interest or estate made, conveyed, or assured, upon *good consideration and bonâ fide*, to any person or persons 'not having at the time of any such conveyance or assurance to them made any manner of notice or knowledge of such covin, fraud, or collusion as is afore said.' Upon this statute it has been determined, (1) That if the settlor be not indebted at the time, the settlement, even though entirely voluntary, is good against subsequent creditors; (2) That the mere existence of debts at the date of the settlement will not invalidate it if the settlor be solvent; that is, if he be possessed of property sufficient for the payment of his debts independent of the property so aliened; (3) That a settlement which might have been invalidated in the hands of the donee will be good against the creditors of the donor in the hands of a purchaser from the donee for valuable consideration without notice.

Voluntary obligations not affecting particular property, such as bonds, though the grantor should have been solvent at the time of making them, will not, it seems, entitle the grantee to come in *pari passu* with creditors for value, who will always be preferred; but the cancellation or release of a voluntary obligation, if untainted by fraud, may form a valuable consideration for the conveyance of property or for a substituted engagement.

By the 27 Eliz., c. 4, all conveyances, &c. of lands, tenements, or hereditaments are declared void when made with intent to defraud subsequent purchasers for money or other good consideration; 'any pretence, colour, feigned consideration, or expressing of any use or uses, to the contrary notwithstanding.' There is a saving of all conveyances made upon *good consideration and bonâ fide*. It also makes void, as against the same persons, all conveyances 'with any clause, provision, article, or condition of revocation, determination, or alteration at (the grantor's) will or pleasure,' whether such clause extend to the whole interest conveyed, or only partially affect it; but then follows a proviso 'that no lawful mortgage made *bonâ fide* and without fraud or covin, upon good consideration, shall be impeached or impaired by force of this act.' This statute has been construed to extend to all voluntary conveyances, though not in fact made with intent to defraud, and though the purchaser had notice of the prior conveyance. The consequence of this is, though probably not intended by the framers of the act, that it is impossible to make an irrevocable free gift of lands or tenements. As to what is a voluntary settlement, and what is a good consideration to sustain a settlement against a subsequent purchaser under this act, see Sugden, *On Vendors and Purchasers*, vol. ii., p. 161, *et seq.*

The statute 27 Eliz., c. 4, does not apply to personal estate. It has been determined on this act, by analogy to the determination on the last-mentioned act as to creditors, that a purchaser from a voluntary grantee will be preferred to a subsequent purchaser from the grantor. The *good* consideration mentioned in this and the preceding statute must be a valuable consideration (that is to say), either a property or marriage consideration. The consideration of blood has no application to either of these statutes, and therefore a conveyance made in consideration of 'natural love and affection,' as in the case of a postnuptial settlement upon a wife and children, is considered, for the purposes of these statutes, as voluntary. It has been decided however that a husband, having made a voluntary settlement on his wife and children, has no equity to compel specific performance of his contract with a subsequent purchaser; but he can sell the property which he has so settled, and the purchaser will have a good title, and can enforce performance of the contract for sale, if the husband should refuse to convey the property.

By stat. 21 Jac. I., c. 19, all voluntary settlements of traders were invalidated by their bankruptcy, though they might have been solvent at the time of making them; but the stat. 6 Geo. IV., c. 16, s. 73, has placed the settlements of traders on the same footing with voluntary alienations in general.

Property cannot be settled so that the interest taken by any person under the settlement shall be unaffected by his bankruptcy; but it may be given to a man until he shall become bankrupt, provided there is a gift over of the property on that event. In the same manner the property coming from the wife may be settled on the husband so as to be devested on his bankruptcy. But when the property is the husband's own, it has been determined that, though the claims of the husband's creditors might have been defeated by a trust of the whole for the separate use of the wife, a limitation of the property to the husband until his bankruptcy, with a gift over in that event to the wife or any other person, is void. Upon the same principle, a bond or other obligation given by the husband upon his marriage, conditional for the payment of a sum of money to trustees for his wife and children in the event of his bankruptcy, is void as against his creditors who claim under the fiat, if he has received no portion with his wife; but if he has received a portion with her, the obligation, being considered so far as a settlement of the wife's property, will be good against the creditors to the extent of it.

3. As to secret settlements and agreements in fraud of the marriage contract.

Secret settlements of her property made by the wife pending the treaty for marriage, without the privity of the husband, are void as against him, if made in derogation of his marital rights; and this, it seems, is equally true, whether the husband knew of the existence of the property before the marriage or not. The rule applies to every species of gratuitous incumbrance created by the wife upon her property under such circumstances.

The courts of equity, upon the general principles on which they act in cases of fraud, will set aside all secret covenants or agreements entered into contrary to the good faith of the marriage treaty, and not with the privity of all the parties to the settlement. Relief in such cases will not be refused even to a person who was a party to the fraudulent transaction of which he complains.

Upon the same principle, if a creditor or holder of any security or charge on the estate of one who is engaged in a treaty of marriage, misrepresent the amount of his debt or incumbrance to any of the parties to the contract, whether for the purpose of promoting the marriage, or for any other purpose, he will be bound by such misrepresentation. Money which has been lent to a woman for the purpose of being represented as her own, cannot, after the marriage, be claimed as a debt from the husband.

4. Settlements of real property usually consist of limitations of an estate or estates for life to one or more persons *i.e.* (where the settlement is made on marriage), to one or both parents and the survivor of them, with remainders over to their children. When such settlements are made previous to the marriage, and the children are of course unborn, the remainders to them are contingent, and the tenants for life would therefore have it in their power to destroy such remainders. [Remainder.] It has accordingly become the universal practice to insert, after the limitations of life estates to the parents, a limitation to trustees to preserve contingent remainders, followed by remainders to the first and other sons of the marriage severally in tail, with remainders over. This is what is called a limitation in strict settlement. By this method the estate is rendered inalienable till the eldest son of the marriage attains the age of twenty-one, when he can join with his father in barring his own estate tail and all the remainders over, whereby a new estate in fee simple is acquired, and the property may be settled again. [Primogeniture; Remainder.] This was formerly effected by means of a common recovery [Recovery], but it is now effected by a deed executed under the provisions of 3 & 4 Wm. IV., c. 74. By this act fines and recoveries are abolished, and the objects of these old modes of assurance are now obtained by a deed which must be enrolled in Chancery within six months after its execution. As, before this act, a tenant in tail expectant on a particular estate of freehold could only have barred his own issue by a fine [Fine], unless he could obtain the concurrence of the owner of the particular estate in suffering a recovery, so, under the new act, his power is equally limited, unless he can obtain the concurrence of the owner of the first existing estate under the settlement (whether it be for life or lives, or any greater estate, not being an estate for years) prior to the estate tail, who is called the protector of the settlement. The act contains several provisions for the purpose of ascertaining who shall be protector in the cases of joint ownership, coverture, and the existence of estates for years or in dower; and it provides for the cases where the protector is a lunatic, or convicted of treason or felony. The act also gives the settlor power to appoint by the deed a protector of the settlement, in lieu of the person who would otherwise have been the protector. The consent of the protector must be given either by the deed of assurance or by a separate deed, which must be enrolled in the same manner as the assurance itself. The same act repeals (except as to settlements made before the 28th of August, 1833) the statute of 11 Hen. VII., c. 20, whereby women who were seised of estates tail of the gift of their husbands (*ex provisione viri*) were prohibited from alienating them.

The estates limited in settlements of real property may be either legal or equitable. [Uses.]

When charges are intended to be created upon real estate, as for jointures or portions for children, it is usual to limit terms of years out of the estate to trustees for securing payment of the charges by perception of the rents and profits, or by sale or mortgage of the estate for the periods so limited. These terms are inserted at proper places in the settlement, according to their objects, among the other limitations; and such limitations as are subsequent to these terms of years in the order of arrangement, are also made subject to them in point of legal and equitable interest. It is usual to provide that the terms shall cease when their objects are accomplished or become unnecessary or incapable of taking effect.

Estates for lives and terms for years are incapable of being entailed; but they, as well as personal property of any kind, may be settled in trust as effectually, and so as to be inalienable for as long a time as estates of inheritance. The property in such settlements is usually assigned to trustees in trust for the husband, or for the husband and wife for his or their life or lives and the life of the survivor; and then in trust for the first and other sons severally, and the heirs of their bodies. This limitation vests the absolute interest in the eldest son, who will be entitled to dispose of the property upon his attaining the age of twenty-one; but in order to provide for the event of the eldest son dying under age and without issue, in which case his interest would otherwise vest in his father, if alive, as his heir or next of kin, it is usual to introduce a proviso that the property shall not vest absolutely in any son dying under the age of twenty-one years and without issue; and it has been determined, that, in construing settlements of both real and personal property, when the real estates are limited in strict settlement, and the personal property, according to a form frequently adopted, upon and for the same trusts, estates, and purposes as the freeholds, as far as the law will permit, a proviso of the kind above mentioned is to be understood.

There is no restriction as to the number of life estates which may be limited in settlements to take effect in succession, provided the persons be all in existence at the date of the settlement; for, in point of fact, this amounts to no more than an estate for the life of the survivor.

Thus it appears that real or personal property may be settled so as to be inalienable for a life or any number of lives in being, and twenty-one years after. To this must be added a period of nine months, which is allowed for the birth of a posthumous child in cases where gestation exists. As the period of twenty-one years was no doubt adopted originally with reference to the term of minority, which must elapse before an estate tail could be barred, it was formerly thought that this period could not at all events be added to an executory trust; but it is now settled otherwise. All restraints on alienation beyond the above-mentioned limits are void, as tending to what is called in law a perpetuity; and all the subsequent limitations, if contingent, are also void. The same rules are applicable to executory devises, and springing and shifting uses [Wills; Uses]; but not to remainders limited to take effect after estates tail, which are not subject to any restriction; because, as such limitations may be defeated at any time by barring the estates tail, they can have no tendency to a perpetuity.

The forms of settlements may be varied according to the objects and intentions of the parties, and the construction of the articles upon which they are founded. The principle upon which a Court of Equity acts in executing marriage articles, is to look rather to the intentions of the parties as deducible from the circumstances, than to the literal meaning of the words employed by them. Thus, when the words used in articles concerning the settlement of real estate are such as would give the father an estate tail, and thereby enable him to defeat the settlement, the court will in general direct limitations in strict settlement to be executed, under which the father will take a life estate only. Upon the same principle, even though a deed of settlement has actually been executed after marriage, if it appear to be in any respect inconsistent with the letter or spirit of the antenuptial articles, the court will rectify it.

Questions frequently arise as to what powers, covenants, and provisos are to be introduced into marriage settlements made in pursuance of executory trusts, whether created by articles, wills, or other instruments. The determination of these depends entirely upon the rules of construction as applied to each particular case.

Of the powers usually introduced into settlements of real estate, the most important are—powers of jointuring and raising portions; powers of leasing and management; and powers of sale and exchange.

Where the wife, upon whose marriage the settlement is made, does not take a life interest in the estate in the event of surviving her husband, provision is usually made for her by way of jointure in bar of dower. [Jointure; Dower.] In addition to this, powers are frequently introduced to enable the husband, in case of his surviving his wife, and marrying again, and sometimes also the other tenants for life under the settlement, to make provision for their widows, by way of jointure, which the nature of their estate would not have otherwise entitled them to do. Powers of jointuring, and powers for charging the estate with portions for the benefit of the younger children of the then existing or a future marriage, will not, it seems, be inserted in settlements executed under the direction of a Court of Equity, without clear authority for them in the articles; for without such authority the court can have no data by which to regulate the quantum of interest to be taken by the donees.

Powers of leasing for the usual term of twenty-one years are essential to the management of an estate, and will be considered as authorised by the use of the most general expressions in the articles; or perhaps introduced as a matter of course; but a power to grant building leases will not, it seems, be implied without express authority.

Powers of sale and exchange are also considered as usual powers in a settlement, and will be authorised by the use of very slight expressions in the articles.

In settlements of personalty, where the property is assigned to trustees, they are empowered to invest and lay out the funds, and also to vary the securities from time to time. After the declaration of trusts for the husband and wife and children, such settlements usually contain powers of providing for the maintenance, advancement, and education of the children who are or may become entitled to shares in the funds under the preceding trusts.*

Settlements both of real and personal estate usually conclude with what are called trustee clauses, that is to say, clauses which enable the trustees to give effectual receipts; to provide for the appointment, when needful, of new trustees; for the indemnity of the trustees against involuntary losses; and for the payment of their expenses.

Marriage settlements sometimes contain covenants to settle particular lands; covenants to settle, or to purchase and settle lands of a certain value, or future real estate; covenants to settle present or future personalty; and covenants by parents, on the marriage of one of their children, to leave to that child an equal or some porportionate share with the rest.

The covenant to settle particular lands of course binds heirs, devisees, and all into whose hands the lands come, except a purchaser for valuable consideration without notice; and, in case of the lands being so alienated, satisfaction may be claimed out of the general assets of the covenantor.

Questions frequently arise upon covenants to settle, or to purchase and settle lands of a particular value, as to what amounts to performance. On this point the following positions appear to be established:—1, Where the covenantor has no lands at the time, any purchase he may afterwards make will be presumed to have been made in pursuance of the covenant; 2, It seems, though there are conflicting authorities upon the point, that if the covenant be *to settle*, and the covenantor, having at the time lands adequate to the performance of the covenant, die without making any purchase, the lands which he had at the time will be bound to the extent of the covenant; 3, Where the covenant is to *purchase and settle*, it seems that no lands of which the covenantor is seised at the time will be affected, but all after-purchased lands will be affected to the extent of the covenant.

Covenants to settle future real estate of which the husband shall become seised during the marriage, or during his life, do not affect lands of which the covenantor is then seised, but extend to all after-acquired lands, even to such as come to the husband under the provisions of the deed of settlement.

Covenants to settle present or future personalty are considered as applying to capital only, not to income. If real estate should have been purchased with the personalty subject to such a covenant, the land is not bound *in specie* by the covenant, but is charged with the money invested in the purchase.

Covenants to leave one child an equal or proportionate share with the rest, attach only upon that portion of the settlor's property which may remain at the time of his death. The parent may therefore make an absolute gift of any part of his property in his lifetime to another child without committing any breach of his covenant; but a gift reserving any interest to himself is a breach of it. The benefit of such a covenant is confined to children living at the death of the parent.

5. Marriage is not an absolute gift to the husband of the wife's personal estate, but only entitles him to so much of it as he may have reduced into possession, assigned or released during his lifetime. Accordingly, questions frequently arise upon settlements as to the title of the husband, under them, to the whole of his wife's fortune. Upon this point the following propositions appear to be established:—1, The antenuptial settlement of property made by the husband upon the wife, in consideration of her fortune, entitles him only to her *then*, and not to the *future* personal property; 2, That if a part only of her fortune appears to have been stipulated for, the residue of what she then has, or what may afterwards accrue to her, will not belong to the husband; 3, That when it appears from the settlement, either expressly or by implication, that the agreement was for the whole of the wife's present and future personal estate, the husband, or his personal representative (in case of his predeceasing his wife), will be entitled to claim the whole under the contract.

When the husband has not entitled himself by contract to the *choses in action* of the wife, there is no bar to his getting possession of such of them as are recoverable at law; but if he require the assistance of a Court of Equity for the recovery of them, and the wife does not consent to his obtaining the whole, that court will not lend its aid, except upon the terms of the husband's making a provision for the wife and her children, by way of settlement, out of the fund. Most frequently one half of the fund is directed to be settled, but the proportion given in each case depends upon the circumstances, though it never amounts to the whole. The rules of the Court of Equity in directing settlements out of the wife's equitable *choses in action* are the same, whether the application to it is made by the husband himself or by his creditors. Settlements out of the wife's equitable *choses in action*, when made by the husband, are no less valid against his creditors than when made under the direction of the court; and even a settlement by him of the entire fund, which the court would not have directed, has in some cases been held valid against his creditors; though the decisions in those cases seem hardly consistent with the law as laid down under the 13 Eliz., c. 5.

(Separate Use; Cruise, *Digest*, vol. iv.; Roper *On*

---

* Similar clauses are contained in settlements of real estate, where there are trusts for raising portions.

Husband and Wife; Martin's *Conveyancing*, by Davidson, vol. i., art. 'Settlement.')

SETTLEMENT. [POOR LAWS.]

SETTLEMENT, ACTS OF. [GEORGE I.]

SETUBAL, or **ST. UBES,** a sea-port town of Portugal, in the province of Extremadura, is situated in a bay of the Atlantic, at the mouth of the river Sandão, with an excellent harbour capable of receiving ships of any burden. It is fifteen miles south-east of Lisbon. The town is supposed to have been built out of the ruins and on the site of the antient Cedobriga, which was destroyed by the Moors. The environs abound in corn, wine, and oil, and above all in salt, of which last article a large quantity is annually exported. The streets are well paved and tolerably clean, and the town is defended by eleven bastions, and several outworks, besides a very strong citadel called San Felipe, and a fort, the Outaõ, which serves as a lighthouse, and defends the mouth of the harbour. Setubal contains five parish churches, several convents, now shut up, and one hospital. It had once an academy for the study of mathematics, called 'A Academia problematica,' founded by John V. The population is estimated at about 18,000.

SEVAJEE, surnamed *Bosla*, the founder of the Mahratta power in India, was born in May, 1627, at Poonah, the *jagheer*, or fief, of which was held by his father Shahjee, under the kingdom of Ahmednuggur, and, after its dissolution, from the Beejapoor monarchy. His restless and ambitious character appears to have developed itself at a very early age, as in 1647 he had supplanted his father at Poonah, and in the following year possessed himself of all the Northern Concan. The Beejapoor government was then fully occupied in guarding against the aggressions of the Delhi Moguls: and Sevajee continued for several years to extend his power by progressive encroachments without coming to an open rupture, till his spoliations became so daring that in 1658 a large force was sent against him under Afzul Khan, a leader of reputation. He succeeded however in assassinating* the general at an interview; routed and dispersed his army, and maintained himself in the field till 1662, when a peace with Beejapoor left him in possession of his acquisitions. But he now came into collision with the formidable power of Aurungzebe, with whose armies in the Dekkan he was unable to cope; and though he succeeded by a sudden irruption (January, 1664) in surprising and sacking the distant emporium of Surat, from which he brought off an immense booty, he found it expedient in the following year to make his submission to the emperor, and cooperating with the Mogul troops in their invasion of Beejapoor, did distinguished service in the campaign. He was disgusted however by the haughty reception which he met with at the court of Delhi; and having made his escape with difficulty from the capital, he reoccupied his former territories, which he greatly enlarged at the expense of the falling kingdoms of Beejapoor and Golconda, avoiding for some years to renew hostilities with the Moguls. This interval he employed in settling his dominions, and introducing a strict system of discipline into his army; and when the war with Aurungzebe broke out anew (1670), he not only ravaged the country with his light cavalry, and inflicted a second sack on Surat, but in 1672 for the first time engaged and defeated a regular Mogul force in a pitched battle. To this period is also assigned the commencement of the *chout*, a sort of tribute or *blackmail*, consisting of the fourth of the revenue, on the payment of which any province was exempted from devastation, and which long continued a principal source of Mahratta revenue.

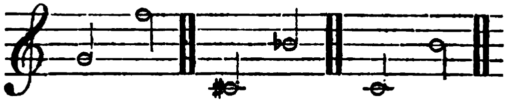
He had for several years previous assumed the title of raja, and the royal prerogative of coining money; but in 1674 he was solemnly crowned at Rayghur, with all the pomp of the Mogul ceremonial, signalising his accession by an inroad in which he for the first time carried his arms north of the Nerbudda. His next exploit was in a different direction: having secured his rear by an alliance with Golconda, he boldly crossed the peninsula (1676) to the eastern coast, possessed himself of the strong forts of Vellore, Gingi, and Wandiwash, between Madras and Pondicherry; and overran great part of Mysore, to which he laid claim from his father Shahjee having held a jagheer there at the end of his life. From these conquests he was recalled (1678) by the invasion of Golconda by the Moguls; and though his plans were for a time disconcerted by the desertion of his son Sambajee to the enemy, he compelled Aurungzebe's viceroy of the Dekkan to retire from Golconda, and to raise the siege of Beejapoor, while he exacted from the latter state, as the price of his aid, the cession of all the country between the Toombuddra and the Kishna. His power was now predominant throughout Southern India, none of the shattered sovereignties of which were able to oppose any check to his progress; but his further schemes of aggrandisement were cut short by a sudden illness, of which he died April 5, 1680, aged nearly fifty-three. His son Sambajee (who had previously resumed his allegiance) succeeded him; but neither his abilities nor his fortune were equal to those of his father, and he was taken and put to death in 1689.

Sevajee (in the words of Mountstuart Elphinstone) 'left a character which has never since been equalled or approached by any of his countrymen. The distracted state of the neighbouring countries presented openings by which an inferior leader might have profited; but it required a genius like his to avail himself, as he did, of the mistakes of Aurungzebe, by kindling a zeal for religion, and through that a national spirit among the Mahrattas. It was by these feelings that his government was upheld after it had passed into feeble hands, and was kept together, in spite of numerous internal disorders, until it had established its supremacy over the greater part of India.'

SEVASTOPOL. [SEBASTOPOL.]

SEVENOAKS. [KENT.]

SEVENTH, in Music, a dissonant interval, of which there are three kinds,—the minor or ordinary seventh, from G to F; the diminished seventh, from C sharp to B flat; and the major or sharp seventh, from C to B. Ex.:



For the *chord* of the seventh, its inversions and treatment, see CHORD.

SEVER, ST. [LANDES.]

SEVERITE occurs massive, in pieces from two to five inches in diameter. Fracture uneven. Fractured surfaces dull. Hardness 1· to 1·5; yields easily to the knife. Brittle. Polishes by friction. Adheres strongly to the tongue, but emits no argillaceous odour when breathed on. Colour white. Streak shining. Dull. Slightly translucent. Found near St. Sever in France, in a gravelly soil. Severite, as shown by the annexed analysis by Pelletier, is a hydrated silicate of alumina:—Silica, 50; Alumina, 22; Water, 26; Loss, 2.

SEVERN AND WYE. The Severn is the finest, and, next to the Thames, the largest and most important of British rivers. The river Wye, being one of its chief tributaries, will be included in this article, as well as some notice of the Bristol Channel.

The original name of the Severn was Hafren, of which Severn is only a corruption. It was subsequently called by the Romans Sabrina, a name given to it, as it is said, in consequence of the fate of Sabra, or Sabrina, who was the daughter of Locrine, king of Britain, by Estrildis, a captive virgin, to whom, in order to unite himself, Locrine had divorced his former queen Gwendolen. On the death of the king, Gwendolen assumed command, and caused Sabrina and her mother to be drowned in the Hafren, which from that time received her name. Milton, in his 'Comus,' has made her the goddess of the river. The attendant spirit says:—

> 'There is a gentle nymph not far from hence,
> That with moist curb sways the smooth Severn stream,
> Sabrina is her name, a virgin pure;
> Whilome she was the daughter of Locrine,
> That had the sceptre from his father Brute,' &c.

Some antiquarians derive the name *Sabrina* from *sabr*, 'sand,' or *sabrin*, 'sandy:' and others derive the present name of the river from its Saxon appellation *sæferne*, 'sea-flowing.' Severn however, as already stated, is the same word as Hafren.

The Severn rises on the western border of Montgomeryshire, from a chalybeate spring on the eastern side of Plinlimmon, at a very considerable elevation, and within a very short distance from the sources of the rivers Wye and Rhiedol. It flows eastward about twelve miles to Llanidloes, as far as which place it still retains the original British name of Hafren. At Llanidloes the Severn receives the waters of the Clywedog; and thence it inclines to the north-east by Newtown and Welshpool; near the latter place it becomes navigable for small boats and barges. Some distance below Welshpool it is joined by the Vyrnwy, a considerable stream which rises on the north-western edge of Montgomeryshire. Previously to this accession the Severn receives in Montgomeryshire, on its right bank, the Mule and the Camlet, and on its left the Tirannon, the Garno, and the Rhiw. About one mile below the confluence of the Vyrnwy, the Severn quits Montgomeryshire, of which county this river and its tributaries form the chief drainage. The length of its course to this point is about 51 miles.

---

* The singular weapon, called a *tiger's claw*, with which this murder was effected, is now in the Museum of the East India Company

Previous to entering Shropshire, the Severn inclines to the east, and this is its general direction through the vale of Shrewsbury, which town it nearly surrounds. From Shrewsbury it takes a south-eastern course (its extreme northern point being a few miles above Shrewsbury), through Coalbrook Dale to Bridgnorth, and enters Worcestershire a short distance above the town and port of Bewdley. The principal tributaries of the Severn in Shropshire are: on the right bank, the Meole or Red-brook, which enters at Shrewsbury; the Cound, Marbrook, and Bore-brook; and on the left, the Perry, Tern, Bell-brook, and Worf. The Severn receives the whole of the waters of the interior of Shropshire, and its course through that county is between 60 and 70 miles. From Bewdley the river runs southward from Stourport, where it receives the Stour on the left, and about eight miles lower down the Salwarpe joins it on the same side. Five miles farther it reaches Worcester. Two miles below this city the Severn receives a considerable accession of water from the right bank by the junction of the river Teme, the principal part of whose course is in Worcestershire; but which rises in Radnorshire, and flows through portions of Herefordshire and Shropshire. Still flowing nearly south, the Severn passes Upton, and quits Worcestershire at Tewkesbury, where it receives the Avon, and enters Gloucestershire. [Avon, *Upper*.]

From Tewkesbury the river again changes its direction, and gradually inclines to the south-south-west, which direction it chiefly follows for the remainder of its course. One mile above the city of Gloucester the stream divides into two channels, the left and main branch flowing by Gloucester, and the right receiving the Ledden. These two branches unite a little below Gloucester, forming the rich tract of land called Alney Island. From Gloucester the river pursues an extremely winding course to Newnham, previously receiving the river Frome from the left. A short distance below Newnham its channel widens considerably; and although it retains the name of *river* as far as the mouth of the Bristol, or Lower Avon, it is in fact rather the æstuary of the Severn than the river itself. The width of this æstuary between the village of Frethern below Newnham and the mouth of the Avon, where the Bristol Channel may be said to commence or terminate, varies from one to three miles. The total length of the Severn, from its source in Montgomeryshire to the Bristol Channel, is about 200 miles.

In the antient division of Britain, the Severn appears to have formed the boundary between the territories of the Silures and the Ordovices on the west, and the Dobuni on the east. In the subsequent divisions of counties, it has scarcely anywhere been employed as a line of separation.

In the commencement of its course, the valley of the Severn is narrow, and supplies little pasturage; below Llanidloes it gradually opens, and is from one to two miles wide, and tolerably productive. The range of the Plinlimmon hills, which, extending west, comprises the Long mountain, and terminates in the Breidden hills, separates the drainage of the Severn from the Wye, Teme, Clun, &c. By this range also the course of the Severn is deflected to the north. On the west and north-west the Berwyn mountains separate the tributaries of the Severn from those of the Dovey and the Dee.

In respect to navigation, the Severn has long been of very great importance. It supplies the means of transporting the produce of mines and manufactories of various descriptions lying in the vicinity of the river to the sea, to North Wales, and the towns and remote districts of the counties through which it flows. The river being navigable for barges from near the town of Welshpool in Montgomeryshire, 'there seems,' says Mr. Telfourd, 'good reason to infer that water-conveyance was practised in this district at as early a period as in any part of Great Britain situated at an equal distance from the sea.' In consequence chiefly of this, Shrewsbury has for several centuries past been a sort of metropolis for North Wales. In Shropshire there are extensive iron-works as well as large manufactories of china, wedgwood, and other earthen wares, nearly the entire produce of which is distributed by barges and boats on the river. The transmission of coal and lime is also facilitated by the same means.

The importance of the Severn, in consequence of the medium of intercourse which it affords between the large towns on its banks, such as Gloucester, Worcester, Shrewsbury, &c., is very considerable; but in estimating the advantages which a navigable river presents, care should be taken to distinguish between its *natural* and *artificial* importance. Under the former may be classed those advantages we have just enumerated, viz. the exportation of those productions, manufactured or unmanufactured, which exist independently of and unassisted by the river, while to the latter must be referred those advantages derived by the inhabitants of cities and towns which were originally indebted for their very formation and existence to their situation with respect to the river. In the latter case the river supplies those demands which it was originally the means of creating.

Along the greater part of its course the use of the Severn as a navigable river has been much impeded; first, by the fords and shoals which are frequent in a river the bed of which has a considerable declivity and consists of matter of such different qualities; and, secondly, by the deficiency of water in drought, and the superabundance of it during rainy seasons.

It is said that the inconvenience arising from the latter cause was much increased by the embankments raised to protect the low lands in Montgomeryshire and in the upper parts of Shropshire. Previously, when the river was flooded, it overflowed these low lands to a great extent, and they, operating as a side reservoir, took off the top waters; and on the other hand, these waters, gradually returning into their former channels, furnished a supply for the purposes of navigation after the flood had subsided. It has been suggested that these impediments might be removed by deepening the bed of the stream where the shallows occur, and by the erection of locks and weirs. The former suggestion has been partially carried into effect, but it is remarkable that there is no lock or weir along the whole course of the river.

The fall of the river from Buildas in Shropshire, to Gloucester, is as follows:—

	Distance in miles.	Total fall.		Fall per mile.	
		ft.	in.	ft.	in.
From Buildas to Bridgnorth	11	29	6	2	8
Bridgnorth to Stourport in Worcestershire . .	18	41	9	2	4
Stourport to Worcester	13	23	0	1	9
Worcester to Gloucester	30	10	0	0	4
Total .	72	104	3		

Vessels of 110 tons can ascend to Gloucester; those of 80 may go to Worcester; of 60, as far as Bewdley bridge, and those of 30 tons may ascend to Coalbrook-dale.

The barbarous and expensive custom of hauling barges by men instead of horses is gradually losing ground, but such a beneficial change has been retarded owing to the want of an act of parliament on the subject, without which it seems impossible to obtain the consent of the owners of property on the banks to the establishment of a horse towing-path. The whole of the Severn navigation, extending upwards of 160 miles, is free from tolls.

The commercial importance of the Severn has been much increased by its connection with several canals, which are here enumerated. The Stroudwater Canal, which commences at the Severn near Framiload, between Gloucester and Newnham, and terminates in the Thames and Severn Canal, thus uniting our two greatest navigable rivers. The Stroudwater Canal was commenced in 1760, and the latter (the Thames and Severn) in 1783, and opened in 1789.

The Gloucester and Berkeley Canal, which shortens the navigation from the Severn near Berkeley, to Gloucester, was completed in 1826.

The Gloucester and Ledbury Canal, which is about to be extended from the latter town to Hereford.

The Worcester and Birmingham Canal.

The Droitwich Canal, which runs along the valley of the Salwarpe.

The Staffordshire and Worcestershire Canal, which commences at Stourport, on the Severn, and following the course of the Stour, joins the Birmingham and Liverpool Junction Canal.

The Shropshire Canal, which with its branches is used for transporting the produce of the manufacturing district of Coalbrook-dale to the Severn, which it joins at Coalport. This canal was completed in 1792.

The Shrewsbury Canal, originally formed to convey coal to that town from Ketley in Shropshire, has since been extended by a branch through Newport to the Birmingham and Liverpool Junction Canal before mentioned.

The Montgomeryshire Canal commences in the Severn at Newtown, and passing Welshpool, communicates with a branch of the Ellesmere Canal; but as the Severn is not navigable as high as Newtown, this canal can hardly be included as one of the connecting links in the Severn navigation.

The Worcester and Birmingham Canal, hitherto one of the most important in connection with the Severn, has been materially diminished in value, as regards the traffic between Gloucester and Birmingham, by the line of railroad lately opened from the former city through Cheltenham to Birmingham, and passing within a short distance of Worcester. A bill was however introduced into parliament during the last session (February—July, 1841) for improving the navigation of the river between Gloucester and Worcester.

The fish found in the Severn are salmon, shad, lampreys, roach, dace, gudgeon, bleak, flounders, eels, lamperns, elvers, chub, carp, trout, grayling, tench, and perch. Salmon was formerly so plentiful that, according to Dr. Nash, a clause was commonly inserted in the indentures of the apprentices of Worcester, that they should not be fed upon that fish oftener than twice a week. The Severn salmon is now however a scarce fish, although there are no weirs upon the river to impede their ascent.

Having traced the Severn to the point where it merges in the Bristol Channel, a short distance above which, on the Monmouthshire coast, is the mouth of the Wye, our attention is called to the latter river, which, although inferior in its size and the length of its course to the Severn, is much superior in point of picturesque scenery.

The Wye has its rise on the border of Montgomeryshire, and on the mountain of Plinlimmon, about two miles south-west from the source of the Severn. Taking a south-east direction, it receives a number of little tributaries, and quits Montgomeryshire and enters Radnorshire between the village of Llangerig and the town of Rhayader, at the distance of eighteen miles from its source. At Llangerig the river inclines to the south. The Marteg, a Radnorshire stream, joins it from the left bank. Below Rhayader it receives from the right the waters of the romantic Elan, and at the same place becomes the boundary between the counties of Radnor and Brecknock. Its tributaries from the Radnorshire side are the Ithon, Edw, and Bach-howey; from Brecknockshire, the Irvon at Builth, and several miles lower down a stream from Talgarth. The scenery from Builth to Glasbury and Hay is extremely beautiful. At Glasbury the river inclines to the north, but on entering Herefordshire flows south-east. The extent of surface drained by the Wye from the south side between Hay and Monmouth, a distance of forty miles, is very inconsiderable. The fine range of the Black Mountains throw the waters on the south into the Usk and Munnow and their several tributaries. From Hay the valley of the Wye opens on the left into a wide tract of fertile land, which continues to Hereford. The river is navigable as far as this city, and indeed in the winter, and whenever there is a depth of water, barges ascend to within a short distance of Hay, for the conveyance of timber, &c. About four miles below Hereford it is joined from the north by the Lug, which rises in Radnorshire, and is increased in Herefordshire by the waters of the Arrow and Frome. The general course of the Wye between Hereford and Ross is south-east, but with frequent and considerable bends through rich valleys. From Ross the river has a general inclination first to the south, and then to the south-west, passing under the beautiful ruins of Goodrich Castle. From the cliff called Symond's Yat, a fine view is obtained of the winding river and hanging woods. The Wye makes a singular bend here, for although the direct distance by land from one part of the river to another is not more than six hundred yards, the course by water exceeds four miles. The river for a short distance divides Herefordshire first from Gloucestershire, and subsequently from Monmouthshire, and then enters the latter county. At Monmouth the Munnow joins the Wye from the right, and a mile lower down the smaller stream of the Trothy enters from the same side. The river is again deflected to the south. At Redbrook it forms the boundary between Monmouthshire and Gloucestershire, and continues to divide them to its mouth. At Brook's Weir the river is met by the tide, and this is the point where the maritime and internal navigations are connected. Vessels from thirty to ninety tons reach this spot. Flowing past the village of Tintern, to the magnificent ruins of whose abbey [MONMOUTHSHIRE] it lends additional beauty, the river flows under Wyndcliffe and through the romantic grounds of Piercefield to Chepstow. [CHEPSTOW.] The appearance of the river from Tintern to its mouth is greatly deteriorated by the muddy and turbid state of the tidal water. At Chepstow the river is crossed by a massive iron bridge, and about two miles and a half south-west of that town the Wye falls into the æstuary of the Severn.

The spring-tides at Chepstow rise to a great height. Large vessels ascend to Chepstow-bridge, and steamers ply regularly for the conveyance of passengers between that port and Bristol. Above Chepstow large vessels reach as far as the tide will carry them. Vessels varying from 18 to 30 tons go as far as Hereford, but the progress of even these small vessels is impeded by shallows. They are towed against the stream, generally by men.

The length of the course of the Wye is about 130 miles.

The part of the Wye most usually visited by tourists is that from Chepstow to Monmouth and Ross, and this is the finest and most picturesque portion of its course. The tour of the Wye, as well as of most rivers, should be commenced at the mouth, and the stream ascended, although in the contrary direction there are views which in the ascent are either lost or seen from a less favourable point; and therefore to see the whole of its splendid scenery to the best advantage, the Wye should be traversed in both directions. The view from Wyndcliffe, comprising the æstuary of the Severn and the Bristol Channel, with the Somersetshire coast in the distance, and the Wye, and town and castle of Chepstow beneath, is not excelled perhaps in the whole world, and certainly not in Great Britain.

Although not so much frequented as the lower part, the whole course of the river above Ross will amply repay a visit. From that town to Hereford the rocks and narrow gorges are, it is true, lost; but in their place the traveller finds the beautiful woods and wide-spreading fertile valleys of Herefordshire. The scenery again on the Welsh border, between Radnorshire on the right, and Brecknockshire and Herefordshire on the left side, may almost rival the most exquisite portions of Monmouthshire; while yet higher, and where the Wye is nothing more than a mountain torrent, there is much to gratify and reward the time and toil expended in the excursion.

Owing to the isthmus or neck of land above the mouth of the Wye, and the projection of Aust Cliff on the opposite shore, the width of the Severn is here only one mile, while higher up, as was before stated, it expands to between two and three miles. At this narrow part of the æstuary is the principal passage, called Aust Ferry, or Old Passage, from Somersetshire to Monmouthshire and South Wales. About four miles lower down is the New Passage, which is considerably wider, and not so much frequented.

The æstuary of the Severn receives the drainage of about 5900 square miles, viz.:—the Severn, 4500; the Wye, 1400.

The Severn, with its tributaries, includes the greater portions of the counties of Montgomery, Salop, Worcester, Warwick, and Gloucester, and small parts of Radnor and Hereford, while the latter effects almost the entire drainage of the counties of Radnor and Hereford, and parts of Montgomery, Brecknock, Gloucester, and Monmouth. In the former river is included the Teme, one of its principal tributaries, which drains a great portion of the land lying between the Severn and Wye.

In examining the superficial deposits of the districts through which the Severn and its tributaries flow, Mr. Murchison has drawn some very important and interesting conclusions respecting the antient state and position of this district. In Herefordshire, parts of Shropshire and Worcestershire, and the adjoining Welsh counties, the loose detritus covering the surface is found to be of local origin, or, in other words, derived from the rocks in the immediate neighbourhood, but testifying the action of water from the north-west to the south-east. The drifted matter being of local origin, the inference is, that the action of the water producing it was also local, and unconnected with any vast or general deluge. From the sometimes elevated position of the gravel, and other circumstances, it is also to be inferred that the high coombs, as well as valleys, were permanently under the level of the sea. The nature of the excavation also indicates the action of water propelled at different times by various causes. This tract is exempted from foreign drift, and is in a great measure circumscribed by the course of the Severn; but although the direction in which this detritus has moved corresponds with the general direction of the present drainage of the country, it is impossible that it can be the result of fluviatile action; and accordingly whenever the rivers quit the main course of this drift, these coarse materials are no longer found upon their banks. The Severn presents an example of this. It has been before observed that this river in its course through Montgomeryshire into Shropshire is deflected to the north. The materials of the drift do not accompany the river in this bend, but are 'strewed over hill and dale in a south-easterly direction.' Farther west however, and in large tracts of Lancashire, Cheshire, Shropshire, Staffordshire, and Worcestershire, the detritus is derived from various centres, and is overspread by a great drift from the north. 'The country from which this drift proceeded is clearly shown by its contents; for none of the varieties of granite and other rocks which it contains, occur in Wales or the adjacent parts of England, but they are all well known to exist in Cumberland and Scotland. This granitic detritus is further proved to have issued from the north, not only by its greater volume in that direction, but also by the blocks diminishing gradually in size as they are traced from north to south.' The western side of this tract appears to be the edge of the high lands of Denbighshire, and an irregular line from thence to Oswestry, and south-east towards Shrewsbury, and from thence nearly along the right bank of the Severn to the vale of Worcester. The eastern side has no well defined limits as yet observed, until it reaches the vale of Worcester, where it occurs in the form of a delta, included between the Malvern and Cotteswold hills. The western boundary appears to follow the junction of the members of the Silurian system with the new red-sandstone and other more recent deposits, the latter being the portions covered. The valley of the Severn amply proves that the present relative position of hill and plain had no connection with the boundary of this northern drift. It has been stated that the edge of this drift is from Oswestry to Shrewsbury; now between those places 'there are no continuous ridges ranging from east to west which could oppose the southward course of this drift. On the contrary, the ridges of Silurian rock trending from the south-west expose their north-eastern extremities, leaving between them a succession of longitudinal valleys which are open to the tract which is strewed over with the granitic bowlders.' The most striking of these valleys is that of the Severn; for although the northern drift occupies heights north of and several hundred feet above this valley, not a trace of it occurs south in the low grounds beyond the Breidden hills, which would have been the case if the present relative positions had existed, for then the northern drift must have been propelled far into the low depression from which the Severn issues into the plain of Shrewsbury. Mr. Murchison naturally infers that great changes have taken place in the relative levels, and that 'while the country about Shrewsbury was sea, the Severn of that epoch must have terminated at the Breidden hills, by emptying itself into a bay in which the northern drift was accumulating. This hypothesis is further sustained by tracing the present line of the Severn to the south, after it has escaped from the gorge of Bridgnorth. Throughout this portion of its course, the river flows in the same direction as the great northern drift, and thus the elbow made by the latter from Oswestry to Bridgnorth can be explained satisfactorily by inferring that the Silurian region constituted an antient line of shore during the period when the whole of the present valley of the Severn, from the Breiddens to the mouth of the river, was submarine.' From the facts here stated, and from a variety of other corroborative evidence, Mr. Murchison is led to believe in the existence of a great channel of the sea, extending southwards through Worcester and Gloucester, the eastern and western shores of which were the Cotteswold and Malvern hills. The former chain presents sloping escarpments to the valley of the Severn, with salient and re-entering angles, precisely like the headlands of a shore formed by the action of a sea upon the soft and hard materials. On the opposite side the sharp ridge of the Malverns stands out like a mural buttress on the flank of the Silurian region, reminding the traveller of rocks of similar form and composition on the sides of straits. Elevations of this region must have subsequently taken place, and reduced the Bristol Channel to its present form.

The Severn is charged with a larger amount of turbid sediments than any other river in Europe; the result of its own long course and of those of its tributaries through tracts of marl and soft sandstone. Richard of Cirencester notices this peculiarity in his treatise 'De Situ Brit.,' lib. 1, cap. vi.: 'Hæc erat celebrata illa regio Silufum, tribus validissimis habitata populis, quos inter præ reliquis celebres Silures, proprie sic dicti, quam ab ora relicta *turbidum Sabrinæ fretum* distinguit.'

Shakspere also—

> 'Three times hath Harry Bollingbrooke made head
> Against my power; thrice from the banks of Wye,
> And *sandy-bottom'd Severn*, have I sent him
> Bootless home and weather-beaten back.' (*Henry IV.*)

This fine sediment is in some places deposited on its banks towards the mouth, and the quantity thus deposited is increased by artificial means. The mud is encouraged to accumulate upon lines of pile and osier, which, as the tide retreats, retain the sediment. Upon these, other lines of osier-fencing are placed, until the new land is raised to a considerable height. This plan has been very effectually practised by Lord Segrave. On the other hand, the sudden rising of the tides has occasioned great damage to the low lands, to guard against which, sea-walls, piles, and other precautionary means have been adopted. The inundations in the years 1606, 1687, 1703, and 1737, are recorded to have produced great devastation.

The Bristol Channel, commencing with the æstuary of the Severn, separates Monmouthshire and South Wales from the counties of Somerset and Devon, and terminates in St. George's Channel. Its width from King's Road, the mouth of the Lower Avon, to the opposite coast, is about five miles. It then rapidly widens to about twelve miles, but is again slightly contracted between the southern point of Glamorganshire and the western part of Somersetshire. It again expands, forming, on the Welsh coast, Swansea and Carmarthen bays, and on the coast of Devonshire, Barnstaple or Bideford Bay. The width at its termination in St. George's Channel, taken from St. Gowan's Head on the coast of Pembrokeshire to Hartland Point in Devonshire, is about forty miles. The coast-line, both on the Welsh and Devonshire sides, is extremely irregular. Lundy Island is situated between 10 and 11 miles north-north-west of Hartland Point in Devonshire. Its length from north to south is two miles and a half, and its width from east to west about one mile. It is composed of granite. [DEVONSHIRE.] Caldy Island is about four miles off the Pembrokeshire coast. There are several smaller rocky islets in different parts of the channel.

The relative times and heights of the tides of the Bristol Channel are laid down as follows:—

	High Water Time.		Height of High Tide
	h.	m.	feet.
Lundy Island . . .	5	15	27
Hartland	5	20	26
Appledore	5	30	
Barnstaple Reach (6 miles up)	6	0	
Bideford Branch . . .	6	0	
Ilfracombe	5	45	
Fairland	6	10	33
Minehead	6	30	38
Sully	6	45	31
King's Road . . .	6	45	46
Bristol	7	0	40
Chepstow	7	[illegible]	[illegible]

From Hartland Point to King's Road is about ninety miles; it appears that the tide travels over this distance in about an hour and a half. The tide increases as it advances.

The high tide at Chepstow is accounted for on 'the principle of the conservation of force.' When any quantity of matter is in motion, its motion is capable of carrying every particle of the mass to the height from which it must have fallen to acquire its velocity, but if the motion be employed in raising a smaller quantity of matter, it is capable of raising it to a height proportionally greater. In bays and channels which narrow considerably, the quantity of water raised in the narrow part is less than in the wider, and thus the rise in such cases is greater. The magnitude of the tides will also be increased by the banks acting as the portion of a shore in which there is a point of convergence of tides which always produces an augmentation. The great tide, at Chepstow does not affect the river as high as Tintern, its force being absorbed by friction and various other causes.

The *Bore* which enters the Severn is nine feet high, and is produced, as in other places, by the depth and quantity of water on the inland side not allowing the surface there to be immediately raised by means of the transmitted pressure.

The greatest velocity of the tidal current through the 'shoots,' or New Passage, is fourteen miles an hour. This occurs lower down two hours after high-water, but as the Severn is approached the difference of time is diminished, according to the general observations on this subject. (Whewell 'On Tides,' in *Phil. Trans.*)

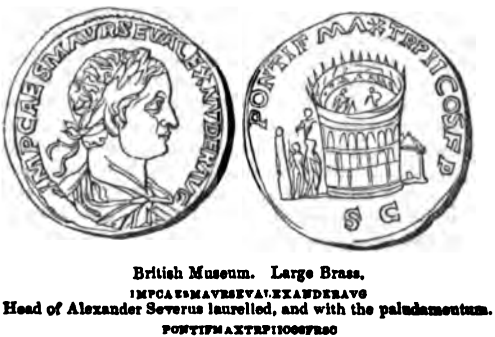
According to Mr. Ham of Bristol, the water of the channel is of a higher temperature on the Welsh coast than on the Somersetshire side, being at 67° Fahrenheit on the former, when 65° near the mouth of the Avon. The cause is probably the fact that the bed of the channel on the Welsh side is much more shallow than on the opposite coast, and consequently a greater space of the bottom is exposed to the rays of the sun on that side at low-water; but these experiments should be repeated and confirmed. The increased quantity of mud held in suspension on the Welsh side is also attributed to the shallowness of the water there. Of five samples taken from the surface, the following were the results:—

	Per Imp. Gallon.	
At the mouth of the Avon the water contains	26·3	grs.
In the deep part of the Channel .	28·5	
Advancing farther, where the water begins to shallow	35·0	
On the opposite coast	72·0	
Mouth of the Usk	39·5	
5)	201·3	
Average	40·3	

The quantity of mud in an area of 225 square miles (the extent to which these data are supposed to apply, and taking the above as an average at the depth of one fathom) will be about 700,000 tons.

SEV'ERUS, MARCUS AURELIUS ALEXANDER, a Roman emperor, was the son of Julia Mammæa, the sister of Soemis, who was the mother of Elagabalus. He was born at Arca Cæsarea, in Phœnicia, in the temple of Alexander the Great (after whom he was called), A.D. 208. In his early years he was brought up at Rome, and during the reign of his cousin Elagabalus was, by the advice of his grandmother Julia Mæsa, bred in strict seclusion from the court. In his education his mother showed great care and discretion, and withdrew him from the temptations and perils thrown in his way by the emperor. In his twelfth year he was appointed consul with Elagabalus, and was styled Cæsar, the usual title of the successor to the empire. He became very popular with the army, who believed him to be the son of Caracalla, a notion which he appears to have afterwards encouraged. The particulars of the revolt in which Elagabalus was murdered have already been given. [ELAGABALUS.] On his death, Alexander was made emperor, A.D. 222, first by the proclamation of the army, and afterwards more formally by the senate. His reign may rather be called the regency of his mother, who conducted the chief business of government with great firmness and discretion. She made it her first care to repair the ruin caused by the excesses of Elagabalus. She restored the temples which had been profaned, selected a council of 16 from the senate for her ministry, and appointed the jurist Ulpian præfect of the Prætorian guard. Under her guidance Alexander led a life of strict but not ascetic morality, giving free access to his friends, applying himself closely to the business of the state, and in his leisure hours to literature.

The attempts of the empress-mother to reform the dissolute army were frustrated by their turbulent spirit. The Prætorian guards revolted and murdered Ulpian, and such was the weakness of the government, that Epagathus, their ringleader, was sent to Egypt, that he might there undergo the punishment which it was not thought safe to inflict at home. Dion Cassius informs us, in the fragment of his Life of Alexander, that his own life was threatened by the troops which he commanded, but saved by the management of the emperor. In the latter part of his reign (about 231 A.D., according to Eckhel, 'Doctrina Vet. Num.,' from the evidence of a coin), Alexander undertook an expedition against Artaxerxes, the founder of the dynasty of the Sassanidæ, who threatened to extend his empire over Asia Minor, and treated the embassies from Rome with disdain. The accounts of this war differ. Lampridius (*Hist. Aug. Script.*), in his Life of Alexander, Eutropius, and Aurelius Victor speak of the great victory obtained by Alexander, and their testimony is confirmed by a coin described by Eckhel. On the other hand, the narrative of Herodian (lib. iv., 13, &c.), more consistent throughout with itself, with the undisciplined state of the army, and the unwarlike character of the emperor, records the defeat of the Roman forces in three separate divisions, the sickness of Alexander, and his retreat to Antioch, whither however he was not followed by Artaxerxes, whose resources were so much weakened by the war that he remained quiet for several years. The emperor was shortly afterwards roused from a state of luxurious inactivity by the news of a revolt of the Germans, who had passed their boundaries. He proceeded to quell this insurrection in person, but having recourse to bribery to buy off the rebels, he incurred the contempt of his troops. This feeling was fostered into mutiny by the arts of Maximinus, who had been entrusted with great power, and the result was a sedition, in which Alexander and his mother were both killed at a place called Sicila in Gaul, A.D. 235. As far as we can gather from a comparison of the exaggerations of Lampridius with the scanty statements of other writers, Alexander seems to have been of a gentle and peaceful disposition, ill suited for the command of a turbulent soldiery and corrupt people, not less from his tender age and the control to which he was subjected by his mother, than from an effeminacy and want of firmness natural to his race and country. We have in Lampridius a very interesting account of his private life and of the manner in which he passed his day. He bestowed great care in adorning and improving Rome. The Thermæ Alexandrinæ were built by him. His reform in the currency is alluded to by a coin bearing the inscription 'Restituta Moneta.' His other coins record his bounties to the people, his expedition to Persia and triumph, and his consecratio. He had three wives: Memmia, the daughter of Sulpicius; Orbiana, who is known by her coins; and another, who was banished by his mother, and whose name has not come down to us. (Herodian, lib. vi.; Dion Cassius lib. lxxx.; Ælius Lampridius, in the *Historia Augusta.*)



British Museum. Large Brass.
IMPCAESMAVRSEVALEXANDERAVG
Head of Alexander Severus laurelled, and with the paludamentum.
PONTIFMAXTRPIICOSPPSC
The amphitheatre of Titus, with two gladiators fighting in it; at the side three figures standing.

SEVE'RUS ALEXANDRI'NUS, a Greek rhetorician, who lived about A.D. 470. There are extant under his name six Narratives (Διηγήματα), and eight Ethopoeiæ ('Ηθοποιΐαι

The six narratives are mentioned by Iriarte as being among the Greek MSS. of the Escurial. The Ethopoeiæ are printed in Gale's 'Rhetores Selecti,' which were edited by J. F. Fischer, Leipzig, 1772.

An Ethopoeia, of which *allocutio* is the Latin equivalent, is defined by Priscian to be 'an imitation of a speech (*sermo*), adapted to the character and to the supposed persons; as, for instance, what Andromache might have said on the death of Hector.' The Ethopoeiæ of Severus contain, among others, the following subjects: what Æschines might say on going into banishment upon Demosthenes furnishing him with means for his journey; what Menelaus might say upon Helen being carried away by Alexander; what a painter might say on having painted a girl and fallen in love with her. The frigid commonplaces of these short pieces are merely curious as specimens of the literature of the age to which they belong.

SEVE'RUS, CORNE'LIUS, an epic poet of the time of Augustus. Respecting the circumstances of his life nothing is known, except that he died very young. Quinctilian (x. 1, § 89) says that he was more a versifier than a poet, though he allows that, considering the early age at which he wrote, he showed very great talents. His poems were: 'Bellum Siculum,' the first book of which was, according to Quinctilian, of considerable merit. Which Sicilian war he described in this poem is not certain, but it is supposed that it was the war which Sextus Pompeius carried on after he had gained possession of Sicily. [POMPEIUS, p. 386.] There is a poem still extant, called 'Ætna,' which contains, in 640 hexameters, a description of Mount Ætna, and an account of the causes of its eruptions. Now as Seneca (*Epist.* 79) calls Cornelius Severus the author of a poem 'Ætna,' it has been supposed that this poem is the work of Severus. But the language in the extant poem, as well as several allusions to events which happened in the reigns of Claudius and Nero, place it beyond doubt that the extant poem is not the work of Severus. The description of Mount Ætna to which Seneca alludes was probably only a part of the 'Bellum Siculum.' A second poem of Cornelius Severus contained a description of the death of Cicero, and a fragment of it, which proves the great talents of the young poet, has been preserved by Marcus Annalus Seneca. (*Suasor.*, vii., p. 49.)

(Burmann, *Antholog. Lat.*, ii. 155; Wernsdorf, *Poet. Lat. Minor.*, tom. iv., p. 33, &c., and p. 217, &c.)

SEVE'RUS, L. SEPTI'MIUS, was a native of Leptis in Africa, where he was born, A.D. 146, of an equestrian family. It is impossible to give more than a rapid sketch of the life of this enterprising man.

After his eighteenth year Severus came to Rome for his improvement, and received the rank of senator from M. Aurelius. He studied law in company with Papinian, who was a relation of his second wife, under Q. Cervidius Scævola; and he received from Aurelius the office of advocatus fisci, in which he was succeeded by Papinian. In his youth he was of licentious habits, and he had to defend himself against a charge of adultery, of which however he was acquitted before the proconsul Didius Julianus, whom he afterwards succeeded in the empire. After filling the quæstorship and other public offices, he was appointed proconsul of Africa, his native country. Under Aurelius he also filled the tribunate, an office of which he scrupulously discharged the duties. About this time he married his first wife, Marcia. After the death of Aurelius, he visited Athens; and when he became emperor, he showed the citizens that he had not forgotten certain slights put upon him during his residence there. Under Commodus he held the office of legatus of the Lugdunensis Provincia. On losing his wife, he looked out for another whose nativity was favourable to his ambitious views; for Severus appears to have been a believer in astrology. He heard of a woman in Syria whose destiny it was to marry a king, and accordingly he solicited and obtained in marriage for his second wife Julia Domna, by whom he had children.

Severus was at the head of the army in Germany when news came of the death of Commodus, which was followed by the short reign of Pertinax, and the accession of Didius Julianus, who purchased the imperial title. The army proclaimed Severus emperor, and the ambitious general promptly advanced upon Rome to secure his title. Julianus, after a fruitless attempt to stop the progress of Severus by declaring him a public enemy, and an equally unsuccessful attempt to get him assassinated, caused a senatus consultum to be passed for associating Severus with him in the empire. Julianus however was shortly afterwards murdered in his palace, and Severus entered Rome with his soldiers (A.D. 193), where he was acknowledged emperor.

But Severus had a formidable rival in the East, where the legions had proclaimed Pescennius Niger. After arranging affairs at Rome, he set out to oppose Niger, whom he defeated near Cyzicus. The emperor banished the wife and children of Niger, and punished both individuals and cities that had favoured the cause of his rival. He also advanced still farther into the East, into the sandy plains of Mesopotamia, in order to secure the empire on that side and to punish the adherents of Niger. The Parthians and Adiabeni were reduced, and Severus was honoured with the titles of Arabicus, Adiabenicus, and Parthicus by the senate, who also offered him the honour of a triumph, which he refused on the ground that a triumph was not due to a victory gained in a civil war; and he also declined adopting the title of Parthicus from apprehension of provoking such formidable enemies as the Parthians.

On his road to Rome Severus heard of the revolt of Albinus in Gaul, and he directed his march to that province. After the war had been carried on for some time with various success, a great battle was fought at Trinurtium or Tinurtium, not far from Lyon, in which Albinus was defeated and lost his life. On this occasion Severus disgraced himself by that brutal ferocity which was so prominent a feature in his character. He ordered the head of Albinus to be cut off before he was quite dead, and he made his horse trample the body under his feet. Even the wife and children of Albinus, according to some accounts, were put to death, and their bodies thrown into the Rhone. Numerous partizans of Albinus were put to death, both men and women, whose property enriched the ærarium. Spartianus has filled a chapter with illustrious names, who were the victims of the emperor's cruelty, either immediately on the defeat of Albinus or shortly after.

The restless temper of the emperor led him again into the East. From Syria he marched against the Parthians, and took Ctesiphon, their capital, after a campaign in which the soldiers suffered greatly for want of proper provisions. From Parthia he returned to Syria, from which country he marched through Palestine to Alexandria in Egypt. He made many changes in the institutions of Judæa, and forbade under severe penalties the making of Jewish converts. Spartianus adds, that he made the same enactment with respect to the Christians, though we cannot certainly infer from the context that this took place at the same time with the enactment against Jewish converts. The allusion however appears to be to the edict promulgated in the time of Severus, which was followed by a persecution of the Christians. He gave the Alexandrines a kind of senate (jus buleutarum), and made many changes in their institutions.

Severus returned to Rome A.D. 203. He declined the honour of a triumph which was offered to him, on account of his inability to stand in a chariot owing to the gout. But his victory was commemorated by the erection of a triumphal arch, which still remains and bears his name. [ROME, p. 98.]

In the year A.D. 208, Severus, with his two sons, Caracalla and Geta, set out on their British campaign. The object was to reduce to obedience the Caledonians and other tribes in the northern part of the island, who disturbed the Roman dominion. Geta was left with an army in the command of South Britain, and the emperor undertook the campaign in the north with his son Caracalla. He made his way with great difficulty through a country covered with forests and without roads, and though the natives fled before him, the Roman army suffered greatly, and the loss of life, owing to privation of various kinds, was immense. Severus attempted to secure the limit of his conquests by constructing the great rampart, which is known by the name of the wall of Severus, across the neck of land that separates the æstuaries of the Clyde and the Forth. [BRITANNIA.]

The last days of Severus were embittered by the dissentions of his sons, and more particularly by the undutiful conduct of Caracalla, who is even accused of conspiring against the life of his father. He died at York (Eboracum) A.D. 211, in the eighteenth year of his reign, leaving only two children, Geta, and Caracalla, who is also called Antoninus Bassianus. His body, or, according to other accounts, the urn which contained his ashes, was carried to Rome and placed in the tomb of the Antonini

Severus was one of the most distinguished among the Roman emperors. He has been compared with Julius Cæsar, whom he resembled in the energy of his character and in his taste for letters. He was through life the faithful friend of the great jurist Papinian, whom he made libellorum magister and præfectus prætorio, and to whose care he recommended his two sons. He was well acquainted with Greek and Latin literature, and he left behind him memoirs of his life. His habits were plain and simple. He sought out and rewarded merit, and he loved justice. But he punished with inexorable severity, and his great qualities were sullied by cruelty, for which it seems difficult to find any apology or palliation. He embellished Rome with various works, such as the Septizonium and the Thermæ called after his name, and he repaired the public edifices which had been erected by his predecessors.

(Ael. Spartiani, *Severus Imperator;* Herodian, ii., iii.; Dion Cassius, lib. 76, &c.)

British Museum. Actual size.

SEVERVSPIVS AVGPMTRPXII.
Head of S. Severus laurelled.

COSIIILVDSAECFEC.
Commemoration of the celebration of the Ludi Saeculares.

SEVERUS'S WALL. [Britannia.]

SE'VIGNE', MADAME DE. Marie de Rabutin Chantal was born, according to her own account, February 5, 1627, apparently at the château of Boubilly in Burgundy. Her father, the Baron de Chantal, was killed in defending the Isle of Rhé against the English; and her mother also left her orphan at an early age. The charge of her education then fell into the hands of a maternal uncle, the Abbé de Coulanges, an excellent and judicious person, whom she warmly loved, and to whom she owed and owned great obligation. Possessed of great personal advantages and considerable fortune, she married, Aug. 1, 1644, when not yet 18, the Marquis de Sévigné, of an antient house of Brittany. This connection did not prove happy; it was dissolved in 1651, by the death of her husband in a duel, leaving her with a dilapidated fortune and the charge of a son and daughter. The fortune she soon retrieved by retirement and a judicious economy: and in 1654 she re-appeared in Paris, where her beauty and talents placed her at once in the first ranks of society. The Prince of Conti, Turenne, Fouquet, superintendant of finance, and many others of less note, in vain enrolled themselves her admirers; having escaped the yoke of her first ill-assorted marriage, she was never tempted to contract a second; nor, in that gallant age, was her conduct tainted by the prevalent laxity of morals. Her children were throughout life her chief object, and especially her daughter, to her affection for whom we owe the greater part of that admirable collection of letters upon which the fame of Madame de Sévigné is raised. That daughter in 1669 married the Comte de Grignan, who held the government of Provence. Madame de Sévigné died, after a few days' illness, at the town of Grignan, in 1696.

As a letter-writer she is unsurpassed, perhaps unequalled. Unstudied, and not always correct, she possessed a natural eloquence, an ease and liveliness of expression, which will never cease to attract. The merit of her style is said by French critics to be too delicate to be readily appreciable by foreigners: nevertheless its charm cannot fail to be manifest in a greater or less degree to all her readers. 'The letters of Madame de Sévigné,' says La Harpe, 'are the book of all hours, of the town, of the country, on travel. They are the conversation of a most agreeable woman, to which one need contribute nothing of one's own; which is a great charm to an idle person. . . . . Madame de Sévigné tells a story excellently: the most perfect models of narration are to be found in her letters. Nothing comes up to the liveliness of her turns, and the happiness of her expressions: for she is always touched by what she relates; she paints things as if she saw them, and the reader believes that he sees what she paints. She seems to have had a most active and versatile imagination, which laid hold of all objects in succession.'

Her letters, originally published in detached portions, by different persons, are printed collectively in numerous editions. The most complete is that of M. de Monmerque, Paris, 1818, 11 vols. 8vo., and 13 vols. 12mo., containing a text corrected and restored in very numerous passages, and including ninety-four letters not before published. The edition of M. Grouvelle, 8 vols. 8vo., Paris, 1806, is also one of the best, containing memoirs of Madame de Sévigné herself, her daughter, and other persons closely connected with her history, and other auxiliary pieces. These collective editions contain many letters addressed to Madame de Sévigné by her correspondents.

SEVILLE (*Sevilla*) is the name of a province of Spain, which, according to the late division of the Spanish territory, extends from the Sierra de Cazalla in the north, to the Serrama de Ronda in the south; and is bounded on the east by the province of Cordova, and on the west by the frontiers of Portugal and the ocean.

SEVILLE, the capital of the province, is a large and handsome city, situated in a beautiful plain on the banks of the Guadalquivir (the Baetis of the Romans). The name Guadalquivir is a corruption of the Arabic Wada-l-Kebir, 'the great river.' It is in 37° 12′ N. lat. and 6° 8′ W. long Fable has ascribed its foundation to Hercules, but there can be no doubt of its being a very antient city, perhaps of Punic origin. It is mentioned by Strabo (iii., p. 141, Casaub.), Pomponius Mela (ii. 6), Pliny (iii. 1), and Silius Italicus (iii. 392). Its Phœnician name was *Spali* or *Sephala*, which in that language means a plain. Of this word the Romans and Greeks made *Ispalis* or *Hispalis;* the Arabs *Ishbilia*, and modern Spaniards *Sevilla*. Under the Romans it became a Roman colony under the name of 'Colonia Julia Romula,' as appears by many of the coins, and from the statement of Pliny ('Hispalis Colonia cognomine Romulensis') and Strabo. Hispalis gave name to one of the four juridical conventus into which the Roman province of Baetica was divided. Julius Cæsar visited it twice, once as quæstor, and a second time as prætor, when he was instrumental in relieving the citizens from the impositions and tyranny of Metellus. It was for some time the residence of the successors of Alaric, and in 582 took part in the rebellion of Hermenegild against his father Leovigild. In 712 Seville opened its gates to the Arabs, who made it the seat of their empire. Abdu-l-aziz, son of Músa Ibn Nosseyr, held his court in it, and it was not till the time of Ayúb (others say Al-horr) that the seat of the Arab government in Spain was transferred to Cordova on account of its more central position. Seville continued to be the second city of the Mohammedan empire of Spain until the middle of the eleventh century, when a revolution in Cordova detached it from the empire, and Seville became the capital of a separate kingdom.

Moorish Kings of Seville.—In the year 1023 the citizens of Seville, having revolted against Al-Kásim Ibn Hamúd, who then held the supreme power in Spain, appointed three of their number, namely, Mohammed Ibn Al-alehani, Mohammed Al-zubeydi, and Mohammed Ibn Abbád, chief kádhi of the mosque, to administer the government and provide for the security of the place. The latter, having soon after rid himself of his partners in power, assumed the insignia of royalty, and took the title of king. Having marched against Yahya Ibn Hamúd, Al-kásim's nephew and successor, he defeated his army and put him to death near Camona in 1035, and thus was enabled greatly to extend his dominions. On his death in 1041, Mohammed was succeeded by his son Mohammed II., surnamed *Al-mútadhedh-billah* (he who implores the help of God), and Abu Amru, who made himself master of Cordova and the greater part of Mohammedan Spain. He was an able and warlike prince, but very cruel. Grief for the loss of a favourite daughter caused his death in 1068. His second son, Mohammed III., surnamed *Al-mu'tamed-billah* (he who places his reliance in God), inherited his dominions, which comprised all the territories between the Guadalquivir and the Tagus. The limits of this empire were however considerably narrowed by the victories of Alfonso VI., the conqueror of Toledo, who gradually took possession of his best provinces and strongest castles. Mohammed then called to his aid the Almoravides of Africa, whose king, Yúsuf Ibn Táshefin, crossed the straits, and gained in 1086 the memorable battle of Zalaca. The conqueror soon turned his arms against the allies whom he came to defend. Seville was taken in 1091 by Syr Abú Bekr, one of his generals, and Mohammed was sent to the castle of Aghmát in Africa, where he ended his days in 1095. Seville continued in the hands of the Almoravides, and after them in those of the Almohades, who succeeded them. Abú Yusuf Yakub Al-mansúr, the third sultan of the latter dynasty, who reigned from 1163 to 1178, fixed his residence in Seville, which he greatly embellished by laying the foundations of the great mosque, repairing the Roman aqueduct, called the 'Caños de Carmona,' throwing a bridge of boats over the Guadalquivir, strengthening the fortifications, and other useful works. After Al-mámún, the last sultan of the Almohades who ruled in Spain, Seville was reduced by Abú Abdillah Mohammed Ibn Hud, who resided for some time in it; but on the death of this chief, who was assassinated at Almeria in 1238, the city was besieged by Ferdinand III., king of Castile, and taken after fifteen months, on the 23rd of November, 1248. From that period Seville always made part of the dominions of the king of Castile.

Seville is almost circular, and the circuit is from five to six English miles. It is surrounded by walls partly of Roman, partly of Moorish construction, flanked by numerous towers, and has fifteen gates. The suburbs are eight in number, San Bernardo, San Benito, San Roque, Macarena, los Humeros, la Cesteria, Populo, and Triana, which last is supposed to derive its name either from three antique arches which its gate once had, or from the emperor Trajan. The streets, as in most cities built or inhabited by the Moors during their occupation of the Peninsula, are crooked, ill paved, and exceedingly narrow. Seville however contains several fine squares, such as San Francisco, now called 'de la Constitucion,' El Duque, Salvador, and several others. The houses, which amount to about 12,000, are perhaps the most picturesque in the world. They have generally a large paved court, ornamented with running fountains, flowers, &c., and surrounded by marble columns supporting galleries or rooms above. It is usual for the family to inhabit the ground-floor in summer, and the upper stories in winter. In the summer a canvas awning is thrown over the whole court during the heat of the day, and removed at night, and there the family usually sit to receive their visitors. The public walks in Seville are much admired. The principal are 'El Paséo de Christina' and 'Las Delicias;' the latter, which is tastefully planted with odoriferous shrubs, was not completed till 1828.

Seville contains many buildings remarkable either for their antiquity or architecture. 'La Torre del Oro' (the tower of gold) is so called they say because the ships laden with that metal, at the time of the discovery of America, deposited their cargoes there. 'La Lonja,' or Exchange, is a magnificent building, erected by Philip II. in 1523, over which are the archives of the colonies. The 'Casa de Pilatos,' or palace belonging to the dukes of Alcala; the town-hall; the naval college of San Telmo; the cannon-foundery; the tobacco-manufactory, an immense building, 600 feet in length by nearly 500 in breadth, enclosing twenty courts; and the famous aqueduct, built or repaired by the Moors, are among the chief edifices of Seville.

The cathedral was founded in the year 1401, on the site of the antient mosque, but was not completed until 1519. Externally it presents a strange mixture of Arabian, Gothic, and Greco-Roman architecture; but upon the whole its general appearance is very imposing. The interior, which is exclusively Gothic, is both rich and grand. Its dimensions are 420 Spanish feet in length by 291 in breadth, and it is the largest cathedral in Spain. Four rows of enormous clustered columns, eight in each row, separate the aisles. The roof of the centre nave and transept is 134 feet above the pavement; the roof of the side aisles is 38 feet lower. The centre aisle contains the choir and the grand altar. Above the choir, which is a large church of itself, and is only separated from the body of the church by a lofty and richly worked grating of iron, is the organ, which contains 5300 pipes with 110 stops, being 50 more than those of the celebrated one at Haarlem. The high altar is ornamented with the richest marbles, paintings, statues, and a profusion of gilding. On grand festivals it is decorated with immense silver mirrors, made in the form of stars and crowns. Behind the high altar is the 'Capilla Real,' a large gloomy chapel, containing the tomb of Ferdinand III., who took the city from the Moors. The other chapels, in all about 26, contain many treasures of art, both paintings and exquisite carvings, by the best masters of the Sevilian school, as Murillo, Zurbaran, Roelas, Pacheco, Cano, Morales, Vargas, Navarrete, and others.

The Giralda, a lofty square tower of Arabian architecture, which originally formed part of the antient mosque, serves now as a belfry to the cathedral. According to the accounts of all the Arabian writers (Al-makkarí, 'Moham. Dynast., vol. i., p. 56-225) it was built in 1160 by an architect named Jábir (Gever), to whom the discovery of algebra has been erroneously attributed. It was originally only two hundred and fifty feet high; but in 1568 Fernando Ruis, an architect, raised it one hundred feet higher. On the top was placed a statue of Faith, of gilt bronze, which, though fourteen feet high, and of the enormous weight of 3600 pounds, turns on a pivot and acts as weathercock, thus giving its name 'Giralda' to the tower. This tower and the court of the orange-trees (Patio de los Naranjos) are the only remains of the antient Moorish mosque, which in point of size and magnificence equalled that of Cordova. Attached to the cathedral is a very valuable library called Biblioteca Columbiana, from the name of the founder Ferdinand Columbus, the son of the great navigator, who bequeathed to it upwards of 20,000 volumes. During the Peninsular War the treasures of the cathedral were removed to Cadiz, and thus saved from the French. They consist of the Custodia, or tabernacle, in which the host is carried in procession through the city, made of solid silver by the celebrated artist Arfe; it is twelve feet high and of enormous weight; a cross and pair of candlesticks made of the first gold brought from America by Columbus; several pieces of gold-plate, and many vestments for the priests, interspersed with precious stones. Seville has also 28 parish churches, and it contained once 69 convents, 40 for men and 29 for women, besides four Beaterios, a species of foundling-hospitals for the education of orphans and poor children. With one or two exceptions the buildings exist, though the communities which occupied them are now dispersed. The convent of La Merced, founded by Ferdinand in 1249, is one of the most remarkable for its size and architecture. It has lately been destined to receive all the pictures and books collected in the convents of the capital and other towns in the province, with a view to the formation of a provincial library and gallery of paintings. The hospital of La Sangre, an immense building, with a beautiful façade, has accommodation for 300 patients. That of La Caridad which contained the finest pictures by Murillo, 'Moses striking the Rock,' and the 'Parting of the Loaves,' before they were taken to Madrid, is another very interesting building. But the edifice which, after the cathedral, most attracts the attention of travellers is the Alcazar (Al-Kasr), or royal palace of the antient Moorish kings, which, though modernised and spoiled by the Christian kings, still preserves much of its original beauty. In its present state it is a compound of Gothic and Arabic architecture. The principal hall, called Sala de los Embajadores (Hall of Ambassadors), is as fine, though not so delicately worked, as that in the Alhambra. It is fifteen yards square, and three times that height. The pavement is of marble, the ceiling is painted in blue and gold, and the pannelling of the wainscots is formed of painted tiles. The gardens which surround the palace are very beautiful. In one of the rooms on the ground-floor are several statues, inscriptions, and other remains of antiquity, which have been found on the site of the antient Italica, the birth-place of Trajan and Hadrian, which is contiguous to Seville. Excavations are now being made there at the expense of the Spanish government.

Seville is the see of an archbishop. It has a university, founded in 1502; an academy of painting, sculpture, and architecture; a society called Amigos del Pais (friends of the country); a literary and scientific institution, named Lycéo, and several establishments for the diffusion of knowledge and education. Its present population is estimated at rather more than 100,000 inhabitants. The trade, which was very considerable, greatly declined at the separation of the Spanish colonies from the mother country; but it has somewhat revived of late—oil, wine, corn, hemp, flax, liquorice, but above all lemons and oranges, are annually exported in great quantities by the Guadalquivir, which is navigable for vessels of one hundred tons. Three steamers leave Seville daily for Cadiz, and as many go from Cadiz to Seville. The climate of Seville is hot, but healthy. The surrounding country to a considerable distance is so low, that it is frequently inundated, whenever the river overflows its banks, which happens on an average once every five years. There are three good histories of Seville: Morgado, *Historia de Sevilla*, Sev., 1587, fol.; Rodrigo Caro, *Antiguedades y Principado de Sevilla*, 1634, fol.; Ortiz y Zuñiga, *Anales Eclesiasticos de la Ciudad de Sevilla*. A description of Seville has lately appeared in this country by Mr. Standish, *Seville and its Vicinity*, Lond., 1840, 8vo.

SEVRES, DEUX, a department of France, bounded on the north by that of Maine et Loire, on the east by that of Vienne, on the south-east by that of Charente, on the south-west by that of Charente Inférieure, and on the west by that of Vendée. The form of the department approximates to that of an oblong quadrangle, having its greatest extension from north to south. The greatest length is from north by west to south by east, from the banks of the Thoué, on the northern border, to the junction of the three departments of Deux Sèvres, Charente, and Charente Inférieure, 79 miles; the greatest breadth, at right angles to the length, is from near Mauzé to the bank of the Dive, on the border of the department of Vienne, 41 miles. The area of the department is estimated at 2351·5 square miles, being nearly the average area of the French departments, and rather less than the conjoint areas of the English counties of Chester and Salop. The population in 1831 was 294,850; in 1836 it was 304,105, showing an increase in five years of 9255, or rather more than three per cent., and giving 129 inhabitants to a square mile. In amount and density of population it is very far below the average of the departments, and also far below the conjoined English counties with which we have compared it. Niort, the chief town, is on the Sèvre Niortaise, 217 miles south-west of Paris in a direct line; or 261 miles by the road through Orléans, Blois, Tours, Châtelherault, Poitiers, Lusignan, and St. Maixent.

The department is traversed by a chain of hills, which extends from the central group of Auvergne to the mouth of the Loire, bearing in part of its course the name of the Heights of Gatines. These hills enter the department from the department of Vienne on the south-east side, and extend into the department of Vendée on the west side; they separate the basin of the Loire from the basins of the Charente, Sèvre Niortaise, and Lay. The average height of these hills is about 450 feet. That part of the chain of hills, and indeed of the whole department, which lies north-west of a line drawn from Fontenay in the department of Vendée eastward to St. Maixent, and from thence northward by Parthenay and Thouars, is occupied by the primary and lower secondary formations: the rest of the department is occupied by the formations of the oolitic group. There are no coal-pits, and in 1834 there was only one iron-work, which had a furnace for making pig-iron and three forges for producing wrought-iron. Marble, freestone for building, and millstones are dug. There are some mineral waters, but none of great repute.

The portion of the department which belongs to the basin of the Loire is drained by the Sèvre Nantaise (one of the two streams which give name to the department), the Thoué, and the Dive, which last skirts the eastern border. Neither of these is navigable, except the Dive for a short distance. The Thoué receives the Cebron, the Thourt, the Argenton, and some other streams. The rest of the department is drained by the Boutonne and one or two other feeders of the Charente; and by the Sèvre Niortaise, and its feeder the Mignon, which are both navigable. The navigation of the Sèvre Niortaise begins at Niort, but is impeded by shallows and by the winding course of the river. The official statement of the navigation is as follows:—Dive 8 miles; Sèvre Niortaise, 22 miles; Mignon, 7 miles: total, 37 miles. There is, according to the same statement, one navigable canal, viz. that from Niort to Rochelle; but we believe this to be identical, so far as it belongs to this department, with the navigation of the Sèvre. There are a great number of pools, especially among the hills; also a number of marshes.

There were on January 1, 1837, six Routes Royales, or government roads, having an aggregate length of 179 miles, viz. 147 miles in good repair, 6 miles out of repair, and 26 miles unfinished. The principal road is that from Paris to Rochefort, which enters the department on the east side from the department of Vienne, and passes through St. Maixent, Niort, and Maugé, at which town the road to Rochelle branches off. A road from Lusignan (department of Vienne) to St. Jean d'Angély and Saintes (department of Charente Inférieure) crosses this department through Melle, in the south-eastern part; and a road from Saumur on the the Loire (department of Maine et Loire) runs southward by Thouars and Parthenay to St. Maixent, where it joins the road from Paris to Rochefort. Roads run from Niort to St. Jean d'Angély, and to Nantes (department of Loire Inférieure). The departmental roads had an aggregate length of 181 miles, viz. 10 miles in good repair, 3 miles out of repair, and 168 unfinished. The bye-roads had an aggregate length of 20,000 miles.

The temperature in the northern part of the department is colder than in the southern; this is ascribed to its not being so well cleared of wood, and to its having a greater quantity of water, whether standing or running. The summer is not so long, and the heat is tempered by thick fogs. In the southern part the winters are mild, the thermometer scarcely ever falling more than 3° or 4° below zero of Réaumur, or 23° or 25° above zero of Fahrenheit. The south-eastern part is considered the healthiest; in the north fevers and inflammation of the lungs are common; and the inhabitants of the marshy parts are affected by scorbutic complaints, rheumatism, erysipelas, or cancers in the limbs.

The soil varies much; part of it is unproductive, and the backward state of agriculture tends further to diminish the crops; one-third of the best land is constantly in fallow; yet with these deductions the grain-harvest exceeds the consumption of the department. The area of the department may be calculated in round numbers at 1,500,000 acres, of which 1,000,000 acres, or two-thirds, are under the plough. The chief productions are wheat, rye, barley, oats, flax, and hemp. The vine is grown chiefly in the south-west part, where the vintage is converted into brandy. In the north-eastern part about Thouars some tolerable white wine is grown, but in small quantity. The vineyards of the whole department are computed to occupy about 50,000 acres; the gardens and orchards about 24,000 acres. Fruit-trees succeed very well except among the hills; the walnut is extensively cultivated for the sake of its oil. The meadows and other grass lands occupy about 180,000 or 190,000 acres, and the heaths and open pasture-grounds above 50,000 acres. A considerable portion of heath is in the valley of the Sèvre Nantaise, where the land is very poor. The meadows afford pasturage to a great number of cattle, which constitute a considerable part of the wealth of the department. The breed of horned cattle is very good, and a considerable number are sent into Normandie, there to be fattened for the markets which supply Paris. Sheep are also numerous, but the wool is of ordinary quality. The asses and mules which are bred in the neighbourhood of Melle are considered to be among the best in Europe; a considerable number are sent into Spain. Swine and poultry are numerous.

The woodlands amount to about 90,000 acres. Small game is abundant; the deer and the wild boar are found; and wolves have become of late years more numerous than before. The rivers and pools are full of fish.

The department is divided into four arrondissements, as follows:—

Name.	Situation.	Area in Square Miles.	Communes.	Cantons.	Population. 1831.	Population. 1836.
Niort	S.W.	655·5	94	10	97,222	100,208
Bressuire	N.	632	91	6	60,826	63,010
Melle	S.E.	638·5	92	7	73,710	75,580
Parthenay	Central	625·5	79	unk.	63,092	65,307
		2351·5	356		294,850	304,105

A later return makes the whole number of cantons or districts, each under the jurisdiction of a justice of the peace, thirty-one.

In the arrondissement of Niort are—Niort, pop. in 1831, 15,832 for the town, or 16,175 for the whole commune; in 1836 18,197 for the commune [NIORT], and St. Maixent, pop. 4329, on the Sèvre Niortaise; Mauzé, pop. 1756 for the town, or 1797 for the whole commune, on the Mignon; Beauvoir, Rohan-Rohan, Cherveux, Champdeniers, and Coulonges. St. Maixent is on the slope of a hill on the right bank of the Sèvre. It is ill laid out, and the houses are ill-built, but the public walks are agreeable, and the neighbourhood abounds with picturesque scenery. It derives its name and origin from a hermitage established here by St. Maixent in the time of Clovis, which was soon replaced by a Benedictine abbey. The town suffered much in the religious wars of the sixteenth century, and in the Vendean war at the close of the eighteenth. It has a chamber of manufactures, a high school, an ecclesiastical school, and an hospital. Serge, hosiery and other woollens, and leather are made; and trade is carried on in corn, mustard, wool, horses, and mules: there are eleven yearly fairs. At Mauzé the townsmen carry on considerable trade in wine, brandy, and in asses, which are bred in considerable number round the town: there are thirteen yearly fairs. Rohan-Rohan is on an elevated site between the Guirande and the Courance, two streams flowing into the Sèvre or the Mignon: there are twelve yearly fairs. Cherveux has considerable markets. At Champdeniers hats, tiles, and leather are made: there are eight considerable yearly fairs for cattle, resorted to by dealers from Navarre, the Basque provinces, and other parts of Spain. At Coulonges, distinguished as Coulonges-les-Royaux, swanskin, drugget, hats, and leather are made; and trade is carried on in wine, timber, and wool: there are twelve yearly fairs.

In the arrondissement of Bressuire are—Bressuire, pop. in 1836, 1894 [Bressuire], Les Aubiers, and Les Echaubroignes, on or near the streams which flow into the Argenton; Argenton, upon the Argenton; Thouars, pop. 2314, on the Thoué; Oiron, between the Thoué and the Dive; and Cerisay and Châtillon-sur-Sèvre, on or near the Sèvre Nantaise. Tiles and fine linen are made at Les Aubiers. Argenton, distinguished as Argenton-le-Château, was almost destroyed in the Vendean war. Serges and flannels are made in the town, and some good red and white wines are grown in the neighbourhood. Thouars was a place of strength in the time of Pepin in the eighth century; and the English, when masters of Poitou, made it yet stronger; it was however taken from them by Duguesclin, A.D. 1372. It was much injured by the revocation of the Edict of Nantes, and was taken by the insurgents in the Vendean war. The town is on the slope of a hill, near the right bank of the Thoué; it is surrounded by walls, partly ruined, and has two handsome churches, a college, two hospitals, one of them for children, and a handsome castle or mansion built by the duchess of La Trémouille in the time of Louis XIII.: there are three public walks. Woollens, linens, hats, and cutlery are made; and trade is carried on in corn, hemp, horses, mules, and oxen: there are eight yearly fairs. Oiron has an hospital and the ruins of a mansion built by Louis XIV. for Madame de Montespan; trade is carried on in wine: there are three yearly fairs. Tiles and linens are made at Cerisay or Cerizay; and linen, cotton-yarn, and paper at Châtillon-sur-Sèvre. This latter was formerly called Mauléon; it was a place of strength: it was destroyed in the religious wars of the sixteenth century, and again in the Vendean war.

In the arrondissement of Melle are—Melle, pop. in 1831, 2252 for the town, or 2512 for the whole commune; in 1836, 2724 for the commune; on the Beronne, a feeder of the Boutonne; Chefboutonne, Brioux or Briou, and Chizé, on the Boutonne; Sauzé-Vaussay, on a small feeder of the Charente; and La Mothe Sainte Hérave or St. Héray, pop. 2150 for the town, or 2673 for the whole commune, on the Sèvre Niortaise. Melle is in a beautiful and fertile country, of which, from its situation on a hill, it has a commanding prospect. The little stream on which it stands becomes dry in summer. The houses are old and ill built; there are some remains of the antient walls, and an agreeable public walk near the town. Druggets and other woollens, and leather are made; and trade is carried on in corn, trefoil and lucerne seed, cattle, and wool: there are twelve yearly fairs. Melle has a court of justice, a stamp-office, an agricultural society, a departmental nursery, and a college. At Chefboutonne are manufactures of serge, drugget, earthenware, and leather; and considerable cattle-markets. At Brioux or Briou there is a tile-work. At Sauzé or Sauzé-Vaussay, coarse linens are manufactured: there are sixteen yearly fairs. La Mothe Sainte Hérave, or St. Heray, is pleasantly situated. Coarse woollens and leather are made, and trade is carried on in trefoil and lucerne seed, flour, cattle, horses, and mules: there are thirteen yearly fairs.

In the arrondissement of Parthenay are—Parthenay, pop. in 1831, 3606 for the town, or 4024 for the whole commune; in 1836, 4288 for the commune; Secondigny, St. Loup, and Airvault, pop. 1815 for the town, or 1925 for the whole commune, on the Thoué; St. Jouin, near the Dive; and Moncoutant, on the Sèvre Nantaise. Parthenay suffered materially in the English wars, the religious wars of the sixteenth century, and the Vendean war. It is on a slope on the right bank of the Thoué. There are several government offices, a college, an agricultural society, and a theatre: there are some manufactures of woollen yarn, coarse woollens, and leather; and considerable trade in corn and cattle is carried on. Secondigny has the ruins of its antient walls and of an old castle. Coarse woollens are manufactured; asses are bred; and trade is carried on in wine, wood, and iron. There are tile-works and stone-quarries near the town. At St. Loup trade is carried on in coarse woollens, leather, wine, and sheep: there are four yearly fairs. Airvault is a tolerably handsome town; it has the ruins of an antient castle, and of a monastery destroyed in the religious wars of the sixteenth century. Woollen stuffs, hempen cloth, linen, and leather are manufactured; and trade is carried on in clocks and watches, sheep, wool, wine, brandy, corn, and flax. St. Jouin has five yearly fairs for corn, flax, and hemp. Good white wine is produced round the town. Woollen stuffs are manufactured, and there are ten yearly fairs.

This department, with the adjacent department of Vienne, forms the diocese of Poitiers, the bishop of which is a suffragan of the archbishop of Bordeaux. It is in the jurisdiction of the Cour Royale and the Académie Universitaire of Poitiers. There are Protestant consistorial churches at Niort, St. Maixent, Melle, La Mothe, Sainte Héraye, and Lezay, near Melle. The department is in the twelfth military division, the head-quarters of which are at Nantes. It returns four members to the Chamber of Deputies. In respect of education this department is just above the average of France. Of the young men enrolled in the military census of 1828-29, 41 in every 100 could read and write, the average of France being a little more than 39 in every 100.

In the earliest historical period this part of France was included in the territories of the Pictones, or Pictavi, and the Santones, two Celtic nations; but the Santones possessed only a very small portion on the southern border of the department. Both were comprehended in the Roman province of Aquitania Secunda. There were very few Celtic or Roman towns within the limits of the department whose names have been transmitted to us. D'Anville is inclined to fix the Segora of the Peutinger Table, a station between Lemunum or Limonum (Poitiers) and Portus Namnetum (Nantes), at Bressuire. The Rauranum of the Antonine Itinerary (Rarauna in the Peutinger Table) may be fixed at Rom, a village on the Dive, in the arrondissement of Melle; and the Brigiosum of the Table, at Brioux or Briou. Both these stations were on the road between Limonum (Poitiers) and Mediolanum (Saintes). In the middle ages, the department formed part of Poitou. [Poitou.]

SEWARD, ANNA, was born in 1747, of good parents, her father being the rector of Eyam in Derbyshire, prebendary of Salisbury, and canon residentiary of Lichfield. Mr. Seward was a writer of poems, which are printed in Dodsley's collection; and in 1750 he published an edition of Beaumont and Fletcher. He encouraged the poetical indications in his daughter with all the gratified pride of a parent. Pope, Young, and Prior were her favourite authors, and she excelled also in ornamental needlework—an accomplishment she carried into her poems, which bear the same relation to poetry as needlework does to art—ingenious, pretty, and trivial.

She had the society of Dr. Darwin, Mr. Day, author of 'Sandford and Merton,' Mr. Edgeworth, and occasionally that of Doctor Johnson, whom she could not bear. In 1782 she published her poetical novel of 'Louisa,' which met with immense success and rapidly exhausted three or four editions. In 1799 she published a collection of 'Sonnets' intended to 'restore the strict rules of the legitimate sonnet.' They are now very little known. In 1804 she published her 'Life of Dr. Darwin,' written in an affected style; destitute of all requisites for biography; wanting in penetration and delineation of character; puerile in judgment and worse in criticism; nevertheless it contains some pleasant literary anecdotes, and is not without interest. In it she lays claim to the authorship of the first fifty lines in the 'Botanic Garden,' which she had written out of compliment to him, but of which he made no mention. She continued to pour forth little poems of questionable merit, but still maintained her popularity.

After a lingering illness, she expired in March, 1809, bequeathing to Sir Walter Scott her literary performances and particularly the works she had herself intended for the press; and to Mr. Constable, the publisher, her 'Letters, Scott executed his trust by the publication in 1810 of her Poems,' and three volumes of literary correspondence, with a biographical preface. Mr. Constable also published her 'Letters' in six volumes. They afford materials for the study of her character, but they are said to exhibit it in no pleasing light—vanity, bad taste, affectation, and pedantry being mostly prominent.

Posterity, from whose judgments there is no appeal, and with whom the factitious causes of popularity have no weight, has consigned her poems to oblivion, and there is no ground for protesting against this judgment.

SEWER, a place, according to Lord Coke, where water issues, or, as is said vulgarly, 'sues,' whence the word suera or sewer. Callis suggests its derivation from 'sea' and 'weir,' and defines it to be a common public stream, compassed by banks, less than a river and larger than a gutter; but this derivation is devoid of foundation. The word has acquired notoriety as giving the title to 'The law of Sewers,' an important branch of English law. According to that law, the superintendence of the defences of the land against the sea, and against inundation by land-floods, and of the free course of navigable rivers, has been immemorially, 'from the beginning of laws,' says Callis, a matter of public concern: and from very early periods commissions under the common law have from time to time been issued by the crown, empowering persons to enforce the law on such subjects. Many statutes have been passed relating to sewers. The first, according to Lord Coke, is 'Magna Charta,' c. 23, which provides for the taking down of weirs. But the most important of these is 23 Henry VIII., c. 5, commonly called 'The Statute of Sewers,' by which the law was extended, explained, and settled. Several statutes have been since passed, but the most comprehensive is of recent date, 3 and 4 Wm. IV., c. 22. From these two statutes, the decisions especially on that of Henry VIII., and the text-books, the general law of sewers must be ascertained. The act of Wm. IV. does not affect any private or local act for sewers concerning any county or district, &c., or any commission of sewers in the county of Middlesex within 10 miles of the Royal Exchange, except such as lie within any commission of sewers of the county of Essex, or any navigable river, canal, &c. under the management of trustees, by virtue of any local or private act, or any law, custom, &c. of Romney Marsh or Bedford Level. The objects of the law of sewers have been already stated. How those objects are accomplished will most conveniently appear by showing

1. The mode of appointment and qualifications of commissioners of sewers, the duration of their commission and of other acts done under it. 2. The extent, subject-matter, and nature of their authority. 3. The mode by which their authority may be enforced or questioned.

1. The appointment of commissioners of sewers by the late act is vested in the lord chancellor, the lord treasurer, and the two chief justices, or any three of them, of whom the chancellor must be one. Such as have not acted as commissioners before the passing of the statute of Wm. IV., must be possessed, in the same county or the county adjoining that for which the commission issues, of landed estate in fee, or for a term of 60 years, of 100*l.* yearly value, or of a term of 21 years, 10 of which are unexpired, of 200*l.* yearly value, or be heir apparent to an estate of 200*l.* yearly value. Bodies corporate and absentee proprietors possessed of a landed estate of 300*l.* yearly value taxed to sewers may qualify an agent to act as commissioner, provided such agent is named in the commission; persons named ex-officio in any commission as mayor, &c., may act without any further qualification. Callis states that a woman may be a commissioner, for which he says there is warrant in Scripture; for in the first commission which ever issued, the commission of dominion in the first chapter of Genesis, the woman was coupled in commission with the man. He adds also that for anything which appears to the contrary the queen of the South who visited Solomon was a sole queen. A minor above the age of fourteen may be a commissioner. Coincidently with every commission there issues from the crown-office a writ of dedimus potestatem addressed to a list of persons therein named, who are part of the commissioners named in the commission, and authorised to administer the oaths to the commissioners. Previous to entering on office each commissioner takes an oath before these parties for the due performance of his duty, and that he is possessed of the requisite qualification. A commission continues in force for ten years from the date of it; and the laws, decrees, and ordinances made under it, notwithstanding the expiration of the commission, continue in force until they are repealed.

2. Commissioners may be appointed to act in any part of the kingdom of England and Wales or the islands within that kingdom. The English seas are also said to be included within the kingdom of England. Each commission specifies the district to which it applies. The authority of the commissioners extends over all defences, whether natural or artificial, situate by the coasts of the sea, all rivers, water-courses, &c., either navigable or entered by the tide, or which directly or indirectly communicate with such rivers, &c. But they have no jurisdiction over any ornamental works situate near a house and erected previous to the act of Wm. IV., except with the consent in writing of the owner. They have power to repair and reform the defences, and to remake them, when decayed, in a different manner, if this can be done more commodiously. They may also cause rivers, &c. to be cleansed and deepened, and remove any obstructions, such as weirs, mill-dams, and the like, which have been erected since the time of Edward I.: or, if such antient obstructions have been since increased, they may remove the increase. And if any navigable river is deficient in water, they may supply it from another where there is an excess. But the object to be attained by all these acts must be of a general nature, and have for its purpose the furtherance of public general defence, drainage, or navigation. The commissioners have authority also to make and maintain new, and to order the abandonment of old works, and to determine in what way the expenses of the new works shall be contributed. But they cannot undertake any new work without the consent in writing of three-fourths of the owners and occupiers of the lands to be charged. They may also contract for the purchase of lands where necessary to the accomplishment of their objects; the price of which, if not agreed on, must be determined by a jury summoned for that purpose. In them is vested the property in such lands, and in all the works, tools, materials, &c. of which they are possessed by virtue of their office. The commissioners have power to make general laws, ordinances, and provisions relating to matters connected with sewers in their district, as well as to determine in particular instances. These laws are to be in accordance with the laws and customs of Romney Marsh in Kent, or 'after their own wisdoms and discretions.' 'Discretion,' says Callis, 'is that herb of grace that I could wish every commissioner of sewers well stored withal.' The mention of it occurs very frequently in the statute of Henry VIII., and would seem to vest, as in truth it does vest, a very large and undefined power in the hands of the commissioners. Notwithstanding however this reference to their discretion, it must always be understood that they have no authority to do anything which is not both just and reasonable, and also in accordance with the laws of the land; or, as Lord Coke expresses it, every commissioner ought to have 'duos sales, viz. salem sapientiæ, ne sit insipidus, et salem conscientiæ, ne sit diabolus.'

To accomplish the purposes for which they are created, the commissioners have power to appoint a clerk, and various officers called surveyors, collectors, bailiffs, &c.; and they themselves, or any six of them, when duly assembled, constitute a court of record. By their own view, or the report of their surveyor, they may ascertain what old defences need repair, what new ones are necessary, what impediments or annoyances require removal, what money or materials must be provided for such purposes. To form a court, ten days' notice to the owners or occupiers of lands within the district who are required to attend are necessary, except in a case of emergency, when it may be summoned by two commissioners immediately. It is the duty of the sheriff, on receipt of the precept of the commissioners, to summon a jury from the body of the county to attend in their court. Before any charge can be laid, the commissioners must further inquire, through means of the jury, by witnesses examined on oath before them, where it is that any defence is needed or any nuisance exists; and by whose neglect or default, if any, such things have occurred, and what parties are liable to contribute to the expenses of putting all in a proper condition. The general fundamental criterion by which the liabilities of parties to contribute must be ascertained, is the circumstance of their deriving benefit or avoiding injury from the works of sewers. When a party has been once presented as liable by a jury, he is presumed to continue liable during the existence of that commission.

The liabilities of parties to contribute may arise either by tenure, that is, by holding lands on condition of contributing to repairs of a bank, &c.; or by custom, or prescription, or by covenant. If a man holding lands charge them by covenant for himself and his heirs, and the lands descend to the heir, he is liable to their amount. Parties also may be charged by reason of their ownership of the bank, &c. requiring repairs, or because they have the use or profit of it; or because they are frontagers, that is, have lands joining the sea where the defences are needed. If no one appears to be liable for any of these causes, the expenses are then to be imposed on all the level; that is, all the land lying upon the same level. The reason for this imposition is, that all such land is liable alike to suffer by any injury to the defences against the sea, or by any defect in the drainage, and benefits alike by their restoration and maintenance; the whole of it therefore ought in justice to contribute towards the expenses incurred. Even in those cases where a special liability, such as has been above stated, rests on particular individuals, the whole level is still bound to contribute in any case of immediate danger; or where, in spite of the due repairs having been done by the party liable, an injury has occurred by some sudden and inevitable accident, as an extraordinary tide or flood, or where the land liable is insufficient for the expenses necessary. Any new work also must be made and maintained at the expense of the whole level; and where extraordinary repairs are necessary to a great port of the sea, not the level only, but the whole county is liable. The parties liable within the level are all those who have within it any lands or tenements, or profits *à prendre*, such as rights of common, of fishery, &c., provided they receive benefit by the repair or injury by the non-repair; but a party may be exempted from contributing to a general assessment, on the ground of a special custom under which he is bound to do some particular act, such as repairs of a bank for the general service. The duty of the jury, after hearing witnesses, is to present the parties liable to repair; and in cases where the whole level is liable, to present the particular quantity of land or other profit that every one has who is liable within the level. It is sufficient to charge the ostensible owner or occupier. These presentments may be traversed or contested by the party whom they charge, and he may attempt to disprove the facts stated in them, and so show that he is not liable to the extent charged, or not liable at all. After the necessary facts are ascertained, the commissioners make a decree for the assessment of every person in the proportion to which he appears to be liable. The apportionment must be made by the commissioners: it is not sufficient for them to assess a certain sum upon a township or other district, leaving it to the parties themselves to apportion. Where, by reason of immediate necessity, works have been done without any presentment of a jury, the commissioners may afterwards make a rate to defray the expenses. In cases of emergency, the commissioners, by their order, may compel the service of carts, horses, and labourers: they may take soil, &c., and cut down timber within the level, if necessary for their purposes, subject of course to a proper remuneration, which may be recovered before them.

3. After an assessment has been duly made and demanded, the commissioners may by their warrant direct their bailiff to distrain and sell the goods of those who neglect to pay (the distress may be made without the district of the commissioners); or the party may be amerced for non-payment, or the lands themselves which are liable may be sold. In case of such a sale, a certificate of it must be made by the commissioners into Chancery. Constables within the district are bound to obey the orders of the commissioners. In cases where an obstruction or impediment has been, after presentment by the jury, ordered to be removed, the party causing it may be amerced; or if he is unknown, then the person who most suffers by the injury may be empowered by the commissioners to remove it; or the surveyor, after notice, may do what repairs, &c. are necessary, at the expense of the parties making the default: and for any act of negligence or default or misfeazance, an amercement may be imposed by the jury. The commissioners themselves may enforce parties to fulfil the duties lawfully imposed upon them. Thus they may fine a juryman who refuses to act, or a sheriff who fails to summon a jury; and they may maintain order in their court by fining and imprisoning those persons who attempt openly to disturb it.

If the commissioners make an order in a matter out of their jurisdiction, the order may be removed by certiorari into the court of King's Bench, and there quashed; and the commissioners are fineable for contempt if they proceed after a certiorari has been allowed. But a certiorari cannot be demanded of right; it is within the discretion of the court of King's Bench to refuse it, and the impropriety of the order must be made out very distinctly before a certiorari will be granted. Where the order is for repairs, and is made upon an inquisition before a jury who find that a party ought to repair, the court will not proceed in the matter unless the party charged consents to repair in the meantime. If it afterwards appears that he ought not to repair, he will be entitled to reimbursement, which may be awarded to him by the commissioners. An order which is good in part may be confirmed for so much, although it is quashed for the remainder.

An action may be brought against the commissioners for anything done by them beyond their authority. They may sue and be sued in the name of their clerk, who, nevertheless, may be a witness for them. (Callis *On Sewers*; 4 *Inst.*; Comyns's *Digest*, 'Sewers;' Viner's *Abr.*, 'Sewer.')

The sewers of the city of London and its liberties are under the care of commissioners appointed by the corporation, who were first empowered to make the appointment by the 19 Chas. II., c. 31, the act for rebuilding the city after the great fire. They were entrusted with this power by that act for seven years only. A few years afterwards it was made perpetual; and by 7 Anne, c. 9, the commissioners of sewers for the city of London were invested within the city and its liberties with all the authorities possessed by the ordinary commissioners elsewhere.

SEWERS. In treating on the construction and management of sewers, the name will be used in the limited sense in which it is commonly applied to the subterraneous passages formed for the drainage of towns; and the sewers of London, being the most important, and those respecting which most information can be procured, will form the principal subject of this notice.

Covered drains or sewers of great size, and of very solid construction, still exist under the streets of some antient Roman cities, and especially of Rome itself. The cloacæ or sewers of Rome are so capacious that barges are said to have been floated through them; and their magnitude has led to the conjecture that, although their origin is usually attributed to the time of Tarquin, they are in reality the remains of some older city; their dimensions being considered disproportionate to the extent of the then infant city of Rome. For a particular account of the existing remains of these works, see CLOACÆ, vol. vii., p. 268.

In modern times the sewers of London stand unrivalled for extent and excellent construction, although much yet remains to be done to render them adequate to the necessities of an immense and constantly increasing population. It will be seen from the preceding article that the early legislative enactments relating to sewers, so far as they provide for drainage at all, do so for the drainage of the surface only; while, from the practice so common in London, of building not only cellars, but habitable apartments also, much below the level of the ground, convenient means of drainage to a considerable depth are essential to the health and comfort of the inhabitants, and the dryness and stability of the houses themselves. Although additional powers have been from time to time conferred upon some of the commissions by which the sewage of the metropolis is managed, this defect is far from being completely remedied. A little consideration as to the circumstances under which the duties of the commissioners have gradually changed and extended, will tend to account for many of the defects of the existing system, which deserves admiration for its comparative excellence, rather than calls for any expression of dissatisfaction at its admitted defects. Mr. Walker, the engineer, in evidence before a parliamentary committee in 1834, stated that when, in the previous year, some French engineers were sent over to England by their government, nothing seemed to attract their attention more than the sewage of London, the drainage of Paris being a subject then under consideration; 'but,' he adds, 'their ideas of the proposed drainage never extended to more than taking away the surface drainage, and they seemed astonished when I told them that the water from our lowest cellars drains into those great sewers.' It is very curious to trace the effect of the extension of population in and about London in converting what were, a few centuries ago, streams of pure water, into receptacles and channels for the filth and refuse of a densely inhabited district, until they have become so offensive, and so inadequate to the offices required of them, as to render necessary the substitution of deep and wide subterraneous channels, or arched sewers, for the once healthy, but now pestilential rivulets. This has been done by the writer of a paper in Knight's 'London' (No. XIII.), to which we are indebted for the following particulars respecting the watercourse now known as the Fleet Ditch or Sewer, which affords the most striking example of these changes. Stow tells us that 'Antiently, until the time of the Conqueror, and two hundred years later, this city of London was watered (besides the famous river of Thames on the south part) with the river of the Wells, as it was then called, on the west; with a water called Walbrook running through the midst of the city into the river of Thames, severing the heart thereof; and with a fourth water, or bourn, which ran within the city through Langbourn Ward, watering that part in the east. In the west suburbs was also another great water, called Oldborn, which had its fall into the river of Wells.' In this passage, which enumerates the principal natural water-courses of the old city, the Fleet is designated by a title indicative of the 'choice fountains of water, sweet, wholesome, and clear,' which, from the northern suburbs of the city, contributed their tributary rills to the main stream, which descended from the high ground about Hampstead. However clear and sweet this river may once have been, it was early rendered otherwise by the extension of population on its banks. The paper alluded to above tells us that 'So early as 1290 the monks of White Friars complained to the king and parliament that the putrid exhalations arising from it were so powerful as to overcome all the frankincense burnt at their altars during divine service; and even occasioned the deaths of many of the brethren.' Many attempts were made to cleanse the Fleet river, and restore it to its antient condition of utility as a navigable stream; but they proved unavailing, and the stream which formerly conducted vessels with merchandise as far as Fleet Bridge and Old Borne (now Holborn) Bridge, if not further, became, in the language of Pope,

> 'The king of dykes! than whom no sluice of mud
> With deeper sable blots the silver flood.'

The total surface which is drained into this stream in the Holborn and Finsbury districts of sewage is stated to be about 4444 acres, of which about 1788 acres are now covered with streets and houses; while in 1746 the surface so built upon was only about 400 acres. This increase of buildings, besides greatly augmenting the ordinary drainage from the surface, by reducing its absorption, has rendered necessary some provision for carrying off the refuse water and filth from thousands of habitations. The Fleet dyke or ditch has therefore been, for several years past, in course of conversion into a great arched sewer, of which only a small portion now remains incomplete. In 1826 it was determined to enlarge this sewer for a length of nearly 16,000 feet, from Holborn to Kentish Town;—the expense was estimated at 46,682*l.* The greater part of this work has been already executed, the remaining length being chiefly in the direction of the intended new street north of Farringdon Street. The commissioners make it a principle, wherever it is practicable, to form their covered sewers under the pavement of streets; a circumstance which occasionally deters them from covering sewers in districts where the arrangement of the streets is not fully decided on, although the increase of population may render the open channels a great nuisance.

The names of the seven trusts or commissions into which the sewers of London and its suburbs are divided, and some further particulars respecting them, have been given in a previous volume. [LONDON, vol. xiv., p. 123.] It has long been considered that the system of management is capable of considerable improvement; as the want of uniformity of plan, and of cordial co-operation in the several districts, is liable, in various ways, to lead to inconvenience. A select committee of the House of Commons was appointed in 1834 'to inquire into the state of the law respecting sewers in and near the metropolis, and into the administration of the same by the various Boards of Commissioners of Sewers; with a view to suggest such amendments in both as shall be deemed advisable;' and this committee, after a careful investigation, pronounced their opinion that the law is especially deficient in three points. These defects are, 1st, a want of uniformity—the law itself varying in different districts; or if not so, being variously interpreted by their respective commissions; 2nd, the want of publicity and responsibility—there being some of the trusts in which the courts are not open to the public, and where the right of the ratepayers to inspect the accounts is not admitted; and, 3rd, equality of rateage, with inequality of advantages—it being the usual practice to rate all houses which either receive a benefit from the sewers or avoid a damage. On this system very few houses are exempt, as all may be considered to derive benefit more or less from the surface drainage of the streets. So long as merely the surface drainage of the town was attempted, this principle might be considered equitable; but as the sewers are now used for other important purposes, and it is highly desirable that every house should have an underground communication with them, it appeared to the committee unjust that the same rate should be levied upon houses possessing this advantage, and upon such as neither have it, nor, without great additions to the present sewage, can be supplied with it. In some cases the commissioners appear not to be possessed of necessary powers for making new sewers, or even covering in existing open sewers; while the law provides no means of compelling the builders of new streets to provide them with proper drainage, or even of enforcing communication with a sewer when made. A bill for regulating the drainage of towns was introduced in the last session (1841), which, if passed, would have done much to remove these defects; but it was lost in consequence of the abrupt termination of the session. A striking illustration of the evils arising from the want of unity of plan among the various commissions is afforded by the fact stated in evidence before the committee, that the improvement and enlargement of the sewers in the Holborn and Finsbury divisions, which communicate with the Thames through those of the City of London commission, occasioned so great an influx of water to the latter, that they became totally unable to discharge it; and consequently their contents were, during heavy falls of rain, forced into the neighbouring houses. This circumstance has rendered necessary the construction of enlarged sewers through the city at great expense; 'but,' as observed in the Report, 'if anything like combination had existed previously, the improvements would have been carried on simultaneously, and the inconvenience would never have occurred.' Notwithstanding the liability of the present system to abuse, the committee reported that the laws appeared to have been, of late years, administered with good faith and integrity on the part of the commissioners; and their investigation did not lead them to recommend a consolidation of the various trusts into one—a measure which had been suggested as a probable improvement. The evidence given on this occasion proved that much was being done to remedy the defects of the sewage, both by deepening, enlarging, and otherwise improving old sewers, and by making new ones. Mr. Daw, chairman of the City of London commission, stated that full one-third of the sewers in the city had been made in the ten years preceding 1834. A return made by the officers of the Westminster division shows that, between 1807 and 1834, there had been built, within the Ranelagh Level,* 2692 feet of open and 6886 feet of covered sewers, making a total length of 9578 feet, at the cost of the commissioners; while the length made during the same period by private persons was 91,708 feet. From a letter printed in the Appendix to the Report of the Committee, respecting the district drained by that portion of the Fleet ditch which is within the jurisdiction of the commissioners for the Holborn and Finsbury divisions, it appears that no less than 31,000 feet of new sewers were made in that district between 1822 and 1831, at a cost of more than 23,000*l.* Since the year 1834, improvements have been going on rapidly in some districts. In the Tower Hamlets division, as appears by the evidence of the surveyor before the Select Committee of the House of Commons on the Health of Towns, in 1840, nearly 25,000 feet of new sewers were proposed in 1834 or 1835, of which four-fifths were completed by 1840. There do not appear to be published data from which the total extent of the sewers in the metropolitan districts can be ascertained; but by the courtesy of Mr. Roe, surveyor of the Holborn and Finsbury divisions, we are enabled to state that the total length of the main covered sewers in those districts, down to April, 1841, was as follows:—

---

* *Level* is an arbitrary term, originally applied to the district drained by a particular sewer; although there are now several outlets for the drainage in many districts that bear the name of levels. In the Ranelagh district, for instance, besides the principal outlet, which is called the Ranelagh sewer, the Commissioners' map shows six minor openings into the Thames, three of which receive the sewage from several branches.

	Feet.		Miles.
Holborn division . .	217,566	or about	41¼
Finsbury division . .	220,885	. . . .	41¾
Total .	438,451	. . . .	83

Of these main sewers nearly one-half have been made within the last twenty years, and 10¾ miles in the three years from January, 1838, to December, 1840. In addition to these, there are 16 miles of smaller sewers to carry off the surface water from the streets and roads, and 254 miles of drains leading from houses to the main sewers. (*London*, No. XIII., p. 231.)

While such facts as the above show that much has been done of late years in extending the benefits of underground drainage, there are still many densely peopled districts, both in London and in some of the principal provincial towns of the kingdom, which are either entirely without sewers, or in which the sewage is extremely defective. The witnesses examined in 1840 by the Committee on the Health of Towns brought forward numerous instances of this kind, in which the worst effects were produced on the health and morals of the people by the contaminated atmosphere and the filthy condition of the houses in which they are compelled to live. A Report on the Sanitary State of the Labouring Classes, by Dr. Southwood Smith, expresses a very strong opinion as to the injurious effect of deficient drainage; and so intimate does that gentleman conceive its connection to be with the presence of disease, that he observed, in his evidence before the committee alluded to, 'if you were to take a map and mark out the districts which are the constant seats of fever in London, as ascertained by the records of the Fever Hospital, and at the same time compare it with a map of the sewers of the metropolis, you would be able to mark out invariably, and with absolute certainty, where the sewers are, and where they are not, by observing where fever exists; so that we can always tell where the commissioners of sewers have not been at work by the track of a fever.' For instances to bear out this assertion the reader is referred to the evidence itself, in which many scenes are described that are too filthy and disgusting for repetition, and abundant proof is given that the evils complained of are as debasing to the character as they must be destructive to the health of the poorer classes; for, as remarked by Dr. Arnott, 'where filth is unavoidable, it makes people careless of making a little addition to it; it does not shock their feelings as if all was clean.'

As sewers are, from their peculiar situation and use, more difficult to examine and repair than many other structures of brickwork, while a defect may be productive of very serious injury before it attracts notice, it is especially desirable that they should be constructed in the most perfect and durable manner; while the necessity of providing for the passage of water from existing branches, and from such as may be constructed at a future time, requires great care in adjusting the dimensions, inclination, and level. All the sewers constructed by the metropolitan commissions of late years are of such dimensions as to allow a man to pass through them, for the purpose of inspecting or cleansing them. From a statement in the Appendix to the Report of the parliamentary committee of 1834, it appears that the smallest sewers in the City of London division are about four feet three inches high by two feet three inches wide, the dimensions being increased, according to circumstances, up to eight feet six inches by seven feet, which are the general dimensions of the new sewer from Moorfields to London Bridge, although at the mouth it is increased to ten feet by eight feet. The water brought down by the Fleet Ditch is conducted from Holborn Bridge by two sewers, from twelve to fourteen feet high, and six feet six inches wide, one on each side of Farringdon Street. These sewers unite, towards the mouth, into one passage about eighteen feet by twelve; and even that, the surveyor states, is sometimes insufficient to carry off the water. When a storm occurs at high-water, the quantity brought down by the Fleet Ditch will, he says, raise the water in the lower part of the sewer five feet almost instantaneously; and under such circumstances, the water has been occasionally forced up through the communicating drains, so as to flood the surface. In the district under the management of the Westminster commission, the common sewers are built of the form represented by the annexed transverse section, which represents, on a scale of a quarter of an inch to a foot, a sewer of the larger sort, the greatest height being five feet six inches, and width three feet. Smaller sewers are made of the same form, but only five feet high, and two feet six inches wide. The regulations for building sewers, issued by the commissioners, require that the bricks used be 'good, square, hard, sound, and well-burnt stock bricks, and be properly laid in well-compounded mortar, made of one part of good strong stone lime and two parts of clean river sand; the workmanship to be of the best description, the bricks of each arch to be well bonded, and the bricks of the arch at the bottom of the sewer to be laid close at the top edge, and to an even curvature on the upper surface, bedded in mortar and grouted.' It is further ordered that when Roman cement shall be used in the works, 'it shall be of the best quality, and shall not be mixed with more than one-half of clean river sand.' This form of sewer has been, we believe, generally adopted in London; but Mr. Roe, surveyor to the Holborn and Finsbury commission, who has introduced several important improvements in the construction and management of sewers, has suggested that it is a form not calculated to give the greatest strength, and states that in some cases the sides have given way to the pressure of the earth behind them. He therefore prefers an oval form, as represented in *Figs*. 2 and 3, which are copied from the regulations recently issued by the commissioners for the construction of new sewers and drains. These are drawn to the same scale as *Fig*. 1. The part in which the joints are marked in the cut is, according to the directions, to be worked in blocks with cement.

Fig. 1.

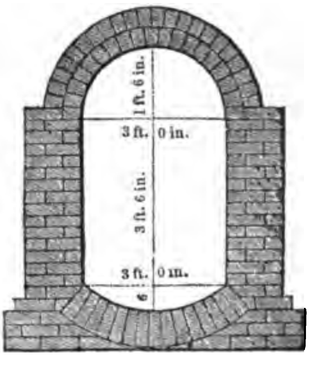


Fig. 2.

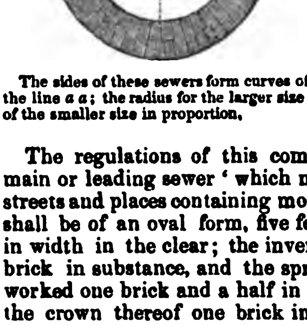
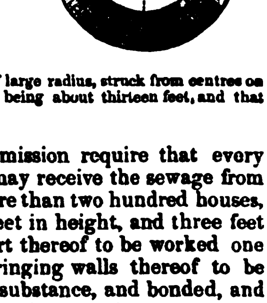


Fig. 3.



The sides of these sewers form curves of large radius, struck from centres on the line *a a*; the radius for the larger size being about thirteen feet, and that of the smaller size in proportion.

The regulations of this commission require that every main or leading sewer 'which may receive the sewage from streets and places containing more than two hundred houses, shall be of an oval form, five feet in height, and three feet in width in the clear; the invert thereof to be worked one brick in substance, and the springing walls thereof to be worked one brick and a half in substance, and bonded, and the crown thereof one brick in substance, in two separate half-bricks,' conformably with the transverse section copied in the preceding cut, *Fig*. 2. All branch sewers which may receive the sewage from streets containing less than two hundred houses, are required to be four feet six inches in height, and two feet six inches in width in the clear: the whole being worked one brick in substance, the bottom and springing walls being bonded, and the crown worked in two separate half-bricks. The section of this, which is called the second size, is represented in *Fig.* 3. Mr. Roe states, in the paper in which this new form of sewer is recommended, that its adoption would effect a saving of one shilling and sixpence per lineal foot in sewers of the first size. The expense of building sewers of course varies greatly, according to their depth and other contingent circumstances; but in 1834 (before Mr. Roe's improvements were introduced), the average cost of the larger sewers in the Holborn and Finsbury divisions was stated to be from twenty to twenty-five shillings per foot, and of the smaller sewers from twelve to fifteen shillings per foot. In the Tower Hamlets district, the ordinary dimensions, as stated to the committee of the House of Commons in 1834, are four feet six inches by three feet for the larger, and four feet by two feet six inches for the smaller sewers. The inverted arch which forms the bottom of a sewer, besides adding to its strength, is useful in increasing the force of the current, and enabling it to carry away the ponderous matter that would otherwise settle and choke up the sewer. In the evidence before the committee on the Health of Towns (p. 127), Mr. Newman, one of the surveyors in the Surrey division, stated that the badness of the soil in that district, and the existence of quicksands, increased the difficulty and expense of constructing the sewers, and rendered necessary the adoption of cast-iron bottoms.

The inclination of sewers must vary greatly in different districts, but should always, if possible, be sufficient to enable the water to run freely, and to carry off the solid matter that usually enters with it. The regulations of the Holborn and Finsbury commissioners require that the inclination 'be not less than one-fourth of an inch to every ten feet in length, and as much more as circumstances will admit, in those portions that are in a straight line; and double that fall in portions that are curved.' Those issued by the Westminster commission in 1836, state that the current required for sewers, in all cases, is one inch and a quarter to every ten feet in length; but probably this has been ascertained to be a greater inclination than is necessary, as the more recent regulations order 'that the current of all sewers to be built be regulated by the commissioners according to the surface required to be drained,' without specifying any particular inclination. These also require that, where the situation will admit of ample fall and depth of sewer, there shall be at least three feet of depth between the upper part of the crown of the arch and the surface of the road. In some cases it is very difficult to obtain sufficient inclination in a sewer, and still to make it deep enough to drain the basement story of neighbouring houses; which may be readily conceived from the fact that some parts of London are below the level of high water. Considerable portions of the district comprised in the Surrey and Kent commission of sewers, by which the drainage of the whole of London south of the Thames is effected, are below that level; and the surveyor of the Tower Hamlets commission states that in some parts at Wapping the pavement is five feet below the high-water mark of the Thames. (*Report on Health of Towns*, p. 125.) The greater part of the district drained by the Blackwall or Poplar commission would be inundated but for the river walls; so that in this division the duties of the commissioners consist, as intimated by the old laws relating to sewers, as much in the maintenance of embankments as in making provision for drainage. To prevent the tide from entering sewers that drain low ground, it is necessary to close their lower ends with heavy flaps, which are opened by the attendants, or flap-keepers, at proper times, so as to allow free exit for the sewage at low-water. Wherever it is practicable, new sewers are built at a considerable depth from the surface. The depth of that in Watling-street, in the City of London, which is an extraordinary case, is from thirty-three to thirty-five feet. Some difficulty not unfrequently occurs in crowded districts, where deep and capacious sewers are especially needed, owing to the danger attending their construction. In many cases, particularly in the older streets of the city, it is necessary to shore up the houses by a massive frame-work of timber, to prevent their falling while the sewer is in progress; and in some instances it has been considered unadvisable, solely on this account, to attempt their construction, even where they were much needed. The want of sewers in some parts of London obliges the inhabitants to use force-pumps to relieve their cesspools; a practice which, besides being very expensive, is injurious to health, as the filthy water so pumped out runs along the open gutters until it reaches a gully-hole. This operation is performed at night, by which the evil is rendered less apparent; and it has been proposed, in some cases, to lay an iron pipe beneath the foot pavement to carry off the water so pumped out, that it might not run on the surface.

It is highly desirable, where a sewer must deviate from a straight line of direction, to effect such deviation by means of regular curves; and also to make branch sewers enter the main line by a curved instead of an angular junction. Mr. Roe ascertained, by experiment, that the time occupied in the passage of an equal quantity of water along similar lengths of sewer with equal falls, was as follows:—

Along a straight line . . .	90 seconds.
With a true curve	100 „
With a turn at right angles . .	140 „

It is therefore evident that the occurrence of angular or ill-formed turns in a sewer must have a similar effect to diminishing its capacity, as such parts of the sewer will not pass so much water as the straight parts; and it also has the disadvantage of occasioning the deposition, in the form of sediment, of matter that would otherwise pass off with the water. This evil may be met by giving a greater fall to curved than to straight portions of the sewer. The new regulations of the Holborn and Finsbury commissioners, in which the improvements of Mr. Roe are embodied, require that the curves in sewers passing from one street to another, or where a turn is required, shall be formed with a radius of not less than twenty feet, and also that the inclination or fall shall be increased at the junction.

Where private drains are to be laid into a sewer for the purpose of draining houses, it is necessary that the lowest pavement or floor of the building be at least four feet above the level of the sewer, measuring to the bottom of the side wall, or commencement of the invert; because the house would otherwise be liable to be flooded with water from the sewer, when unusually full. The regulations for private drains, issued by the Westminster commission, require that the bottoms of such drains shall be twelve inches above the bottom of the sewer with which they are intended to communicate, and recommend that they have a fall of at least a quarter of an inch in a foot. This fall, in a length of sixty feet, amounts to fifteen inches, by adding to which thirteen inches for the height of the drain and brick arch over it, eight inches for the depth of ground and paving over the upper end of the drain, and twelve inches between its lower end and the bottom of the sewer, we obtain the necessary total fall of four feet. The Holborn and Finsbury commissioners require a space of two feet between the bottom of the drain and the bottom of the sewer; but the total difference of level between the sewer and the basement floor is only two inches greater than that mentioned above; the prescribed fall being only a quarter of an inch in a yard, or five inches in a length of sixty feet. To prevent injury to the sewers, it is always required that the brick rings at the junctions of private drains, and about three feet of the drains themselves, shall be made by the commissioners; a fixed price being paid to them by the individual for whom the drain is constructed. The metropolitan commissioners of sewers are required to furnish builders, on application, with information as to the lowest level to which they can supply the means of drainage; but, under the present state of the law, they have no power to prevent the excavation of ground for buildings, or the formation of cess-pools, to a greater depth than can be drained by the sewers; although they may refuse permission for the construction of private drains opening into the sewer in such cases. The disinclination evinced by many proprietors of houses to avail themselves of the facilities offered by the construction of new sewers, for improving the drainage of their property, is truly surprising, and shows how imperfectly the advantages of good sewerage are appreciated. A remarkable case was mentioned to the committee on the Health of Towns, in which a new sewer nearly a mile and a half long had been made, in the parish of Camberwell, on the urgent application of the inhabitants, and yet only one application had been made for a private drain in the whole distance. Drains leading from private houses are usually of a circular form, and nine inches in diameter, though some are of greater size. In this, as in almost every other point of detail, the various metropolitan commissions are far from being uniform. While the Holborn and Finsbury commissioners will not allow, except in special cases, a private drain of more than nine inches in diameter, those for the Tower Hamlets division allow nothing under twelve inches, and admit drains of fifteen or even eighteen inches diameter.

The construction of gully-holes and shoots for conducting the surface drainage of the streets into the sewers, and a variety of other matters, vary considerably in the different commissions. It has been usual in all, until very recently, to make apertures or *man-holes* at convenient distances, to enable persons, when necessary, to enter and cleanse the sewers. In the regulations of the Westminster commission, it is ordered that these apertures be formed at, or near to, every intersection of the sewers, and also that they be at distances not exceeding 180 feet from each other. They are built in the form of oblong shafts of brickwork, up to within about eighteen inches of the surface of the road, and covered with cast-iron plates, over which the roadway is made good. The inconvenience attending the use of these apertures, in order to open which it is necessary to break up the carriage-way, might be avoided by the general adoption of side-entrances, which form an important feature of the improved system now being introduced in the Holborn and Finsbury commission. These are passages extending from the side of the sewer to the foot-pavement, through which they may at any time be entered by unlocking and opening a cover or trap-door, consisting of pieces of flag-stone mounted in an iron frame. When a person enters the sewer by one of these openings, the cover is held open by a self-acting catch, and an iron grating, which admits light and air, rises into its place, and serves to prevent any passenger from accidentally falling in. It is proposed in some cases to combine the side-entrances with the gully-holes, by which some expense may be saved. The advantages of an easy access to the sewers at all times are very great; and the positive saving of expense by the adoption of this system is expected, as appears from the Report in which it is recommended, to be considerable. It is proposed that there shall on an average be one side-entrance to every six hundred feet of sewer.

The last-mentioned improvement is intimately connected with another, which promises to be of great value—a method of cleansing sewers by using water in *flushes*. A great quantity of solid matter enters the sewers with the water which they are intended to carry off; and as their current is usually very trifling, it is deposited in the form of a sediment. This takes place especially at the points of junction of branch sewers, gullies, and private drains; and it has often happened that the deposit has gone on accumulating until it has reached the level of the private drains, the consequent choking up of which has given the first intimation of the state of the main sewer. Besides the injurious effect of this accumulation of filth upon the health of persons residing near the sewer, such a state of things is productive of great expense, it being sometimes necessary to break up the road, and open and rebuild both the sewer and, occasionally, the drains opening into it. But the evil does not rest here; for it has been a common practice to spread the deposit of filth on the surface instead of carting it away, whereby its noxious effluvia have become productive of disease to the neighbourhood. Although in general the current of water in the sewers is not sufficiently rapid to carry off this solid matter, Mr. Roe, conceiving that it might be made so by damming it up, and then letting it off in flushes, tried a series of experiments on the velocity of water in sewers when dammed up to various heights, by which he found that he could, by a head of water varying from ten inches to four feet, obtain a velocity of from thirty to eighty-six inches per second. The power of running water at various velocities has been treated of in the artice ALLUVIUM [vol. i., p. 357], where it is stated that a velocity of three inches per second is sufficient to enable a current of water to tear up fine clay; and that a stream running at the rate of three feet per second will tear up beds of loose stones of the size of an egg. It is therefore evident that, by a moderate head of water in a sewer, a current may be produced of sufficient force to tear up and carry away a considerable deposit of sedimentary matter. The average annual deposit is stated to be nearly an inch and a half in thickness—a quantity which might be readily removed by flushing once a-year only; but far better by repeating the operation, as it is proposed to do, three or four times in a year, which will prevent its ever accumulating in considerable quantity. To show the effect of the operation in practice, we quote the particulars of three experiments, from a report presented by Mr. Roe to the commissioners:—

1st Experiment. Water backed up 70 feet; head, 13 inches; quantity, 26 hogsheads; which, when let off, cleared away rather more than 1¼ inches of deposit from 370 feet of sewer, having a fall of a quarter of an inch in each 10 feet, and being the whole length that needed cleansing.

2nd. Head of water, 18½ inches; quantity, 45 hogsheads; cleared away 1½ inch of deposit from 300 feet of sewer; part of the bottom on a dead level.

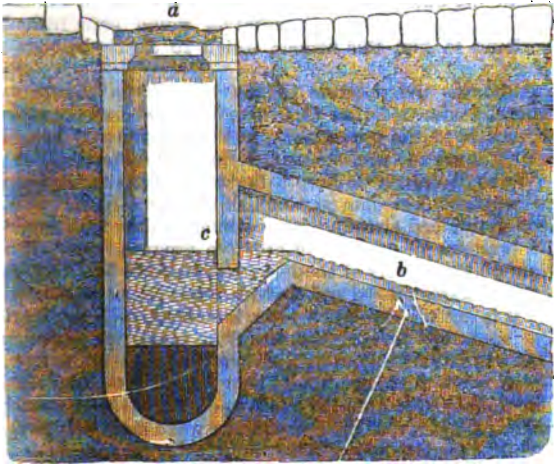
3rd. Head of water, 10 inches; quantity, 20 hogsheads; deposit heavy; flush cleared away 1½ inch from 330 feet of sewer.

The necessary head of water is produced by simply accumulating the ordinary contents of the sewer, which may be done either by a cast-iron gate, fitting closely to a frame-work built into the sewer, and rising to the height that the head is required to be, or by a drop plank or gate of the same material, sliding up and down in nearly vertical grooves. In either case the apparatus may be managed, by means of the side entrances before alluded to, with the greatest facility. The drop plank may, it is stated, be drawn up in two seconds and a half, and the gate may be thrown open in less than one second; and, as the height of each head is regulated by the level of the private drains near it, no injury is done if the water rise to the top of the gate, so as to run over it, before the attendant is ready to let it off; so that one person is enabled to set a number of stop-gates, and return to let them off in succession. In the report alluded to, Mr. Roe gives a detailed calculation to prove the superior economy of this plan of cleansing, and concludes his recommendation of it by observing 'that irrespective of any saving to be effected by flushing the sewers with water, he considers that the prevention of a large quantity of foul deposit from remaining in a state of fermentation for years together beneath the streets, and the consequent removal of a great cause of offensive effluvia, together with avoidance of large quantities of slop being laid out on the surface (as is the case in the ordinary mode of cleansing), would be benefits of such worth as to warrant the utmost use of stop-planks and water, for keeping sewers free from deposit.' The ordinary run of water in the sewers has hitherto been found sufficient for the purpose; but in case of its proving otherwise, a supply of water for flushing might be readily procured from the water companies.

Of the numerous plans that have been suggested for improving the sewage of the metropolis, a few claim a brief notice. Among these is that brought forward a few years since by Mr. John Martin, of which the particulars are given in the Report of the Select Committee on Sewers, in 1834, and were also published in the form of a pamphlet. The main feature of this plan was, that the water collected in the sewers should not be emptied immediately into the Thames, but into spacious receptacles near its banks, in which the solid matter might subside, so as to become useful as manure. To effect this it was proposed to construct a great sewer, principally of iron, along each bank of the river; into which the existing sewers should empty themselves, instead of into the river itself. Mr. Cubitt stated to the committee on the Health of Towns that he did not think Mr. Martin's plan went far enough; and that the sewage should, in his opinion, be conducted several miles below London before it is allowed to enter the river; so that it might not be liable to be driven back to the town by the incoming tide. The great importance of the object aimed at in this suggestion will be admitted by all who reflect that a great portion of the inhabitants of London are supplied with water from the Thames, which is necessarily contaminated, under the present system, by the influx of the entire sewage of the metropolis.

Very different opinions have been expressed as to the advisability of preventing the escape of the effluvia of sewers by the gully-holes; and it has indeed been contended that they are by no means so noxious as to render such a measure desirable as a sanitary precaution. Although the evidence laid before the committees on Sewers and on the Health of Towns tends generally to prove the injurious character of such exhalations, it does not appear from it that the persons employed in and about the sewers are a particularly unhealthy class of men; and even open sewers, which are almost universally condemned, do not appear to be always productive of visible unhealthiness. The surveyor of the Tower Hamlets division says, in his evidence before the latter committee (p. 125), 'in Hackney, which is one of the most healthy districts, we have more than three miles of open sewers; it is the filth of the inhabitants, more than anything else, which affects their health.' The degree of insalubrity occasioned by the exhalations from sewers, whether closed or open, depends much upon the velocity of their current, and may, under some circumstances, be trifling, although in others it is an evil that demands remedy. It is absolutely necessary to provide some means for the escape of the gases engendered in the sewers, and this is commonly done by the gully-holes in the streets; the entrances to private drains being usually, in the better sort of houses, secured by an apparatus called a stink-trap, which prevents the escape of the effluvia. But even the vent provided by the gully-holes is sometimes insufficient; and the gases not unfrequently accumulate and explode in the sewers, thereby endangering the men whose duty it is to enter them. Mr. Fuller, a medical gentleman, in presenting a plan for ventilating sewers to the parliamentary committee of 1834, stated that of all the cases of severe typhus that he had seen, eight-tenths were in houses either untrapped from the sewers, or which, being trapped, were situated opposite to gully-holes; and he mentioned cases in which servants sleeping in the lower rooms of houses so situated were invariably attacked with typhus fever. Instances were also adduced in which it had been found necessary either to trap or to remove gully-holes in the vicinity of butchers' shops, owing to the injurious effect of the effluvia upon the meat. Many varieties of air-traps or stink-traps have been suggested, and tried on a limited scale, for diminishing this evil. A very simple plan, introduced by Mr. Cuff, is represented in section by *Fig.* 4. In this cut *a* represents the grating, which is imbedded, as usual, in the pavement of the street, and *b* is the passage leading to the sewer. The vertical shaft or well is carried down below the level of this passage, the bottom being formed into a receptacle for the solid matter that enters with the water; and which, being in a quiescent state, and constantly covered with a considerable depth of water, is not likely to emit any injurious smell. This receptacle may be cleared out once a month, or oftener, the operation being the work of a few minutes only; and Mr. Cuff proposed, in some cases, to have an iron vessel fitting the bottom of the well, so that it might be drawn up by a crane attached to the cart that carries away the solid matter, and returned to its place when emptied. The curtain-wall, or dipping-valve, at *c*, extends a little below the level of the entrance to the sewer, so that while it allows water to flow freely into the sewer when it has filled the well to the level of the inclined passage, it effectually prevents the escape of air from the sewer to the gully-hole. It is a defect of this, in common with many other kinds of trap, that in dry weather the water sometimes becomes too low to prevent the passage of air; but this inconvenience admits of easy remedy. The recent successful introduction of flushing renders one feature of the plan,—the exclusion of solid matter from the sewers,—less important than formerly. Mr. Cuff stated, in 1834, that his traps had been in use in the Tower Hamlets division for seven years, notwithstanding the opposition of the commissioners; the Pavement Trust having, in that district, an independent power over the gully-holes. They have also been used in St. James's Park, Whitechapel, and other parts of London; and, we believe, in several provincial towns.

Fig. 4.



Before any system of traps can be extensively adopted with safety, means must be provided for producing ventilation in the sewers. The plan recommended by Mr. Fuller was to have a large furnace, with a high chimney, erected as near as convenient to the highest point of every main sewer, and so connected with it that the fire should be supplied with air from the sewer only. The lower end of the sewer was to be closed with a trap that would allow water, but not air, to pass; so that air could enter only at the gully-holes, of which a sufficient number should be left open to supply the draft of the furnace, all the rest being trapped. By carefully adjusting the number and situation of the open gully-holes, it was conceived that a sufficient current of air might be produced in all the sewers to prevent any emission of foul air into the streets or houses, as the open gullies would have a current setting into instead of escaping from them; while the air drawn from the sewers by the furnace would be purified by passing through the fire, and would finally escape at such a height as to avoid any risk of becoming a nuisance. A similar plan has been suggested in America, and also in Paris. (Gill's *Technical Repository*, vol. iii., p. 85; and vol. vii., p. 55.) The opinions of scientific men as to the practicability of introducing such a system of ventilation on a large scale, and at a sufficiently moderate expense, are not very decided; but the importance of some such improvement is obvious. For further particulars respecting Mr. Fuller's plan, and experiments to ascertain the necessary dimensions of the chimney, &c., the reader is referred to the Report of the Committee on Sewers, especially to the evidence of Messrs. Fuller and Walker. It has been suggested that occasionally the large fires used in manufacturing establishments might be taken advantage of in introducing such a system of ventilation.

The great importance of having every drain that enters a dwelling-house secured by an air-trap may be conceived from the fact stated by Mr. Fuller, that in several houses in which he measured the current of foul air emitted from the drains, he found it set into the houses at the rate of from six to ten feet per second. Subjoined are sectional representations of two simple kinds of trap suitable for domestic use, the action of which needs but little explanation. That represented in *Fig.* 5, which is very commonly used in London, is made entirely of metal, and is intended for use in sinks; the apparatus being fitted into the stone, so as to be flush with, or sunk a little below, its upper surface. The grating, to which the inverted cup that acts as a dipping-valve is attached, and which is distinguished by a lighter colour in the engraving, may be screwed out when necessary, in order to cleanse the trap. The water, after passing under the edge of the dipping-valve, and rising to the top of the vertical pipe, runs off through it to the drain. The second plan, shown in *Fig.* 6, is copied from Hebert's *Engineer's and Mechanic's Encyclopædia*, art. 'Air-trap.' This trap is adapted for insertion in kitchen floors of stone, brick, or paving-tiles. It is made of common red pottery, and occupies a space of nine inches square, the same as a common paving-tile.

Fig. 5.

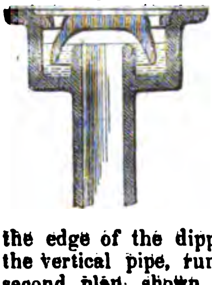
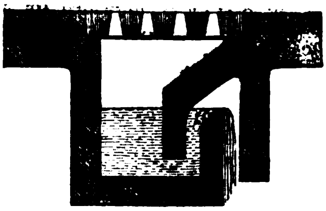


Fig. 6.



A patent was taken out in 1822, by Mr. Williams, for a plan which he proposed in order to remedy the inconvenience of breaking up the streets in order to repair or cleanse the sewers, to lay pipes for water or gas, &c. This desirable object was to be effected by building a substantial tunnel, or *subway*, along the centre of every street, the subway being lighted and ventilated by gratings in the carriage-way, and entered by side passages at convenient intervals. The sewer was to be either alongside or in the lower part of the subway, opening into it by apertures which, when closed, would not permit the escape of effluvia; and the iron pipes for the supply of water and gas were to be laid along the sides of the tunnel, or suspended by iron straps from the arch. Such a plan would offer great facilities for effecting any necessary repairs or laying new pipes; and would also favour the improvement of street pavements, as their frequent disturbance under the present system tends to discourage the adoption of durable methods of paving, and occasions constant and enormous expense. Mr. Williams's plan is fully detailed in an octavo volume published by him in 1828, entitled 'An Historical Account of Subways in the British Metropolis,' &c.

(*Reports of the Parliamentary Committees on Sewers and on the Health of Towns; Papers printed for the Commissioners of Sewers of the Westminster and Holborn and Finsbury Divisions;* &c. &c.)

SEXAGE'SIMA, the second Sunday before Lent, or the next to Shrove Tuesday; so named, as being, not exactly, but about the sixtieth day before Easter. Brady, in his 'Clavis Calendaria,' vol. i., p. 175, says, 'The name of the first Sunday in Lent having been distinguished by the appellation of Quadragesima, and the three weeks preceding having been appropriated to the gradual introduction of the Lent fast, it was consistent with propriety to call the three Sundays of these weeks by names significant of their situation; and reckoning by Decades, the Sunday preceding Quadragesima received its present title of *Quinquagesima*, the second *Sexagesima*, and the third *Septuagesima*.

SEXAGESIMAL, a name given to the system of reckoning in which each unit is the sixtieth part of the preceding, to which, in our day, we are only accustomed by the method of measuring angles and time. The Greeks, and Ptolemy in particular, brought this method into use in astronomical matters, and their successors seem to have attempted to make it a general mode of reckoning. There exist treatises of arithmetic fashioned on this system, one for instance by BARLAAM.

In the sexagesimal arithmetic, $17\ 26'\ 48''\ 53'''\ 9^{iv}$ stands for 17 units + 26-sixtieths of a unit, or 26 minutes or *scrupula prima* [SCRUPLE] + 48-sixtieths of a minute, or 48 seconds or *scrupula secunda* + 53-sixtieths of a second, or 53 thirds or *scrupula tertia* + 9-sixtieths of a third, or 9 fourths or *scrupula quarta*.

Addition and subtraction are easy enough in this system; multiplication, division, and the extraction of roots are more complicated. If we had, for example, to multiply $7\ 26'\ 43''\ 51'''$ by $11\ 47'\ 18''\ 56'''$, each term of one factor must be multiplied by every term of the other, and the denomination of each product must be as high as those of both factors put together. Thus when we come to $43'' \times 56'''$, the result must be in fifths $(2 + 3 = 5)$; and 43×56 being 2408, we have 2408^{v}, or $40^{iv}\ 8^{v}$. This process was aided by a large sexagesimal multiplication table, which may be seen in Delambre, *Astronomie Ancienne*, vol. ii., p. 32. There is also a large sexcentenary table, constructed by John Bernoulli (III.), and published (or republished) by the British Board of Longitude. There is little need to give any further account of sexagesimal processes.

SEXES OF PLANTS. The existence of sexes in the vegetable kingdom is now generally admitted by all botanists, but it is only lately that it has been adopted in its full extent. By the word sex is represented a collective idea of two individuals, the one producing fruit and the other being essential to the production of fruit in the first. This distinction of sex is much more marked in the animal than in the vegetable kingdom, and whilst in the former it has been recognised at all times, in the latter it has been the result of accumulated observation and experiment.

The question as to whether the antients were aware of the sexuality of plants, has been one of great difference amongst botanists, and much learning has been brought to the discussion. De Candolle, in his 'Physiologie Végétale,' tome ii., has quoted many passages from Theophrastus, Pliny, and some of the Roman poets, which furnish evidence of their having distinguished male and female plants. Herodotus (i. 193) also mentions the fact that in his time the Babylonians 'applied the fruit (he probably means the flowers) of the male palms, as the Greeks call them, to the fruit-bearing palms.' This operation he supposed to be of the same nature as that called caprification, which is practised on the fig. This consists in procuring the branches of the wild fig, and holding them over the fruit of the cultivated fig, which afterwards arrives quickly at maturity. These two processes however are essentially different, and proves that Herodotus had no clear idea of what he described. The first is a real instance of vegetable impregnation, as the wild branches of the date bear the male flowers, whilst the cultivated trees bear only female flowers. In the last instance the cause of maturing the fruit arises from the fact that the cultivated fig will not produce its fruit in perfection unless punctured by a little insect called a *cynips*, which abounds upon the wild fig, and the bringing their branches together communicates the insect from the one to the other. Whatever may have been the suspicions excited in the minds of Herodotus and other antient writers from these facts, it is very clear that no attempt was made to identify the processes of fertilization in plants and animals, and to regard it equally in each as the result of a union of sexes. Amongst modern writers Cæsalpinus and Zaluziansky seem to have been among the earliest to point out the fact that plants with female flowers did not bear fruit unless brought into contact with plants bearing male flowers. Clusius states, in a work published as early as 1611, that the female flowers of Carica Papaya produced no fruit without the male flowers. Subsequently to these observers, Sir Thomas Millington, Grew, and Kay stated in a very distinct manner, in their writings, the functions of the stamens and pistils. Camera however, a physician at Nürnburg, was the first who wrote expressly on the existence of sexes in plants, and drew the especial attention of botanists to the fact. But whatever might be the interest attached to this subject by previous botanists, it was not till the time of the great Linnæus, who made the sexes of plants the foundation of his celebrated artificial system, that their existence and importance were generally admitted by scientific men. It has been usual to give Linnæus the honour of the discovery of the existence of sexes in plants, but in his own works he has given the credit to whom it was due, and his great reputation would gain little by ascribing to him this honour, which so clearly belongs to others.

Although the doctrine of the sexuality of plants was generally admitted after this time, it has yet had occasional opponents to the present day, but the arguments brought against it are too weak to need serious refutation.

We shall enumerate here a few of the facts occurring in the vegetable kingdom on which this doctrine rests. It has been mentioned already that one kind of date-tree requires the presence of another in order to produce fruit. If we examine the flowers of the two trees, we shall find that one kind possesses pistils, and that the other possesses stamens, and it is not till the latter come in contact with the former that seeds are formed and the fruit comes to perfection. This was remarkably exemplified in the year 1800, in Lower Egypt, when the Mussulmans, being at war with the French, were unable to go into the woods to obtain the wild stamen-bearing flowers, and the consequence was a total failure that year of the date crop. The same thing occurs with all plants which have their pistils on one plant and their stamens on another. There is at present a specimen of the Chinese pitcher-plant (*Nepenthes distillatoria*) in the Edinburg Botanic Garden, with pistilliferous flowers, which never produced any seed or fruit till its pistils were brought into contact with the stamens of a specimen that was growing in another part of Scotland. Monœcious plants, or those which have their stamens and pistils on different flowers in the same plant, exemplify the same thing. If we take a cucumber plant, which is monœcious, and cut away early in their growth the stamen-bearing flowers, the pistil-bearing flowers will produce no fruit.

The stamens and the pistils, that are placed in different flowers in the date and the cucumber, are placed together in the same flower in many plants, which are thence called hermaphrodite. If we take the flower of one of these plants, say an apple-blossom, and cut out of it the stamens, it will be found that the pistil, instead of increasing in size and becoming an apple, will die away. Another proof is seen in what are called double flowers. In these flowers, which are very common amongst the cultivated species of plants, the petals are increased in number and size at the expense of the stamens; the stamens in fact being metamorphosed into petals. In these flowers the same thing occurs as if the stamens had been cut away; the pistil is not fertilised, and neither seeds nor fruit are the result of their growth.

By the production of what are called hybrids among plants, the fact of the existence of sexes is still more satisfactorily proved. It is well known that if two animals of different species breed together, the produce is a third, which is like neither parent. And this is the case with plants. If the stamens of one species be applied to the pistil of another at the proper period, the seed produced on the ripening of the pistil will produce a plant with the characters of the two parent plants mixed. This property of producing hybrids is much more common among plants than animals, and frequently occurs in the wild state. It will not however occur between all species, but only such as are very nearly allied; and is seldom known to take place at all between different genera.

The movements of the stamens and pistils at the period of impregnation are also proofs of the necessity of contact between these two organs. In many liliaceous plants, in some of the saxifrages, and in the parnassia, the stamens, which are placed almost at right angles with the pistil in the first stage of their growth, rise up and place themselves in immediate contact with the pistil. In the geraniums and the kalmias the filaments curve down, in order to bring the summit of the stamen, the anther, into connection with the pistil. In some cases the summit of the pistil, the stigma, which is the part on which the influence of the stamen is exerted [IMPREGNATION], is carried towards the stamen, as in the passion-flowers, the nigella, and the epilobiums. In other instances the stigma dilates in a remarkable manner, as in the tulips and the gratiola. The relative position also of the stamens and pistils in hermaphrodite plants is such as to secure the influence of the stamen on the pistil. In those cases in which the stamens are longer than the pistil, the flower is always upright; so that the pollen, which is the fertilising agent of the stamen [POLLEN], falls directly upon the stigma. On the contrary, when the styles of the pistil are longer than the stamens, the flowers droop; so that the pollen, when it is discharged, is effectually carried to the stigma. This is seen in the Campanulas and Fuchsia. Many other plants exhibit arrangements of this nature for the accomplishment of the same purpose.

Another curious set of arrangements for effecting of the fertilization of plants are those which secure the application of the pollen to the stigma in a perfect state. If the grains of pollen are exposed to water or too much moisture, they burst, and their fecundating power is lost. This is the reason why heavy rains do so much injury to crops in blossom, as they break the anther-case; and the pollen being exposed to the action of water, it cannot fertilise the pistil, and no fruit is produced. In some plants there is no protection against this cause of sterility; but in others, as is well known, the flowers close previous to rain, and thus the effect of moisture is prevented. In aquatic plants, there are several means for protecting the pollen from the influence of the water. In the Zostera, which grows at the bottom of the sea, the flowering takes place in a doubling of the leaf, which contains a certain quantity of secreted air, and the influence of the water is thus kept off. In many plants that grow at the bottoms of lakes and rivers, the flower-stems are always elevated above the surface of the water; and no fertilization of the pistil takes place unless the flowers reach the air. This is the case in the white and yellow water-lily, in the Myriophyllum, Hippuris, &c. The Utricularia possesses a complicated apparatus. It remains for the most part of the year at the bottoms of ditches and ponds; but at the season of flowering it ascends to the surface, and, after fertilization is accomplished, descends again. This is effected by its leaves and stem being supplied with a number of small vesicles, which, when the plant is at the bottom of the water, are filled with mucus, which by its weight keeps the plant in its position; but as the season of flowering approaches, these vesicles become filled with air: the plant being thus rendered specifically lighter than the water, it is torn up by its roots, and floats to the top. When fertilization is effected, the vesicles again fill with mucus; and the plant sinks to the bottom, and matures its seeds in a situation fitted for their future germination.

With all this evidence, proving the necessity for two sets of organs for the reproduction of the species of plants, it will not be necessary to enter into the objections that have been raised against the doctrine of the sexuality of plants. These objections have been generally founded upon the occasional observation of the fact that seeds and fruit have been produced where stamens could not have been present; but it might as well be urged against the same theory in animals, that in some species, as the aphis, reproduction takes place without the concurrence of two individuals. A question however of some interest has been recently raised by some eminent German botanists as to the correctness of calling the stamens the male and the pistils the female organs. Schleiden, who has paid great attention to the microscopic investigation of vegetable tissues, maintains that the pollen grain is the true ovulum, 'if the ovulum,' he says (Lindley's *Introduction to Botany*, p. 346), 'be understood in physiology to represent that material foundation from which the new being becomes immediately developed, and if we term that portion of the organism in which this material commencement is deposited before it becomes developed, the female organ; whilst that part which calls into action or promotes the development of the germ by means of its potential effects, is termed the male organ, it is evident that the anther of the plant is nothing but a female ovarium, and each grain of pollen the germ of a new individual. On the other hand, the embryo-sac only works potentially, determining the organization and development of the material foundation, and for this reason therefore ought to be termed a male principle, were we not to consider, perhaps more correctly (without embarrassing ourselves with lame analogies taken from the animal kingdom), that the embryo-sac merely conveys new organizable fluids by means of transudation, and thus only serves the office of nourishment.' Endlicher and some other botanists maintain similar views.

The possession of sexes by Cryptogamic plants is at present only matter of inference. The existence of female organs in most of the orders seems tolerably clearly made out; but various parts have had the function of the male organ assigned to them. Much light may be expected to be thrown on this department of botany by further inquiry.

The structure of the organs of the sexes is explained under the articles ANTHER, POLLEN, STAMEN, STIGMA, SPORULE, SPORANGIUM, and THECA.

SEXTANS (the Sextant), a constellation which Hevelius had the singular bad taste to place on the back of the Hydra and at the feet of the Lion. It comes directly between the bright stars α Leonis (Regulus), and α (or Cor) Hydræ.

Character.	No in Catalogue of		Magnitude.	Character.	No. in Catalogue of		Magnitude.
	Flamsteed. Piazzi. ( ) Bradley. [ ]	Astron. Society.			Flamsteed. Piazzi. ( ) Bradley. [ ]	Astron. Society.	
b	2	1168	5	*i*	26	1239	6
s	4	1183	6		27	1241	6
t	6	1185	6	*k*	28*	1246	5
A	7	1189	6	*l*	30	1248	6
d	8	1190	6	*u*	31	1250	6
	9	1191	6	*x*	32	1253	6
	10	1192	6	*m*	33	1267	6
	11	1194	5½		34	1270	6
e	13	1201	6		35	1272	6
C	14	1205	6	*n*	36	1275	6
f	15	1208	4	o^1	37	1277	6
	16	1210	6	o^2	38	1280	6
g^1	17	1211	6	*p*	40	1286	6
g^2	18	1213	6	*r*	41	1288	6
	19	1216	6		(6)	1215	6
	21	1218	6		(223)	1195	6½
z	22	1224	6	*q*	[1456]	1245	6
h	23	1231	6				

SEXTANT. The history of the sextant was involved in some doubt until the late Professor Rigaud undertook to investigate the subject. The result will be found in the 'Nautical Magazine,' vol. i., p. 351, and No. xxi. The following account is a brief outline of his inquiry.

The early modern navigators used the *cross-staff;* this was afterwards exchanged for Davis's *back-staff,* called by the French *quartier anglais.* Hooke proposed an instrument for the purpose of taking altitudes at sea, which is very ingenious; the sun was seen reflected from a plane glass, while the horizon was viewed directly.* Hooke does not seem to have esteemed his invention so highly as it deserved, for in a subsequent lecture on astronomy and navigation, in 1694, he makes no mention of this, but describes a quadrant of a different construction. In 1699 Newton exhibited an instrument to the Royal Society, which is described as 'the old instrument mended of some faults;' and at some later time he communicated to Dr. Halley a scheme for an instrument which was probably never executed, but of which a drawing and description were found among Dr. Halley's papers after his death in 1742. (*Phil. Trans.*, vol. 42, p. 155.)

---

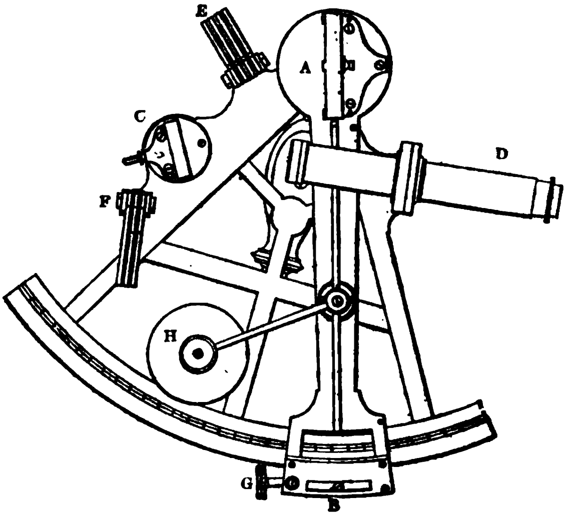
* This star is supposed to be a mistake of Flamsteed's, and to be only another version of 29 Sextantis. (Baily's 'Flamsteed.')

The date of the invention of Hadley's quadrant was proved, on examination by the Royal Society, to have been not later than the summer of 1730. A notice of it was given at a meeting of the Society, May 13, 1731; and the instrument exhibited May 27. The memoir is published, vol. 37, p. 147.

At the meeting of the Society, May 20, Dr. Halley expressed an opinion that the principle of Hadley's new instrument had been discovered and proposed by Newton, and a search was made into the minutes of the Society to ascertain the fact. The only notice which could be found was that already mentioned, viz. in 1699, and this was clearly an improvement of an old instrument, and not the proposal of one new in principle. Halley, at a meeting on the 16th of the following December, expressed himself satisfied that Hadley's instrument was much different from that formerly invented by Sir Isaac Newton. It seems not unlikely that Halley's recollections were of the instrument which Newton had proposed to him, and the description of which was found among his papers, but that he had forgotten the manner of the communication, and confounded the latter instrument with that which Newton had exhibited to the Royal Society. This is, we think, a very probable failure in the memory of a man of seventy-six, and what many younger persons experience daily. That Halley did not immediately see the advantages of Newton's latter proposal may appear a little strange, but Halley's forte clearly did not lie in mechanical construction or astronomical observation.

A little after Hadley's invention, viz. about October or November, 1730, Thomas Godfrey of Philadelphia, a glazier by trade, proposed and had executed an instrument which he called a bow, very much resembling Hadley's earlier construction. This was described in a letter to Dr. Halley from James Logan, Esq., dated 25th May, 1732. Mr. Logan had put off writing more than twelve months after the instrument was placed in his hands, and this neglect threw some doubt on the originality of the invention, which could only be satisfactorily established by additional evidence. After examination the Royal Society came to the conclusion that Godfrey's discovery was also original. We think it is clearly proved that the priority is due to Hadley, and that there is no pretence for doubting Godfrey's originality. Some hasty writers, adopting mere hearsay for their guide, have attempted to give the subject a national and *patriotic* colour, which, unphilosophical at all times, is a simple absurdity when the contending parties are, as in this instance, of the same race. We have thus tried to give a hasty summary of Professor Rigaud's statements and conclusions, which we entirely adopt. The perusal of the original memoirs will gratify the lover of exact and discriminating research. Hadley's second construction, which is incomparably superior to his first and to Godfrey's bow, scarcely differs from the present sextant.

The sextant is figured and described in almost every book of navigation, and is so commonly to be met with, that we shall be very brief. A is a plane glass, called the *index* glass, silvered behind, and perpendicular to the face of the instrument. It is fixed on a centre perpendicular to the instrument, and moves with the *index bar* AB, the end of which, B, slides over the graduated arc. C is a plane glass, the lower half of which, next the instrument, is silvered, and the upper half left clear. It is called the *horizon*-glass, and should be parallel to the index-glass when the index points to 0° at the beginning of the arc. D is a telescope for viewing the objects observed. This should be of good quality and with an inverting eye-piece. In the common quadrants there is merely a plate with a small hole for directing the sight. Suppose a ray of light to proceed from the eye, it will proceed in the direction of the telescope, and if it falls on the upper or unsilvered part of the horizon-glass, it will pass forward in a continued straight line until it falls upon some exterior object. But if the ray falls upon the silvered part of the horizon-glass, it will be reflected to the index-glass (the horizon-glass is so placed as to make equal angles with lines from the eye and index-glass), and again reflected from the index-glass, outwards (*i.e* from the observer), until it meets some external object. Now instead of supposing the rays to pass from the eye, suppose them to come from external objects to the eye; then there will be two images presented at the same time, one formed by the rays which pass through the unsilvered part of the horizon-glass, and another formed by the rays which have been previously reflected by the two glasses; and it is easily shown from the elementary principles of optics, that when two objects are thus apparently seen in coincidence, the angle which they subtend at the point of meeting is exactly double the angle which is contained between the planes of the index and horizon glasses, if these be supposed to be prolonged until they meet. Hence, if the index be at zero when the glasses are parallel, and if the arc be divided into half-degrees which are numbered and subdivided as whole degrees, the arc actually read off, after any such observation as is here described, will measure twice the inclination between the glasses (for this inclination is evidently the same as the angle between the parallel position of the index-glass and its new position), and, in consequence of the optical principle above mentioned, this will be the true measure of the angle between the objects when they are so distant that the place of the eye and the intersection of the rays may be considered to be the same. The sextant therefore furnishes the means of measuring the angle between any two well-defined objects, in whatever direction they may be placed (so that the angle does not exceed 140°), and without requiring more steadiness than is necessary for seeing the objects distinctly. E and F are sets of dark glasses of varying intensity, which may be turned before either the index or horizon glass when required; G, a tangent screw for giving slow motion to the index-bar; H, the reading microscope and reflector. The handle below is visible in the drawing, and there is a screw behind the collar of the telescope for giving an up-and-down motion to the telescope, which alters its distance from the plane of the instrument without affecting its parallelism thereto.



The adjustments of the sextant may be divided into those which more properly concern the artist and those which are to be attended to by the observer. It should be distinctly understood that no other instrument requires so much care and skill in its construction and use as the sextant. There are scarcely half a dozen makers in England, and probably not double that number in all Europe, who are fit to turn out a sextant; and though skilful sextant observers are somewhat more plentiful, they are still exceedingly rare. The fabric of the sextant should be strong and light. A blow which would not seriously damage a theodolet or circle, where three or more readings correct pretty nearly the errors which arise from such injury, would entirely ruin a sextant; but while giving strength, the maker must be on his guard to avoid weight. Troughton and Simms's double-frame sextants of 8 inches radius are a very good model, those of 10 inches are too large; single-frame sextants may be had of 7, 6, or 5 inches radius. All these sizes have or may have the same telescope, glasses, and shades. Those which we have hitherto seen seem to admit of some improvement in their scheme. Mr. Dollond casts his sextants in one piece of hard metal, which is an improvement, and very beautiful instruments they are. The limb of the instrument should be perfectly plane, and the axis on which the index-glass turns exactly perpendicular to it. If a purchaser is sufficiently confident in his own judgment to rely on that, rather than on the reputation of the maker, he should release the clamp, observe whether the index-bar moves easily and without shake along the whole arc, and also whether the vernier seems to press equally in every position. The telescope should be of the best quality, with a large aperture and of as short a focal length as these conditions permit. It should show the edge of the sun and moon quite sharp and distinct with the highest powers employed. The index-glass is generally the most faulty member of a common sextant; the faces are not parallel, and consequently when rays fall very obliquely upon it (in which case those reflected from the front surface are nearly as copious as those from the silvered back), there are two faint and separated images seen instead of one bright one. The artist tries his index-glasses by the following test: The sun is viewed with a high power after *very* oblique reflection from the index-glass, and those glasses only are retained in which the image is single and sharp. The rejected glasses find their way to the second-rate makers. The horizon-glass, which is smaller and on which the rays fall at a larger angle, does not, if imperfect, affect the images so much, but it too should be examined. The shades or dark glasses, which are either interposed between the glasses or placed before the horizon-glass, are next to be examined. The two images of the sun are brought into proper contact, after applying the highest power to the telescope and putting the proper dark glass on the eye end. One of the lightest shades is then interposed between the index and horizon glasses, and if the contact is slightly disturbed, this shows the form of the shade to be prismatic. The shade is turned in its cell until the effect is perpendicular to the plane of the sextant. The corresponding shade before the horizon-glass is now interposed and tried as the former one, and turned round exactly as before, until its effect is also perpendicular to the plane of the instrument. Leaving this latter shade untouched, and substituting the next dark shade in place of that first employed, the process is again repeated, with this caution, that the error, if any, caused by the prismatic form of the last shade, is to be made exactly contrary to that of the first shade, as well as perpendicular to the plane of the sextant. In this way, changing when necessary the dark glass at the eye end of the telescope, all the dark shades are carefully examined and set right, and it need not be said that those which are very prismatic or which affect the sharpness of the images are to be rejected. The index-glass is now to be set at right angles to the plane of the instrument. This is done by looking very obliquely in the index-glass, when the edge of the limb or the divided arc seen by reflection will form an uninterrupted continuation to that seen directly, if the glass is perpendicular; otherwise the arc will appear broken where the direct and reflected images meet; by touching the screws seen in the figure, this error may be corrected. Repeating the observation at different parts of the limb, will show whether the axis has been set at right angles to the limb. The horizon-glass is to be made parallel to the index-glass by bringing the two images of the sun to coincide, when, if there is any lateral overlapping, it may be remedied by turning a screw (shown in the figure) which is in the mounting of the horizon-glass. The index error, as it is called, is of no importance whatever, though many observers are afraid that when large it vitiates the observation. This is an idle prejudice, but one which the maker is compelled to respect. Having ascertained the diameter of the sun by measuring it forwards and backwards, he sets the index to the proper angle and then files away a little of one of the pins against which the index-glass is pressed, until he brings the images nearly into contact. Contacts should now be formed, first by turning the tangent-screw so as to separate the images, and then by bringing them together. If the readings do not agree, the centre moves too stiffly or the index-bar is too weak. Finally, the telescope is to be set parallel with the plane of the instrument. There are two parallel wires in the focus of the telescope, which are to be placed parallel to the instrument, and then as large an angle as possible is to be taken between two distinct objects, making the contact exactly in the middle of the wires. The contact must now be examined when the objects are first at one side and then at the other of the field of view. If they separate equally when at equal distances from the centre, the position of the telescope is correct; if not, there are adjusting screws in the collar which carries the telescope by which this error may be corrected. For some of these latter adjustments mechanical means may be and sometimes are applied. The instrument should however comply with the foregoing tests, which any one can try who understands the use of the instrument.

---

* This is described in Hooke's 'Posthumous Works,' p. 503, and was probably presented to the Royal Society in 1666. In practice, besides some other objections, it would have been troublesome to ascertain the *index error* in this construction.

We will now suppose an observer equipped with such a sextant, who wishes to make the best use of it. Before taking a series of observations, the index error should be ascertained. The telescope is fixed and set to focus, and the parallel wires placed parallel with the plane of the instrument. If the sun is visible, a dark glass for the eye-end of the telescope is selected, which shows him clearly, but without distressing the eye, and the direct and reflected images are made equally bright by moving the adjusting screw, which raises or depresses the telescope. The contact is first made, bringing the reflected image apparently below the image seen directly, and the angle is read off on the supplemental or back arc: suppose this reading to be 33′, which consider positive or +. Then make the contact again with the reflected image apparently above that seen directly (the reflected image is that which moves on moving the index), and read off again: suppose this is 32′, which call −. It is evident that at the middle position the two images coincide, and the index and horizon-glass are parallel; that is, the reading on the back arc is 30″ when the glasses are parallel. Hence 30″ must be *added* to every other reading to give the true angle. If the algebraical signs are used, the rule is very simple: Add the two readings together and halve the result; this with its *proper* sign is the *index correction* to be applied to all observations. If the sun is not visible, the moon may be used in the same way. If neither is to be seen, then bring the two images of a bright star, or the sea horizon, or any *distant* well-defined object into contact, and the reading, if on the back arc, is to be added, if on the forward arc, is to be subtracted from all other observations. The sun is always to be preferred when visible, and the observation is to be repeated before or after observation. If the images overlap laterally, *i.e.* if the horizon-glass is not parallel to the index-glass, this must be previously adjusted. The next caution is with respect to dark glasses. When it is possible (as in observing altitudes of the sun at land in a mercurial horizon, &c.) to make the observation with a single dark glass on the eye-end of the telescope, without using any shade, this should always be done, for the error of this dark glass does not affect the contact at all, and the distortion caused by it is not magnified, whereas any fault in the dark shade between the index and horizon glasses produces actual error in the observation, an the distortion is magnified subsequently by the telescope. The images are to be brought to equal brightness by the screw which raises or depresses the collar carrying the telescope, and that with considerable nicety. In observing distances of the sun and moon, or altitudes of the sun at sea, dark shades are necessary. The fainter object is to be observed directly, and a proper shade interposed between the index and horizon glasses to reduce the two objects to something like the same brightness. The final equalization is to be effected by the up-and-down motion of the telescope. The accuracy of the observation depends a good deal upon the nicety with which this equal toning of the two images is effected; with a little experience this is readily learned. From the construction of the sextant the faint object is easily viewed *directly* when the brighter object is either above or on the right hand of the fainter, but not so if the bright object is to the left of the fainter, when the handle side of the instrument is uppermost. For these observations, the instrument should have a second handle, which may be applied when wanted; perhaps when the distance between the moon and a bright star or planet is to be observed, there may be no difficulty in viewing the moon directly, after placing a dark shade before the horizon-glass, though the light which enters the eye without passing through the telescope must deaden the retina considerably. A blackened card screen slipped over the tube of the telescope would probably be found useful in this case, and absolutely necessary if the sun were observed directly. This latter observation cannot, we conceive, be satisfactorily made in any case. When the sextant is held in the hand, it should not be grasped tightly, as this causes tremor. The handle should be fitted to the observer's hand. There is scarcely ever hold enough given. When observing an altitude at sea, there is a little difficulty in bringing down the object to the point of the horizon immediately under it. But as the shortest distance is the true distance, by running along the horizon and keeping the object in the field, the direction in which the object should be observed is easily found, and the contact made there. In observing lunar distances the great art is to turn the instrument round the line of sight exactly as if the telescope were an axis of rotation. The index is set to the approximate distance, and the fainter object viewed directly; when the plane of the instrument passes through both objects, the brighter will come into the field, and the contact is to be made by the tangent-screw, or nearly so. We think it is better in all cases where the angle between the objects is increasing or decreasing, to make the contact open or close, and then try to seize on the moment when the contact is perfect, or the two moments when the contact begins and when you conceive it to end. The mean will probably be near the truth. All contacts must be made scrupulously in the centre between the two parallel wires. When the angle is large, inattention to this point will cause considerable error.

On shipboard, the observations, except those of lunar distance, are necessarily rude and imperfect, the sea horizon is generally ill defined and badly seen, the dip is somewhat uncertain, and as the single altitude is observed, all the error committed tells upon the final angle. The accuracy of observation is however equal to the wants of navigation in ordinary circumstances. (A *dip sector* might be useful where more than usual accuracy is required.) On land, where the altitudes are taken from a mercurial horizon, and the sextant fixed on a stand, the observation is capable of great accuracy, and does not require much skill or delicacy in mere handling. There is one peculiar advantage in sextant observations, that when the mercury is quiet enough to reflect a well-defined image, there is no need of any further steadiness or of a second observer, one of which conditions is absolutely necessary in every other instrument in common use which is adjusted by a plumb-line or level. We think the capabilities of the sextant as a geographical instrument have not been generally appreciated by English travellers; certain it is that few have used it with all the profit they might have done.

The mercurial horizon is a shallow rectangular wooden or iron trough, into which a small quantity of mercury is poured. If there is any wind, the trough must be covered with a penthouse, the sloping sides of which are glazed with plates of glass ground very flat and true. Any object seen in the mercury appears to be just as much below the horizontal plane as it is really above it; hence if the angle between any heavenly body and its reflection be measured, this angle is just twice the actual altitude of the body at that time above the horizon of the place. Suppose the altitude of the sun is to be observed in order to determine the time: The trough is placed with its largest dimension towards the sun, and the roof so that the sides cast no shadow, the proper dark glass is affixed to the telescope, the images brought to equal brightness, the index error ascertained, and the telescope is then directed to the image of the sun in the mercury. Holding the plane of the sextant vertical, and moving the index forward gradually, the image of the sun reflected by the index-glass will appear to enter the field from below. If the sun be rising, the index should be carried forward until the two images, having crossed, are clear of each other, and then the index is clamped. The two images will gradually close, and the exact moment by the chronometer is to be noted when the contact takes place. If the sun is rising with tolerable rapidity, the contact of the upper limb, *i.e.* the separation of the two images, should be noted, exactly as before, without touching the clamp. The index is then read off; it may then be put forwards, and the observation repeated. If the interval between the contacts of the lower and upper limb is found to be in both cases nearly the same, the observer may be satisfied that he has committed no great error in noting the moments of contact Where the greatest accuracy is required, it is usual to set the index to a whole number of degrees for the first pair of observations, and to put it forward 1° 30′ or 2° for the second pair, and so on till the observer is satisfied or wearied; and then in the afternoon to set to the highest reading for the first pair, and so on *backwards* till you arrive at the first reading. Collecting the corresponding pairs, you have an approximate time for apparent noon, which, after being corrected by the *equation to equal altitudes* for the change of the sun's declination, gives the time of *apparent* noon by the chronometer; and this, when corrected a second time by the *equation of time* taken and interpolated from the 'Nautical Almanac,' gives the time of *mean noon* by the chronometer, and consequently the error of the chronometer on mean time at the place. If the altitudes are very low, and the barometer and thermometer have changed considerably between the observations, a corresponding correction must be applied, but in most cases this is not requisite. The time may in this way be generally got as accurately as the chronometer will keep it during the interval. When observations of the sun are made for the latitude, the altitudes should be taken continuously for several minutes before and after apparent noon, observing the upper and lower limb alternately, or at least an equal number of each: thus getting rid of the sun's semidiameter, besides bringing more divisions into play. It is not easy to give a definite rule for the extent of these observations on each side noon; but when the time is known, and the altitude of the sun not great, we have never scrupled to go as far as the *Tables of Reduction*, *i.e.* a good half hour on each side the meridian. It is of great importance however, when the observations are pushed so far, that the number of observations on each side, and the times at which they are taken, should nearly correspond. If this precaution be observed, a slight error in the actual time of noon does not matter. When time is determined by absolute altitudes, the roof of the mercurial horizon should be reversed after half the observations, and the same precaution should be adopted when observations are made for the latitude. For equal altitudes it is necessary to keep the same position of the roof in both cases.

In the observations already described, and for lunar distances, a stand for the sextant will indeed add greatly to the accuracy of the observations, but is not absolutely necessary for a practised observer; so far as our own experience has gone, good observations of the stars can scarcely be made without a stand. By lying on the ground, and resting the edge of the sextant on a book or some convenient support, the observation may undoubtedly be made; but in most situations and in many climates this would expose the observer to more inconvenience and risk than he can prudently encounter. With a stand, and a little experience in setting it up, the observation of a star is just as accurate as that of the sun. The time is noted when the images form a figure like this **, parallel to the horizon; and stars of the third magnitude, or even lower, are quite bright enough for the purpose. We have observed Polaris very tolerably with a snuff-box sextant when the instrument rested on a book; the telescope, though of extra size for the instrument, was of much smaller aperture than those attached to ordinary sextants. It is rather steadiness which is required for these observations than light. Equal altitudes of the same star give the moment of its meridian passage by the chronometer without computation; and as this is the R.A of the star, the error of the chronometer, if it be sidereal, is obtained at once; if it should be a solar chronometer, the computation is very easy, *i.e.* merely computing the mean solar time of the star's transit of that day from the R.A. of the star and the longitude of the place. The computation of *circummeridian* altitudes of a star for the latitude is rendered more simple by using a sidereal chronometer, for the hour angles observed with the solar chronometer must be reduced to sidereal time before taking out the corrections to the meridian from the Tables of Reduction.

There are certain faults either usual or inevitable in the sextant, which are now to be pointed out, and the mode of eliminating their effect from the final result. First, the determination of index correction is always somewhat erroneous, and this error runs through all the absolute observations, and affects the mean with its whole amount. Again, if the telescope be not parallel to the plane of the instrument, or if the contact be not made exactly midway between the wires, the angle read off is too large, and exceeds the true angle, and there is no principle of compensation; this class of errors has always the same sign. Finally, as sextants are now divided, there is no certainty that the axis of the index is exactly concentric with the divided arc. It is difficult to say within what limits this error is confined, but we think it amounts not unfrequently to 10″, 15″, or even 20″ in the total arc.* This is not however proportional to the arc, though it is generally smaller in the smaller arcs. Hence if this effect of excentricity lie the same way as the other errors, as it easily may, the most careful observer will make a considerable mistake in measuring a large angle. If we further suppose the error of the lunar tables to be in the same direction (the best meridian observations show that she is not unfrequently from 10″ to 15″ out of her tabular place), it will be seen that the longitude, determined as it generally is by distances between the moon and sun, or the moon and a *single* star, may differ much more from the truth than lunar observers usually think possible.†

Mere instrumental error is got rid of by combining those observations which they affect in contrary ways. Thus in equal altitudes, the *fixed* errors, such as index error, excentricity, bad division, inclination of the glasses or telescope, have contrary effects on the morning and afternoon sights, and therefore no effect on the mean. Making the contacts out of the middle of the wires is a casual error, and just as likely to happen in the morning as in the evening observations; so that as the angles are the same in both cases, errors of this kind will have pretty much the same influence on the mean of several pairs. Hence the great excellence of the method of equal altitudes for determining the time, so far as instrumental error is concerned; it is an additional advantage that an error in the supposed latitude is also without sensible influence. Again, if time is deduced by absolute altitudes of a star rising in the east, the result will be affected one way by the errors above described; if a second star be observed at nearly the same altitude setting in the west, the altitude will be affected to the same amount; and if the stars have declinations which do not widely differ, the result deduced from the second star will be affected to the same extent, but in a contrary way from the first; a mean of the two results will be nearly free from any error, except the casual error of observation. A latitude by the sun or a star to the south, which is erroneous from the above-mentioned causes, will be balanced and corrected by a star of nearly the same altitude to the north; or a star to the north may be balanced by two to the south, one of higher and the other of lower altitude. It is scarcely credible how nearly the time or latitude may be thus determined. We have a series of such latitudes with an 8-inch sextant, observed by Mr. Lassell at Liverpool, which scarcely differ more than 2″ or 3″ from each other, though deduced from different groups of Greenwich stars. When the longitude is to be obtained from lunar distances, a considerable number of observations should be taken from the objects east and those west of the moon. If a pair can be selected on different sides of the moon, and nearly at the same distance from her, the result will be liable to the effect of casual error only, and to the error of the lunar tables. This latter error cannot be got rid of at the time of observation; but after the Greenwich, Cambridge, Edinburgh, Cape of Good Hope, and Oxford observations for the year have been published, it will generally be possible to find the error of the moon at the time of observation with considerable accuracy. This must be done whenever a sure longitude is to be deduced from lunar distances, and lunar observations must be taken in great numbers, so as to destroy casual error, to settle nice points in geography.

When a few more fundamental points in longitude are fixed, it will not be necessary to use lunar distances, except in long voyages, or in the centre of large and uncivilized countries. The recent improvements in chronometers, and the reduction in their price, have greatly superseded this kind of observation already, and will continue to do so more and more.

When the arc of the instrument is limited to 90°, which is usually the case in the common wooden instrument, it is called a quadrant (and sometimes an octant, as being in form an eighth of a circle), and a second horizon-glass and sight are sometimes appended for the *back* observation. A sight-vane (a plate of brass pierced with a small hole) is placed below the ordinary horizon-glass, and a second horizon-glass is fixed near this vane, so that lines from the centre of the index-glass, and from the latter vane, make equal angles with its plane. The plane of this second horizon-glass should be at right angles with the index-glass, when the index is at zero. This adjustment may be verified by making the sea horizon, seen directly through the second vane and unsilvered part of the second horizon-glass, coincide with the sea-horizon at the back of the observer, which is seen by two reflections from the index-glass and silvered part of the second horizon-glass. The angle between the fore and back sea-horizons is evidently equal to 180° + twice the dip of the horizon. The dip is known from the observer's height above the sea-level. Suppose it to be 4′, and that the reading on the back arc is 5′; it should be twice the dip, or 8′: therefore the zero position of the index for the back observation is at 3′ on the forward arc. This may be corrected by altering the second horizon-glass, if there are the means of adjustment, *i.e.* by making the front and back sea-horizon coincide when the reading is 8′ on the back arc. By moving the index forward, the reflected sun, which is behind the observer, can be brought to touch the sea horizon in front; and the reading, when the index error has been corrected, is 180° − the sun's distance from the front horizon. Now this latter angle is evidently 180° + 2 × dip − sun's altitude; hence it is clear the angle read off is the sun's altitude above the horizon − 2 × dip. Hence sun's altitude − dip (the altitude required) = angle read off + dip. If the index error be not adjusted, the angle must be corrected for the index error; in the preceding instance the 3′ must be added to the sun's altitude. The back observation however, though useful in certain circumstances, is not much used at present, and many quadrants are fitted up without the second vane and horizon-glass.

If a sextant be used in the manner we have attempted to describe, the results will be found to be very satisfactory. The attentive reader will see that the principle to be seized upon is that of always making two observations at nearly the same time, in which the errors, except the casual errors of making the contacts and of reading off, are the same, but the effects of which on the final result are different. It is not always convenient to afford the time which these balanced observations require; and, in fact, they are often impracticable. It will therefore be well worth the careful observer's while to determine the constant errors of his sextant, at different angles, where he has a good opportunity, and to use this knowledge where circumstances do not allow him to make a balanced set.

Very small sextants are sometimes fitted in a box, and are called *snuff-box* sextants. These admit of considerable accuracy, but, except in particular cases, they are not carefully adjusted, &c. The principle is of course the same as in the larger sextants, and they have a small telescope and dark glasses. It is desirable that the box should be wide enough to admit a finger to wipe the glasses, especially when the snuff-box sextant is used, as it frequently is, for maritime surveying. The salt spray very soon clouds the glasses, and there is no light to spare. For all sea-going purposes, except taking lunar distances, and for military and maritime surveying, the snuff-box sextant will be found very convenient and sufficiently accurate. If made with the utmost care, and skilfully used, we think it capable of determining the latitude within 1′, and the time to 3^s or 4^s; but an instrument-maker could not be expected to take so much trouble, unless for a favourite customer or for an expedition of some importance.

After the invention of Borda's repeating reflecting circle, Troughton, who was averse to the principle, produced a non-repeating circle, which he called the British circle, but it more commonly goes by his name. This may be understood by conceiving the circle, of which the sextant is a part, to be completed, and that while the telescope and glasses are at the front of the instrument, the divisions and three equidistant verniers attached to the index-glass are at the back. The observations ought always to be made in pairs, and for this purpose there are two handles, one to the front and another at the back. Thus, suppose it were required to take the altitude of the sun: this is first observed exactly as with the sextant, and the three verniers read off, the index-glass being above the line which joins the telescope and horizon-glass. Let the instrument be conceived to turn round this line through 180°, then the index-glass is below, and with the face downwards. By moving the index backwards to zero, it will become parallel to the horizon-glass, and continuing this motion until it is at the original angle, but *on the back arc*, the sun will be brought down exactly as in the former observation; when the contact is to be made with the tangent screw, and the indices again read off. By combining the observations, it is clear the index error is destroyed, and this is one point of superiority to the sextant. Again, the three readings wholly destroy any effect of excentricity, and very greatly diminish those errors which may arise from accidental injury to the figure of the circle: while the six readings greatly reduce the errors of division. The errors caused by defects in the dark glasses and horizon-glass are eliminated, and such as arise from a defect in the index-glass are diminished, and this too by the principle of the instrument, using it independently upon one object. These advantages are undoubtedly very great, but the additional weight of the circle and trouble in handling it, the trouble of reading three verniers for every observation, the shortness of the radius, and consequent necessity of limiting the subdivision to 20″, seem to overbalance them in the opinion of most seamen. We think that an intelligent observer will get results of nearly equal value from the sextant or from Troughton's circle, but that the sextant requires much care in selecting and balancing observations, which the circle does not. Whenever time or latitude is to be deduced from observations of one object at one time, as where the sun alone is used on geographical expeditions, or when lunar distances are taken from the sun alone, or from one star, the sextant cannot enter into comparison with the circle. A very excellent Spanish observer, Don J. J. Ferrer, determined the obliquity of the ecliptic with one of Troughton's circles more accurately than the Greenwich quadrant could do, at a time when that quadrant was still the principal declination instrument in the Royal Observatory. And if frequent reading off is not too great an objection, Troughton's circle may be recommended as the safer and more independent instrument, and as demanding less thought and care from the observer.

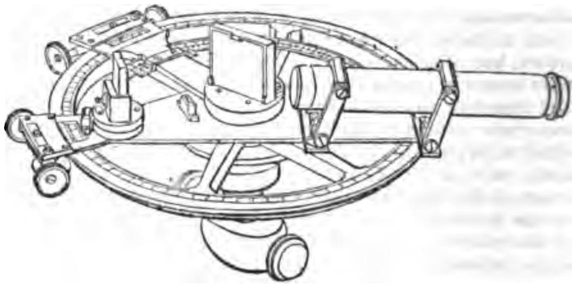
---

* Mr. Simms is of opinion that with a dividing engine of a better construction, this error of excentricity may be reduced to 2″ or 3″.

† We think no prudent seaman would rely upon lunar distances at sea to a smaller quantity than one-third of a degree. At land a good observer should seldom be out more than an eighth of a degree; and a large mass of careful observations, corrected for the errors of the lunar tables, might perhaps come within the sixteenth or twentieth of a degree. This seems to us almost the limit of what is to be expected from lunar distances, and it is inferior in accuracy to one favourable lunar transit, with a tolerable telescope, a well practised observer, and a corresponding observation at a principal observatory.

We have already, in the article **Repeating Circle**, described the original discovery of the principle by Tobias Mayer and his first application of it. After Mayer had greatly improved the lunar tables, he proposed the following construction for measuring the angle between the moon and any other object with the greatest exactness. (*Tabulæ motuum Solis et Lunæ, auctore Tobias Mayer*, London, 1770.) The instrument is an entire circle, on the centre of which the index-bar turns, the index-glass being over the centre. The telescope and horizon-glass are fixed on a second bar, which also turns, but excentrically, on the same centre. The two bars can be clamped independently of each other, and each in any position, and there is an index or fiducial line to each, by which the divisions of the circle may be read off. Now, suppose a distance between the moon and sun to be required (the dark shades, &c. may be understood from what has been said on the sextant): First, having fixed the index-bar at zero, bring the horizon-glass to be parallel to it by observing the sun (as in determining index correction); then move forward the index-bar, and observe the distance between the moon and sun's nearest limbs, as with the sextant. If the angle were now read off, we should have the simple distance affected with the whole error of graduation, and obtain no advantage over the sextant. By moving the horizon-bar, bring the two glasses to be parallel exactly as before, and make the measure between the limbs of the moon and sun also as before, by moving the index-bar alone. The angle, if read off now, would be twice the angle required, but the errors of division and reading off would be only those which affect the first and last position of the index-bar. In this way the angle may be *repeated* as often as you please, until the bars have travelled once, twice, or even oftener round the circle, and it is evident that the errors of division and reading off are those at the first and last position of the index-bar, and those alone; which may be as inoperative on the measurement of the angle as the observer pleases or has patience for. This would seem a great advantage, but when Bird was ordered to make a circle on this model, the divisions were found to be so good, that repetition added little to the accuracy of which a single observation was capable, and the fresh determination of a position of parellelism after every observation was too much trouble to be taken when not absolutely necessary. The reflecting circle of Mayer was not adopted in England, but great pains employed in constructing and dividing the sextant, in which our artists were eminently successful.

In France it is probable that the art of instrument-making was at this time less advanced, and therefore the merit of Mayer's principle more readily appreciated. The celebrated Borda, who was a seaman and navigator, first had an improved instrument on this construction made about 1775,* and published a full description of its form and use in 1787 (*Description et Usage du Cercle de Réflexion, par le Chevalier de Borda*, Paris, 1787), to which we refer the reader as a standard and classical work. The accompanying figure will explain Borda's instrument, though it is not precisely similar to that which he recommended



Five-Inch Diameter.
Borda's Reflecting Circle, by Troughton and Simms.

The index-glass, with its bar, vernier, and tangent screw, and the excentric bar which carries the telescope, horizon-glass, with its vernier and tangent screw, require no explanation. The telescope has a parallel-ruler motion to bring the images to equal brightness, which is, we believe, Bird's construction. Borda holds his telescope by two ears, each of which can be raised or depressed separately, and he has a graduation for each, so as to move them equal quantities. Dollond, in his very beautiful repeating circles, has an up-and-down piece *above* the bar. The important and essential conditions of the repeating circle are, that moving one index shall in no way affect the other; that the clamps when fixed shall not be liable to move from looseness, bad balancing or bad centering when the position of the circle is changed; and finally, that the axis of the index-glass and the collar on which the horizon-bar turns shall both be so true, and of such a length, that the motions of each bar are parallel to the plane of the divided circle. The same precautions must be taken as in the sextant in trying the index and horizon glasses, in placing the prismatic edges of the dark glasses up and down alternately, in setting the glasses perpendicular to the plane of the circle, and the telescope parallel to it; and it is scarcely necessary to add that the directions given above for using dark glasses, equalizing brightness, &c., apply to one reflecting instrument as well as another. The cells into which the dark glasses are inserted, when wanted, are seen between the two glasses and also in front of the horizon-glass.

On looking at Borda's circle as it is here represented, the opening of the angle between the two glasses is towards the spectator; hence an observer looking through the telescope would see an object directly in the line of the telescope, and some other object, call it A, which lies towards the spectator, by reflexion. Now suppose the index-bar to be moved through the position of parellelism and until the glasses make the same angle as before, but with the opening from the spectator, it is clear, first, that the angle read off between the first and second positions will be twice the original angle; and secondly, that the observer, still looking at the same object as before seen *directly*, will see by reflexion an object on his right hand (call it B), which makes the same angle with the axis of the telescope as A did, but on the other side. Now if we suppose the whole instrument to turn half round upon the telescope as an axis, it is evident that A will be seen exactly as at first, while the index-bar has been moved forwards twice the angle between A and the axis of the telescope produced. This is exactly the complete observation with Troughton's circle, and thus while we have got double the angle by two observations, we have got rid of index error, and have only two readings to which error of division and reading off can apply.[*] Now suppose the instrument to be returned to its original position, and, leaving the index-bar securely clamped, move the horizon-bar, which carries the telescope and horizon-glass, through the same angle and in the same direction as the index-bar has travelled. If the original object be again viewed through the telescope, and the contact between that and A perfected by the tangent screw of the horizon-bar, it is clear that everything is exactly as at starting, except that the index and horizon bar have each moved over the divided circle exactly twice the angle to be measured. Let the operation which has been described be repeated, and everything will be as at starting, except that the indices will have moved over four times the angle, and it is evident that there is no limit to the number of repetitions except the will of the observer. So that, theoretically at least, the influence of bad division, bad centering, and bad reading off upon the final angle may be reduced below any sensible quantity. There is another very considerable advantage, viz. that there are only two readings off of each vernier[†] for any number of repetitions.

---

* Borda's alterations were apparently very simple: he drew the telescope back until its object-glass fell short of the index-glass, while Mayer's projected beyond it, and he carried the horizon-glass forward almost to the edge of the circle, which Mayer planted close before his telescope. Yet these slight modifications completely changed the instrument.

On looking at the figure again it will be seen that the rays of light which fall on the index-glass pass *between* the telescope and the horizon-glass, and there is a particular angle at which they pass through the horizon-glass before falling on the index-glass. This occasions some inconvenience, as the reflected image in that case is scarcely ever quite perfect, and if the sun be the reflected object, the interposed dark glass increases the imperfection. When Borda's circle is used in the hand for observing altitudes, the instrument is to be held alternately in the left and right hand for the crossed observations, but in taking lunar distances there is the same difficulty as in the sextant when the face is downwards. A handle with curved tube may however be applied pretty much as in Troughton's circle, and if it is fixed into a collar which turns on the centre, it may be kept out of the way of the telescope, &c There is a part of this circle which, though not actually necessary, will be found of great convenience, the graduated semicircular arc which is attached to the horizon-bar. The index-bar, either by its edge or by a fiducial line, points out the reading on the semicircle, and shows 0 on each side when the glasses are parallel. By the help of this it is easy to set roughly to any angle on one side or the other, and thus save the trouble which nice setting would require, or seeking for an object, which is still more troublesome. In some circles two small pieces which slide easily can be fixed on this semicircle, and the proper opening is given by the touch alone, that is, when the index-bar just feels the stop. But there is always a risk of forcing a clamp which is supposed to be fixed, by the slightest touch, and therefore we prefer setting by a coarse-reading. As the chronometer must be noted and read off at every observation, there will generally be light enough for this purpose. Borda's original circles were much too large, and very weak and ugly. Six inches diameter seems to us quite sufficient for an instrument of this construction, which is intended to be used according to its principle. The telescope and glasses are nearly the same for all sizes, and the repetition reduces the errors of division and reading off so rapidly that we should prefer rather a coarse division, which is easily seen, to a fine one. A boldly cut division to 30″ would probably be best for general purposes; the circle should be as light as is consistent with strength, but the main points to be looked to are the independence of the index and horizon bars, the truth and perpendicularity of the centerings, and the firmness of the clamps. Whether the want of balance in both bars, and especially the horizon-bar, is wholly innoxious, is a point of some doubt, otherwise there would seem to be no theoretical objection to a well-made repeating circle. Hitherto this instrument has not been much used in England. By some it may have been thought more troublesome than the sextant; it has generally been made too large and cumbersome, and perhaps prejudice may be added as one of the causes why it has not been properly valued. Mr. Dollond has however made several of late (somewhat varying from that here described), of a beautiful model and with very convenient stands. At the same time, though warm partizans of the repeating principle, we conceive that the results with a repeating circle will not be superior to those which may be attained by the sextant or by Troughton's circle when in the best hands, but it is more independent, requires less thought and care and skill than the sextant, and is neither so troublesome nor so cumbrous as Troughton's circle.

An alteration was proposed in Troughton's construction by Mr. Hasslar, director of the survey of the coast of the United States. The circle turns freely round the centre, and is clamped at pleasure either to the frame which supports the horizon-glass and telescope, or to the index-bar which carries the index-glass. The arrangement is exceedingly ingenious, but we suspect that the clamping and unclamping must affect each other, notwithstanding the beauty of the workmanship. They are also made much too heavy for the hand, and, considering the principle, unnecessarily so Mr. Hasslar has employed them, we believe, in his survey, but we have not heard of their use elsewhere. The idea of a moveable or flying circle was probably taken from De Mendoza Rios, who proposed a flying vernier, as well as circle. ('Phil. Trans.,' 1801, p. 362.) The complication of this construction, and the practical objections to it, were, we presume, fatal to its adoption; for we are not aware that it has ever been successfully used. In observing altitudes at sea, it is presumed that the horizon is always visible, which in hazy weather, or in dark nights, is frequently not the case. There have been several proposals for overcoming the difficulty by adapting a plumb-line or level to the sextant when required.

Several modifications, additions, and supposed improvements have been made in this class of instruments, but none of sufficient importance to require notice here. The sextant and circle, such as we have described them, are sufficient for the cases which practically occur; and without disputing the ingenuity and even utility of certain modifications in peculiar and exceptional cases, we believe that there is little to be gained by such alterations as have been hitherto proposed.

For reducing observations made with reflecting instruments, we must refer to the usual works on nautical astronomy. The tables of Thompson, or Riddle, or Inman, or Raper, will afford sufficient information. Borda's memoir, already mentioned, should be carefully studied by every one who proposes to use a repeating circle; and Troughton's article CIRCLE, in Brewster's 'Edinburgh Encyclopædia,' will be found of great value, especially as a guide to the circle known by his name. We have ventured very frequently to modify their opinions and directions, and the intelligent reader may decide for himself.

SEXTON, an officer of the church, whose name is supposed to be a contraction of *sacristan*, the name of the person who in antient times had the care of the sacred vessels and other things used in religious services. The greater simplicity of Protestant ceremonies has rendered this duty one of small importance, and it is now usually performed by the parish clerk; so that the sexton has sunk into an officer whose chief business it is to see to the preparation of graves and to assist in depositing the corpses. To him also belongs the care of sweeping the church, and other similar menial offices.

SEXTUS EMPI'RICUS, a Greek philosopher and physician of celebrity, who flourished about A.D. 200. The particulars of his life are uncertain, and the only two indications on which we can rely are those given in his own works, that he was the pupil of Herodotus of Tarsus, and that he lived about the period before mentioned.

---

[*] Some observers use the repeating circle as a sextant. They change the readings from time to time by altering the position of the horizon-bar and determining the zero position of the index-bar. This mode of observing will undoubtedly tend to destroy errors of division and excentricity, but it is a complete sacrifice of the best qualities of a repeating circle. At any rate index error should be destroyed in the way we have pointed out, which would be some compensation for the reduced radius of the divided arc. Borda calls the pair *observations croisées*, or *crossed observations*.

[†] The index-vernier is usually read off and the horizon vernier neglected. Lieutenant Raper has pointed out the following use of the second vernier. Place the glasses parallel and read off both verniers; then if you wish to measure two angles rapidly, observe one by moving the index-bar, and the other by moving the horizon-bar. In observing altitudes of two stars in uncertain weather and in maritime surveying, this recommendation may be of great service. Let the greater angle be first measured by moving the index-bar, then the angle moved over by the index-bar is the greater angle, and the difference between this angle and that moved over by the horizon-bar is the less angle.

Diogenes (ix., *Timon*) simply says, Sextus, the Empiric (ὁ ἐμπειρικὸς), was the pupil of Herodotus of Tarsus: he wrote the ten books of Sceptica, and other excellent works.' Equal uncertainty exists as to the place where he lived and taught, although, from the only existing evidence of value (viz. from a passage in his own work, Πυῤῥώνειαι Ὑποτυπώσεις, iii. 16), it appears that he taught philosophy and exercised his art, at least during one period of his life, in the same place as his master. But his very identity has been a matter of of dispute. Suidas (Σέξτος) speaks of Sextus, a native of Libya, to whom he attributes a work entitled 'Sceptica,' in ten books; but he also attributes ten books of 'Sceptica' to Sextus of Chaeronea, whom he calls a follower of Pyrrho, though it is well known that this Sextus, the nephew of Plutarch, and one of the preceptors of M. Aurelius, was a Stoic. That the philosopher of Chaeronea and Sextus Empiricus are two different persons is clearly shown by Kuster, in a note in his edition of Suidas (*in v.* Σέξτος χαιρωνεύς).

His surname of Empiricus, prefixed to his works, and given him by Diogenes Laertius, intimates that he belonged to that school of medicine which styled itself the Empiric; and he himself confirms this in his treatise πρὸς τοὺς Μαθηματικοὺς Ἀντιῤῥητικοί, *Adversus Mathematicos*, lib. i., 161.

His works are among the most valuable of those extant in antient philosophy, and have been largely consulted by all subsequent historians. The 'Pyrrhonian Hypotyposes,' in three books, contains all the celebrated arguments of the antient sceptics. [SCEPTICISM.] The first book is a complete analysis of scepticism. He divides philosophers into dogmatists, academics, and sceptics, and then classifies the sceptics themselves. Next follows an exposition of the nature of scepticism, its method, endeavours, and aims; with a learned and precise account of all the celebrated terms in use amongst sceptics, such as ἐπέχω, 'I refrain from judging;' οὐδὲν ὁρίζω, 'I define nothing;' and others. This book is peculiarly valuable as an exposition, but is perhaps inferior to the two succeeding books, which are directed against the dogmatists, where, after stating every subject of belief, he opposes each of them with a string of sceptical objections. Morals, religion, logic, nothing escapes his doubt; and this is done in a manner at once peculiar and subtle, and affords an interesting exposition of the insufficiency of human reason to settle those illimitable inquiries of

> 'Fate, foreknowledge, free-will absolute,'

which have ever formed the 'vexatæ quæstiones' of philosophers. [SCEPTIC.]

The other work of Sextus Empiricus, which is entitled 'Adversus Mathematicos,' is only another form of the Pyrrhonic Institutes above mentioned. It is directed against all who admit the possibility of a science. This discussion, though conducted on very different principles, has been much in vogue amongst the German and French metaphysicians, and indeed involves the whole philosophy of human knowledge. What science is, whether science be possible, whether science be positive or psychological, these are questions eternally renewed. M. Auguste Comte, in that vast system which he has elaborated in his 'Cours de Philosophie Positive,' denies altogether the possibility of a psychological science; while the Germans, on the other hand (led thereto by the fundamental principle common to them all, that the external universe receives its laws from the laws of the mind), contend that all science must necessarily be psychological. But Sextus Empiricus sweeps away both parties, and will admit no science whatever to be possible. The first book of his 'Adversus Mathematicos' undertakes to refute grammarians and historians; the second annihilates the rhetoricians; the third, the geometricians; the fourth, the arithmeticians; the fifth, the astrologers; and the sixth, the musicians.

There are five more books always added to the work, all directed against logicians, moralists, and physicians (φυσικοί, in the Greek sense); but to make them part of the same work as the first five books can only have arisen from the ignorance and carelessness of his first editors. They have no real connection with them, but may rather be regarded as a supplement to the second and third books of the 'Hypotyposes,' to which they belong in intention as well as spirit. The two works are indeed closely allied in spirit, and are only various forms of the same philosophy and the same purpose.

Such as they have come down to us, these two works form an encyclopædia of scepticism such as can be found nowhere else. They are, as M. Ancillon well observes, 'a positive arsenal of every species of doubt methodically arranged, and from which the sceptics of succeeding times have armed themselves, choosing from his immense magazine the arms suitable to their minds or to the nature of their subjects.'

The influence of Sextus Empiricus, except as an historian, has been very small. The Alexandrian philosophy and the Christian religion alike combined by their success to prevent his forming a sect of any consequence; and although modern sceptics have availed themselves of his arguments to prop up their own incredulity, yet there is a tendency in the human mind at variance with this barren philosophy, which no ingenuity, however subtle or plausible, has ever been able to overcome.

There are few editions of Sextus, and none which can be called critical. The first translation of the 'Hypotyposes' was by Henry Stephens, 1562, 8vo. The first edition of the Greek text of both works was published at Paris, 1621, fol. This edition is accompanied with a Latin version. An edition of the Greek text, also with the Latin version, was published by J. A. Fabricius, Leipzig, 1718, fol.

SEXUAL SYSTEM. [SEXES OF PLANTS.]

SEYCHELLE COCOA-NUT is the fruit of one of the palms (*Lodoicea Sechellarum*), respecting which many fabulous accounts were formerly related, such as, that it was produced at the bottom of the sea, the nuts being only found thrown up on the coasts of the Maldive Islands. They were called Coco de Maldivia or Coco de Salomon by the early Portuguese navigators. Many marvellous medical virtues were ascribed to these nuts by the physicians of the age, both Asiatic and European, and they were consequently sold at a high price. At present they form only objects of curiosity, and are well known under the name of double cocoa-nuts. The tree yielding them was first discovered by Barré, a French officer of engineers, in 1769, then described by Sonnerat, but for the first time accurately by Labillardière, 'Ann. Mus., Paris,' ix., p. 140, t. 13. A very full description and illustrative plates have been given by Dr. Hooker, in the 'Botanical Magazine,' N. S., No. iv., v., and vi., 1827; and a paper on the subject was lately read at the Royal Asiatic Society by a resident of the Seychelle Islands. To the inhabitants the tree is useful for its timber, which is hard externally, and employed in building their huts and for posts; the leaves and their footstalks are used for the roof, walls, and partitions, and for many other domestic purposes. The nuts weigh from 20 to 25 pounds each, and, when fresh, contain a white, transparent, and jelly-like substance, which is edible. The shells are employed in making vessels and dishes of various kinds, and the entire nuts form articles of commerce, as they are esteemed in other countries both for their fabled virtues and as curiosities.

SEYCHELLES ISLANDS are a group of islands situated in the Indian Ocean, north-east of Madagascar, between 3° and 5° S. lat. and 53° and 56° E. long. These islands rest on an immense bank of sand and coral, which is said to extend from north-west to south-east more than 240 miles, and in width between 30 and 90 miles. It is a kind of vast platform in the sea, on which the superstructure of the islands has been raised. The general depth of water on the bank varies between 12 and 40 fathoms. It is free from dangers, but the ground-swell is very great on it.

The number of islands, including the small islands, is nearly thirty, of which however only fifteen are of any importance from their size or produce.

Islands.	Acres.	Islands.	Acres.
Mahé	30,000	Marianne	250
Praslin	8,000	Conception	120
Silhouette	5,700	Felicité	800
La Degue	2,000	North Island	500
Curieuse	1,000	Denis	200
S. Anne	500	Vache	200
Cerf	400	Aride	150
Frigate	300		

The other islands are small, and only occasionally visited to obtain cocoa-nuts or turtles.

The surface of the islands is irregular, presenting a diversity of hill, rock, and ravine, without any extent of level land. The rocks are granitic; the soil is in some parts scanty, but good; it produces abundance of wild fruits and vegetables. Cultivation is carried on only in the narrow valleys, the soil there being deeper and richer than on the higher grounds, from which it is often washed down by the rains. The island of Mahé, which is the largest, and the residence of the government agent, is sixteen miles long and from three to four broad. The rugged chain of granitic hills which passes through its centre is about 400 feet above the sea in the highest parts. This island has much valuable wood, especially on the more elevated spots, which have not been cleared for cultivation. The Seychelles contain many excellent harbours, which are never visited by tornadoes, and may at all times be considered perfectly safe.

The climate is fine and healthy, and the heat is never oppressive. The thermometer generally varies between 84° and 64°, and the mean annual temperature is between 70° and 72°. The sea and land breezes are regular, but feeble, except in the month of August, when strong breezes occur. Gales of wind are very seldom experienced, and hurricanes are unknown.

The grains which are most cultivated are rice and maize. Mandioc is also grown, as well as cotton, coffee, tobacco, and the sugar-cane. There are a few clove-trees. Among the productions found in a wild state are cocoa-nuts, pine-apples, cucumbers, and red pepper. But the most remarkable production is the *coco do mar*, which for some centuries was considered to be the fruit of a tree which grew on the bottom of the sea, whence it took its name. [SEYCHELLE COCOA-NUT.] The inhabitants of the islands derive great advantages from this tree. Besides the fruit, which is eaten, though it is tasteless, the wood is used for many domestic purposes; the cabbage which is found at the summit of the tree, though bitterer than that of the common palm, makes an excellent pickle. With a hundred of its leaves a house may be built, and the majority of the houses in Praslin are made of them. The down of the leaves is put into mattresses and pillows; the stalks are formed into baskets and brooms; and the heart of the younger leaves is cut into narrow stripes, from which hats for both sexes are made, and generally worn in the island. The fibrous covering of the nut is manufactured into ropes, and the shell is universally used as a pitcher, many of them containing six or eight pints; divided longitudinally it makes plates and dishes for the slaves; and when small it forms drinking-cups. All attempts to transplant this tree to the other islands have hitherto proved fruitless. Another production which seems to be peculiar is called *bois rouge*, or *bois de Mahé*. It is not inferior in beauty and solidity to mahogany, and is well adapted for cabinet-work, but it is not found in sufficient quantity to become a great article of export. Cattle and sheep are rather numerous, and very good. Alligators are found in the wide mouths of several brooks. The flying fox, a large kind of bat of hideous aspect, is eaten, and is considered a dainty.

The population is composed of whites and negroes. In 1825 it consisted of

White persons . . .	582
Free coloured persons . .	323
Slaves	6058
Total .	6963

The town of Mahé is situated on the north-east side of the island of the same name, in a small glen, irregularly built, and containing only a few good houses inhabited by persons of respectability, who generally prefer living in the environs. It is not far from a deep bay enclosed by a semicircle of tolerably high land; but the innermost part of the bay is occupied by shoals and coral rocks, which are partly dry at low water. The number of small trading vessels belonging to the island may be ten or twelve; they sail to the islands of Mauritius and Bourbon, and to India. They have also many large schooner-rigged boats, which they employ in communicating between the islands; and numerous canoes built and fitted with much skill and neatness. The inhabitants get the few articles of European manufacture which they are in need of from Mauritius and Bourbon, to which islands they send their produce, as also Mahé wood, wax, and tortoise-shell.

It is probable that these islands were known to the Portuguese under the name of the Amirante Islands, a term which now belongs to a much smaller group lying south-west of the Seychelles, consisting of several low small islands, which are uninhabited, and only visited occasionally for the turtles and cocoa-nuts with which they abound. The Seychelles were partially explored by Lazarus Picault, in 1743, by order of Mahé de la Bourdonnais, then governor of the island of Mauritius. The name of Seychelles is derived from Moreau de Seychelles, who was an officer of rank in the French East India service when they were first explored by the French. About the year 1768 the French formed a colony on the island of Mahé; and as about that time Poivre took much pains to transplant the spices of the Moluccas into the French colonies, they were also cultivated in Mahé; but they did not succeed, with the exception of cloves, of which there are still a few trees. The Seychelles capitulated to the English in 1794, but were not taken possession of. On the capture of Mauritius however in 1810, they were occupied; and by the peace of Paris (1815) formally ceded to England, together with Mauritius.

(Prior's *Narrative of a Voyage in the Indian Seas;* Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar.*)

SEYMOUR, EDWARD, First Duke of Somerset. [EDWARD VI.]

SEYMOUR, THOMAS, Lord Seymour of Sudley. [EDWARD VI.]

SEZANNE. [MARNE.]

SFORZA, JA'COPO ATTE'NDOLO, born about the middle of the fourteenth century, at Cotignola, a village near Faenza, of humble parents, forsook in early youth his occupation of a labourer to enlist in one of those companies of adventurers which were then numerous about Italy, and which served for hire the highest bidder among the petty princes and republics of that age. Jacopo, having displayed great courage and perseverance, acquired a considerable reputation in that turbulent militia. After serving under several 'condottieri,' or leaders, he attached himself to Alberico da Barbiano, a captain superior to the rest both by birth and the loftiness of his views. Alberico belonged to the family of the lords of Cuneo, and aspired to the glory of delivering Italy from the foreign mercenaries and forming a national militia. Having collected a force of 12,000 men, all natives of Italy, he gave it the name of the Company of St. George. In the year 1376, pope Gregory XI., who was residing at Avignon, sent an order to his legate in Italy to endeavour to restore the authority of the Papal see over the towns of the Romagna, which had revolted at the instigation of the Florentines. The cardinal took into his pay a body of foreign mercenaries called the Breton Company commanded by John Hawkwood, whom the Italians called 'Acuto,' a valiant condottiero of those times. These troops having entered Faenza without opposition, began plundering the town, and killed many of the people. In the following year the cardinal of Geneva was sent from France by the pope with another body of foreign mercenaries, chiefly cavalry, from Britanny and other parts of France; and having attacked Bologna without success, he wintered at Cesena. Here the soldiers, having come to blows with the citizens, were driven away with the loss of six hundred of their number; but soon after, having again got admission into the town, some say under a general amnesty granted by the legate, they set about sacking it, killing all the men, violating the women, and not sparing even the nuns. Four thousand of the unfortunate inhabitants of Cesena were killed on that day (1st of February, 1377), and eight thousand escaped to beg their subsistence in the neighbouring towns and villages. The report of these enormities spread indignation all over Italy; and Alberico, supported by Barnabo Visconti, lord of Milan, the Florentines, and by the people of Bologna, Forli, and other towns, marched to attack the foreign troops, which he met at Marino in the Papal state. Jacopo Attendolo, and Braccio da Montone, another distinguished pupil of Alberico, fought under him. After a desperate combat, the foreign mercenaries were utterly defeated and nearly annihilated. The Breton Company was entirely disbanded, and Italy, at least for a time, was freed from foreign mercenaries. Alberico was called the 'Liberator,' and he assumed on his standard the motto 'Liber. Ital. ab Exter.' Attendolo, who had greatly contributed to the victory, received from Alberico the surname of 'Sforza,' by which name, and no other, he and his descendants have become known in history.

Sforza subsequently entered the service of Gian Galeazzo Visconti, lord of Milan. Afterwards he engaged himself to the republic of Florence against the rival republic of Pisa, which had in its service Agnolo della Pergola, another celebrated condottiere. Sforza defeated his antagonist, and the Pisans were obliged to sue for peace. The Florentines made Sforza their captain-general, with an annual salary of twelve hundred golden ducats. He afterwards entered the service of the marquis of Ferrara against Ottobuono de Terzi, tyrant of Parma, whom he defeated, and treacherously stabbed to death at an interview at Rubiera. Such was the virtue of the condottieri. The marquis of Ferrara obtained by this means the dominion of Parma and of Reggio, and he rewarded Sforza by giving him the estate of Montecchio. Sforza afterwards served the Florentines against Ladislaüs, king of Naples, whom he defeated near Arezzo. Ladislaus made large offers to Sforza to enter his service, which he accepted, and the king dying soon after, Sforza became great constable or commander-in-chief under his sister and successor Joanna II. At her profligate court the brave but blunt condottiere was exposed to the intrigues and cabals of worthless favourites, and he lost the good graces of his sovereign, and was imprisoned. But he was necessary to her, and he finally triumphed over his rivals. In the year 1417 he was sent by Joanna to Rome to recover possession of that city for the Holy See. The people of Rome, taking advantage of the schism, had risen in arms and asserted their independence, and the new pope, Martin V., who had just been elected by the council of Constance, was far away. The popular party had called in the celebrated condottiere Braccio da Montone, who however left the town on the approach of Sforza. After restoring the Papal authority, Sforza returned to Naples, where he was again banished from the court by the intrigues of Gianni Caracciolo, the then favourite of Joanna II. Sforza, at the head of his trusty men, took possession of Naples, and obliged the queen to banish Caracciolo. Shortly after he was sent again to Rome to assist pope Martin V. against his factious subjects, who were supported by Braccio da Montone, whom he defeated and obliged to ask for a truce. At this time the pope gave to Sforza his native village of Cotignola in fief, with the title of count. Having returned to Naples, he again incurred the displeasure of the fickle Joanna, upon which he took the part of Louis of Anjou, count of Provence, an hereditary claimant of the throne of Naples. The queen called to her assistance Alfonso, king of Aragon and of Sicily, whom she appointed her heir and successor. Alfonso came with a fleet and an army, defeated Sforza, and occupied the city of Naples. But Alfonso abused his victory, and he treated the queen as his prisoner. Sforza came to the assistance of his mistress, and drove away Alfonso. In the meantime Braccio da Montone was ravaging the northern provinces of the kingdom. Sforza marched into the Abruzzi in the midst of winter, but in fording the river Pescara, which was swelled by heavy rains, his horse was carried along by the rapid current, and Sforza was drowned. Thus ended the restless career of this brave but illiterate soldier, whose surname, acquired on the field of battle, became that of a sovereign dynasty.

Francesco Sforza, born in 1401, son of Jacopo, learnt the art of war under his father. He received from Queen Joanna the title of count, and several domains in the kingdom of Naples. He afterwards entered the service of Filippo Maria Visconti, duke of Milan. Being ill-rewarded by the duke, he accepted the offers of the Venetians and the Florentines, and led their allied forces against the Milanese, who were commanded by Piccinino, a celebrated condottiere, whom he defeated in several campaigns, A.D. 1438-41. The duke of Milan, in great alarm, offered Sforza his only daughter Bianca, with the city and territory of Cremona for a dowry. Sforza assented, concluded a peace between the belligerents, and the marriage was solemnised in October, 1441. But soon after the duke Filippo Maria, again becoming suspicious of his son-in-law, excited against him pope Eugenius IV., who sent Piccinino to deprive Sforza of his domains in the March of Ancona. Sforza repaired thither, and for several years fought against the troops both of the pope and of Alfonso, king of Naples, and conquered the greatest part of the March of Ancona. But the death of the duke his father-in-law opened a new field to his ambition, and he aspired to the sovereignty of the duchy of Milan. There were other pretenders, who alleged that Bianca was an illegitimate child of the late duke; and the people of Milan, considering the Visconti dynasty as extinct, proclaimed the republic. But Pavia and other towns which had been subjected by Milan detached themselves from it, asserting an equal right to their independence. Sforza turned these dissensions to his own account; he accepted the command of the Milanese troops, with which he defeated the Venetians, who wished to dismember the duchy; but having refused to obey the directions of the commissioners from Milan concerning his military movements, he suddenly concluded peace with Venice, and the Venetians agreed to give him 6000 auxiliary troops to take possession of Milan. In February, 1450, the people of Milan, reduced by famine, and distracted by anarchy within their walls, opened the gates to Sforza, who was solemnly proclaimed duke of Milan in the following March. In his new dignity he acted with prudence and mildness. He promised to raise no new taxes, to employ none but Milanese for civil offices, and he enforced the laws for the protection of persons and property; he made alliance with the Florentines, conciliated the Pope and Alfonso of Naples, and was acknowledged by Louis XI. of France. The Venetians and the Duke of Savoy declared war against Sforza; but after a desultory warfare, peace was made, by which Brescia, Bergamo, and Crema remained to Venice, and the river Sesia was fixed as the boundary between the duchy of Milan and the states of the house of Savoy. The duchy of Milan under Duke Sforza embraced the following towns:—Milan, Pavia, Cremona, Lodi, Como, Novara, Alessandria, Tortona, Valenza, Bobbio, Piacenza, Parma, Vigevano, Genoa, and Savona. The last two cities were conquered by Sforza.

Duke Sforza restored and embellished the ducal palace, raised the castle of Porta Giovia, terminated the magnificent structure of the great hospital, one of the most interesting buildings of Milan, and constructed the navigable canal, or Naviglio della Martesana, which communicates between Milan and the river Adda. The reign of Sforza lasted sixteen years. He died of dropsy, in March, 1466, at the age of sixty-five, generally regretted. In his private life he was frugal, sober and continent, affable and humane. His Life has been written by Simonetta, and Corio and the other historians of Milan record his virtues.

Galeazzo Maria Sforza, son of Francesco, who succeeded him on the ducal throne, was very unlike his father: he was suspicious, cowardly, licentious, and cruel. He quarrelled with his mother the duchess Bianca, a most meritorious woman, who retired to Marignano, where she died after a short illness, not without some rumours of poison. He put to a cruel death several innocent persons, and dishonoured many women of all classes. At last a conspiracy was formed against him, and on the day after Christmas-day, 1476, he was stabbed whilst on his way to church. The people took no part with the conspirators, who were put to death. His infant son Giovanni Galeazzo was proclaimed duke, under the guardianship of his mother Bona of Savoy. But Ludovico Sforza, styled 'il Moro,' on account of his dark complexion, and brother of the deceased duke, took possession of the regency, arrested the dowager duchess, put to death her faithful minister Simonetta, and at length usurped the sovereign authority, confining his nephew and his wife to their apartments. The young duke had married a granddaughter of Ferdinand, king of Naples, who remonstrated with Ludovico on his conduct, but to no effect. Ferdinand armed against him, and Ludovico, to avoid the storm, invited Charles VIII. of France to undertake the conquest of the kingdom of Naples. This was the origin of all the wars and calamities of Italy in the sixteenth century, and of the loss of its political independence. Charles came into Italy assisted by Ludovico, and took Naples, but was soon obliged to retire in consequence of the general hatred of the people to the French for their insolence, rapacity, and oppression. Meantime the duke of Orleans seized upon Novara, and laid some hereditary claims to the duchy of Milan. Ludovico, who now saw the danger of having introduced the foreigners into Italy, formed a league with the Venetians and the pope, and drove away the French out of Italy.

After the suspicious death of Duke Giovanni Galeazzo, which happened in 1494, at the early age of five and twenty years, Ludovico was proclaimed duke of Milan, and confirmed by a diploma of the emperor Maximilian I. But the duke of Orleans, having become king of France by the name of Louis XII., sent an army to the conquest of the duchy of Milan, under Trivulzio, a Milanese noble, and a personal enemy of Ludovico Sforza. The Venetians and pope Alexander VI. having joined the French, Sforza was obliged to yield to the storm, and he took refuge in Germany.

The French entered Milan in 1499, without opposition and Louis XII. was proclaimed duke of Milan. The French however soon became as odious in Lombardy as they had been at Naples, and insurrections took place in several towns. In January, 1500, the people of Milan revolted, and in the following February Ludovico Sforza re-entered his capital. The French however kept their ground in the fortresses, and new reinforcements coming from France, Ludovico marched against them to Novara, but being forsaken by a body of Swiss in his pay, who, through an intrigue of the French, had received orders from their government not to fight against their countrymen who were in the opposite army, he was defeated and taken prisoner, and sent to France, where he was imprisoned in the castle of Loches till 1508, when he died.

Ludovico had several good qualities; he was generous, fond of the arts and of learned men; he was the friend of Bramante and Leonardo da Vinci, with whose assistance he embellished Milan, built the lazzaretto, instituted the public schools, protected Merula, Calchondylas, and other distinguished scholars, and founded chairs of Greek, geometry, and astronomy. Ludovico's policy was artful and crooked; he had obtained the ducal throne by unfair means, but it was unfortunate for Milan that he lost it to make room for strangers. After many years of war in Italy between French, Germans, and Spaniards, during which his two sons Maximilian and Francis Sforza were for short periods seated on the ducal chair, being puppets in the hands of their Swiss or German auxiliaries, Lombardy became finally an Austrian dependency, and the house of Sforza became extinct.

'SGRAVESANDE, WILLIAM JACOB, a Dutch mathematician and philosopher, whose family name was Storm van 's Gravesande, was born at Hertogenbosch (Bois-le-duc), September 27, 1688. On the side of his grandmother he was descended from the celebrated physician Jean Heurnius, and some of his ancestors had been magistrates of Delft in the beginning of the fifteenth century.

He received his earliest education in his father's house, and while very young he showed a decided predilection for scientific researches. When sixteen years old he was sent to the University of Leyden to study the law, and before the end of 1707 he took the degree of doctor. His legal studies did not however prevent him from applying himself to mathematical subjects, and before he was nineteen years of age he published his 'Essai sur la Perspective;' a work which was favourably noticed by John Bernoulli, and contains a development of the ingenious idea, that if a horizontal or an equatorial dial be viewed through a plane inclined in any manner, by an eye at the extremity of the gnomon, the perspective representation of the dial on that plane will constitute a dial for the same plane. (Montucla, *Hist. des Mathématiques*, tom. i., p. 733.) 'SGravesande, on his return to the Hague, followed for a time the profession of a barrister, but in 1713, a society of young men of talent having undertaken a work entitled 'Le Journal Littéraire,' he became one of its most zealous contributors, and furnished for it numerous extracts from works relating to mathematics and natural philosophy. He also published in the journal a paper on the construction of the air-pump (in which machine he had made some improvements), one on the theory of the collision of bodies, and several other original dissertations. The work was afterwards carried on at Leyden under the title of 'Journal de la République des Lettres,' and it terminated in the year 1733.

'SGravesande accompanied, as secretary, the deputies of the States-General when they came to London in 1715, in order to congratulate George I. on his accession to the throne of England. Here he became acquainted with Dr. Burnet, bishop of Salisbury, and was made a Fellow of the Royal Society; and after his return to the Hague he was made, in 1717, professor of mathematics and astronomy in the university of Leyden. During the vacations of the years 1721 and 1722 he made two journeys to Cassel, in consequence of invitations from the landgrave of Hesse, who wished to have the benefit of his advice respecting a machine which was supposed to be capable of perpetual motion, and who besides had manifested an enlightened taste for experimental philosophy.

In 1724 'SGravesande, on quitting the chair of mathematics at Leyden, delivered an oration which, under the title 'De Evidentia,' he afterwards printed at the head of the third edition of his 'Elémens de Physique.' In this he ascribes the pre-eminence to mathematical evidence, considering it as the only criterion of truth; and he makes the sanction of moral evidence consist in the will of the Deity, by whose law he supposes that man believes the testimony of his senses and trusts in the conclusions drawn from analogy.

In 1730 'SGravesande added civil and military architecture to the subjects which he taught, and four years afterwards he undertook to give instructions in a course which comprehended logic, metaphysics, and moral philosophy. From attachment to his country 'SGravesande declined, in 1724, an invitation from Peter the Great, who wished him to become a member of the Royal Academy then recently formed at St. Petersburg; and, in 1740, a similar invitation from the king of Prussia. He was occasionally employed as an engineer in superintending the hydraulic operations which were executed in Holland. He was also consulted by the ministers of the States when measures relating to finance were in contemplation; and having a great facility in discovering the key to secret writing, he was of great service during the war of the Succession in decyphering such of the enemy's despatches as happened to be intercepted.

This distinguished professor was the first who, on the Continent, publicly taught the philosophy of Newton, and he thus contributed to bring about a revolution in the physical sciences, but he is said to have been more skilful in making observations and experiments than in conducting transcendental researches; and falling into an error respecting the nature of force, by confounding what is called living or active force, which is represented by the product of a body's mass multiplied into the square of its velocity, with simple force, which is proportional to the velocity merely, he was led to adopt the opinion of Leibnitz on this subject, in opposition to that of Newton. It is further observed that 'SGravesande, whose philosophical lectures are distinguished by a simplicity which is the true language of science, was not always consistent in the development of his ideas. His 'Introduction to Philosophy' is the work of a disciple of Locke, yet he neither adopted the particular doctrines of that writer, nor did he propose any system of his own, but he borrowed by turns the principles assumed by different philosophers.

He married in 1720, and had two sons, whom he had the misfortune to lose within eight days of each other, when the eldest was fourteen and the other thirteen years of age. He supported this heavy affliction with the fortitude of a Christian philosopher; and after a long sickness he died, February 28, 1742, being then in the fifty-fourth year of his age.

The principal works of 'SGravesande are the 'Essai de Perspective,' 1711; 'Physices Elementa Mathematica,' &c., of which the first edition was published at the Hague in 1720, and the sixth, which is in English, by Dr. Desaguliers in 1747; 'Philosophiæ Newtoniæ Institutiones in usus Academicos,' an abridgement of the preceding work, Leyden, 1723; 'Matheseos Universalis Elementa,' &c., Leyden, 1727; 'Introductio ad Philosophiam,' &c.: of this the first edition was published in 1736, and the last in 1756. He also edited a collection of the works of Huygens, and the 'Arithmetica Universalis' of Newton.

SHAD. [Clupeidæ.]

SHADDOCK. [Citrus.]

SHADWELL. [Middlesex.]

SHADWELL, THOMAS, a dramatic author, well known as the hero of Dryden's satire of 'Mac Flecknoe,' was born in Norfolk in 1640, of an antient Staffordshire family. He was bred to the law, but disliking the drudgery of an office, he quitted it and travelled abroad. On his return to England he became intimate with the reigning wits, and particularly with Rochester, Otway, and Dryden. He shortly after produced his first comedy of 'The Sullen Lovers,' which was so well received that he continued in this dramatic career, and became so notable a man as to be set up by the Whigs as a rival of Dryden. In 1688, on the secession of Dryden from the poet laureatship, Rochester recommended Shadwell to the place. He died in 1692, it is said in consequence of too large a dose of opium, which he was in the habit of taking. His dramatic works are—'The Sullen Lovers,' 1688; 'The Royal Shepherdess,' 1669; 'The Humourist,' 1671; 'The Miser,' 1672; 'Epsom Wells,' 1673; 'Psyche,' 1675; 'The Libertine,' 1676; 'The Virtuoso,' 1676; 'Timon of Athens,' 1678; 'A True Widow,' 1679; 'The Woman Captain,' 1680; 'The Lancashire Witches,' 1682; 'The Squire of Alsatia,' 1688; 'Bury Fair,' 1689; 'The Amorous Bigot,' 1690; 'The Scowerers,' 1691:

'The Volunteers,' 1693. A complete edition was published in 1720, in four volumes 12mo.

Thomas Shadwell owes his immortality to ridicule. Dryden, his former friend, impaled him on the point of the keenest satire, and there he remains for the laughter of ages. And yet nothing could be more unjust than this satire, for of all Shadwell's faults dulness certainly was the least, and it was absurd to make him—

> 'Through all the realms of dulness absolute;

or to say—

> 'Mature in dulness from his tender years,
> Shadwell alone, of all my sons, is he
> Who stands confirmed in full stupidity.
> The rest to some faint meaning make pretence,
> But Shadwell never deviates into sense.'

This is exquisite writing, but very untrue. Shadwell was a man of much tact, observation, and liveliness, whose extreme negligence and haste in writing alone seem to have been the cause of the short-coming of his comedies Rochester, who certainly was a good judge of wit and vivacity, said—

> 'Of all our modern wits none seem to me
> Once to have touched upon true comedy
> But hasty Shadwell and slow Wycherley.
> Shadwell's unfinished works do yet impart
> Great proofs of nature's force, though none of art ;'

and no one who looks into his plays (which few of his critics and biographers have done) can fail being struck with the truth of this remark. The world, on Dryden's authority, laugh and vow he 'never deviates into sense.' He often wrote a play in a month; and thus all his works betray carelessness. It is remarkable that Pope's 'Dunciad,' which was an imitation of 'Mac Flecknoe,' also commits the very serious mistake of making a very lively pert man like Cibber the hero of dulness.

Shadwell set Ben Jonson before him as his model, and he followed him at a considerable distance both in his writings and in his personal behaviour. Sensual, given to excesses, and loose in his conversation, he had the faults of that great man, with little of his 'immortal substance.'

SHA'FEI is the patronymic of a celebrated Mohammedan doctor, named *Mohammed Ibn Idris al Shdfei*, who was the founder of one of the four sects which are considered orthodox by the Moslems. Sháfei was born at Gazah, in Syria, in the year 150 of the Hejra (A.D. 767), the same year in which Abú Hanifah, the founder of the sect of the Hanefis or Hanefites, died. At the age of two he was taken to Mecca by his parents, and there educated. He applied himself early to the study of theology and law, and soon became distinguished in both those sciences. He was gifted with so wonderful a memory, that he could repeat a whole volume after reading it twice over. He is considered the first Mohammedan doctor who discoursed of jurisprudence, and methodised that science. To his attainments in all branches of theology Sháfei added many other literary accomplishments. He was an excellent poet, and used to deliver lectures on the works of the ancient Arabian poets, explaining the difficult passages, and astonishing his auditory with the extent of his erudition. His contemporary Ibn Hanbal used to say of him, that he was 'as the sun to the world, and as health to the body.' His assiduity was such, that he used to divide the night into three parts, one for study, another for prayer, and the third for sleep. Sháfei died in Egypt, A.H. 204 (A.D. 819). He left several works, which are held in great esteem by the Mohammedans. The principal is his treatise on the *Ossúl*, or fundamental principles of Islám; his *Sunun* and his *Masnad*, two other works on the same subject, have found numerous commentators. The Sháfeites spread formerly about Mawara-l-nahar, or Transoxiana; they are now met with in every Mohammedan country, but chiefly in Arabia and in India.

SHAFTESBURY, a parliamentary borough and market-town in the hundred of Monckton-up-Wimborne (otherwise Upwinbourne Monckton) in the county of Dorset, on the Exeter mail-road by railway to Basingstoke, and then through Salisbury. It is 105 miles from London, and 20 from Salisbury.

Shaftesbury is supposed to have existed in the time of the Britons, and to have been called by them Caer Palladwr. Drayton (*Heroic Epistle of Owen Tudor to Queen Catherine*) speaks of Mount Pallador as though it were the name of the hill on which the town stands, rather than of the town itself. Roman coins have been found here. Alfred restored it after it had been destroyed by the Danes. An antient inscription on a stone removed from the ruins of a religious house, and mentioned by William of Malmesbury, has led Camden and others to ascribe to Alfred the foundation of the town: it contains the words 'Ælfredus Rex fecit hanc urbem.' The town was called by the Saxons 'Sceftesbyrig,' or 'Sceaftesbyrig:' the name in Domesday is 'Sceptesberie;' it was variously written by the historians of the middle ages, until it assumed its present form, which is sometimes altered into Shaston, or, more correctly, Shafton.

In the reign of Athelstan there were in the place two mints, and an abbey of Benedictine nuns, to which the body or part of the body of King Edward the Martyr was conveyed for burial soon after his murder at Corfe Castle. The possession of this relic added much to the reputation of the abbey, and among other visitors attracted by it was Canute the Great, who died at Shaftesbury, A.D. 1036. [CANUTE.] Shaftesbury is mentioned as a borough in Domesday-book, and appears at an early period to have contained twelve parish churches. In the abbey, Elizabeth, wife of Robert Bruce, king of Scotland, was detained as a prisoner (A.D. 1313-14). The revenues of the abbey at its dissolution were 1329*l.* 1*s.* 3*d.* gross, 1166*l.* 8*s.* 9*d.* clear. In the civil war of Charles I., the 'clubmen,' an association formed to protect the county against both the belligerent parties, held a meeting at Shaftesbury to the number of 2000, when they were surprised by Fleetwood with a parliamentarian force of 1000 men, and their leaders apprehended.

The town is in a healthy but bleak situation, chiefly on the top of a steep hill, and commands a view to the south and west over part of Wiltshire, Somersetshire, and Dorsetshire. The surrounding district is fertile. The town is badly supplied with water. It is irregularly laid out; and the streets are not paved, and only partly lighted. The houses are irregularly built, and for the most part of mean appearance: the building material commonly employed is stone from the neighbouring quarries. On the top of the hill is a well of prodigious depth, from which the inhabitants are partly supplied with water, which is drawn by machinery worked by a horse. There are four churches. St. Peter's, in the middle of the town, consists of a nave and chancel, with two aisles extending the whole length of the church, and a square embattled tower: it is a building of considerable antiquity, much defaced by modern alterations. Trinity church consists of a nave and chancel, and of two aisles extending the whole length of the church, with an embattled tower and pinnacles: it stands in a spacious churchyard, laid out with rows of lime-trees. St. James's church is a neat building, consisting of a nave, chancel, vestry on the south side, and an embattled tower. St. Rombald's, or St. Rowald's, consists of a nave and chancel, both small, and of a low embattled tower of modern date. There are meeting-houses for Independents, Friends, and Wesleyans. There are no remains of the abbey church, and scarcely any of the conventual buildings. On the brow of the hill west of the town is a small mound or earthwork. The ground adjacent is called the Castle-green or Castle-hill, but there is no account of a castle having stood there. There is a handsome town-hall lately built.

The population of the borough of Shaftesbury in 1831 was 3061. The borough then comprehended part of the parishes of Trinity, St. James, and St. Peter, with the liberty of Alcester. St. Rombald's parish was not included in the borough. All the three parishes extend beyond the borough limits. The augmentation of the parliamentary borough, by the Boundary Act, increased the population to 8969, and the area to 20,910 acres. A boundary less extensive than the parmentary boundary, but more comprehensive than the old one, has been recommended by the commissioners of municipal corporation boundaries. The trade of the town is very little: it has a weekly market, held on Saturday, and three yearly fairs.

Shaftesbury is described in Domesday-book as a borough; but its corporate constitution did not assume a complete form till the time of James I. By the Municipal Reform Act, the council consists of four aldermen and twelve councillors.

Shaftesbury has been uninterruptedly represented in parliament from the time of Edward I.; but its representatives were reduced to one by the Reform Act; and by the Boundary Act the outparts of the three borough parishes, together with the parishes of Cann St. Rumbold, Motcombe, East Stower, Stower Provost, Todbere, Melbury Abbas, Compton Abbas, Donhead St. Mary (in Wiltshire), and St. Margaret's Marsh, and the tything of Hartgrove in

Fontnell Magna parish, were added for parliamentary purposes. The constituency in 1835-6 consisted of 270 ten-pound householders, and 254 scot and lot voters; total 524; in 1839-40, of 302 ten-pound householders, and 189 scot and lot voters; together 491. Shaftesbury is one of the polling-places for the county. It gives the title of earl to the family of Cooper.

The two rectories of St. Peter and Trinity are united in one benefice, of the clear yearly value of 168*l.*; the living of St James is a rectory, of the clear yearly value of 286*l.* They are in the rural deanery of Shaftesbury, the archdeaconry of Dorset, and the diocese of Sarum.

There were in the three parishes, in 1833, six infant or dame schools, with 131 children, namely 69 boys and 62 girls; seven day-schools of all kinds (one endowed), with 200 children, namely 131 boys and 69 girls; and three Sunday-schools, with 515 children, namely 213 boys and 302 girls.

SHAFTESBURY, ANTHONY ASHLEY COOPER, FIRST EARL OF, was the son of Sir John Cooper, of Rockborne in Hampshire, who was created a baronet in 1622, and of his wife Anne, only daughter and heiress of Sir Anthony Ashley, of Wimborne St. Giles's, in Dorsetshire, who had been secretary-at-war to Queen Elizabeth. He was born at Wimborne St. Giles's, 22nd July, 1621, and inherited the estates both of his father and of his maternal grandfather, the latter especially being of great extent. His father died in 1631.

Sir Anthony Ashley Cooper (or Cowper, as the name is often written) was entered of Exeter College, Oxford, in 1636; and in 1638 he became a student of law at Lincoln's Inn. While yet however only in his nineteenth year, having already excited great expectations by his talents, he was called into public life by being returned as one of the members for Tewkesbury to the parliament which met in April, 1640. He did not sit in the next—the Long Parliament, which met in November that year; but he continued to adhere to the royal interest till he was deprived, in 1643, of the government of Weymouth, upon which, says Clarendon, 'he gave himself up, body and soul, to the service of the parliament, with an implacable animosity against the royal interest.' The next year, having raised a force in Dorsetshire under a parliamentary commission, he stormed the town of Wareham, and reduced all the surrounding country. But he appears to have been afterwards suspected of still retaining a secret attachment to the royal cause. Nevertheless he was called upon to sit as one of the members for Wiltshire in the first (Barebone's) parliament assembled by Cromwell after his dissolution of the Long Parliament, 28th April, 1653; and by this parliament or convention he was repeatedly appointed one of the Protector's council of state, in which capacity however it is affirmed that he gave a strenuous opposition to Cromwell's designs. He represented the town of Poole in the next parliament, which met 3rd September, 1654; and he was also a member of Oliver's last parliament, which assembled 17th September, 1656, and of that convened by Richard, 27th January, 1659.

Notes of many of his speeches during this part of his life are preserved by Burton; and he is said, by Anthony Wood, to be the person by whom a very long and remarkable one was delivered in March, 1659, which was published soon after in a pamphlet under the title of 'A seasonable Speech made by a worthy Member of Parliament in the House of Commons concerning the other House.' It handles the memory of the deceased Protector with great severity.

After the deposition of Richard Cromwell, Sir Anthony, although he did not enter into any direct correspondence with the king, incurred the suspicion of the council of state, and was for a time in some danger. He continued however to pursue his object with equal perseverance and address, and his vigilance and activity in watching and taking advantage of every turn in the progress of events were undoubtedly of great service in helping to bring about the Restoration. In the Convention Parliament, which met 20th April, 1660, Sir Anthony was one of the select committee appointed to draw up the invitation to the king; and he was also one of the commissioners sent over to Breda. Monk indeed, the apparent author of the Restoration, appears to have been wholly in the hands of Sir Anthony, and to have acted under his direction.

As soon as Charles had come over, Sir Anthony, besides being appointed governor of the Isle of Wight, colonel of a regiment of horse, and lord-lieutenant of the county of Dorset, was made chancellor of the exchequer and a privy councillor; and the following year he was raised to the peerage as Baron Ashley of Wimborne St. Giles. In the patent it was acknowledged that the Restoration was chiefly owing to him, and that the nation had been delivered from the evils in which it was involved 'by his wisdom and counsels, in concert with General Monk.' He also sat as one of the commissioners of oyer and terminer on the trial of the regicides, in October, 1670, a display of zeal which, all things considered, was thought not to argue much delicacy of feeling.

As chancellor of the exchequer, serving under his relation and intimate friend the earl of Southampton, lord-treasurer, who was in bad health, Lord Ashley is said to have had almost the entire management of the treasury in his own hands. But both in council and in parliament, so long as Clarendon retained his influence, he was found acting with what we may call the opposition section of the ministry. He did what he could to resist the Uniformity Bill, and the other similar measures directed against the dissenters (actuated, as Clarendon affirms, by his indifference to all religion); and he also opposed the French connection, the sale of Dunkirk, and the war with the Dutch. Clarendon, to whom Ashley appeared to have no principle, admits that he spoke 'with great sharpness of wit, and had a cadence in his words and pronunciation that drew attention.' On the death of Southampton, in May, 1667, Ashley, retaining his office of chancellor of the exchequer, was appointed one of the commissioners for executing the office of lord treasurer. A treaty of commerce was concluded with Spain in the same month, the instructions for which were drawn up by Ashley; and the peace with Holland and the fall of Clarendon followed in August of the same year. Yet Clarendon will have us to believe that it was through his interference—principally, he seems to insinuate, out of a feeling of compassion—that the king was reluctantly induced to consent to the insertion of Ashley's name as one of the lords commissioners of the treasury; and he speaks of Ashley suffering himself to be degraded by the arrangement which made the major part of the commissioners the quorum, instead of the chancellor of the exchequer being authorised to act alone, as had, it seems, been usual in former commissions. There can be no doubt that Ashley's influence in the government was greatly augmented by his new position. In those days the office of chancellor of the exchequer was much less important than it has since become.

But when Charles's natural inclinations, and the influence of the Duke of York, brought about a renewal of the old connection with France, Ashley, after very little hesitation, yielded to the current; and his name is one of those immortalised under the comprehensive designation of the Cabal Ministry, which, in 1670, concluded the new French treaty, began the establishment of a system of arbitrary domestic government, and, within two years, involved the country again in a war with Holland. Ashley however is not accused of having received any of the French gold with which some of his associates were bribed on this occasion, and he appears to have resisted, though ineffectually, some of the worst proceedings of the government, particularly the shutting up of the exchequer in January, 1672, of which he has been charged by some writers with being the adviser. It was by his advice that Charles published the celebrated declaration for suspending the execution of the penal laws against the Nonconformists and Recusants, in March, 1672; but Ashley seems to have regarded this act as no illegal stretch of authority: he afterwards maintained, in a warm argument on the subject with Locke, who enjoyed much of his intimacy and confidence, not only that the king's supremacy entitled him to do many things in ecclesiastical which he could not do in civil matters, but further, 'that a government could not be supposed, whether monarchical or of any other sort, without a standing supreme executive power, fully enabled to mitigate or wholly to suspend the execution of any penal law in the intervals of the legislative power.' To attempt to cure the occasional inconveniences of particular laws by means of a legislative power always in being, he contended was, 'when considered, no other than a perfect tyranny.'

In April, 1672, Ashley was created Earl of Shaftesbury; and in November following, on the resignation of Sir Orlando Bridgman, who is said to have refused to put the great seal to the declaration of indulgence, he was raised to the place of lord chancellor. His conduct in this office has been represented in very opposite lights; but it appears that, without much knowledge of law, his natural sagacity enabled him to do substantial justice in most cases that came before him, and to acquit himself to the satisfaction both of the public and the profession. Roger North, in his 'Examen,' asserts that he began by trampling on all the forms of his court, and cutting and slashing after his own fancy; but the bar, he adds, 'soon found his humour, and let him have his caprice, and after, upon notice, moved him to discharge his orders; and thereupon, having the advantage, upon the opening, to be heard at large, they showed him his face, and that what he did was against common justice and sense; and this speculum of his own ignorance and presumption, coming to be laid before him every motion-day, did so intricate and embarrass his understanding, that in a short time, like any haggard hawk that is not let sleep, he was entirely reclaimed.' So that, as Roger expresses it, in the Life of his brother, the Lord Keeper Guilford, he came, as is said of the month of March, 'in like a lion and out like a lamb.' It is asserted however that none of his decrees were reversed. The tribute which Dryden pays to both his integrity and his ability as a judge, in the otherwise severe character he has drawn of him in his 'Absalom and Achitophel,' is well known:—

> 'In Israel's courts ne'er sat an Abethdin
> With more discerning eyes, or hands more clean;
> Unbribed, unsought, the wretched to redress,
> Swift of dispatch, and easy of access.'

Shaftesbury retained the seals till November, 1673, when he was dismissed from office, no doubt by the influence of the Duke of York and the popish party in the cabinet, whose confidence or good-will he had never been able to conciliate, although the ready and cordial manner in which he had lent his support to some of the most unpopular measures of the court had at the same time gone far to deprive him of the favour of the public. Among the most remarkable parts of his political conduct while chancellor are his compliance with the king's command to issue writs for supplying vacancies in the House of Commons during the prorogation of parliament; his strenuous advocacy of the war with Holland, to which in his speech delivered at the opening of the session in February, 1673, he applied the famous expression of Cato, 'Delenda est Carthago,' calling further upon his hearers to remember that the states of Holland were England's eternal enemy both by interest and inclination; and his eager and effectual support of the Test Act, which was passed in that session. Of the Corporation Act, passed twelve years before, it chances that he had been a decided opponent.

On his dismissal from office, Shaftesbury at once openly joined the ranks of opposition, and applied all his activity and talent of intrigue to thwart the measures of the court. By taking up the cry of No Popery, and holding himself up as the martyr of his zeal for Protestantism, he speedily regained his old popularity; and in the session which began in January, 1674, the House of Commons showed from the first day of its re-assembling what a powerful party his friends constituted there. Indeed they proved to be the majority of the House, the proceedings of which the ministers could find no way of checking except by resorting to a prorogation, which they continued from time to time till it had lasted for the unprecedented space of fourteen months. And when the House was found to be in no better humour after parliament had at length been suffered to meet again, in April, 1675, it was prorogued anew in June, and then, after another short session, which began on the 13th of October, was at once prorogued to the 15th of February, 1677, or for above fifteen months. When it re-assembled, Shaftesbury contended in his place that the parliament had been actually dissolved by being so long kept in a state of suspension; upon which it was voted that he should acknowledge his error and beg the king's pardon on his knees at the bar, and, when he refused to do this, he was committed to the Tower. He applied to the Court of King's Bench, and repeatedly petitioned both the king and the House of Lords; but he was not released till he at length consented, after an imprisonment of above a year, to make the submission originally required. In November, 1680, the House of Lords resolved that these proceedings were 'unparliamentary from the beginning and in the whole progress thereof,' and ordered them all to be obliterated from the journals of the House. The Earl of Salisbury, Lord Wharton, and the Duke of Buckingham, who had committed the same offence in the debate on the prorogation, had been all sent to the Tower along with Shaftesbury; but they were liberated on petitioning his majesty after a few months' detention.

The oppressive usage he had been subjected to at once embittered Shaftesbury's hostility to the court and made him more formidable than ever by the accession of public favour which it procured him. Soon after his release occurred the strange affair of Titus Oates and the alleged Popish Plot; when Shaftesbury took so eager a part in maintaining the truth of the story, that some writers have been inclined to suspect that it was all a contrivance of his own. But even those who acquit him of this charge are far from unanimous in holding that he actually believed in the existence of the plot, although he turned it to much account in the promotion of his party or personal objects. When the new council, consisting of thirty members—fifteen the existing chief officers of state and of the household, ten other members of the House of Lords, and five selected from the House of Commons—was established in the early part of 1679, Shaftesbury was made its president. It was immediately after being placed in this position that he drew up and carried through parliament the famous act for the better securing the liberty of the subject, now known as the Habeas Corpus Act, but in those days commonly called Lord Shaftesbury's Act. In October following however he was dismissed from his office of president of the council; and soon after, by his advice, Lord Russell, Lord Cavendish, and two others of his friends resigned their seals at the board. Shaftesbury now, on the 26th of June, 1680, took the bold step of appearing at the bar of the Court of King's Bench, and formally presenting the Duke of York to the grand jury as a Popish recusant. The grand jury were sent for by the court, and dismissed while they were considering the indictment; but when the king found it expedient to allow the parliament to meet again in October, after having been prorogued since July of the preceding year, the bill for excluding the Duke from the throne, which had been brought forward in the last session, was again passed by the Commons; and a new prorogation was had recourse to in January, 1681. Then followed the Oxford parliament, which was found equally intractable with its predecessors, and was put an end to in the same manner. For some time before this, Shaftesbury had been in close alliance with the Duke of Monmouth; and it is said to have been by his advice that Monmouth had recently returned from Holland, in defiance of his father's injunctions. It is supposed that Shaftesbury, in his hatred of the Duke of York, or his conviction of the dangers to be dreaded from his accession, had made up his mind to support the pretensions of Monmouth to the throne, on the ground of an alleged marriage between his mother and Charles. Alarmed by these designs, the court resolved to make a bold effort to destroy the powerful demagogue; and on the 2nd of July, 1681, Shaftesbury was seized by an order of council at Thanet House, in Aldersgate Street, and, being brought before the king and council, was committed to the Tower on a charge of high treason. But when the bill of indictment was preferred against him at the Old Bailey, on the 24th of November, the grand-jury ignored it. It is said that the applause in the court upon this announcement lasted a full hour. Dryden, who had a short time before celebrated the union of Monmouth and Shaftesbury, in his 'Absalom and Achitophel,' now wrote his much more acrimonious satire of 'The Medal,' in reference to a medal which was struck in honour of his lordship's deliverance.

Shaftesbury however seems now to have felt that there was no safety for him under the present system of things in England—that he had involved himself too deeply in the contest with the government to hope that they would ever rest till they had effected his destruction. In these circumstances he attempted to prevail upon his friends to join him in an armed insurrection; and upon their refusal, he fled to Holland, on the 18th of November, 1682. Here he took up his residence in Amsterdam, where an attack of the gout in his stomach put an end to his life on the 21st of January, 1683.

Lord Shaftesbury was three times married, and left a son, who succeeded him in his titles, by his second wife Frances, daughter of David Cecil, third earl of Exeter.

Few losses of the kind are more to be regretted than that of the Memoirs of his own time, which Shaftesbury is said to have written, and Locke, to whom he had committed the manuscript, to have destroyed in the fright into which he was thrown by the execution of Algernon Sydney. There is a short biographical account of Shaftesbury in Locke's works; but the most complete Life of him is that drawn up under the direction of his great-grandson, the fourth earl, by Mr. Benjamin Martin and Dr. Kippis, an impression of which was printed towards the end of the last century, all the copies of which are said to have been destroyed except two, from one of which the work was reprinted in 1836, in 2 vols. 8vo., under the superintendence of Mr. C. W. Cooke, by whose name it sometimes passes.

SHAFTESBURY, ANTHONY COOPER, THIRD EARL OF, born at Exeter House, London, in February, 1671, was the son of Anthony Cooper, second earl, and consequently the grandson of the subject of the preceding article, whose favourite he was from childhood, and who is said to have himself superintended his education in his earliest years. The method he took to instruct him in Greek and Latin was to place him while yet very young under the charge of a female of the name of Birch, who is affirmed to have had so great a knowledge of these languages that she spoke both with considerable fluency, and enabled the boy to read them with ease by the time he was eleven years old. He was afterwards sent to Winchester, and then spent some years in travelling on the Continent, whence he returned to England in 1689. In 1693 he entered parliament as one of the members for Poole, and took a considerable share in the business of the house on the Whig side; but his health suffering from his close attendance, he resigned his seat in 1698, and went over to Holland, where, assuming the character of a student of medicine, he made the acquaintance of Bayle, Le Clerc, and other distinguished literary persons. His father dying the following year, he returned home; and he made a considerable figure in the House of Lords during the short remainder of the reign of King William. Soon after the accession of Anne, however, he again retired to Holland; and, although he came back to his native country after an absence of two years, he never again took any part in public life. His last years were entirely dedicated to literature. In 1708 he published his 'Letter on Enthusiasm;' in 1709, his 'Moralists, a Philosophical Rhapsody;' the same year his 'Sensus Communis, or Essay on Wit and Humour,' in which he announced his famous doctrine of ridicule being the test of truth; in 1710, his 'Soliloquy, or Advice to an Author;' in 1711, a collected edition of all these works. The state of his health had now become so alarming that he was induced once more to leave England for a milder climate; he proceeded to Naples, and was enabled for some time to resume his pen, but at last sunk and died there on the 15th of February, 1713. A complete collection of his various pieces, which he had employed his last days in preparing, appeared soon after his death, in three volumes, under the title of 'Characteristics of Men, Manners, Opinions, and Times.'

Lord Shaftesbury's writings excited great attention and admiration in his own day; and his name still remains a considerable one in the history both of English philosophy and English eloquence. He appears to have bestowed unwearied pains upon his diction; but although he abounds in ingenious, forcible, and even brilliant passages, he failed to attain the crowning art of concealing his art, and his composition has for the most part an air both of effort and affectation. His philosophy as a system has little claim to originality; but it is animated by a lofty spirit of antient wisdom and beauty; and is full of glimpses and hints of important and sometimes new truths. 'The noble author of the "Characteristics,"' Warburton has said, while expressing his repugnance to the general character of Shaftesbury's philosophy, 'had many excellent qualities both as a man and a writer. He was temperate, chaste, honest, and a lover of his country. In his writings he has shown how much he has imbibed the deep sense and how naturally he could copy the gracious manner of Plato.'

Lord Shaftesbury married, in 1709, his relation Jane, daughter of Thomas Ewer, Esq., of Lea in Hertfordshire; and by this lady, who survived till 1751, he left one son, Anthony, the fourth earl. His own mother was Lady Dorothy Manners, daughter of John, first duke of Rutland.

SHAG. [PELECANIDÆ, vol. xvii., p. 384.]

SHAGREEN (French, *Chagrin;* German, *Schagrin;* Russian, *Schagrim*), a sort of leather, grained so as to be covered with small round pimples or projections. It is very hard, and is used as a covering for small cases and boxes, and for other purposes. It is prepared in Russia, especially at Astrachan, in Poland, and in various parts of the Levant. It is made chiefly of the skin of horses, asses, and mules. A piece of the skin of the back, immediately above the tail, is the part selected as most suitable. The skin is soaked in water, scraped, and stretched on frames: while soft, small seeds, such as mustard seeds, are pressed into it, and is is then dried with the seeds in it. The seeds are afterwards beaten out, and the skin has then that pimpled graining which is peculiar to the leather. It is afterwards polished, soaked in a ley, and dyed of various colours. Though very hard, it is easily softened in water, and is therefore easy to work. The best kind is said to be brought from Constantinople.

SHAH-ALIM I. (also called *Sultan Moazim* and *Bahadur Shah*) succeeded as emperor of India on the death of Aurungzebe, of whom he was the eldest surviving son (A.D. 1707, A.H. 1119). During the life of his father he had been entrusted with various important commands; but his uniformly unassuming deportment failed to disarm the jealous suspicions with which Aurungzebe habitually regarded his sons, and he was at one period, for nearly seven years, kept under restraint. At the outset of his reign he had to sustain a contest with his two brothers, Azim and Cambakhsh, who were dissatisfied with the splendid appanages, the kingdoms of Beejapoor and the Dekkan, bequeathed them by their father; but these ambitious princes were successively defeated and slain, leaving Shah-Alim without a rival. The remainder of his short reign presents few events of importance, being chiefly occupied by operations against the Sikhs, who had lately exchanged the character of peaceful devotees for that of armed fanatics, and had overrun the Punjab and adjoining provinces. He died in a fit, in his camp before Lahore, at the age of seventy (lunar) years, Feb. 16, 1712 (A.H. 1124), and was succeeded, after a short civil war, by his eldest son Jehandar-Shah. His character is summed up by an able native historian, Meer Hussein-Khan, with a frankness which singularly contrasts with the adulation usual in Eastern writers: 'This emperor was extremely good natured, and mild even to a fault; but very deficient in firmness, for which quality indeed the princes of the house of Timour have never been remarkable in later times.'

SHAH-ALIM II. succeeded to the nominal rank of emperor on the murder of his father Alimghir by the vizier Ghazi-ed-deen, Nov. 1759 (A.H. 1173); a fate which he himself had only escaped by flying from Delhi some time previous. He spent several years in the vain attempt to establish his authority in some of the provinces of the distracted empire, and is often mentioned by English writers of that period under the name of the *Shahzadeh*, or prince; but in 1755 he was compelled to throw himself on the protection of the British, who assigned him the city and district of Allahabad for his maintenance, receiving in return a formal grant of Bengal, Bahar, and Orissa, the original *title-deed* of the Anglo-Indian empire. His impatience to return to Delhi however led him to throw himself into the arms of the Mahrattas in 1771; but he found himself merely the tool of his new allies, and after various vicissitudes, he was seized and blinded (1788) by a Rohilla chief named Gholam Khadir, who had taken Delhi. The recovery of the capital by Madajee Sindiah restored him to liberty, but he continued virtually a captive of the Mahrattas till the capture of Delhi by Lord Lake in 1803, when he was rescued from the miserable and degraded state to which he had been reduced, and assigned an annual pension of 120,000*l.* for his support. He died in 1806, aged eighty-seven, and was succeeded by his son Akbar Shah II., who continued an English state pensioner all his life, and never exercised authority beyond the palace walls. Akbar died at the age of eighty-two, Sept. 28, 1837, and his son Mohammed Bahadur Shah, is the present titular monarch.

SHAH NAMEH. [FIRDUSI.]

SHAHABAD, a considerable town in Hindustan, in the territory of the king of Oude, in 27° 40′ N. lat. and 79° 53′ E. long., about 85 miles north-west from Lucknow, and about 18 miles south from Shahjehanpoor, direct distances There are many large houses and remains of fortifications.

SHAHEE, Lake. [AZERBIJAN; PERSIA.]

SHAHJEHAN, or *King of the World,* the title assumed by Khurrem-Shah, the fifth of the Mogul emperors of India, who succeeded his father Jehangnîr Selim Shah, A.D. 1627 (A.H. 1037). He had borne a distinguished part in the transactions of his father's reign, and had the glory (1614) of first reducing the Rana of Oodipoor, the chief of the Rajpoots, to submission; and in 1616 he was declared heir to the throne, though he had then two elder brothers living, both of whom however died before Jehanghîr. He was afterwards employed against Candahar and the Dekkan, and distinguished himself by his bravery and military skill; but the intrigues of the famous empress Noor-Jehan, who favoured the pretensions of a younger prince named Shahriyar, led to his disgrace and recall. He was even driven for a time (1623) into open rebellion, and was never entirely reconciled to his father. On the death of Jehanghîr however the succession was secured to Shahjehan by the fidelity of the vizier Azof-Jah, and Shahriyar was taken and put to death. The revolt in the following year (1628) of a powerful chief named Khan-Jehan Lodi, who took refuge with the independent Moslem kings in the Dekkan, gave rise to a war in that quarter which lasted several years, and ended in the total subjugation of the kingdom of Ahmednuggur (1631), while the more powerful states of Beejapoor and Golconda were compelled (1636) to pay tribute to the court of Delhi. A war with the Uzbeks in Balkh (1644-7) was attended with little result; and Candahar (which, after falling into the hands of the Moguls in 1637, had been recovered ten years later by the Persians) defied all the efforts of two successive armaments, led by the princes Dara-Sheko and Aurungzebe, to retake it. The war in the Dekkan was renewed in 1655; and Aurungzebe, who was viceroy in the south, gained great advantages over the two kingdoms which remained, Beejapoor and Golconda. But a dangerous illness, which seized Shahjehan in 1657, led to a premature civil war between his four sons for the succession. The eldest, Dara-Sheko, had been destined by his father for the heir; but he was overthrown by the united forces of Aurungzebe and Morad, who entered Agra (1658), and deposed their father, while Aurungzebe, speedily getting rid of Mourad, proclaimed himself emperor. Shoojah, the fourth brother, was shortly after defeated and driven out of India; and Dara, being taken prisoner the next year in a fresh attempt, was put to death by order of Aurungzebe. From this period Shahjehan was confined by his ungrateful son to the citadel of Agra, though constantly treated with respect and allowed an ample establishment. He died there, Dec. 1666 (A.H. 1076), in the seventy-fourth year of his age. The reign of Shahjehan was the epoch of the greatest splendour and prosperity of the Mogul dynasty, though its *territory* was afterwards greatly extended by Aurungzebe. The wise regulations introduced by Akbar for securing impartial justice to all classes of his subjects, Hindu as well as Moslem, were still in full force; and Tavernier, who visited India during this reign, says that Shahjehan 'reigned not so much as a king over his subjects, but rather as a father over his family and children.' The magnificence of his court was unequalled even in the tales of oriental pomp. The famous *peacock throne*, the jewels composing which were valued at 6,500,000*l.*, was constructed by his orders; but the most durable monuments of his greatness are the numerous and splendid public buildings which he erected. The city of New Delhi, or Shahjehanabad, with its fortified imperial palace and noble mosque, was built under his direction; but the superb mausoleum of the Taj-Mahal near Agra, which he built for the sepulchre of his favourite queen, and in which he himself lies interred, is unsurpassed perhaps by any edifice either in Europe or Asia for chaste elegance of design and beauty of execution. Notwithstanding this vast expenditure, his finances were so well regulated, that after defraying the cost of his military expeditions, and maintaining an army of 200,000 men, he left the treasure of 24,000,000*l.* (Khafi-Khan), the savings of an annual revenue of from 25,000,000*l.* to 30,000,000*l.* But all this prosperity greatly declined under Aurungzebe, whose bigotry led him to renew the oppression of the Hindus, and whose resources were exhausted by the civil wars to which this gave rise, and by his insatiable thirst for conquest.

SHAHJEHANPOOR, a town of Hindustan, in Rohilcund, in 27° 54′ N. lat. and 79° 50′ E. long., about 100 miles north-north-west from Lucknow, direct distance. It is in the British Territory, and is the residence of a British judge. It is seated on the Gurruck, a quiet winding stream. The town is large, and contains about 50,000 inhabitants. There is a castle, and some stately old mosques, most of which are ruinous; but the houses are in good condition, and the bazaars have an appearance of activity and opulence.

There is another town called SHAHJEHANPOOR in Malwa, in 23° 26′ N. lat. and 76° 18′ E. long. The name of both the towns is derived from the emperor Shahjehan, by whom they were founded.

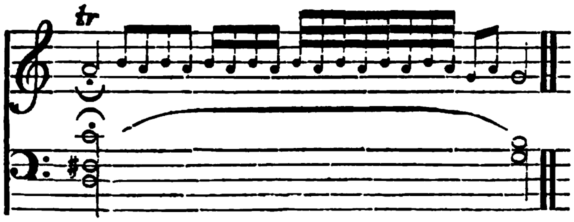
SHAH ROKH BEHADIR, called also *Shahrokh Mirza* (*Behadir* signifying 'a champion,' and *Mirza* 'a prince'), was the fourth son of Tamerlane. The news of his birth was brought to his father, it is said, while he was playing at chess, and when he had just given check to the king (Shah) with his castle (Rokh): from these two words the name of the son was formed. He succeeded his father A.H. 807 (A.D. 1405), and was engaged during the greater part of his life in wars with Cara Yousuf, a Turcoman prince of the dynasty of the Black Sheep, and with the sons of this potentate. He defeated the father in three different battles, and was equally successful against his two sons Jehanshah and Iskender. He however restored the province of Azerbijan to Jehanshah, whom he made his tributary, and left Iskender to wander from province to province. In A.H. 818 (A.D. 1416), Shah Rokh restored the famous fortress of the city of Herat, which his father had laid in ruins, employing upon this work 7000 men. He also rebuilt the walls of Herat itself, as well as those of Merou; the latter had been in ruins since the irruption of Gengis Khan.

The children of Shah Rokh were: Ulug Beg, who governed Mawarannahar, or the country beyond the Oxus; Abulfatha Ibrahim, who governed Persia during the lifetime of his father, and died twelve years before him, leaving behind him many public works, amongst others a college; he had deservedly the reputation of a liberal patron of literature; Mirza Baisankar, or Baisangor, who also died in his father's lifetime, a year before his brother just mentioned, leaving three children, who reigned separately or jointly, and waged the most bloody wars with one another; Soyurgatmish, who commanded under his father in India and the country of Gazneh, and died A.H. 830 (A.D. 1427); and Mirza Mohammed Jouki, who died A.H. 848 (A.D. 1445). The Transoxan provinces given to Ulug Beg had been previously held by Mirza Khalil Sultan, grandson of Tamerlane and nephew of Shah Rokh, who confirmed him in this government. But of this he was despoiled by a rebel courtier, who kept him prisoner; and on the death of the rebel, the provinces of Persian Irak and Azerbijan were given to the restored prince in lieu of his original territory. Shah Rokh himself died after an illustrious reign of forty-three years, at the age of seventy-one, at Ray in Persia. (D'Herbelot, *Bibliothèque Orientale*.)

SHAH-ZEMAUN (*King of the Age*) became king of Cabul and Afghanistan on the death of his father Timour Shah, A.D. 1793 (A.H. 1208), in spite of the opposition of his elder brother Humayoon: another brother, Mahmood, was also defeated in battle and driven into Persia. The Doorauni kingdom had fallen into great disorder during the indolent reign of Timour; but instead of bending his efforts to re-establish subordination in his dominions, he became possessed with the ambition of emulating the Indian conquests of his grandfather Ahmed Shah, expelling the Mahrattas from Delhi, and restoring the ascendency of the Moslems. With these views, and encouraged by the invitation of the Rohillas, he three times (in 1795-96-98) invaded the Punjab and occupied Lahore; but though his movements occasioned considerable alarm to the Mahrattas (who remembered their former defeats by the Afghans), and even to the British in Bengal, who assembled a force on their frontier to check his progress in case of need, he was in each instance recalled by the attacks of the Persians and Uzbeks on the north and west, and by the renewed attempts of his brother Mahmood on the crown. The unpopularity of the vizier Wuffadar Khan detached many nobles from the king's party; and the desertion of Futteh Khan, the powerful chief of the Barukzyes, enabled Mahmood, in 1800, to possess himself of Candahar. A force sent against him was dispersed; and Shah-Zemaun, flying towards Cabul, was treacherously seized and given up to his brother, by whom he was blinded and imprisoned. Mahmood now became king, but was dethroned in his turn, after two years, by Shah-Shoojah-al-Mulk (the lately restored prince), who was full brother to Shah-Zemaun. The latter was now released and treated with kindness; but when Shoojah was driven from his throne in 1809, the blind Shah-Zemaun accompanied his flight, and died in exile.

Google

SHAKE, in Music, the alternate and rapid iteration of two sounds which are not less than a semitone, or more than a whole tone, apart. This grace—for as such it is considered—is generally introduced at a pause, and should commence rather slowly, and increase in rapidity as it proceeds, always concluding with a turn. Ex.:



The *sign* of the Shake is a *t* and an *r* conjoined, the two first letters of the Italian *trillo*, or the French *trille*, both signifying the same as the English term.

SHAKERS, a religious sect which arose in the English county of Lancashire about the year 1747. As the individuals of whom it at first consisted had previously been Quakers, they were sometimes called Shaking Quakers, but more commonly Shakers, from the violent shaking of their bodies in their religious exercises. In 1758 they were joined by Ann Lee, a native of Manchester, whose reputation gradually increased, together with the numbers of the sect, till, in 1770, she laid claim to divine inspiration, and called herself Ann the Word. In 1774, in consequence of the persecution to which they were subjected, she and some of her followers set sail from Liverpool for New York, where they arrived in safety. Ann Lee fixed her residence at Watervliet, on the Hudson, not far from Albany. Her labours were very successful in increasing the numbers of the sect. She died at Watervliet in 1784. In 1832 there were 6000 Shakers in the United States, comprised in fifteen 'families,' as their communities are called. The property of each 'family' is held in common; and as the members, who are both males and females, are all single persons, celibacy being strictly enjoined, the numbers can only be kept up by converts. They are generally distinguished for good conduct in the common business of life. They agree with the Quakers in their abhorrence of war, their objection to take oaths, and in the belief of the direct influence of the Holy Spirit: but of their peculiar religious doctrines it is impossibly to give any intelligible account. Instead of the original violent shaking, they now move round their hall of worship in a regular and uniform dance to the singing of a hymn, clapping their hands in unison.

SHAKSPERE, WILLIAM.* One of the editors of Shakspere, Steevens,—says, 'All that is known with any degree of certainty concerning Shakspeare is—that he was born at Stratford-upon-Avon—married and had children there—went to London, where he commenced actor, and wrote poems and plays—returned to Stratford, made his will, died, and was buried.' This is not '*all* that is known with any degree of certainty.' There is indeed a lamentable deficiency in the materials for Shakspere's life, such as perhaps exists in no similar instance of a man so eminent amongst his contemporaries. Mr. Hallam has justly observed, 'All that insatiable curiosity and unwearied diligence have detected about Shakspeare serves rather to disappoint and perplex us than to furnish the slightest illustration of his character. It is not the register of his baptism, or the draft of his will, or the orthography of his name, that we seek. No letter of his writing, no record of his conversation, no character of him drawn with any fulness by a contemporary, can be produced.' But if we have nothing but registers, and title-deeds, and pedigrees, and wills, we must be content with these 'spoils of time,' in the absence of matters which bring us nearer to the individual. We have however the possibility left of throwing some light upon the obscurity, by grouping these records, amidst the mass of circumstances of which they form so small a part. We have the 'tombstone information,' as such facts have been called; but we have something more. The life of Shakspere has to us a value above that of all other values in connexion with his writings. Whatever difference of opinion there may be as to the dates of particular works, there is, upon the whole, sufficient evidence to enable us to class those works in cycles. This species of inquiry forms no unimportant part of the biography of Shakspere; and new views may, without impropriety, be based upon the new circumstances connected with the poet's literary history which have been opened to us by diligent inquirers during the last few years.

In the register of baptisms of the parish church of Stratford-upon-Avon we find, under the date of April 26, 1564, the entry of the baptism of William, the son of John Shakspere. The entry is in Latin—'Gulielmus filius Johannes Shakspere.' The date of William Shakspere's birth has always been taken as three days before his baptism; but there is certainly no evidence of this fact. Who was John Shakspere, the father of William? The same register of baptisms shows, it is reasonably conjectured, that *he* had two daughters baptised in previous years—Jone, September 15th, 1558; Margaret, December 2nd, 1562. Another brief entry in another book closes the record of Margaret Shakspere; she was buried on the 30th of April, 1563. There is very little doubt that the elder daughter, Jone, died also in infancy; for another daughter of John Shakspere, also called Jone, was baptised in 1569. William was in all probability the first of the family who lived beyond the period of childhood. From these records, then, we collect, that John Shakspere was married and living in the parish of Stratford in 1558. He was no doubt settled there earlier; for in the archives of the town, by which his course may be traced for some years, we find that he was, in 1556 one of the jury of the court-leet; in 1557, one of the ale-tasters; at Michaelmas of that year, or very soon afterwards, he was elected a burgess or junior member of the corporation; in 1558 and 1559 he served the office of constable, which duty appears then to have been imposed upon the younger members of the corporate body; lastly, in 1561, he was elected one of the chamberlains. Here then, previous to the birth of William Shakspere, we find his father passing through the regular gradations of those municipal offices which were filled by the most respectable inhabitants of a country town. What the occupation of John Shakspere was cannot be very readily determined. Aubrey, the antiquary, who lived till nearly the end of the seventeenth century, and whose manuscripts are preserved in the Bodleian Library at Oxford, says, 'Mr. William Shakespear was born at Stratford-upon-Avon, in the county of Warwick; *his father was a butcher*, and I have been told heretofore by some of the neighbours, that when he was a boy, he exercised his father's trade; but when he killed a calf, he would do it in a high style, and make a speech.' There has been recently published a letter, which was formerly in the possession of the family of Lord de Clifford, written by a member of one of the inns of court, and giving an account of the writer's visit to Warwickshire in 1693. After copying the inscription on the poet's monument, he says, 'The clerk that showed me this church was above eighty years old. He says that this Shakespeare was formerly in this town *bound apprentice to a butcher*, but that he ran from his master to London, and there was received into the playhouse as a servitour, and by this means had an opportunity to be what he afterwards proved. He was the best of his family; but the male line is extinguished.' Aubrey's anecdotes of Shakspere are supposed to have been collected about 1680. The letter-writer from Warwickshire was gratifying his honourable curiosity about him whom he styles 'our English tragedian' in 1693. The parish clerk 'above eighty years old' was probably the informant of both parties. He would have been about three years old when Shakspere died, and the period of Shakspere's apprenticeship which he records would have been some forty years earlier. The accounts, it will be seen, materially differ. Aubrey says, 'His father was a butcher;' the parish clerk, 'He was bound apprentice to a butcher.' To the edition of Shakspere's works published by Rowe in 1709, was prefixed a 'Life.' Rowe acknowledges 'a particular obligation' to Betterton, the celebrated actor, 'for the most considerable part of the passages relating to this life, which I have here transmitted to the public; his veneration for the memory of Shakspeare having engaged him to make a journey into Warwickshire on purpose to gather up what remains he could of a name for which he had so great a veneration.' Betterton, then, thus speaking through Rowe, says, 'He was the son of Mr. John Shakspeare, and was born at Stratford-upon-Avon, in Warwickshire, in April, 1564. His family, as appears by the register and public writings relating to that town, were of good figure and fashion there, and are mentioned as gentlemen. His father, who was a *considerable dealer in wool*,' &c. But Malone, in his posthumous 'Life' of the poet, has published a document which is held to be decisive as to this question. It is a record of proceedings in the Bailiff's Court in 1555, in which some process is shown to have been taken against John Shakyspere, of Stratford, *glover*. Malone has argued that this was a considerable branch of trade, and no doubt it was. But we are by no means certain that John Shakyspere the glover was the same person as the poet's father. There was another John Shakspere living in Stratford, who has been repeatedly mistaken for the more interesting butcher, woolman, or glover; and the mistake, we believe, has gone somewhat farther than has been acknowledged. He was a younger man than the father of our poet, for he married in 1584. He was a shoemaker, as is proved by repeated entries in the books of the corporation. Might not his father have been the glover in 1555? Shakspere appears to have been one of the most common names in the town of Stratford; and we have also, as well as John the shoemaker, Thomas, a butcher. About the same period William Shakspere's father is called *a yeoman* in one of the deeds relating to his property. We believe, as we shall presently show, that he was originally of the rank which is denominated gentleman at the present day; he was subsequently *legally* recognised as a gentleman, in the sense in which the word was used in former days. It was not incompatible with this opinion that he should be either a butcher or a dealer in wool. Whether he possessed any patrimonial property or not, he undoubtedly, by marriage, became the proprietor of an estate. He married, as we shall see, an heiress—a lady of antient family. It was after this marriage that he was designated by some a butcher, by others a dealer in wool. There is a mode of reconciling these contradictory statements which has been overlooked by those who have been anxious to prove that Shakspere was not the son of a butcher. In Harrison's 'Description of England,' we have an exact notice of the state of society at the precise time when John Shakspere, the possessor of landed property, was either a butcher or a woolman, or both. We have here a complaint of the exactions of landlords towards their tenants, particularly in the matter of demanding a premium on leases; and it thus proceeds :—'But most sorrowful of all to understand that men of great port and countenance are so far from suffering their farmers to have any gain at all, that *they themselves become graziers*, BUTCHERS, *tanners*, SHEEPMASTERS, *woodmen, and denique quid non*, thereby to enrich themselves, and bring all the wealth of the country into their own hands, leaving the commonalty weak, or as an idol with broken or feeble arms, which may in a time of peace have a plausible show, but, when necessity shall enforce, have an heavy and bitter sequel.' The term 'gentleman-farmer' was not invented in Harrison's time, or we should, we believe, have a pretty correct description of the occupation of John Shakspere.

---

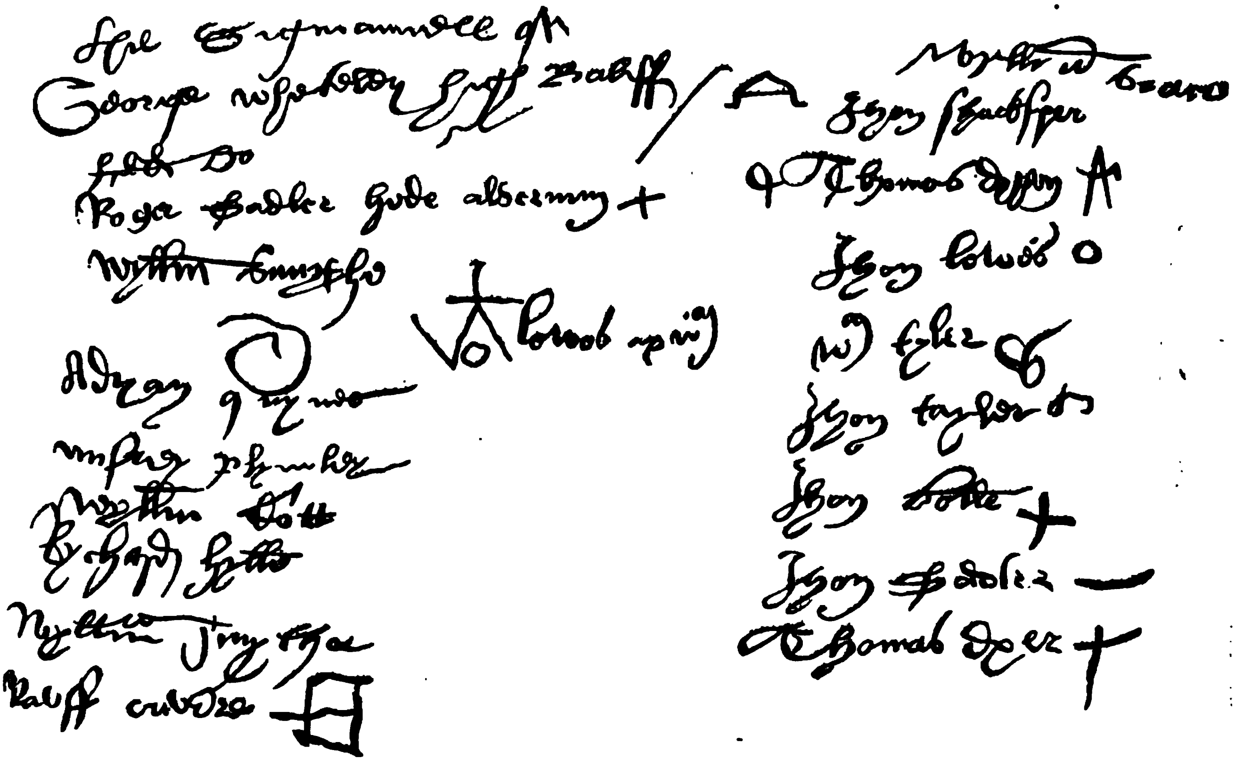
* In the article English Drama this name has been written as commonly printed—*Shakspeare*. This orthography was adopted by the commentators in the belief that the poet had so *written* his name. This was an error, and acknowledged as such by Malone ('Inquiry,' &c., p. 121). Sir Frederic Madden has shown, in a letter published in the 'Archæologia,' vol. xxvii., that in the acknowledged genuine signatures in existence, 'the poet always wrote his name SHAKSPERE, and, consequently, that those who have inserted an *e* after the *k*, or an *a* in the second syllable, do not write the name (as far as we are able to judge) in the same manner as the poet himself uniformly would authorise us to do.' In the Stratford Register, both at his baptism and burial, says Sir F. Madden, the name is spelt *Shakspere*. We may add that, in the same registers, the entries of the baptism of his three children, and of the burial of his son (which entries were most probably made under his own inspection), are spelt *Shakspere* The printers however, during his life, and in the folio of 1623, spell his name Shakespeare.

But we have now to inquire who was the mother of William Shakspere? His father died in 1601. On the 9th of September, 1608, we have an entry in the Stratford register of burial, 'Mary Shakspere, widow.' It is stated in a bill in chancery, of the date of November 24th, 1597, that John Shakspere and Mary his wife were 'lawfully seised in their demesne as of fee as in the right of the said Mary of and in one messuage and one yard land, with the appurtenances, lying and being in Wylnecote.' In the will of Robert Arden, dated November 24th, 1556, we find, 'I give and bequeath to my youngest daughter Mary all my land in Willmecote, called Asbyes, and the crop upon the ground,' &c. We shall presently have occasion more particularly to refer to a grant of arms made to John Shakspere in 1569, and confirmed in 1599. In the latter document it is recited that he 'had married the daughter and one of the heirs of Robert Arden, of Wellingcote.' The grandfather of Mary Arden was groom of the chamber to Henry VII., and he was the nephew of Sir John Arden, squire of the body to the same king. Sir John Arden was a son of Walter Arden, and of Eleanor, the daughter of John Hampden of Buckinghamshire. There were thus the ties of a common blood between William Shakspere and one of the most distinguished men of the next generation—John Hampden, who was a student in the Inner Temple when the poet died. Mary Arden's property has been computed to be worth some hundred and ten pounds of the money of *her* time. It is probable that Mary Arden became the wife of John Shakspere soon after her father's death, which was in 1556.

Of these parents, then, was William Shakspere born, in 1564, in the town of Stratford. In that town there is a street retaining its antient name, Henley-street, being the road to Henley-in-Arden, where, in 1574, stood two houses with a garden and orchard annexed to each; and these houses were then purchased by John Shakspere. It is said that William Shakspere was born in one of these houses. His father may have inhabited the house before the purchase; and it is more than probable that he did, for at a court-leet in 1556 there is an entry of an assignment to him of the lease of a house in Henley-street, and of another in Greenhill-street. There is nothing to prove that the poet was *not* born in the house in Henley-street; and there that house still stands, altered according to modern fashion, its gable roofs destroyed,—divided and subdivided into smaller tenements,—part converted into a little inn, part the residence of a female who shows the room where it is alleged that Shakspere first saw the light, and the low-roofed kitchen where his mother taught him to read. The walls of that bedroom are covered literally with thousands of names, inscribed in homage by pilgrims from every region where the glory of Shakspere is known. At the time when Shakspere's father bought this house, it was, no doubt, a mansion as compared with the majority of houses in Stratford. There is an order from the Privy Council to the bailiff of Stratford, after a great fire which happened there in 1614, pointing out that fires had been very frequently occasioned there 'by means of thatched cottages, stacks of straw, furzes, and such-like combustible stuff, which are suffered to be erected and made confusedly in most of the principal parts of the town without restraint.' Stratford, like nearly every other town of England in that day, closely built, imperfectly drained, was subject to periodical visitations of the plague. From the average annual number of births and burials we may infer that the usual number of the inhabitants was about 1200. When William Shakspere was about two months old, the plague broke out in this town, and, in the short space of six months, 238 persons, a fifth of the population, fell victims. The average annual mortality was about forty. No one of the family of Shakspere appears to have died during this visitation. In 1566 another son, Gilbert, was born. The head of this growing family was actively engaged, no doubt, in private and public duties. In 1568 John Shakspere became the bailiff, or chief magistrate, of Stratford. This office, during the period in which he held it, would confer rank upon him, in an age when the titles and degrees of men were attended to with great exactness. Malone says that, from the year 1569, the entries, either in the corporation-books or the parochial registers, referring to the father of the poet, bear the addition of *master*, and that this honourable distinction was in consequence of his having served the office of bailiff. We doubt this inference exceedingly. John Shakspere would not have acquired a permanent rank by having filled an annual office. But he *did* acquire that permanent rank in the year 1569, in the only way in which it could be legally acquired. A *grant of arms* was then made to him by Robert Cooke, Clarencieux. The grant itself is lost, but it was confirmed by Dethick, Garter King at Arms, and Camden, in 1599. That confirmation contains the following preamble: 'Being solicited, and by credible report informed, that John Shakspere, now of Stratford-upon-Avon, in the county of Warwick, gent., whose parent and great-grandfather, late antecessor, for his faithful and approved service to the late most prudent prince, King Henry VII., of famous memory, was advanced and rewarded with lands and tenements, given to him in those parts of Warwickshire where they have continued by some descents in good reputation and credit; and for that the said John Shakspere having married the daughter and one of the heirs of Robert Arden of Wellingcote, in the said county, and also produced this his antient coat-of-arms, heretofore assigned to him whilst he was her majesty's officer and bailiff of that town: in consideration of the premises,' &c. Nothing, we should imagine, could be clearer than this. John Shakspere produces his antient coat-of-arms, assigned to him whilst he was bailiff of Stratford; and he recites also that he married one of the heirs of Arden of Wellingcote. Garter and Clarencieux, in consequence, allow him to impale the arms of Shakspere with the antient arms of Arden of Wellingcote. The Shakspere arms were actually derived from the family name, and the united arms were used in the seal of William Shakspere's daughter. Yet Malone has a most elaborate argument to prove that the grant of arms was made entirely with reference to the circumstance that John Shakspere had married one of the daughters and heirs of Arden of Wellingcote. Such questions may appear frivolous and unworthy to be discussed in the notice of a man so elevated above the accidents of birth and station. Yet the subject is important in connexion with the education of Shakspere. A great deal of what would appear little less than miraculous in his writings, especially with reference to the almost boundless amount of knowledge which they contain on every subject, will raise in us not a vulgar wonder, but a rational admiration, when we look at him as a well-nurtured child, brought up by parents living in comfort if not in affluence, and trained in those feelings of honour which were more especially held the possession of those of gentle blood. His father and mother were, we have no doubt, educated persons; not indeed familiar with many books, but knowing some thoroughly; cherishing a kindly love of nature and of rural enjoyments amidst the beautiful English scenery by which they were surrounded; admirers and cultivators of music, as all persons above the lowest rank were in those days; frugal and orderly in all their household arrangements; of habitual benevolence and piety.

Malone assures us that Shakspere's father *could not write*. We have taken some pains to examine the evidence which was produced for this assertion. Putting the higher considerations of the poet's education out of the question, we thought it scarcely consistent with his habitual reverence for those things which we are called upon to honour, that he should make his own father the subject of his satire, and that during his father's lifetime, in the praise which Jack Cade bestows upon those who 'do not use to write their names, but have a mark of their own, like honest plain-dealing men.' Malone tells us that John Shakspere had a mark of his own, and it 'nearly resembles a capital A, and was perhaps chosen in honour of the lady whom he had married.' He further says, 'Out of nineteen persons who signed a paper relative to one of their body who had been elected bailiff, ten of whom were aldermen, and the rest burgesses, seven only could write their names; and among the twelve marksmen is found John Shakspere.' The paper to which he refers is an order of a common-hall, dated September 27, 1564.

Malone talks as if John Shakspere's use of a mark was a common thing. There is not another example in the corporation-books in which the name of John Shakspere is attached to any order of a common-hall. Such orders were very rarely signed by members of the corporation who were present, but the entry to which the name of John Shakspere is affixed was a very special one. In this special order, then, of which a fac-simile is before us, there are *two* marks made *near* the name of *John Shacksper*, but not affixed to it, which nearly resemble a capital A. The first of these (which is in the first column of names, Shacksper's being in the second) follows the entry of the sign-manual of 'George Whetely, high-bailiff;' and twenty-five years afterwards, we find in the corporation books George Whetely still using precisely the same sign-manual. But there is another mark also *near* the name of John Shacksper. It is not much like an A, but is the exact representation of an open pair of compasses, such as carpenters and bookbinders use, having a quadrant upon which the leg moves. The mason or carpenter, no doubt, used this sign; as another of the corporation drew a very good gridiron. The compasses are *immediately opposite* the name of Thomas Dyxun, above whose mark stands the name of John Shakspere separated by a space large enough for the insertion of a third name. There are twelve marksmen, five of whom bear the name of *John*. All these Johns are written without doubt by the same pen—*Jhon;* but the *Jhon* of our poet's father has a marked difference: in the five the *h* is most distinctly separated from the following letter; in his it is as distinctly connected with it. There are two marksmen whose names begin with a capital S. The *s* beginning the name of Shacksper is entirely different—it cannot be called a capital, being the plain *long s*, the same that is found in the second syllable *sper*. These facts are to be weighed against Malone's assertion.



William Shakspere then, we think, had a mother who could read and a father who could write. They probably could do something more in the way of advancing the intelligence of their son. But, at any rate, when he became old enough, they would send their boy to the endowed grammar-school of the town in which they lived. He probably went there about 1571, when his father had become chief alderman of the town.

The free-school of Stratford was founded in the reign of Henry VI., and received a charter from Edward VI. It was open to all boys, natives of the borough; and, like all the grammar-schools of that age, was under the direction of men who, as graduates of the universities, were qualified to diffuse that sound scholarship which was once the boast of England. We have no *record* of Shakspere having been at this school; but there can be no rational doubt that he was educated there. His father could not have procured for him a better education anywhere. It is perfectly clear to those who have studied his works (without being influenced by prejudices, which have been most carefully cherished, implying that he had received a very narrow education) that they abound with evidences that he must have been solidly grounded in the learning, properly so called, which was taught in grammar-schools. As he did not adopt any one of the learned professions, he probably, like many others who have been forced into busy life, cultivated his early scholarship only so far as he found it practically useful, and had little leisure for unnecessary display. His mind was too large to make a display of anything. But what professed scholar has ever engrafted Latin words upon our vernacular English with more facility and correctness? And what scholar has ever shown a better comprehension of the spirit of antiquity than Shakspere in his Roman plays? The masters of the Stratford school, from 1572 to 1587, were Thomas Hunt and Thomas Jenkins. They are unknown to fame. They were, no doubt, humble and pious men, satisfied with the duties of life that were assigned to them. Hunt was the curate of a neighbouring village, Luddington. It is most probable that they did their duty to Shakspere. At any rate they did not spoil his marvellous intellect.

There are local associations connected with Stratford which could not be without their influence in the formation of Shakspere's mind. Within the range of such a boy's curiosity were the fine old historic towns of Warwick and Coventry, the sumptuous palace of Kenilworth, the grand monastic remains of Evesham. His own Avon abounded with spots of singular beauty, quiet hamlets, solitary woods. Nor was Stratford shut out from the general world, as many country towns are. It was a great highway; and dealers with every variety of merchandise resorted to its fairs. The eyes of Shakspere must always have been open for observation. When he was eleven years old Elizabeth made her celebrated progress to Lord Leicester's castle of Kenilworth; and there he might even have been a witness to some of the 'princely pleasures' of masques and mummeries which were the imperfect utterance of the early drama. At Coventry, too, the antient mysteries and pageants were still exhibited in the streets, the last sounds of those popular exhibitions which, dramatic in their form, were amongst the most tasteless and revolting appeals to the senses. More than all, the players sometimes even came to Stratford. What they played, and with what degree of excellence, we shall presently have occasion to mention.

A belief has obtained that William Shakspere's family, about his fourteenth year, became embarrassed in their circumstances, and subsequently fell into great poverty. The question is not uninteresting, looking at the probable influence of such a state of his father's circumstances upon the future destiny of the great poet. A passage in the poet's 'Life' by Rowe has led to the pains-takings by which this theory has been sought to be established:—'His father, who was a considerable dealer in wool, had so large a family, ten children in all, that, though he was his eldest son, he could give him no better education than his own employment. He had bred him, it is true, for some time at a free-school, where, it is probable, he acquired what Latin he was master of; but the narrowness of his circumstances, and the want of his assistance at home, forced his father to withdraw him from thence, and unhappily prevented his further proficiency in that language. It is without controversy that in his works we scarce find any traces of anything that looks like an imitation of the antients.' Rowe then goes on to assume that because he did not copy from the antients he had never read them; he has given us no facts to prove the narrowness of his father's circumstances. Malone however says there is 'abundant proof' that when our author was about fourteen years old his father was 'by no means in affluent or even easy circumstances.' This may be. He supplies however certain extracts from the Corporation and parochial books to show that John Shakspere was 'in distressed circumstances.' These are, we think, all capable of another interpretation. But there is one entry which would be decisive if it could be proved to apply to the poet's father. In 1586 a return is made into the Bailiff's Court, upon an action for debt, upon which distraint was ordered against John Shakspere; and the return sets forth that he has nothing upon which distress can be levied. This would indeed imply a breaking up of the family, a scattering of all their worldly goods. But Malone, who has taken very laudable pains to show that there was *another* John Shakspere in Stratford, a shoemaker, who married in 1584, and actually received a *loan out of a charity-fund* about that time, does not suggest the possibility that *this* might be the John Shakspere who had no goods to be taken in execution. The return in the Bailiff's Court does not designate the debtor by the alderman's received title of *master*, or *magister*. The rise however of our poet's father must have been as rapid as his fall—if he had fallen; for there is a memorandum affixed to the grant of arms in 1596—'he hath lands and tenements, of good wealth and substance, 500*l.*' Malone assumes that this is a fiction of the Heralds' Office. Why cannot we, who read the past thus darkly—who even know so little of the present—be content with what is obvious in private or public history?

Inquiries such as these would be worse than useless, unless they had some distinct bearing on the probable career of William Shakspere. Of the earlier part of that career nothing can, probably, ever be known with certainty. His father added to his independent means, we have no doubt, by combining several occupations in the principal one of looking after a little land; exactly in the way which Harrison has described. Shakspere's youth was, in all probability, one of very desultory employment, which afforded him leisure to make those extraordinary acquisitions of general knowledge which could scarcely have been made, or rather, the foundations of which could not have been established, during the active life which we believe he led from about his twentieth year. It is in this manner, we are inclined to think, that we must reconcile the contradictory traditions of his early employment. As his father, carrying on various occupations connected with his little property, might, after the lapse of years, have been a woolman in the imperfect recollection of some, and a butcher in that of others, so his illustrious son, having no very settled employment, may have been either reputed an assistant to his father, a lawyer's clerk, a schoolmaster, or a wild scapegrace, according to the imperfect chroniclers of a country-town, who, after he returned amongst them a rich man, would rejoice in gossiping over the wondrous doings of the boy. It is thus, we believe, that old Aubrey, having been amongst the parish-clerks and barbers of Stratford some fifty years after Shakspere was dead, tells us, 'from Mr. Beeston'—'though, as Ben Jonson says of him, that he had but little Latin and less Greek, he understood Latin pretty well, for he had been *in his younger years* a schoolmaster in the country.' His precocious gravity as a schoolmaster must have been as wonderful as his poetical power; for Aubrey also tells us, 'this William, being inclined naturally to poetry and acting, came to London, I guess about *eighteen*, and did act exceedingly well. . . . . . He began *early* to make essays at dramatic poetry, which at that time was very low, and his plays took well.' Here, we think, is a statement not very far from the truth,—a statement derived from Aubrey's London information. The stories of the butcher and the schoolmaster were Stratford traditions, perhaps also with some shadow of reality about them.

The earliest connected narrative of Shakspere's life, that of Rowe, thus briefly continues the history of the boy:—'Upon his leaving school he seems to have given entirely into that way of living which his father proposed to him; and in order to settle in the world after a family manner, he thought fit to marry while he was yet very young. His wife was the daughter of one Hathaway, said to have been a substantial yeoman in the neighbourhood of Stratford.' The information which Betterton thus collected as to Shakspere's early marriage was perfectly accurate. He did marry 'the daughter of one Hathaway,' and he was no doubt 'a substantial yeoman in the neighbourhood of Stratford.' At Shottery, a pretty village within a mile of the town, there is yet a farm-house, now divided into two tenements, where it is affirmed that Hathaway dwelt. By a copy of Court Roll, of the date of 1543, it appears that John Hathaway then held a copyhold estate at Shottery The identical farm-house or cottage, with its little garden and orchard, remained in the possession of the descendants of the Hathaways till 1838: it was then sold. William Shakspere was married to Anne Hathaway before the close of the year 1582. He was then eighteen years and a half old. This was indeed an early marriage. His wife was considerably older than himself. Her tombstone states that she died 'on the 6th day of August, 1623, being of the age of sixty-seven years.' In 1623 Shakspere would have been fifty-nine years old. The marriage bond and licence were discovered amongst the papers of the Consistorial Court at Worcester, in 1836: and were published, by Mr. Wheler of Stratford, in the 'Gentleman's Magazine.' The bondsmen are, Fulk Sandells, of Stratford, farmer, and John Richardson, of the same place, farmer, and they are held and bound in the sum of 40*l.*, &c. This bond is dated the 28th of November, in the 25th year of Elizabeth—that is, in 1582. The bondsmen subscribe their marks. The licence is affixed to the bond, and the remarkable part of this document is, that they were to be married 'with *once* asking of the bans;' they were not to be married 'without the consent' of Anne's friends. There is no record where they were married. In 1583 an entry of the baptism of 'Susanna, daughter to William Shakspere' is found in the Stratford register. The entry is the fourth of the month, the word *May* being attached to the first entry of the month. A comparison of the dates of the marriage licence and the baptism of Shakspere's first child leads to the obvious conclusion that the same fault into which the courtly Raleigh and the high-born Elizabeth Throgmorton had fallen had disturbed the peace of the humble family of the Hathaways, and had no doubt made the mother of the imprudent boy-poet weep bitter tears. But there was instant reparation—a reparation, too, that must have been the voluntary act of him who had committed the error. The troth-plight had no doubt preceded the legal marriage. There was however no public shame. William Shakspere was an inhabitant of Stratford, and his wife is denoted as such in the licence;—and there they dwelt when they were married;—and there their children were born;—and there they lived in their later years in opulence;—and there they died. We can see no useful purpose to be served in drawing inferences unfavourable to the general character of Shakspere's wife from the document which has been discovered, and especially in assuming that domestic unhappiness banished him from Stratford. Early in 1585 twin children were born to him,—and they were baptized on the 2nd of February as 'Hamnet and Judeth.'

The cause which *drove* Shakspere from Stratford is thus stated by Rowe:—'He had, by a misfortune common enough to young fellows, fallen into ill company, and, amongst them, some that made a frequent practice of deer-stealing engaged him more than once in robbing a park that belonged to Sir Thomas Lucy, of Charlecote, near Stratford. For this he was prosecuted by that gentleman, as he thought, somewhat too severely; and in order to revenge that ill usage he made a ballad upon him. And though this, probably the first essay of his poetry, be lost, yet it is said to have been so very bitter, that it redoubled the prosecution against him to that degree that he was obliged to leave his business and family in Warwickshire for some time, and shelter himself in London.' All this, amongst a great deal of falsehood, probably contained some tissue of the truth—such as the truth appeared to the good old folks of Stratford in Betterton's time, who had heard stories from their grandfathers of what a wild young fellow the rich man was who bought the largest house in Stratford. Malone gravely undertakes to get rid of the deer-stealing tradition, by telling us that there was no *park*, properly so called, at Charlecote. It is more material that the statute of the 5th of Elizabeth, which Malone also recites, shows clearly enough that the hunting, killing, or driving out deer from any park was a trespass punished at the most with three months' imprisonment and treble damages. Sir Thomas Lucy, who was on terms of intimacy with the respectable inhabitants of Stratford, acting as arbitrator in their disputes, was not very likely to have punished the son of an alderman of that town with any extraordinary severity, even if his deer had been taken away. To kill a buck was then an offence not quite so formidable as the shooting of a partridge in our own times. But we may judge of the value of the tradition from some papers, originally the manuscripts of Mr. Fulman, an antiquary of the seventeenth century, which, with additions of his own, were given to Corpus Christi College, Oxford, on the decease of the Rev Richard Davies, rector of Sandford, Oxfordshire, in 1707. The gossip of Stratford had no doubt travelled to the worthy rector's locality, and rare gossip it is:—'*He* (Shakspere) was much given to all unluckiness, in stealing venison *and rabbits*, particularly from Sir Lucy, *who had him* OFT *whipt*, and SOMETIMES *imprisoned*, and at last made him fly his native country, to his great advancement. But his revenge was so great that he is his Justice *Clodpate;* and calls him a great man, and that, in allusion to his name, bore three *lowses* rampant for his arms.' Is it necessary to do more than recite such legends to furnish the best answer to them?

Although John Shakspere, at the time of his son's early marriage, was not, as we think, 'in distressed circumstances,' his means were not such probably, at any time, as to have allowed him to have borne the charge of his son's family. That William Shakspere maintained them by some honourable course of industry we cannot doubt. Scrivener or schoolmaster, he was employed. It is on every account to be believed that the altered circumstances in which he had placed himself, in connection with the natural ambition which a young man, a husband and a father, would entertain, led him to London not very long after his marriage. There, it is said, the author of 'Venus and Adonis' obtained a subsistence after the following ingenious fashion:—'Many came on horseback to the play, and when Shakspere fled to London from the terror of a criminal prosecution, his first expedient was to wait at the door of the playhouse, and hold the horses of those who had no servants, that they might be ready again after the performance. In this office he became so conspicuous for his care and readiness, that in a short time every man as he alighted called for Will Shakspeare, and scarcely any other waiter was trusted with a horse while Will Shakspeare could be had.' Steevens objects to this surpassing anecdote of the horse-holding, that the practice of *riding* to the playhouse never began, and was never continued, and that Shakspere could not have held horses at the playhouse-door because people went thither by water. We believe there is a stronger objection still: until *Will Shakspere* converted the English drama from a rude, tasteless, semi-barbarous entertainment, into a high intellectual feast for men of education and refinement, those who kept horses did not go to the public theatres at all. There were representations in the private houses of the great, which men of some wit and scholarship wrote, with a most tiresome profusion of unmeaning words, pointless incidents, and vague characterization,—and these were called plays; and there were 'storial shows' in the public theatres, to which the coarsest melo-drama that is now exhibited at Bartholomew Fair would be as superior as Shakspere is superior to the highest among his contemporaries. But from 1580 to 1585, when Shakspere and Shakspere's boys are described as holding horses at the playhouse-door, it may be affirmed that the English *drama*, such as we now understand by the term, had to be created. We believe that Shakspere was in the most eminent degree its creator. He had, as we think, written his 'Venus and Adonis,' perhaps in a fragmentary shape, before he left Stratford. It was first printed in 1593, and is dedicated to Lord Southampton. The dedication is one of the few examples of Shakspere mentioning a word of himself or his works:—'I know not how I shall offend in dedicating my unpolished lines to your lordship, nor how the world will censure me for choosing so strong a prop to support so weak a burden; only if your honour seem but pleased, I account myself highly praised, and vow to take advantage of all idle hours till I have honoured you with some graver labour. But if the first heir of my invention prove deformed, I shall be sorry it had so noble a godfather, and never after ear so barren a land, for fear it yield me still so bad a harvest. I leave it to your honourable survey, and your honour to your heart's content, which I wish may always answer your own wish and the world's hopeful expectation.' The dedication is simple and manly. In 1593 then Shakspere had an employment—a recognised one—for he speaks of 'idle hours' to be devoted to poetry. He calls this poem too 'the first heir of my invention.' If it 'prove deformed,' he will never after ear (plough) so barren a land.' Will he give up writing for the stage then? It is a remarkable proof of the low reputation of the drama that even the dramatic works which Shakspere had unquestionably produced in 1593 were not here alluded to. The drama scarcely then aspired to the character of poetry. The 'some graver labour' which he contemplated was another *poem;* and he did produce another the next year, which he also dedicated to the same friend. This was the 'Rape of Lucrece.' Perhaps these poems were published to vindicate his reputation as a writer against the jealousies of some of the contemporary dramatists. But we still think that he used the term 'first heir of my invention' in its literal sense; and that 'Venus and Adonis'—or at least a sketch of it—was the first production of his imagination, his invention. It bears every mark of a youthful composition; it would have been more easily produced by the Shakspere of eighteen or twenty than any of his earliest dramas. He had models of such writing as the 'Venus and Adonis' before him. Chaucer he must have diligently studied; Spenser had published his 'Shepherd's Calendar,' his Hymns to Love and Beauty, and other poems, when Shakspere's genius was budding amidst his native fields. But when he wrote 'Henry VI.' or the first 'Hamlet,' where could he seek for models of dramatic blank verse, of natural dialogue, of strong and consistent character? He had to work without models; and this was the real 'graver labour' of his early manhood. It has been discovered by Mr. Collier that in 1589, when Shakspere was only twenty-five, he was a joint proprietor in the Blackfriars theatre, with a fourth of the other proprietors below him in the list. He had, at twenty-five, a standing in society; he had the means, without doubt, of maintaining his family; as he advanced in the proprietorship of the same theatre, he realized a fortune. How had he been principally occupied from the time he left Stratford, to have become somewhat rapidly a person of importance amongst his 'friends and fellows?' We think, by making himself useful to them, beyond all comparison with others, by his writings. It appears to us not improbable that even before Shakspere left Stratford, he had attempted some play or plays which had become known to the London players. Thomas Greene, who in 1586 was the fourth on the list of the Blackfriars shareholders, was said to be Shakspere's fellow townsman. But the young poet might have found another and more important friend in the Blackfriars company:—Richard Burbage, the great actor, who in his own day was called 'the English Roscius,' was also of Shakspere's county. In a letter of Lord Southampton to the Lord Chancellor Ellesmere (written about 1608), introducing Burbage and Shakspere to the chancellor, it is said:—'They are both of one county, and indeed almost of one town.' It is perfectly clear therefore that Shakspere, from the easy access that he might have procured to these men, would have received inviting offers to join them in London, provided he had manifested any ability which would be useful to them. That ability, we have no doubt, was manifested by the production of original plays (as well as by acting) some time before he had attained the rank and profit of a shareholder in the Blackfriars company.

The theory that Shakspere had not produced any of his dramas till several years after he was a shareholder in the Blackfriars theatre, is generally upheld by the assertion that he is not noticed by any contemporary writer till after the period usually assigned to the commencement of his career as a dramatic author; that is, about 1592. There is an allusion to 'Hamlet' by Nashe, in 1589; and the most reasonable belief is, that this was Shakspere's Hamlet—an earlier sketch than the early one which exists. We believe with Dryden and Rowe, that a remarkable passage in Spenser's 'Thalia' applies to Shakspere (*Store of Knowledge*, No. 2), and that poem was published in 1591. The application of these passages to Shakspere is strongly disputed by those who assign the first of his plays to 1593. In an age when there were no newspapers and no reviews, it must be extremely difficult to trace the course of any man, however eminent, by the notices of the writers of his times. An author's fame then was not borne through every quarter of the land in the very hour in which it was won. More than all, the reputation of a dramatic writer could scarcely be known, except to a resident in London, until his works were committed to the press. The first play of Shakspere's which was printed was 'The First Part of the Contention' ('Henry VI.,' Part II.), and that did not appear till 1594. Now Malone says, 'In Webbe's 'Discourse of English Poetry,' published in 1586, we meet with the name of most of the celebrated poets of that time; particularly those of George Whetstone and Anthony Munday, who were dramatic writers; but we find no trace of our author, or any of his works. But Malone does not tell us that in Webbe's 'Discourse of Poetry' we meet with the following passage —'I am humbly to desire pardon of the learned company of gentlemen scholars, and students of the universities and inns of court, if I omit their several commendations in this place, which I know a great number of them have worthily deserved, in many rare devices and singular inventions of poetry; for neither hath it been my good hap to have seen all which I have heard of, neither is my abiding in such place where I can with facility get knowledge of their works.' 'Three years afterwards,' continues Malone, Puttenham printed his 'Art of English Poesy;' and in that work also we look in vain for the name of Shakspere.' The book speaks of the one-and-thirty years' space of Elizabeth's reign; and thus puts the date of the writing a year earlier than the printing. But we here look in vain for some other illustrious names besides those of Shakspere. Malone has not told us that not one of Shakspere's early dramatic contemporaries is mentioned—neither Marlowe, nor Greene, nor Peele, nor Kyd, nor Lyly. The author evidently derives his knowledge of 'poets and poesy' from a much earlier period than that in which he publishes. He does not mention Spenser by *name*, but he does 'that other gentleman who wrote the late 'Shepherd's Calendar.' The 'Shepherd's Calendar' of Spenser was published in the year 1579. Malone goes on to argue that the omission of Shakspere's name, or any other notice of his works, in Sir John Harrington's 'Apology of Poetry,' printed in 1591, in which he takes occasion to speak of the theatre, and mentions some of the celebrated dramas of that time,' is a proof that none of Shakspere's dramatic compositions had then appeared. Does he mention 'Tamburlaine,' or 'Faustus,' or 'The Massacre of Paris,' or 'The Jew of Malta'? As he does not, it may be assumed with equal justice that none of Marlowe's compositions had appeared in 1591; and yet we know that he died in 1593. So of Lyly's 'Galathea,' 'Alexander and Campaspe,' 'Endymion,' &c. So of Greene's 'Orlando Furioso,' 'Friar Bacon,' 'James IV.' So of the 'Spanish Tragedy' of Kyd. The truth is, that Harrington, in his notice of celebrated dramas was even more antiquated than Puttenham; and his evidence therefore in this matter is utterly worthless. But Malone has given his crowning proof that Shakspere had not written before 1591, in the following words:—'Sir Philip Sidney, in his 'Defence of Poesie,' speaks at some length of the low state of dramatic literature at the time he composed his treatise, but has not the slightest allusion to Shakspere, whose plays, had they then appeared, would doubtless have rescued the English stage from the contempt which is thrown upon it by the accomplished writer; and to which it was justly exposed by the wretched compositions of those who preceded our poet. 'The Defence of Poesie' was not published till 1595, but must have been written some years before.' There is one slight objection to this argument: Sir Philip Sidney was killed at the battle of Zutphen, in the year 1586; and it would really have been somewhat surprising if the illustrious author of the 'Defence of Poesy' could have included Shakspere in his account 'of the low state of dramatic literature at the time he composed this treatise.'

If the instances of the mention of Shakspere by his contemporaries during his lifetime be not numerous, we are compensated by the fulness and explicitness of one notice —that of Francis Meres, in 1598. Short as his notice is, it is by far the most valuable contribution which we possess towards the 'Life' of Shakspere. Meres was a master of arts of Cambridge, and subsequently entered the church. In 1558 he published a book called '*Palladis Tamia*, Wit's Treasury.' It is a collection of moral sentences from antient writers, and it is described by Anthony Wood as 'a noted school-book.' Prefixed to it is 'A Comparative Discourse of our English Poets.' Nothing can be more decisive than this 'Comparative Discourse' as to the rank which, in 1598, Shakspere had taken amongst the most eminent of his contemporaries.

'As the Greek tongue is made famous and eloquent by Homer, Hesiod, Euripides, Æschylus, Sophocles, Pindarus, Phocylides, and Aristophanes; and the Latin tongue by Virgil, Ovid, Horace, Silius Italicus, Lucanus, Lucretius, Ausonius, and Claudianus; so the English tongue is mightily enriched, and gorgeously invested in rare ornaments and resplendent habiliments, by Sir Philip Sidney, Spenser, Daniel, Drayton, Warner, Shakespeare, Marlow, and Chapman.

'As the soul of Euphorbus was thought to live in Pythagoras, so the sweet witty soul of Ovid lives in mellifluous and honey-tongued Shakespeare; witness his 'Venus and Adonis,' his 'Lucrece,' his sugared sonnets among his private friends, &c.

'As Plautus and Seneca are accounted the best for comedy and tragedy among the Latins, so Shakespeare, among the English, is the most excellent in both kinds for the stage; for comedy, witness his "Gentlemen of Verona," his "Errors," his "Love Labours Lost," his "Love Labours Won," his "Midsummer's Night Dream," and his "Merchant of Venice;" for tragedy, his "Richard II." "Richard III.," "Henry IV.," "King John," "Titus Andronicus," and his "Romeo and Juliet."

'As Epius Stolo said that the Muses would speak with Plautus's tongue, if they would speak Latin; so I say that the Muses would speak with Shakespeare's fine filed phrase if they would speak English'

The list of Shakspere's plays which Meres gives in 1598 can scarcely be supposed to be a complete one. Previous to 1598 there had been only *printed* the two Parts of the 'Contention' (now known as the 'Second and Third Parts of Henry VI.') 'Richard III.,' 'Richard II.,' and 'Romeo and Juliet.' Of the six comedies mentioned by Meres, not one had been published; neither had 'Henry IV.,' 'King John,' nor 'Titus Andronicus;' but, in 1597, 'Love's Labour's Lost,' and the 'First Part of Henry IV.,' had been entered in Stationers' Hall. Without the list of Meres therefore we could not have absolutely shown that the 'Two Gentlemen of Verona,' the 'Comedy of Errors,' the 'All's Well that Ends Well' (which we have every reason to think was designated as 'Love Labours Won') the 'Midsummer Night's Dream,' the 'Merchant of Venice,' the 'King John,' and the 'Titus Andronicus,' were written and produced before 1598. The list of Meres omits the original 'Hamlet' and the 'Taming of the Shrew,' which we may believe were produced before 1598; but, looking at Meres' list alone, how gloriously had Shakspere earned that reputation which he had thus acquired in 1598! He was then thirty-four years of age, but he had produced all his great historical plays, with the exception of 'Henry V.' and 'Henry VIII.' He had given us 'Romeo and Juliet,' and had even 'corrected and augmented' it; the stage was in possession, and the fame acknowledged, of six of his most delicious comedies. Before the close of that century we have little doubt that he had also produced 'Henry V.,' 'The Merry Wives of Windsor,' and 'Much Ado about Nothing.'

Of the plays thus produced before the close of the sixteenth century, we would assign several (not fewer than nine, including the doubtful plays) to the period from Shakspere's early manhood to 1591. Some of those dramas may possibly then have been created in an imperfect state, very different from that in which we have received them. If the 'Titus Andronicus' and 'Pericles' are Shakspere's, they belong to this epoch in their first state, whatever it might have been. We have no doubt that the three plays, in their original form, which we now call the three Parts of 'Henry VI.,' were his; and they also belong to this epoch. That 'Hamlet,' in a very imperfect state, probably more imperfect even than the sketch in the possession of the duke of Devonshire, is the play alluded to by Nashe in 1589, we have little doubt. In the duke of Devonshire's copy, dated 1602, there are passages, afterwards omitted, which decidedly refer to an early state of the stage. Amongst the comedies, 'The Two Gentlemen of Verona,' 'Love's Labour's Lost,' 'The Comedy of Errors,' and 'The Taming of the Shrew,' contain very strong external evidence, especially in the structure of their versification, that they belong to the poet's earliest period. When the time arrived that he had fully dedicated himself to the great work of his life, he rarely ventured upon cultivating the offshoots of his early versification. The doggerel was entirely rejected—the alternate rhymes no longer tempted him by their music to introduce a measure which is scarcely akin with the dramatic spirit—the couplet was adopted more and more sparingly—and he finally adheres to the blank verse which he may almost be said to have created—in his hands certainly the grandest as well the sweetest form in which the highest thoughts were ever unfolded to listening humanity. We have only one drama to add to this cycle, and that, we believe, was 'Romeo and Juliet' in its original form.

The 'Midsummer Night's Dream' may be taken, we apprehend, as a connecting link between the dramas which belong to the first cycle and those which may be assigned to the remaining years of the sixteenth century.

We have little difficulty in determining the plays which belong to Shakspere's *middle* period. The list of Meres, and the dates of the original editions of those plays, are our best guides. The exact years in which they first appeared can only be determined in one or two cases; and it is of little consequence if they could be determined. The earliest of the historical plays of this cycle were those which completed the great story of the wars of the Roses. 'Richard III.' naturally terminated the eventful history of the house of York; 'Richard II.' commenced the more magnificent exhibition of the fortunes of the house of Lancaster. Both these plays were printed in 1597. The two great historical plays of 'Henry IV.' which succeeded them were, no doubt, produced before 1599. 'Henry V.' undoubtedly belongs to that year; and this great song of national triumph grew out of the earlier history of the 'mad-cap Prince of Wales.' The three latter histories are most remarkable for the exhibition of the greatest comic power that the world has ever seen. When the genius of Shakspere produced Falstaff, its most distinguishing characteristics, his wit and humour, had attained their extremest perfection. There is much of the same high comedy in 'King John.' This was the period which also produced those comic dramas which are most distinguished for their brilliancy of dialogue—the 'fine filed phrase' which Meres describes—'The Merry Wives of Windsor,' 'Much Ado about Nothing,' and 'Twelfth Night.' The 'Merchant of Venice,' and 'All's Well that Ends Well,' belong to the more romantic class. The 'Twelfth Night' was originally thought to have been one of Shakspere's latest plays; but it is now proved, beyond a doubt, that it was acted in the Middle Temple Hall in the Christmas of 1601.

The close of the sixteenth century brings us to Shakspere's thirty-fifth year. He had then been about fifteen years in London. We are not willing to believe that his whole time was passed in the capital. It is not necessary to believe it; for the evidence, such as it is, partly gossip and partly documentary, makes for the contrary opinion. Aubrey tells us 'the humour of the constable in 'A Midsummer Night's Dream' he happened to take at Grendon in Bucks, which is the road from London to Stratford, and there was living that constable about 1642, when I first came to Oxon.' The honest antiquary makes a slight mistake here. There is no constable in 'A Midsummer Night's Dream;' but he probably refers to the ever-famous Dogberry or Verges. In the same paper Aubrey says, 'he was wont to go to his native country once a year.'

But we have more trustworthy evidence than that of John Aubrey for believing that Shakspere, however indispensable a protracted residence in London might be to his interests and those of his family, never cast aside the link which bound him to his native town. In 1596 his only son died, and in Stratford he was buried. The parochial register gives us the melancholy record of this loss. This event, afflicting as it must have been, did not render the great poet's native town less dear to him. There his father and mother, there his wife and daughters, there his sister still lived. In 1597 he purchased the principal house in Stratford. It was built by Sir Hugh Clopton, in the reign of Henry VII., and was devised by him under the name of *the great house*. Dugdale describes it as 'a fair house built of brick and timber.' It appears to have been sold out of the Clopton family before it was purchased by Shakspere. In the poet's will it is described as 'all that capital messuage or tenement, with the appurtenances, in Stratford aforesaid, called the New Place.' The London residence of Shakspere at this period is stated to have been in Southwark, near the Bear Garden. It is now incontestably proved that in the year previous to 1596 Shakspere held a much more important rank as a sharer in the Blackfriars Theatre than in 1589; and that the Globe Theatre also belonged to the body of proprietors of which he was one. A petition to the privy council, presented in 1596, was found in the State Paper Office a few years ago, in which the names of the petitioners stand as follows:—

'The humble petition of Thomas Pope, Richard Burbage, John Hemmings, Augustine Phillips, William Shakespeare, William Kempe, William Sly, Nicholas Tooley, and others, servants to the Right Honourable the Lord Chamberlain to her Majesty.'

There is a tradition that the valuable estate of New Place was purchased by Shakspere through the munificent assistance of Lord Southampton. It is pleasant to believe such a tradition; but it is not necessary to account for Shakspere's property in the theatres, or even for his purchase of New Place at Stratford, that we should imagine that some extraordinary prodigality of bounty had been lavished on him. He obtained his property in the theatre by his honest labours, steadily exerted, though with unequalled facility, from his earliest manhood. The profits which he received not only enabled him to maintain his family, but to create an estate; and his was not a solitary case. Edward Alleyn, who was a contemporary of Shakspere, a player and a theatrical proprietor, realized a fortune; and he founded Dulwich College.

It has been held, especially by the German critics, that the Sonnets of Shakspere have not been sufficiently regarded as a store of materials for his biography; and it has been very ingeniously attempted by a recent writer, Mr. Brown, to show that the whole of these, with a few slight exceptions, are to be taken as a continuous poem or poems. He calls them Shakspere's 'Autobiographical Poems.' But we would ask, can these one hundred and fifty-four Sonnets be received as a continuous poem upon any other principle than that the author had written them continuously? If there are some parts which are acknowledged interpolations, may there not be other parts that are open to the same belief? If there are parts entirely different in their tone from the bulk of these Sonnets, may we not consider that one portion was meant to be artificial and another real,—that the poet sometimes spoke in an assumed character, sometimes in a natural one? This theory we know could not hold if the poet had himself arranged the sequence of these verses; but as it is manifest that two stanzas have been introduced from a poem printed ten years earlier—that others are acknowledged to be out of order—and others positively dragged in without the slightest connection—may we not carry the separation still further, and believing that the 'begetter' (by which name some W. H. is honoured by the bookseller in a dedication)—the *getter-up*—of these Sonnets had levied contributions upon all Shakspere's 'private friends'—assume that he was indifferent to any arrangement which might make each portion of the poem tell its own history? We do not therefore take up these poems to 'seize a clue which innumerable passages give us, and suppose that they allude to a youth of high rank as well personal beauty and accomplishment, in whose favour and intimacy, according to the base prejudices of the world, a player and a poet, though he were the author of 'Macbeth,' might be thought honoured;' and we do not feel 'the strangeness of Shakspeare's humiliation in addressing him as a being before whose feet he crouched—whose frown he feared—whose injuries, and those of the most insulting kind, he felt and bewailed without resenting.' (Hallam's *Hist. of Europe.*)

The view which we take of the probable admixture of the artificial and the real in the Sonnets, arising from their supposed original fragmentary state, necessarily leads to the belief that some are accurate illustrations of the poet's situation and feelings. It is collected from these Sonnets, for example, that his profession as a player was disagreeable to him; and this complaint, be it observed, might be addressed to any one of his family, or some honoured friend, such as Lord Southampton, as well as to the principal object of so many of those lyrics which contain a 'leading idea, with variations:'—

'O, for my sake do you with Fortune chid
The guilty goddess of my harmful deeds,
That did not better for my life provide
Than public means, which public manners breeds.
Thence comes it that my name receives a brand,
And almost thence my nature is subdued
To what it works in, like the dyer's hand.'

But if from his professional occupation his nature was felt by him to be subdued to what it worked in,—if thence his name received a brand,—if vulgar scandal sometimes assailed him,—he had high thoughts to console him, such as were never before imparted to mortal. This was probably written in some period of dejection, when his heart was ill at ease, and he looked upon the world with a slight tinge of indifference, if not of dislike. Every man of high genius has felt something of this. It was reserved for the highest to throw it off, 'like dew-drops from the lion's mane.' After a very full consideration of Shakspere's *dramatic* works, we are come to the conclusion that he possessed, above all other men, so complete a mastery over the tendency to colour general representations of life and character with personal views and circumstances, that he invariably went out of himself,—that he saw nothing through his own individual feelings,—and that thus none of his portraits are alike, because none are personifications of his own nature—his own life—his own self-consciousness. If there are some portions of his Sonnets which are conceived in an entirely different spirit, we think they are not very numerous, and must be received as evidences of personal character, habits, and feelings with great scrupulousness.

Shakspere during the last year or two of the sixteenth century, and the opening years of the seventeenth, was for the most part in London. In 1598 we find his townsman, Richard Quiney, writing him a letter, requesting the loan of thirty pounds. Mr. Alderman Sturley, with reference to some public business of that period, not only says in a letter that 'our countryman, Mr. William Shakspere, would procure us money,' but speaks 'of the friends *he* can make.' Such notices are decisive as to the position Shakspere then held in the estimation of the world. In 1601 his father died; and his burial is registered at Stratford. He appears then to have had three brothers living,—Gilbert, Richard, and Edmund. Gilbert, the next to himself, resided at Stratford, and probably managed William's affairs there while he was in London; for in 1602, when the prosperous poet bought a considerable quantity of land near Stratford, of William and John Combe (107 acres), the counterpart of the conveyance (which we have seen) contains an acknowledgment of possession being given to Gilbert Shakspere, to the use of William. It is probable that Gilbert died before William; for no mention is made of him in the poet's will. The younger son of the family, Edmund, born in 1580, followed the fortunes of his illustrious brother. It was probably intended that he should succeed him in his proprietorship of the theatres; but the register of the burials of St. Mary Overies, in Southwark, closes his history in 1607: 'Edmund Shakspere, player, in the church.' Richard Shakspere died in 1613.

In 1603 James I. ascended the throne of England. Lord Southampton, who had so imprudently participated in the conspiracy of Essex, was a favourite of the new king; and one almost of the first acts of the reign was a grant of a patent to the proprietors of the Blackfriars and Globe Theatres. In this patent the name of Shakspere stands the second; the names mentioned being 'Lawrence Fletcher, William Shakspere, Richard Burbage, Augustine Phillips, John Hemmings, Henry Condell, William Sly, Robert Armyn, Richard Cowley.'

It would appear that at this period Shakspere was desirous of retiring from the more laborious duties of his profession as an actor. He desired to be appointed, there is little doubt, to the office of Master of the Queen's Revels. Daniel, a brother poet, was appointed; and in a letter to the Lord Keeper, Sir Thomas Egerton, he thus speaks of one of the competitors for the office:—'It seemeth to my humble judgment that one who is the author of plays now daily presented on the public stages of London, and the possessor of no small gains, and moreover himself an actor in the King's company of comedians, could not with reason pretend to be master of the Queen's Majesty's revels, forasmuch as he would sometimes be asked to approve and allow of his own writings.'

But Shakspere continued to hold his property in the theatre. In 1608 the Corporation of London again attempted to interfere with the actors of the Blackfriars; and there being little chance of ejecting them despotically, a negociation was set on foot for the purchase of their property. A document found by Mr. Collier amongst the Egerton papers at once determines Shakspere's position in regard to his theatrical proprietorship. It is a valuation, containing the following item:—

'Item. W. Shakespeare asketh for the wardrobe
and properties of the same playhouse 500*l.*,
and for his four shares, the same as his fellows
Burbidge and Fletcher, viz. 933*l.* 6*s.* 8*d.* . 1433 6 8'

With this document was found another—unquestionably the most interesting paper ever published relating to Shakspere: it is a letter from Lord Southampton to Lord Ellesmere, the lord chancellor; and it contains the following passage:—

'These bearers are two of the chief of the company; one of them by name Richard Burbidge, who humbly sueth for your Lordship's kind help, for that he is a man famous as our English Roscius, one who fitteth the action to the word and the word to the action most admirably. By the exercise of his quality, industry, and good behaviour, he hath become possessed of the Black Friars playhouse, which hath been employed for plays since it was built by his father, now near fifty years ago. The other is a man no whit less deserving favour, and my especial friend, till of late an actor of good account in the company, now a sharer in the same, and writer of some of our best English plays, which, as your Lordship knoweth, were most singularly liked of Queen Elizabeth, when the company was called upon to perform before her Majesty at court, at Christmas and Shrovetide. His most gracious Majesty King James also, since his coming to the crown, hath extended his royal favour to the company in divers ways and at sundry times. This other hath to name William Shakespeare, and they are both of one county, and indeed almost of one town: both are right famous in their qualities, though it longeth not to your Lordship's gravity and wisdom to resort unto the places where they are wont to delight the public ear. Their trust and suit now is, not to be molested in their way of life whereby they maintain themselves and their wives and families (being both married and of good reputation), as well as the widows and orphans of some of their dead fellows.'

The mode in which Southampton speaks of Shakspere is most noble; it is almost more than could have been expected from a courtier addressing a minister of state. Whatever Southampton might feel towards Shakspere in private, it was something like a breaking down of aristocratic distinctions thus to write of a 'poor player:'—'The other is a man no whit less deserving favour, and *my especial friend.*' Who can doubt the estimation in which Shakspere must have been held by all men when his personal character, as well as his surpassing genius, had thus broken down the observance of the distinctions which in those days were most rigidly clung to? We learn from this letter that in 1608 Shakspere had ceased to be an actor; but he was still a sharer in the company.

We may now suppose that the great poet, thus honoured and esteemed, had retired to Stratford, retaining a property in the theatre—regularly writing for it. There is an opinion that he ceased to act after 1603. In that year his name is found amongst the performers of one of Ben Jonson's plays. But the years from 1604 to his death, in the April of 1616, were not idly spent. He was a practical farmer, we have little doubt. In 1605 he bought a moiety of the tithes of Stratford, which he would then probably collect in kind. He occupied the best house of the place; he had there his 'curious knotted garden' to amuse him; and his orchard had many a pippin of his 'own graffing.' James I. recommended the cultivation of mulberry-trees in England; and who has not heard of Shakspere's mulberry-tree? Vulgar tradition at this time represents him as writing a bitter epitaph upon his friend and neighbour John Combe, as he had satirised Sir Thomas Lucy. He was doing something better. To the first half of the period between 1604 and his death may be assigned—'Lear,' 'Macbeth,' 'Cymbeline,' 'The Winter's Tale,' and 'The Tempest.' The very recital of the names of these glorious works, associated as they are with that quiet country town, its beautiful Avon, its meadows, and its woodlands, is enough to make Stratford a name dear and venerable in every age. But there are others to be added to the wondrous list; and these probably belong to the latter half of the period:—'Troilus and Cressida,' 'Henry VIII.,' 'Coriolanus,' 'Julius Cæsar,' 'Antony and Cleopatra.' The direction of Shakspere's mind to Roman subjects, in his closing period, and the marvellous accuracy, the real substantial learning, with which he has treated them, would lead us to believe that he had renewed the studies of his boyhood in the last years of his retirement. Alfieri learned Greek after he was fifty. It is our opinion that Shakspere continued to write till he was removed by death; and that the Roman plays were the beginning of a series. Who will finish that series?

In 1607 Susanna, the eldest daughter of Shakspere, married a physician resident at Stratford—a man of high professional eminence—Dr. Hall. In 1608 his grand-daughter Elizabeth was born. To this child he bequeathed a sum of money, and all his plate, 'except my broad silver and gilt bowl.' Shakspere was a grandfather at forty-three. In 1608 his mother died—the mother, doubtless, of his ardent love. There is a curious record of Shakspere's later years, which was recently discovered in the library of the Medical Society of London, contained in the 'Diary of the Rev John Ward, Vicar of Stratford-upon-Avon.' The Diary extends from 1648 to 1679; and it contains the following very characteristic entry:—

'I have heard that Mr. Shakspeare was a natural wit, without any art at all; he frequented the plays all his younger time, but in his elder days lived at Stratford, and supplied the stage with two plays every year: and for it had an allowance so large, that he spent at the rate of 1000*l.* a year, as I have heard.

'Shakspeare, Drayton, and Ben Jonson had a merry meeting; and, it seems, drank too hard, for Shakspeare died of a fever there contracted.'

Shakspere's annual expenditure, and the merry meeting, and the hard drinking, are probably exaggerations. They however show that our opinion that Shakspere continued to write for the stage after he had ceased to be an actor has some foundation; and that his residence in comfort and affluence at Stratford did not necessarily imply an abandonment of all his former pursuits. 'Henry VIII.,' upon every rational construction of evidence, was produced at the Globe theatre in 1613, and was then a new play.

We approach the end. Shakspere, according to the register of Stratford, was buried on the 25th of April, 1616.

He survived the marriage of his daughter Judith to Thomas Quiney only two months, and he made his will probably upon the occasion of that marriage. It is dated the 25th of March, but in the document *February* was first written, and afterwards struck out. By this will, which is long, he gives his real estates to his eldest daughter. According to the received interpretation of his will, Shakspere treats his wife with neglect and 'bitter sarcasm,' for which estranged affections would have been no warranty; and consigns her, with a solemn avowal of contempt and hatred, to a miserable dependence, not even recommended or implied, upon the bounty of their common children. According to the dictum of Malone, who first dragged this part of his will into notice sixty years ago, 'His wife had not wholly escaped his memory; he had forgot her,—he had recollected her,—but so recollected her as more strongly to mark how little he esteemed her; he had already (as it is vulgarly expressed) *cut her off, not indeed with a shilling, but with an old bed.*' It was the object of Shakspere by this will to perpetuate *a family estate.* In doing so did he neglect the duty and affection which he owed to his wife? He did not. His estates, with the exception of a copyhold tenement, expressly mentioned in his will, were *freehold.* His wife was entitled to *dower.* She was provided for amply, *by the clear and undeniable operation of the English law.*

SHALE. Any argillaceous deposit, naturally divided into laminæ parallel to the plane of deposition, is rightly so called by geologists. These are sandy, calcareous, purely argillaceous, and carbonaceous shales. Geologists sometimes, very inconveniently, call fine-grained very laminated shales by the title of Slates. A synonym in the north of England mining-districts is Plate.

SHALLOTT. [Allium.]

SHAMOU'L, or SAMOU'L, called by Abul Faraj ('Hist. Dynast.,' p, 408) *Samoúl Ben Yehoúda al-Magrebí al-Andalousí*; by Ibn Abi Osaibia (*Oioún al-Ambá fi Tabacát al-Atebbá*, 'Fontes Relationum de Classibus Medicorum,' cap. xi., § 18) *Samoúl Ben Yahia Ben Abbás al-Magrebí*; and by the anonymous author of the 'Arab. Philosoph. Biblioth.' (quoted by Casiri, 'Biblioth. Arabico-Hisp. Escur.,' tom. i., p. 440) *Shamoúl Ben Yehoúdá al-Andalousí*, an eminent Jewish physician, who (as his name implies) was born in Spain, and was descended from an African family. He came with his father (who was also a great philosopher) to Azerbíján, and settled himself at Marágha, a place afterwards famous in oriental geography for the observatory of the celebrated astronomer Nasireddín (born A.H. 598, A.D. 1200; died A.H. 673, A.D. 1273). He particularly studied astronomy, geometry, mathematics, and medicine, and wrote several works on those sciences, of which one exists in MS. in the Bodleian Library at Oxford (Uri, *Catal.*, p. 209; Nicoll and Pusey, *Catal.*, p. 603). He was for some time attached to the service of the Pehlewanides, an Atabek dynasty of Azerbíján, founded by Ildeghiz about the middle of the sixth century after the Hejra, or the twelfth of our æra (see De Guignes, 'Hist. des Huns,' &c., liv. 13, tom. ii. p. 247). He embraced the religion of Mohammed, and wrote a work against the Jews, in which he accused them of having interpolated the Mosaic Scriptures. His children belonged also to the medical profession. He died at an advanced age at Marágha, according to Abul Faraj and the anonymous author quoted above, about A.H. 570 (A.D. 1174-5); according to Hajji Khalfa (and more probably), A.H. 598 (A.D. 1201-2).

SHANFARAH, an Arabian poet, who lived before Mohammed. He was a very swift runner, and his name became proverbial in Arabia. Having sworn vengeance against the family of another Arab called Salman, he surprised and killed many of its members, but was at last taken himself and put to death. A beautiful poem of Shanfarah is extant, which is entitled 'Lamiyatu-l-arab.' It has been translated by De Sacy, and published in his 'Chrestomathie Arabe' (Paris, 1806), with excellent remarks. It is one of the oldest poems extant in Arabic. *Lamiyat* means any poem rhyming in the letter *lam;* and it was called *Lamiyat* of the Arab, to distinguish it from a later poem by Toghrai, a Persian poet who wrote another poem, which bears the title 'Lamiyatu-l-ajem,' or that of the Persian.

SHANG-HAE, a sea-port in China, situated near 31° N. lat. and 121° E. long., is built on the left bank of the river Woo-sung, which is properly only the channel by which the waters of the Lake Tahoo or Taï (the Great Lake) are discharged into the sea. Though the course of the river probably does not exceed fifty miles, it brings down a great volume of water, and is very deep. Opposite the town of Shang-hae, which is about ten miles from its mouth, the depth in the middle of the stream varies from six to eight fathoms, so that the largest vessels can come up to the harbour, and unload alongside of the commodious wharfs and large warehouses which occupy the banks of the river. At this place the river is nearly half a mile wide.

The town is very large. The streets are narrow, and many of them are paved with small tiles, similar to Dutch clinkers, which make a more agreeable footing than the slippery granite with which other towns in China are paved. The shops in the city are generally small, but wares of all descriptions are exhibited for sale; many of them contain European goods, especially woollens. Du Halde, in his 'Description of China,' says, that in this town and its neighbourhood 200,000 weavers are occupied in making plain cottons and muslins; and Lindsay adds, that the nankeen cloth from Shang-hae is said to be the best in the empire.

This is all that we know of a place which is the principal emporium of Eastern Asia, and whose commerce is as active as that of any other place on the globe, not even London excepted. It is certainly a very remarkable circumstance that such a commercial town has only once been visited by a European vessel, and that not before 1832, when the Amherst, under the command of Capt. Lindsay, entered the Woo-sung river. It is only from Capt. Lindsay's statement that we know anything of the great commerce of this place. He says,—'On our arrival at Woosung (a small town only a mile above the mouth of the river of that name), I was so struck with the vast quantity of junks entering the river, that I caused them to be counted for several successive days. The result was, that in seven days upwards of 400 junks, varying in size from 100 to 400 tons, passed Woo-sung, and proceeded to Shang-hae. During the first part of our stay, most of these vessels were the north-country junks with four masts, from Teen-tsin (Thian-tsin on the Peïho) and various parts of Manchow Tartary, flour and peas from which place formed a great part of their cargo. But during the latter part of our stay, the Fokien (Fukain) junks began to pour in to the number of 30 or 40 per day. Many of these were from Formosa, Canton, the Eastern Archipelago, Cochin-China, and Siam.' Now if we suppose that the commerce of Shang-hae is as active the whole year round as Capt. Lindsay found it to be in the month of July, we come to the conclusion that this port is annually visited by shipping to the amount of 5,000,000 tons. In 1838 the shipping that entered the port of London did not quite amount to 4,000,000 tons; namely, 1,061,923 tons employed in the foreign trade, and 2,908,176 tons in the coasting trade. [LONDON, vol. xiv., p. 128.] But as Capt. Lindsay observes that the winters in these parts are rather severe, and that the snow sometimes lies several feet deep for more than a month, we may suppose that the navigation of the Woosung is annually interrupted for four or six weeks, and thus the commerce of Shang-hae would be reduced nearly to a level with that of London. But though the commerce of Shang-hae is perhaps more active than that of the British metropolis, its sphere is much more limited, as the most remote countries with which it is connected towards the south are Siam and the Sooloo Archipelago, towards the east Japan, and towards the north the province of Leaotong and Mandshooria, whilst London receives merchandise from all the world.

It certainly excites some surprise to find that so active a commerce is carried on in a place which has hardly any commercial relation with foreign countries. But our surprise will cease if we consider that there is no harbour on the Chinese coast between 30° and 35° N. lat., or between the bay of Ningpo on the south, and the peninsula of Shantung on the north. On this tract of coast the two largest rivers of China, the Yellow River and the Yant-se-kiang, enter the sea, and they bring great quantities of earthy matter, which they deposit along the coast, and thus render the whole tract inaccessible to boats beyond the size of a fishing-barge. The Woo-sung is the first river south of the Yant-se-kiang which is deep enough for the purposes of navigation, and hence the whole maritime commerce of this tract is concentrated at Shang-hae. The country which lies at the back of the coast is the most populous part of China, and contains many very large towns, among which those of Soo-tsheou-foo and Hang-tsheou-foo probably contain a million of inhabitants each, and there are others which may vary between 100,000 and 500,000, among which is the antient capital of China, Nankin. [NANKIN.] According to the Chinese census, the country between 30° and 35° N. lat., extending from the sea about 200 miles inland, and comprehending the antient province of Ki-an-gnan, or the present provinces of Ngan-hoë and Keang-soo, contains, on a surface not exceeding 70,000 square miles, a population of more than 40,000,000, or about 600 inhabitants to each square mile. Such a population cannot subsist on the produce of the soil even in the high state of agriculture by which this region is distinguished above all other parts of China. A considerable supply of provisions must be required every year. Such an inference must also be drawn from what is stated by Capt. Lindsay, namely, that the northern country vessels bring chiefly corn and peas; and though he does not mention the cargoes of the Fu-kian vessels, which come from the Eastern Archipelago, Cochin-China, and Siam, it is a known fact that the principal article of export from these countries to China is rice. The immense quantity of grain which is carried into the port of Shang-hae is probably not consumed in that town and the neighbourhood; but a part of it reaches the centre and even the western districts of China Proper, by being conveyed on the numerous canals which are connected with the Imperial canal or Yoon-ho and the two great rivers above mentioned. The exports probably consist of manufactured goods, and the inhabitants pay for the food which they obtain from other countries by supplying their inhabitants with cotton, silk, and linen fabrics.

The islands of Cheusan are situated about 60 or 70 miles to the south-east of Shang-hae. These islands were taken possession of by the British in July, 1840. On the news of this event consternation spread to Peking. The Chinese government came forward with proposals, and seemed extremely anxious to terminate the war by peace on any terms, provided the islands of Cheusan were restored. This readiness on the part of the Chinese was certainly not in accordance with their former policy, and the obvious conclusion was that they were alarmed at the progress of the British arms Now however it is said that the Chinese have resumed their former behaviour; they have retracted their proposals; they have resisted the most moderate demands, and are prepared to repel force by force. What has produced this change? The islands of Cheusan have been abandoned, it is stated, on account of their unhealthiness. It is evident that the Chinese government feared lest the British should retain these islands and fortify them against all attacks. In possession of these islands a few vessels of war and steamboats would have been sufficient to prevent any supply of grain into Shang-hae, and thus the English would have had it in their power to starve the great population which depends annually on these supplies.

(Lindsay's 'Voyage of the vessel Amherst along the

Coast of China,' in *Parliamentary Report*, 1831; Du Halde's *History of China*; Staunton's *Account of an Embassy from the King of England*; &c.)

SHANNON, not only one of the largest rivers in Ireland, but likewise in the British empire. It runs for 220 miles from its source to the sea, and affords a navigable, though at present imperfect line of communication, which nearly intersects Ireland from north to south. It rises within eighteen miles of Sligo, and expanding at intervals into lakes, falls into the sea between the Loop and Kerry heads, fifty-six miles below Limerick. The Shannon is the outlet for the waters of an immense tract of country, and it gives facilities for maintaining commercial intercourse, not only by its communication with the sea, but also with the metropolis by means of two canals. It divides Ireland nearly into two parts, separating the province of Connaught from the rest of the kingdom. This river must be viewed under two distinct heads, as it is locally known under two distinct names, namely, the Lower Shannon, including that portion of the river below Limerick, which is connected with the external commerce of the country; and the Upper Shannon, from its source down to Limerick, which is connected with its internal commerce.

The source of this noble stream is generally considered to be a circular basin of about twenty feet in diameter (and said to have been sounded with 200 yards of line without finding bottom), situated at the southern base of the Kulkeagh Mountain, whence it flows in a deep dead sluggish stream into Lough Allen, in the county of Leitrim, a small basin about eight miles long and three to four broad, lying in the midst of a coal district, and 115 feet below the level of the source. Other small streams fall into this lake, any one of which may be considered the parent of this great river. Of these the largest are the Owenmore, the Arigna, which joins the Shannon before falling into the lake, and the Dorbally. The mountain scenery around Lough Allen is very fine. The land slopes gently to its sides, is well wooded, and cultivated to nearly half the height of the mountains.

Leaving Lough Allen, the river is so obstructed by shallows, that a canal, passing to the eastward of it, has been cut from its southern extremity near Drumshambo, to Battle-bridge, a distance of nearly five miles. In this distance there is a fall of twenty-two feet, which is overcome by two locks, one at Drumleague, half way along the canal, and another at Battle-bridge, where the river navigation is resumed. From this point the river runs in a southerly direction, between shores generally low, with a mid-channel depth varying from five to twenty feet, for six miles, when it receives the waters from two small lakes called Boyle Water and Lough Key, which communicate with the town of Boyle. A mile below this point stands the town of Carrick-on-Shannon, and two miles farther occurs a small expansion called Corry Lough, whence the course of the river is tolerably straight and good as far as Jamestown, a distance of two miles. Here a shallow circuitous bend is avoided by a canal two miles in length, which commences just above Jamestown, and terminates about a mile and a half below Drumsna. On this canal there is a lock with a fall of six feet eight inches on the sills. From a mile below this canal nearly down to Ruskey are a series of small lakes surrounded by low hills, with diversified and in some parts well-wooded scenery, and a tolerably free navigation. These lakes are called Lough Tap, Lough Boedarrig, Lough Boeffin, and Lough Sconnell.

At Ruskey is a stone bridge over the Shannon, which is here very shallow and much obstructed by eel-weirs. The navigation is carried on by a canal three-fourths of a mile long, on the north side of the river, with one lock on it, having a fall of 4 feet 11 inches. Two miles and a half below Ruskey the Shannon enters Lough Forbes, immediately above which the river is nearly dry in summer, though the bed of the river is sufficiently broad. This lake is an irregularly shaped basin two miles long and from a half to three-quarters broad: the water is of the average depth of seven or eight feet, excepting a shoal of small extent near the centre, where the lake is contracted to a breadth of only 350 yards. Lough Forbes is almost surrounded by bog-land, except where a portion of the demesne of Lord Forbes comes down to its eastern shore. From the southern extremity of Lough Forbes the navigation by the river becomes impracticable, and continues so below Tarmonbarry, a small village three miles lower down, where the Shannon is crossed by a stone bridge built on a rocky ford. The communication is therefore carried on by the tributary river Camlin, which empties itself into the Shannon by two mouths, the upper one at the southern extremity of Lough Forbes and the lower one below Tarmonbarry. The lower mouth of the Camlin is however so shallow that a short canal about half a mile in length and with one lock on it has been cut, and near the point of its junction with the Camlin, near the village of Cloondrah, is the grand depôt of the Royal Canal Company, called Richmond Harbour.

Between this and Lanesborough, a distance of seven miles, some few difficulties occur; the river is of an average breadth of 250 yards, not very tortuous, and the depth is frequently 20 feet, though there are some spots with only four; the shores are of bog and very flat, except where a few isolated hills of good land stand near the river. At Lanesborough the Shannon is crossed by a stone bridge, built as usual on a ford of rock and gravel, which obstruction is overcome by a short canal a quarter of a mile long, on the Roscommon side of the river, and merely separated from it by an embankment. This canal has one lock. We here enter Lough Ree (the second expansion of the Shannon in point of magnitude as it is in order from the mouth) which extends 16 miles in a north and south direction, and varies in breadth from three-quarters of a mile to three miles; it reaches within two miles of Athlone. About half way along its eastern shore is a deep indentation, called Derry Bay, at the head of which the river Inny, the only one of any magnitude, falls into the lake. The depth of water in the lake is very irregular; the greatest depth is 120 feet, but this occurs only in few places, and the average depth may be considered at from 20 to 30 feet. The bottom is a slate-coloured mud, except where gravel beds rise and form shallows, which are very numerous, and always contain large masses of limestone rock, which probably forms the basis of the shoal, as all the strata of the surrounding country are of that description. The scenery of the lake is diversified, and, studded as it is with so many islands, frequently becomes picturesque. There is a scarcity of wood, and the land does not in any place exceed 250 feet above the surface of the lake; the shores are unfavourable for landing, being shallow and stony. Not a single village is visible from the lake. Two miles above Athlone, the river becomes narrow and is very much obstructed by eel-weirs and shallows; and under Athlone bridge, which is of stone, there is a considerable fall and rapid. These impediments are surmounted by a canal on the Roscommon side, one mile and a half in length, with one lock on it having a fall of four feet four inches. Between this place and Lough Derg the river makes two large bends, and dividing itself into various branches forms islands, some of which are of considerable size. Eight miles below Athlone stands the Seven Churches, a place which still retains much of its former sanctity, and between these two points the river is free from any serious obstruction, as indeed it continues to be as far as the military post called Shannon bridge, five miles and a half farther. Here the occurrence of a shallow ford with the advantage of firm ground on each side has led to the choice of the place as the site of a stone bridge over the river, and as there is a fall of seven inches over the shallow, a side canal about 250 feet long has been cut on the eastern side with a lock on it, and just below (where the river Suck falls into the Shannon) a smaller one of about the same length has been made through a sharp projecting point. The Suck, which forms the division between the counties of Galway and Roscommon, is a very fine river, and appears at its junction scarcely inferior to the Shannon itself. It rises near Castlereagh in the county of Roscommon, and has a circuitous course of about 60 miles, receiving in its passage a number of tributary streams. It passes near the towns of Roscommon, Athleague, Mount Talbot, Ballyforan, Ballygill, and through Ballinasloe, and is the largest of the tributaries of the Shannon. From the junction of the Suck down to Shannon Harbour the river is of equal and considerable breadth with few obstructions. At Shannon Harbour the Brusna falls into the Shannon on the east side, and just at this point is the junction of the Grand Canal with the Shannon; immediately opposite is another canal running up to Ballinasloe, and for the facility of communication and transporting boats (both canals belonging to the Grand Canal Company), a wooden bridge has been thrown across the Shannon from one to the other. To Banagher, two miles lower, there is a good and uninterrupted navigation. Here there is another stone bridge across the Shannon, built on a bank of gravel; and the fall of one foot nine inches occasioned by it is avoided by a canal about a quarter of a mile in length on the Galway side with one lock upon it. About three miles below Banagher the navigation becomes greatly impeded by shoals and falls, to avoid which there is a canal two miles in length on the Leinster side with one lock on it. This has been cut to avoid the falls of Meelick and Killogues, which are the greatest in the whole line above Killaloe, amounting to seven feet three inches. At the point where the river navigation is again resumed, the Lower Brusna falls into the Shannon, which again offers a wide and uninterrupted channel into Lough Derg, a distance of nine miles, with a water-course, marked out by piles, which generally exceeds 20 feet in depth. One remark will suffice on the nature of the shores between Loughs Ree and Derg: they are uniformly very low, consisting of lands of a rich calcareous nature, always overflowed during the winter season, and producing in the summer large crops of rank coarse grass, and affording pasturage for cattle. These rich lands are generally backed by bog-land elevated from 20 to 30 feet above the river, and towards Athlone by low rounded isolated limestone hills. There are few places where good firm land comes down to the river's edge. At the town of Portumna is a wooden bridge with stone piers, now in course of erection, across the Shannon, and about a mile below this we enter Lough Derg, which is 24 miles in length, lying about north-north-east and south-south-west, and varying in breadth from three-quarters to three miles direct distance, though there are some large bays on both sides which in some places cause an expanse of seven to eight miles. The scenery of this lake is very beautiful, especially towards the southern extremity, where it lies between hills of considerable elevation terminating abruptly on the lake. All the north-western shore, which forms part of the county of Galway, are low and abound in bog-land. In this portion lie the Ballyshrule and Woodford rivers, streams of considerable size and navigable for large boats. The Tipperary shore, which forms all the eastern side of the lake, is greatly diversified in appearance and character: to the north it consists of rounded limestone-hills, which are chiefly used for pasture, while to the south the mountains are higher, more abrupt, and consist of slate formation, which is worked to great advantage. The opposite shore, part of the county of Clare, is of like formation. Lough Derg contains few islands, but it abounds in rocks and dangerous shoals, and the shores, like those of Lough Ree, are difficult of approach from being so shallow and stoney. The greatest depth is 120 feet; the southern portion is generally much deeper than that to the northward. The bottom is of marl, which is dredged up in great quantities for manure. On this lake a steamer of 90 horse-power plies daily between Killaloe and Portumna, for the purpose of towing the lumber boats which go to Dublin by the Grand Canal across the lake. A considerable passenger-trade is also carried on by this route, especially in summer. At Killaloe is the chief depôt and dockyard of the inland department of the Dublin Steam Navigation Company.

About a mile above Killaloe the channel becomes very narrow, although it is free from obstructions till a little way above the bridge, where a bed of rocks impedes the navigation, as well as numerous eel-weirs which are found at all the bridges along the Shannon. A series of falls continues below Killaloe bridge, so that a canal two miles long has been cut close by the river on the Clare side. On this canal there are three locks, the lowest of which is a double one, with a fall of 22 feet in the whole distance, after which the navigation of the Shannon is again resumed in a clear broad stream with only one difficulty as far as O'Brien's bridge, five miles below Killaloe, where the river is again crossed by a stone bridge. About a mile below this commences another series of falls, passing the beautifully-situated village of Castle Connell, and extending for about 7 miles. The canal for avoiding these falls is also on the Clare side; it has two double and four single locks on it, which overcome a fall of 62 feet. Below this the navigation of the Shannon is resumed for one mile and a half, and the communication with the Lower Shannon at Limerick is finally completed by a third short canal a mile long, with two locks and a fall of 13·4 feet. Along the navigable parts of this portion of the Shannon, the land, though good, is generally so low that it becomes necessary to make use of embankments to keep out the water. Immediately above Limerick the river divides into two branches, forming King's Island, on which the old town stands, with the cathedral, castle, and other public buildings. Just above the reunion of these two branches is the last fall of the river.

In reviewing the Upper Shannon, the following general observations offer themselves. This river, which seems by nature formed to facilitate the agricultural and commercial improvement of the kingdom, instead of having been assisted by art, has been rendered almost useless; first by a contracted canal navigation made without any regard to the dimensions of the locks or the level of their sills; secondly, by the improper construction of the several bridges, which choke up the river's course, not only by their numerous piers, but by the mills erected in the arches themselves; also by the mill dams, which in some parts occupy nearly the whole breadth of the river; the numerous eel-weirs, and the total neglect of dredging away small shoals; thirdly, by the want of proper beacons and landmarks. All these deficiencies not only render navigation difficult and dangerous, but the obstruction thus arising to the free course of the winter's floods causes large tracts of the adjacent country to be inundated during that season. To remove these defects it is proposed to do away at certain points with the useless canals and locks, to deepen the bed of the river where requisite, at the same time to erect, at proper places, weirs so regulated as always to keep up a certain level of water during the summer, while they would allow the superfluous waters of the winter to pass off freely; also to cut new canals with lockage on a more extensive scale, so as to admit of the passage of steamers. For this purpose an act of parliament has been passed, and a sum of money granted, and the contemplated improvements are now in progress.

Of the rivers which fall into the Lower Shannon, the Woodford, Ballyshrule, Lower Brusna, and Suck, might be made navigable at little expense, and would open a great district of country.

Under the name of Lower Shannon is comprehended that part of the river below Limerick which is navigable for sea-going vessels. This æstuary is easy of access, and its approach is free from dangers; the entrance between the Loop and Kerry Heads is seven miles wide, and on the former stands a lighthouse, showing a bright fixed light at the height of 270 feet above high-water. About 10 miles to the eastward is a kind of second entrance between Kilkadran and Beal Points, which is contracted to one mile and a half; and off Beal Point a dangerous sand-bank extends nearly half a mile, which still further reduces the navigable channel. On Kilkadran Point is a lighthouse which exhibits a fixed red light 133 feet above the sea, and inside this point is the small bay of Carrigaholt, which affords good shelter for small vessels. Above this there is anchorage in every part of the Shannon, though Scattery, Tarbert, Labasheda, and Foynes, are the only places which offer good shelter from the prevailing westerly winds.

Five miles above Kilkadran Point is Scattery Island, on the Clare coast, about three-quarters of a mile long, rather low and marked by one of the Round Towers; it has a battery on its southern point. To the eastward of this island there is good anchorage. On the Clare shore opposite Scattery stands the village of Kilrush, which is much frequented as a watering-place by the inhabitants of Limerick. A good stone pier has been built for the accommodation of vessels loading, as well as for landing passengers: a steamer plies daily between this place and Limerick, calling at Tarbert.

About five miles to the south-east of Scattery is Tarbert Peninsula (formerly an island), at the north-east point of which, on a rock connected with the mainland by a bridge, is a lighthouse showing a brilliant fixed light 58 feet above the sea. To the south-east of this peninsula there is excellent anchorage, and a temporary pier has recently been erected. The village of Tarbert is about a mile from the landing-place, across the isthmus. Above this the river contracts to less than a mile in width. Opposite Tarbert a peninsula stretches out leaving to the northward of it a deep bay running up about three miles to the village of Cloonderlaw, which gives its name to the bay, and lying as it does more in the direction of the Shannon, is sometimes mistaken for the true course of that river which here turns more to the south-east. To the eastward of this peninsula, and about four miles from Tarbert is Labasheda Bay, another good anchorage, well sheltered from westerly winds; and about four miles further up, on the Limerick side, is Foynes

Island, between which and the mainland there is a good harbour, though the entrance is rather intricate.

A little above Foynes, on the opposite coast of Clare, are a number of small islands, which form the western entrance of the river Fergus, and lie more than half way up the Shannon towards Limerick. Below this the river presents a different appearance from that above the confluence of the Fergus; the land on both sides is high and bold, with a beach either of shingle or gravel beneath, and the channel free from dangers, whilst above this point the land is so flat and low, that with little exception the whole shore on each side is one continued line of embankment, with the mud drying off in many places to the extent of half to three-quarters of a mile. Besides this, there is throughout this portion a number of islands, rocks, and shoals, down the centre of the river, which divide it into two channels. Most of these islands are covered at high-water, a circumstance which gives to the Shannon a very different appearance at the different times of tide; and the river, which, at high-water, has often been called mighty and majestic, becomes at low-water, a very insignificant and unnavigable stream. For eight or nine miles below Limerick the river is so shallow that at low-water every vessel must lie aground; and even far below this there is not a spot where a landing can be effected except through the mud. In addition to these natural difficulties this part of the river is in an equally neglected state with the Upper Shannon, being without beacons, buoys, or land-marks.

At Limerick a very fine range of quays is now in course of construction furnished with cranes, &c., and it is proposed to construct a weir across the river below the town, with proper gates to admit vessels at high water, so as to constitute a floating dock of the whole river above the weir. This would be a most valuable improvement to the port, for all vessels are now obliged to lie aground at low water, much to their injury when deeply laden, as there is not more than five feet water off the town at low tides.

Several rivers join the Lower Shannon, among which the Fergus deserves some notice, as it is navigable for vessels of 200 to 250 tons at high water as far as Clare, nine miles from its confluence with the Shannon. At this part it is very narrow, but about two miles lower it begins to expand to a considerable width, though the navigable channel still remains very confined, the remaining space being filled with extensive mud banks and low islands which are covered with the flood tides.

About nine miles below Limerick the Maigue falls into the Shannon on the Limerick side; though narrow, it is free from obstructions, except a rocky bar across the entrance, and is freely navigable for boats of 40 to 50 tons deeply laden as far as Adare, about eight miles from its mouth. The Askeaton river, which also enters the Shannon on the Limerick side, is not so large as the Maigue, but is still navigable with some difficulty for boats. There are also numerous other streams, many nearly dry at low water, though accessible at high water.

The spring tides in the Shannon rise from seventeen to eighteen feet, the neaps about fourteen feet; the velocity which at the mouth does not exceed a mile an hour, increases as the river becomes narrower, to upwards of three during the ebb at springs; in consequence of which the young flood has so much resistance to overcome that when it does so it rushes up almost like a bore, and the water rises during the first hour's flood as much as seven or eight feet, by which time a great portion of the mud banks become covered, and from having a more expanded space to vent itself in, the velocity becomes very much diminished.

The following is a list of public bridges over the Shannon:—

List of Public Bridges.

	Waterway. Feet.	Distance between. Miles.
Ballytra	85·6	
New Bridge	78·0	½
Drumsherriff	82·6	2
Battle Bridge	113·4	2½
Carrick	233·10	6
Jamestown	139·4	6
Drumsna	175·[illegible]	1
Ruskey	199·3	8
Tarmonbarry	220·6	10
Lanesborough	206·0	7
Athlone	210·6	19
Shannon Bridge	336·0	14
Shannon harbour (wooden)	450·0	6½
Banagher	295·6	2
*Portumna (partly wood)	732·8	13
Killaloe	402·11	24
O'Brien's Bridge	296·8	5
Athlunkard	335·0	7½
Thomond	335·7	1½
Wellesley	350·0	½

Rise of the Locks on the Shannon, taken from their Sills

	ft.	in		
Wellesley Dock Gates	11	4		
Park	1	10		
Annaghbeg	8	7		
Gillogues (double)	11	0		
Newtown	8	2		
Cloonlara	10	7		
Monaskea	10	4		
Errina (double)	13	4		
Cussane (double)	15	5		
Moy	6	8		
Killaloe	0	0		
			97	2
Hamilton	10	6		
Banagher	0	6		
Shannon Bridge	2	4		
Athlone	4	4		
			16	8
Lanesborough	1	3		
Cloondrah	5	11		
Ruskey	4	11		
Jamestown	6	8		
Battle Bridge	10	3		
Drumleague	11	9		
			40	9
Total rise of sills			154	7

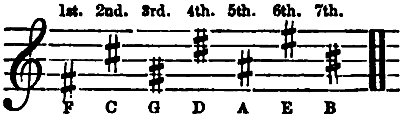
(*Parliamentary Reports; Recent Surveys.*)

SHAPOOR. [Persia—*History.*]

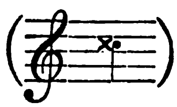
SHAPUR, or SHAPOOR. [Persia.]

SHARK. [Squalidæ.]

SHARP, a character in Music (♯), used to raise, by the degree of a semitone, any note in the natural scale. Before the character of the *natural* was introduced, the sharp was also employed to contradict the flat. When sharps are placed at the clef, they are always taken, according to the number required, in the following order:—



The double sharp, the character for which is a cross (×), is used in chromatic music, and raises a note two semitones above its natural state. Thus c *double sharp*



is, practically—though not strictly so in theory—d natural. [Flat.]

SHARP, JAMES, archbishop of St. Andrews, was born in May, 1618, in the castle of Banff, where his father, Mr. William Sharp, resided in his quality of sheriff-clerk of the county. Sharp's paternal grandfather had been a merchant of considerable eminence in the town of Aberdeen, and was the younger son of a gentleman of landed property in Perthshire. Sharp's mother, Isabel Lesly, a daughter of the laird of Kinninvy, and nearly related to the family of the earls of Rothes, is described as having been an extraordinary woman, honoured by all for her wisdom and piety. She survived to a great age, and lived to see at least King Charles's restoration, and her son fairly mounted on the ladder of advancement, if not his actual elevation to the primacy.

Sharp was educated at the university of Aberdeen, where he is said to have distinguished himself in the studies then in vogue. On leaving college he paid a visit to England, but soon after returned to his native country on being chosen one of the regents, or professors of philosophy, in St. Leonard's College, St. Andrews, an appointment for which he is said to have been indebted to the interest of his relation the earl of Rothes, to whom he had got himself introduced while in the South. His whole history evinces the great talent he had in insinuating himself into the favour of the great. After a short time he exchanged his professorship for the office of minister of the parish of Crail, no doubt a better living, to which he was appointed by his friend John, earl of Crawford and Lindesay.

These facts are given on the authority of a tract entitled 'A True and Impartial Account of the Life of the most Reverend Father in God, Dr. James Sharp, Archbishop of St. Andrews,' which is usually quoted as printed in 1723, although, according to Watt's 'Bibliotheca,' it was first published in 1719. The object of the writer is to make it appear that Sharp was disinclined to Presbytery, or at least opposed to the Solemn League and Covenant, from the beginning; but he must at any rate have complied with both when he accepted his professorship and his living in the church. Indeed it is evident that he assumed the appearance of great zeal for the ecclesiastical system now, after the commencement of the civil war, established in Scotland, and with such success as to take in its firmest and ablest friends, so that he enjoyed the full confidence and took part in all the councils of the leaders of the church. His affability and taking manners also, we are told, made him a favourite among his parishioners; so that, according to his panegyrical biographer, he in a singular manner exemplified the evangelical precept as to the wisdom of the serpent and the innocency of the dove.

In August, 1651, according to Sir James Balfour's 'Annals,' Sharp was one of a number of ministers who were seized and put on board ship at Broughty, on the Tay, and carried off prisoners to England, by order of General Monk, who was then overrunning the country. This remarkable passage in his history is not noticed in the common accounts of Sharp; but frequent allusions occur in the Presbyterian invectives to certain base compliances, by which he is asserted to have purchased the favour of Cromwell on some occasion, and to have obtained his liberty, while his companions were left in bondage. He appears, at all events, to have, after some time, found his way back to his charge at Crail.

Some years after this we hear of him being sent up to London with a commission from the party in the church called the Resolutioners, to plead their cause before the Protector against Mr. James Guthrie, minister of Stirling, the deputy of the opposing faction, called the Protestors or Remonstrators; on which occasion he is said to have so distinguished himself by his management and address that Cromwell remarked to the byestanders, 'That gentleman, after the Scotch way, ought to be styled Sharp of that ilk.' He was no doubt selected for this mission partly on account of the connexions he had formed in England. Burnet says, he 'had been long in England, and was an active and eager man; he had a very small proportion of learning, and was but an indifferent preacher; but having some acquaintance with the Presbyterian ministers in London, whom Cromwell was then courting much, he was, by an error that proved fatal to the whole party, sent up in their name to London; where he continued for some years soliciting their concerns, and making himself known to all sorts of people.' Burnet adds, that 'he seemed more than ordinary zealous for Presbytery,' and that when Dr. (afterwards Bishop) Wilkins expressed to him his belief that it would be necessary for the Protector to set up Episcopacy again (apparently meaning both in England and Scotland), if order was ever to be restored to the kingdom, 'Sharp could not bear the discourse, and rejected it with horror.'

It is characteristic of Sharp that, although thus the agent of the Resolutioners, he always, according to his friendly biographer, kept a good understanding with the chiefs of their opponents, the Protestors. While ingratiating himself with Cromwell also, it seems, he maintained a correspondence with Charles II. during all the time of his exile. General Monk was exactly the character for such a man to get into his hands at the critical moment of the Restoration. It is certain that, whatever may have afterwards been thought or said of the acts by which he had obtained his release from Cromwell when his companions were left in confinement, he had either never lost or had completely regained the confidence of his brethren in the church, five of whom, ministers of Edinburgh, and the leading men of their party, when Monk began his march from the North of England upon London, in January, 1660, applied to him to receive Sharp as their representative, and as a person fully instructed in their views and wishes. Among the persons by whom Sharp was thus commissioned were Mr. Robert Douglas, Mr. John Smith, and Mr. Andrew Ker, who had all been carried along with him to England in captivity eight or nine years before.

The seven months that followed form the portion of Sharp's history which is of the most importance to the appreciation of his character. He proceeded to London, where he arrived 13th February, set out for Breda 4th May, returned to London 26th May, and appears to have remained there till about the middle of August. During all this time he was in close communication with all the leading persons and parties of the day; with Monk and the chief of the English and Scottish nobility then in London; with both the Presbyterian and the Episcopalian ministers there; with Charles himself and the members of his court; and he also kept up an active correspondence with Douglas and the other ministers in Scotland by whom he had been deputed. The numerous letters which passed between him and Douglas have been preserved; they are now deposited in the library of the university of Glasgow, and a very full abstract of them has been given by Wodrow in the Introduction to his 'History of the Sufferings of the Church of Scotland from the Restoration to the Revolution.' Mr. C. Kirkpatrick Sharpe, in a note to Kirkton's 'Secret and true History of the Church of Scotland from the Restoration to the year 1678,' observes that 'Wodrow is accused of gross injustice in garbling Sharp's letters to Douglas;' but that writer, whose partisanship is very decided, neither ventures to warrant the truth of this accusation, nor professes to have examined the original letters. On the other hand, the Rev. Dr. Burns, of Paisley, the modern editor of Wodrow's History, having compared, as he tells us, the letters with the abstract, asserts, 'without hesitation, as a general result of the inquiry, that, while the historian does by no means conceal his design of exposing Sharp's treachery, he had it in his power from these documents to have held him up to detestation in still blacker colours, had he quoted all the expressions of affected devotion—all the solemn protestation of attachment to Presbytery—all the specimens of mean adulation, and all the bitter vituperations against his opponents, which these letters contain.' Dr. Burns probably would not wish to be considered a less zealous partisan than Mr. Sharp; but, besides the authority his statement derives from his having actually seen and read the original letters, it appears to us to be probable in itself. Wodrow, though not a critically exact historian, had a most minute as well as extensive acquaintance with the times of which he writes, and is a very careful compiler from the vast store of original documents on which his work is almost exclusively founded; and, although not a person of much enlargement of mind, he cannot with justice be called either a violent or an unfair writer. We believe him to have been entirely incapable of any designed garbling of these letters of Sharp's. His abstract certainly leaves a strong impression of Sharp's thorough dissimulation and treachery. The opinion which Douglas afterwards formed was, it seems, that he had been corrupted and gained over to the Episcopalian side during his visit to Breda, where he was probably much with Hyde, and where Charles himself treated him with the most flattering favour and familiarity; and in this view of the matter Wodrow also appears to coincide. To us his conduct has the air of intrigue and dishonesty from the commencement of his mission; he may not have made up his mind when he left home to support the restoration of Episcopacy in Scotland, but we believe he set out fully determined to take the course as to that matter which promised most for his own advancement, and that what he saw of the current in which things were running after he got to London very soon determined him as to the part he should act. Burnet relates that, some years subsequent to the Restoration, his enemy Lord Lauderdale, 'to complete his disgrace with the king, got many of his letters, which he had writ to the Presbyterians after the time in which the king knew that he was negotiating for Episcopacy, in which he had continued to protest with what zeal he was soliciting their concerns, not without dreadful imprecations on himself if he was prevaricating with them, and laid these before the king, so that the king looked on him as one of the worst of men.'

Some of Sharp's defenders however take up other ground, and, without disputing the correctness of Wodrow's abstract of the letters, deny that they afford any evidence of his insincerity, or that we have any other reason for believing that he was unfaithful to the cause of Presbytery so long as he was employed on this mission. When he returned to Scotland, he brought with him a letter from the king, directed 'to Mr. Robert Douglas, to be communicated to the Presbytery of Edinburgh,' in which his majesty declared his resolution 'to protect and preserve the government of the church of Scotland, *as it is settled by law*, without violation.' This letter Sharp's enemies will have to have been of his composition: its mode of expression was at least ingenious. The Scottish parliament, which met 1st January, 1661, passed an act—suggested, according to Burnet, at the council-table in a drunken bout—rescinding or repealing all acts passed since the year 1633; and this at once abolished any legal establishment that Presbytery had ever received, and made 'the church as it is settled by law' to mean the old Episcopal church which had been overthrown in 1638. During his late absence from Scotland, Sharp had been elected professor of divinity in St. Mary's college, St. Andrews; he was also appointed his majesty's chaplain for Scotland, with an annual salary of 200*l.* sterling; and now, having gone up again to London, on the rising of parliament, along with Glencairn, the chancellor, and Rothes, the president of the council, he was, in a council held at Whitehall, nominated archbishop of St. Andrews. He returned to Scotland with the same two noblemen on the 31st of August, and left again for England on the 18th of October; and about the middle of December he and three of his brethren were consecrated with great pomp at Westminster by the bishops of London and Worcester.

The history of Sharp's government of the Scottish church cannot be here detailed. He certainly did not allow any recollections of his own very recent renouncement of Presbyterianism, or of the extreme zeal he had been wont to profess for that system of ecclesiastical government, to check his activity and ardour in the maintenance of the opposite order of things that had been now set up. The party he had deserted charge him with an unrelenting persecution of his old associates, of all who would not apostatise like himself, as well as with the most overbearing deportment even to those of his own communion who were his inferiors in station, and with an insatiable ambition; and it cannot be denied that many well-authenticated facts lend strong countenance to these imputations. He may have conscientiously believed such a policy to be necessary, or to be the wisest and best; but whatever were his views or motives, it is certain that we find him on all occasions the advocate for measures of rigour and severity, and constantly clamouring for the more strict execution of the laws against nonconformists.

In 1663 he left the declining interest of the earl of Middleton, to whose support he had been mainly indebted for his nomination to the primacy, and attached himself to his old adversary the earl of Lauderdale; but their association scarcely lasted two years.

In 1664, on the death of the earl of Glencairn, he made strong application for the office of lord-chancellor, but without success. In the beginning of the year 1667 he was commanded to come no more to the council-table, but to remain within his diocese; but this restraint was taken off before the end of the year. On Saturday, the 9th of July, 1668, he was shot at as he was entering his coach in the streets of Edinburgh, by one James Mitchell, a conventicle preacher; but the ball was intercepted by the arm of the bishop of Orkney, who was following him into the coach. The bishop's arm was shattered, but nobody attempted to apprehend the assassin, who was discovered however five years afterwards, and executed in January, 1678, after a series of proceedings which, at least according to one version of the story, are little creditable to Sharp's magnanimity. At last, on Saturday, the 3rd of May, 1679, the archbishop, while travelling with his eldest daughter from Kennoway, where he had passed the night, to St. Andrews, was attacked by a band of nine enthusiasts on Magus Muir, within three miles of that city, dragged from his coach, and slaughtered on the spot with circumstances of the most furious and pitiless barbarity. Various narratives of this murder have been collected by Wodrow, and one has been added by Dr. Burns, in his late edition of that historian's work (4 vols. 8vo., Glasgow, 1829); but the most detailed and in all respects remarkable account of the affair is that drawn up by James Russell, one of the actors in it, which has been for the first time printed by Mr. Sharpe at the end of his edition of Kirkton's History. The same volume also contains a letter from Sir William Sharp, the archbishop son, giving an account of his father's murder dated St. Andrews, the 10th of May.

Wodrow and Burnet, in particular, are very full of notices of Sharp; and a separate Life of him was lately published by the Rev. J. P. Lawson; but the amplest materials for his history still remain in manuscript. Besides the Life published in the beginning of the last century, there is another old memoir of an opposite strain, which has also been printed; and Mr. Sharpe quotes a MS. biographical libel, entitled 'A Character of the Monster of Inhumanitie, who is the Great Reproach of Mankynd,' &c., which is in the Advocates' Library, and is perhaps the Life of the archbishop 'until his arriving at the top of his ambition,' which Wodrow says he had read, 'written by one of the after-sufferers, a worthy gentleman.' Specimens of the style in which his course was wont to be sketched even by sober and serious Presbyterian writers may be seen in Kirkton, i. 81-84, and in Wodrow, i. 236 (Glasg. edit.). In the midst of some strange stories, Kirkton says, 'He was a man of parts and a scholar, as he showed himself when a regent in St. Andrews, but a scholar rather cautious than able; rarely would he ever engage in a dispute, lest he might fall under disadvantage, and never would he be the opponent, which he knew was the most difficult part. His great gift was his prudence, dissimulation, and industry.' Wodrow speaks of a proposal he made to Cromwell, 'which made the usurper very publicly assert him to be an atheist;' and Kirkton affirms that he was taken to be no better than a 'flat atheist' by all that knew him. On the other hand, it is asserted that his moral demeanour was always at least decent and regular; that he was a patron of learning, and that his secret pecuniary charity even extended to the deposed Presbyterian clergy and the other poor of that persuasion.

By his wife Helen Moncrief, daughter of the laird of Randerston, Archbishop Sharp left a son, Sir William Sharp, and two daughters, both of whom were married, the youngest, Margaret, to William, eleventh Lord Saltoun, the ancestor of the present lord. His portrait, from a painting by Lely is engraved in Sharpe's Kirkton, and also in the last edition of Wodrow. The spot where he was murdered on Magus Muir is still marked by a stone erected to the memory of Andrew Guillan, one of the only two of the party who were brought to justice, whose body was there hung in chains; it is now an open space in the midst of a fir plantation, the course of the antient high road having been changed. There is a magnificent marble monument erected to the archbishop by his son over the place where his remains were interred in the parish-church of St. Andrews, exhibiting, besides a representation of the murder, a long and highly laudatory inscription, a copy of which, with a short account of the archbishop, may be found in the 'Reliquiæ Divi Andreæ' of Mr. George Martine, who is supposed to have been his secretary (4to., St. Andrews, 1797).

SHARP, JOHN, archbishop of York, was born at Bradford, 16th February, 1644; his father, Mr. Thomas Sharp, was engaged in trade there, but is said to have been descended from the Sharps of Little Norton, a family of great antiquity in Bradford Dale. In 1660 he was admitted of Christ's College, Cambridge; in July, 1667, he was ordained deacon and priest; and in October of the same year he became domestic chaplain to Sir Heneage Finch (then attorney-general, afterwards chancellor), and tutor to his sons. Having taken his master's degree at Oxford in 1669, he was in 1672, on the recommendation of Finch, nominated by the crown to the archdeaconry of Berkshire. When Finch was appointed the same year lord-keeper, he devolved the exercise of his church patronage upon Sharp, 'whose conscience,' says Nelson, in his *Life of Dr. Bull*, 'he charged with an impartial scrutiny in this matter; adding withal, that he would prefer none but those who came recommended from him; and that if he led him wrong, the blame should fall upon his own soul.' In 1676 Sharp was installed a prebendary of Norwich; and in 1677 he was instituted to the rectory of St. Giles in the Fields, London, on which he ceased to reside with his patron the chancellor, and took a house for himself. In 1679 he commenced D.D. at Cambridge, and that year also he accepted the lectureship at St. Lawrence, Jewry, which he held till 1683. In 1681 he was made dean of Norwich, an appointment for which he was again indebted to the interest of his steady friend the chancellor.

Having been chaplain to Charles II., he was re-appointed to the same office on the accession of James II., but gave great offence and involved himself in some trouble by a sermon which he soon after preached in his own church against popery. Sharp seems to have had no intention of provoking the royal displeasure; his sermon was preached in reply to a written argument in support of the right of the Church of Rome to the style and title of the only visible catholic church, which had been put into his hands as he was descending from the pulpit on the preceding Sunday; and he showed every disposition to make up for any offence he might have given. On the 14th of June, 1686, James addressed a letter to Compton, bishop of London, in which he observed, that notwithstanding the late royal letter to the two archbishops, and the directions concerning preachers issued on the 15th of March, 1685, yet Sharp had in some of the sermons he had since preached 'presumed to make unbecoming reflections, and to utter such expressions as were not fit or proper for him;' 'endeavouring thereby,' continued his majesty, 'to beget in the minds of his hearers an evil opinion of us and our government, by insinuating fears and jealousies, to dispose them to discontent, and to lead them into disobedience and rebellion.' And the bishop was commanded immediately to suspend Sharp from further preaching within the diocese of London, until he should have given satisfaction to his majesty, and his majesty's further pleasure should be known. Compton replied, that he should always count it his duty to obey the king in whatever he could perform with a safe conscience; but that in this case he humbly conceived he was obliged to proceed according to law, and therefore it was impossible for him to comply. His lordship however advised Sharp to abstain in the meantime from preaching; and on the 20th of June Sharp himself proceeded to Windsor with a petition to the king, in which he assured his majesty, that so far had he always been from venting in the pulpit anything tending to schism or faction, or any way to the disturbance of his majesty's government, that he had upon all occasions in his sermons, to the utmost of his power, set himself against all sorts of doctrines and principles that looked that way. 'But,' the petition went on, 'if in any sermon of his any words or expressions have unwarily slipped from him, that have been capable of such constructions as to give your majesty cause of offence, as he solemnly professes he had no ill intention in those words or expressions, so he is very sorry for them, and resolves for the future to be so careful in the discharge of his duty, that your majesty shall have reason to believe him to be your most faithful subject. And therefore he earnestly prayeth that your majesty, out of your royal grace and clemency, would be pleased to lay aside the displeasure you have conceived against your humble petitioner, and restore him to that favour which the rest of the clergy enjoy under your majesty's gracious government.' James would not even hear this petition read; upon which Sharp left town and went down to Norwich, where he amused his leisure in collecting old British, Saxon, and English coins, till at length, in the beginning of January, 1687, a letter from Sunderland informed him that he might return to his function. Kennet, in his 'Complete History,' says that he was indebted for his recal to the intercession of Pepys (the author of the 'Diary'), who was applied to 'as a good-natured man, with wife and children,' and who 'went freely to the king, and prevailed with his majesty' to remit his displeasure.

In August, 1688, Sharp drew up the reasons on which the other archdeacons and himself declined to appear before the ecclesiastical commissioners to answer for not obeying the king's orders in regard to the reading of the declaration for liberty of conscience. On the 27th of January, 1689, he preached before the Prince of Orange, and on the 30th before the Convention; on both occasions praying for King James, although on the 28th the Commons had voted that the king had abdicated and that the throne was vacant. It was not till after a long debate that the House agreed to thank him for his sermon, and to request that he would print it; and he thought it best to decline complying with that request. After the settlement of the new government, Sharp was, in September, 1689, promoted to the deanery of Canterbury, on the removal of Tillotson to that of St. Paul's. He was pressed to accept the place of one of the deprived bishops; but this his feelings would not allow him to do, and he ran some risk of losing the favour of King William, till his friend Tillotson put it into his head to offer to accept the archbishopric of York, on the pretext that such an arrangement would place him in his native district, as soon as it should become vacant by the death of Lamplugh, who was then very ill. He died, in fact, within a fortnight after, and Sharp was consecrated archbishop on the 5th of July, 1691. Sharp acquired a very high character in this eminent office, which he retained till his death, at Bath, on the 2nd of February, 1714. He enjoyed considerable influence at court during the reign of Anne, and, among other things, is said to have had a share in preventing the elevation of Swift to the Episcopal bench. As a preacher he had a clear, easy, correct style; and his sermons, which make seven octavo volumes, only one of which however appeared during his lifetime, have been repeatedly printed. The last edition was published at Oxford in 1840. Mr. Speaker Onslow, in a note to Burnet's 'History of his Own Times,' says of Archbishop Sharp, 'He was a great reader of Shakspeare. Doctor Mangey, who had married his daughter, told me that he used to recommend to young divines the reading of the Scriptures and Shakspeare. And Doctor Lisle, bishop of Norwich, who had been chaplain at Lambeth to Archbishop Wade, told me that it was often related there, that Sharp should say that the Bible and Shakspeare made him archbishop of York.' The 'Life of Archbishop Sharp,' by his son, Dr. Thomas Sharp, archdeacon of Northumberland, which had been in the hands of the compilers of the 'Biographia Britannica,' was published at London in 2 vols. 8vo. in 1829.

SHARP, ABRAHAM, an ingenious mechanist and a laborious calculator, was born at Little Horton, near Bradford in Yorkshire, in the year 1651. After having received the best education which a country school afforded, he was placed as an apprentice with a merchant or tradesman at Manchester; but feeling little inclination for commerce, and being strongly disposed to scientific pursuits, he prevailed on his master to cancel his indentures before the term of his service was expired. He then established himself at Liverpool, and there, while in order to obtain the means of subsistence he kept a school for the instruction of persons in humble life, he applied himself to the study of mathematics, particularly of astronomy, and to the formation of instruments for purposes connected with the sciences. It is probable that the school was soon given up, for Ramsden, the celebrated optician, who was his grand-nephew, relates that in his youth he held the post of an exciseman, and that he quitted that employment on obtaining possession of a small patrimonial estate.

Being thus enabled to consult his own taste in the choice of an occupation, Sharp came to London, where he at first hired himself as a book-keeper to a merchant; but, having procured an introduction to Flamstead, this astronomer engaged him, in August, 1688, in mounting the instruments which had been provided for the Royal Observatory at Greenwich. He afterwards constructed and graduated for the observatory a mural sector whose radius was six feet seven inches and a half, and whose arc contained 140 degrees: the degrees were subdivided by means of diagonal lines, according to the method in use at that time, and by a micrometer screw; and Flamstead states, in the prolegomena to his 'Historia Cælestis,' that the zenith point was determined by observing the zenith distances of stars with the instrument in direct and in reversed positions: in order to accomplish the reversion, it was made capable of being placed alternately on the eastern and on the western side of the wall. Sharp also assisted his friend in observing the right-ascensions and declinations o the sun, moon, and planets, and in forming the famous catalogue (the British) of 2884 fixed stars.

Finding that frequent exposure to the cold air by night injured his health, he resigned his post at the Royal Observatory, and retired to his native town, where, on his recovery, he fitted up an observatory for himself, for which, with his own hands, he formed the lenses of the telescopes and graduated the arcs of the instruments for measuring angles. Sharp is considered by Smeaton as the first who brought hand-graduation far on the way to perfection:

the art was subsequently improved by Smeaton and Bird, but it has since been superseded by the use of dividing-engines, the invention of which is due to Ramsden.

It is however as an accurate calculator that Sharp is particularly distinguished: after his retirement to Horton, he continued to assist Flamstead in his labours, and he computed for him most of the tables in the second volume of the 'Historia Cœlestis:' he was also employed frequently in making intricate calculations for Sir Jonas Moore, Dr. Halley, and other mathematicians. In 1717 he published a treatise, in 4to., entitled 'Geometry Improved,' which contains an extensive and accurate table of circular segments, with an account of its use in the solution of problems; also a table of the logarithms of numbers from 1 to 100, and of the prime numbers to 1100 (all computed to the extent of sixty-one decimal places), together with subsidiary tables to be used in forming from them the logarithms of other numbers. The process of computing logarithms was then far more laborious than it would be now, the formulæ by which the operations may be greatly facilitated not having been discovered; and it is worthy of remark, that those formulæ were not known till after the labour which they would have spared had been undergone. Their utility for the purposes of computation consists therefore chiefly in their being the means by which the numbers given in the earliest tables may easily be verified.

Mr. Sharp calculated, besides, a table of natural and logarithmic sines, tangents, and secants to every second in the first minute of a degree; and he determined to seventy-four places of decimals the length of the circumference of a circle by means of the series expressing that of an arc in terms of its tangent, which had been discovered by James Gregory in 1671. The series, when the arc = 30°, gives (after being multiplied by 6) for the length of the half-circumference, when the semidiameter is equal to unity,

$$2\sqrt{3}\left\{1-\frac{1}{3.3}+\frac{1}{5.3^2}-\frac{1}{7.3^3}+\&c.\right\};$$

and in this state it was employed by Mr. Sharp, who underwent the immense labour of computing the values, and taking the sum of 150 of the terms within the braces, besides that of extracting the square root of 3 to 76 decimal places.

The health of this ingenious man had always been delicate; and after he quitted London, he lived in a very retired manner, receiving only the occasional visits of two friends from Bradford; even his servant had seldom access to him, and the food for his meals was placed, through a hole in the wall, in a closet adjoining his study. It is stated that often during a whole day, when deeply engaged in calculations, he took no refreshment; yet he found time to keep up an extensive correspondence with the great mathematicians of that age, and he regularly attended the services of religion at a chapel for dissenters in the town. He was never married, and he died, July 18, 1742, at the age of ninety-one years.

SHARP, GRANVILLE, was the son of Dr. Thomas Sharp, who held a prebend in Durham cathedral and was archdeacon of Northumberland. Dr. Thomas Sharp was the author of several works, philological, antiquarian, and religious, which were collected and published in 6 vols., 8vo. London, 1763. He was born about 1693, and died in 1758.

Granville Sharp was born in 1734. He was educated for the bar, but he never practised, and quitted the study of the law for a situation in the ordnance-office, which however he resigned on the breaking out of the American war, being opposed to those principles and measures of the British government which led to that war. He then took chambers in the Temple, with the intention of pursuing his studies as a private gentleman.

Granville Sharp, though a man of considerable literary acquirements, and the author of several works in philology, law, theology, and politics, is chiefly known for the boldness, the ability, and the effect with which he stood forward as the opponent of negro slavery. In 1769 he published 'A Representation of the Injustice and Dangerous Tendency of Tolerating Slavery in England; with Remarks on the Opinions given in 1729 by the then Attorney and Solicitor General,' London, 8vo., with an appendix, 1772. His conduct however in a case of individual oppression first brought him conspicuously before the public. A negro of the name of Somerset had been brought to London, and falling ill, was turned out of doors by his master. Sharp found him in the street in a state of the utmost destitution, and took him to St. Bartholomew's Hospital, where he was restored to health, and Sharp then procured him a situation as a servant. About two years afterwards Somerset was arrested by his old master, and imprisoned in the Poultry Compter as a runaway slave. Somerset applied to his former friend Sharp, who brought the case before the lord mayor, by whom it was decided that Somerset should be set at liberty. The master however, in defiance of this decision, seized Somerset in the presence of the lord mayor and of Sharp, and insisted upon his right to his slave. Sharp then brought an action against the master for assault; the case was tried, and was finally referred as a question of law to the twelve judges; it was argued at three sittings, in January, in February, and in May, 1772, and by an unanimous decision the law of England was declared to be that as soon as a slave sets foot on English territory he becomes free.

> 'Slaves cannot breathe in England: if their lungs
> Receive our air, that moment they are free.
> They touch our country, and their fetters fall.'

Sharp continued to exert himself in behalf of the negroes. He wrote four pamphlets against slavery in 1776. At length the Association for the Abolition of Negro Slavery was formed, the first meeting of which was held in London, on the 22nd of May, 1787, when Granville Sharp was appointed chairman of the twelve persons of whom it consisted, most of whom were London merchants, and all but two were quakers. In this great cause Sharp continued to labour, as well as in others favourable to popular rights and political freedom. He was opposed to the impressment of seamen, and a citizen of London having been seized and carried to the Nore, Sharp had him brought back by a writ of habeas corpus from the Court of King's Bench, and he was set at liberty. He sent out a number of negroes whom he found in the streets of London to Sierra Leone at his own expense, and also drew up a 'Sketch of Temporary Resolutions for the intended Settlement on the Grain Coast of Africa, near Sierra Leone,' and thus may be said to have been the founder of the settlement there. He was an advocate of parliamentary reform, having, as early as 1778, published 'A Declaration of the People's Natural Rights to a Share in the Legislature, which is the fundamental Principle of the British Constitution of State; also a Declaration of Defence of the same Doctrine, when applied particularly to the People of Ireland,' London, 8vo.

Granville Sharp continued to pass his time in these and similar benevolent labours till July, 1813, when he died at the age of 79.

Sharp's writings were numerous, and had many readers at the time when they appeared, but as most of them are pamphlets, and were written for temporary purposes, they are not much referred to now. Among them however are some laborious and useful investigations into the great principles of the English constitution, particularly his 'Account of the Ancient Divisions of the English Nation into Hundreds and Tithings,' London, 1784, 8vo., and his 'Account of the English Polity of Congregational Courts, more particularly of the great Annual Court of the People, called Frank Pledge,' London, 1786, 8vo. He was a zealous member of the established church, and had a great dislike to the Roman Catholic religion, but was liberal to Protestant Dissenters of all classes.

(*Memoirs of Granville Sharp, Esq., composed from his own Manuscripts and other authentic Documents*, 1820, 4to.)

SHARP, WILLIAM, an eminent engraver in the line manner, was born on the 29th of January, 1749, in Haydon Yard in the Minories, where his father carried on the business of a gun-maker. He was early apprenticed to an engraver of plates, door-plates, and other such articles, being what is termed a bright engraver. At the expiration of his indentures, Sharp married a French woman, and commenced business in the same line in Bartholomew Lane; but he soon exercised his talent in the higher branches of the art. His earliest effort was an engraving of the old lion Hector in the Tower of London, from an original drawing by himself. In 1782 he sold his shop, and removed to a private house in Vauxhall, where he began to engrave from pictures by the old masters; and soon after he was engaged, in conjunction with Angus, Heath, and Collyer, in decorating the 'Novelist's Magazine' with plates after the designs of Stothard. Here he also completed the Landing of Charles II.

after West, a work which Woollett had left unfinished; and he engraved some plates for Cook's 'Voyages;' and a beautiful oval work, after Bennall, of the Children in the Wood. The profits of his professional employment and a legacy enabled Sharp to take a larger house, and he accordingly removed to Charles Street, Middlesex Hospital. In 1814, when enjoying his highest reputation, he was elected a member of the Imperial Academy of Vienna, and of the Royal Academy of Munich. Sir Joshua Reynolds offered to propose him as an associate of the Royal Academy of London; but Sharp, coinciding in opinion with Woollett, Hall, and other engravers, that the art was slighted by the rule which precludes the election of its professors to the rank of academician, declined the proferred compliment. From London he went to reside at Acton, and finally at Chiswick, where he died of dropsy in the chest, on the 25th July, 1824. Amongst the many works of this eminent engraver may be enumerated the Doctors Disputing on the Immaculateness of the Virgin, and the Ecce Homo after Guido; St. Cecilia, after Domenichino; the Virgin and Child, after Carlo Dolci; Diogenes, after Salvator Rosa; the Sortie from Gibraltar, after Trumbull; the Destruction of the Floating Battery at Gibraltar, after Copley; and the portrait of John Hunter, after Sir Joshua Reynolds. The last engraving is considered to be one of the finest specimens of the art. He also engraved, in some instances, figures in the landscape plates of other persons. As an instance of this may be mentioned the group of Niobe in the print by Samuel Smith, after the original picture by Wilson, now in the National Gallery, a group which is justly considered superior to that from the hand of the painter.

Mr. Sharp, though in the ordinary transactions of life a man of shrewdness, was, in matters of science and religion, a visionary and an enthusiast. No imposture was too gross for his belief, and no evidence sufficiently strong to disabuse his mind. The doctrines of Mesmer, the rhapsodies of the notorious Richard Brothers, and the still more disgusting exhibitions of Johanna Southcott, in turn found in him a warm disciple; and, in the last case, an easy and liberal dupe. By that impostor and her confederates, Mr. Sharp was swindled out of the bulk of his savings, under the delusion that he was purchasing estates in the New Jerusalem. So confident was he of her divine mission, that although she died several years before him, he believed, up to the hour of his own dissolution, that she was only in a trance. In the case of Brothers, he had so strong an opinion of his prophetic powers, that he engraved two plates of his portrait, lest one should not be sufficient to produce the requisite number of impressions which would be called for on the arrival of the predicted Millenium. Upon these plates he inscribed, 'Fully believing this to be the man appointed by God, I engrave his likeness. W. Sharp.' [Brothers.]

The general style of Sharp's engraving was formed from a judicious selection of the merits of all his eminent predecessors and contemporaries, from none of whom he servilely borrowed, but improved upon all by a comparison of their works with nature. The half-tints and shadows of his best engravings are peculiarly rich; and his lines combine, with the utmost freedom, a regularity and accuracy of position rarely attained without mechanical aid. In no quality of his art was he more distinguished than in the power which he possessed of imitating the various textures of the different parts of his subject, a circumstance which is most obvious in a fine impression of the portrait of John Hunter before alluded to. (*Annual Biography and Obituary*, &c.)

SHAW, THOMAS, was born at Kendal, in Westmoreland, about the year 1692. He entered at Queen's college, Oxford, where took the degree of master of arts in 1719; and, after receiving holy orders, was appointed chaplain to the English factory at Algiers. He held this post for twelve years, and did not return to England until 1734. During his absence he was chosen a fellow of his college. In 1734 he took the degree of D.D., and was elected a fellow of the Royal Society. In 1738 he published the first edition of his travels, and presented his collection of natural curiosities and antient medals and busts, which he had formed when abroad, to the university of Oxford. On the death of Dr. Felton, his college nominated him principal of St. Edmund's Hall, and at the same time he was presented to the living of Bramley, in Hants. He likewise held the chair of the regius professorship of Greek in the university until his death, which took place in 1751.

The travels of Shaw extended through countries, some of which were previously little known. He traversed the whole of antient Numidia, and visited Syria, Palestine, and the north of Egypt. His geographical details are exact and very valuable, since they furnish us with information concerning the antient and modern condition of Numidia, and Mauritania Cæsariensis. His descriptions of manners and customs are very interesting, and he appears to have neglected nothing which could enhance the value of his work. In a supplement to his travels he published an account of 600 plants which he had collected; 140 of which were previously unknown to botanists. His extreme accuracy and strict adherence to truth, form one of his chief merits, and to this Bruce bears abundant testimony.

The best edition of his travels was published in 1757, six years after his death, in one volume, quarto, which contains various maps and plates, and the supplement.

SHAW, CUTHBERT, was born in 1738 at Ravensworth in Yorkshire. He was the son of a shoemaker, but received a good education, and became usher in a school at Darlington in Yorkshire. He afterwards came to London, and was for some time an actor, but abandoned the profession for that of an author. He contributed to the periodical literature of the day, and also wrote 'Liberty, a Poem,' 1756, 4to.; 'Odes on the Four Seasons,' Lond., 1760, 4to., published under the name of W. Seymour; 'The Four Farthing Candles, 1762, 4to.; 'The Race, 1766, 4to. (the two last are satires directed against contemporary writers); 'A Monody to the Memory of a Young Lady who died in Childbed, to which is added An Evening Address to a Nightingale, by an Afflicted Husband,' Lond., 1768, 1772, 4to.; 'Corruption, a Satire,' 1769, 4to. Shaw died at London in 1771, at the early age of thirty-three, of a disease occasioned by his dissipated habits. The 'Monody' and 'Address to the Nightingale' are sometimes met with in collections of English poetry, and show that the author had some skill in versification, but little else.

SHAW, GEORGE, the younger son of the Rev. Timothy Shaw, was born at his father's vicarage at Bierton, in Buckinghamshire, on the 10th of December, 1751.

During his childhood he discovered great fondness for the study of natural history; in the cultivation of which science he afterwards attained great distinction. His energies however were not engrossed by that subject, but his talent for the acquisition of all kinds of learning was so great, that when only thirteen years old, he was fully qualified to enter at the university. He was admitted at Magdalen Hall, Oxford, in 1765, where he took his bachelor's degree in 1769, and that of master of arts in 1772. In 1774 he took deacon's orders, and during a short time discharged his clerical duties at two chapelries connected with Bierton.

An increasing love for the cultivation of natural science induced him to repair to Edinburgh, in order to pursue his favourite studies. He continued at Edinburgh for three years, where he studied medicine under Black and Cullen, and afterwards returning to Oxford, obtained the appointment of deputy botanical lecturer. In the discharge of the duties of that office he obtained a high reputation, and on the death of Dr. Sibthorp, was chosen professor of botany in his stead. It was discovered however that by an old statute of the university clergymen were declared ineligible for the office, and Dr. Shaw consequently lost the appointment.

In the autumn of 1787 he took the degree of doctor of medicine, and in the course of the same year removed to London, where he settled as a physician. On the formation of the Linnæan Society, in 1788, Dr. Shaw was appointed one of the vice-presidents, and he afterwards enriched its transactions with many valuable papers. He now began to deliver public lectures at the Leverian Museum, which were always attended by a numerous audience. Nor was he less popular as a writer than as a lecturer, and a periodical entitled the 'Naturalist's Miscellany,' which he now set on foot, was continued till his death. In 1789 he was chosen a fellow of the Royal Society, and it was not long before he gave up the practice of his profession and devoted himself exclusively to scientific pursuits. In 1791 the occurrence of a vacancy at the British Museum induced Dr. Shaw to become a candidate for the office of a librarian; and on his receiving the appointment of assistant keeper of natural history in that institution, he entirely gave up medical practice. His time during the last twenty years of his life was occupied with lecturing on natural history, publishing works on scientific subjects, and editing conjointly with Dr. Hutton and Dr. R. Pearson 'An Abridgment of the Philosophical Transactions.' On the death of Dr. Gray he was appointed keeper of the natural history in the British Museum, which office he held during the remaining six years of his life. In the midst of his useful labours however he was attacked by an illness which terminated fatally in the course of a few days, on July 22, 1813.

Dr. Shaw, at the time of his death, was in his sixty-second year. He was as much beloved for his moral qualities, as respected for his intellectual acquirements, which were of a very high order.

His principal works are: 'The Naturalist's Miscellany,' which had reached its 286th number when he died; 'A Catalogue of the Leverian Museum, illustrated with Coloured Plates,' which appeared between 1792 and 1796; and his well known systematic work on 'Zoology.' He furnished the letter-press to a very magnificent work, containing sixty beautiful prints of plants and animals, which Miller, the editor of the 'Gardener's Dictionary,' had published, but which, from the want of an accurate description of the plates, had not met with a ready sale. The most useful of his works however was his 'General Zoology, or Natural History.' This appeared in parts, and eight volumes were published durrng the lifetime of the author, who left a ninth volume prepared for the press. After Dr. Shaw's death the work was continued by Mr. Stevens, and now forms fourteen octavo volumes.

SHAWER, originally a Mamluke in the house of the vizier of Egypt, Talai-Ebn-Razik, by whom he was appointed governor of the Said. The attempt however of Razik-al-Adel, son and successor of his benefactor, to remove him from this province, led to a civil war, in which Razik was slain; and Shawer compelled the helpless Fatimite khalif, Adhed, to appoint him vizier and commander-in-chief, A.D. 1162, A.H. 558. He was however expelled in a few months by another chief named Dargham, and fled into Syria to the sultan, Noor-ed-deen [NOUREDDIN], whom he persuaded, by a promise of a third of the revenues of Egypt, to send a force under Shîrakoh [SHIRAKOH] to reinstate him; but he broke his engagement when the service was fulfilled, and called in a French army from Palestine, which drove Shîrakoh out of Egypt. A second invasion by the troops of Noor-ed-deen (1166), who was now converted into an enemy, was repulsed by the same aid. But the Christians in their turn threatened to seize on the country, and Shawer was compelled to throw himself on the mercy of the sultan for help. Shîrakoh a third time entered Egypt (1168), and expelled the Franks; but becoming suspicious of the good faith of Shawer, soon seized him and put him to death, himself assuming the vacant dignity of vizier. The fall of the Fatimite dynasty followed within three years. [SALAH-ED-DEEN.]

SHEA-TREE. [BASSIA.]

SHEARWATER. [PETRELS, vol xviii., p. 41.]

SHEBA. [SABAEI.]

SHEEN. [SURREY.]

SHEEP. The Sheep, according to Cuvier, belongs to the class *mammalia*, the young being nourished with milk from the mammæ or teats of its mother; to the order *ruminantia*, with four stomachs, and the organs of digestion disposed for chewing the cud; to the tribe *capridæ*, with horns persistent, and placed on an osseous nucleus; and to the genus *ovis*, with or without horns, but these when present uniformly taking, to a greater or less degree, a lateral and spiral direction. The forehead of the sheep is arched, and protruded before the base of the horns; there are no lachrymal ducts, the nostrils are lengthened and oblique, and terminate without a muzzle; there is no beard properly so called, the ears are small, and the legs slender. The hair is of two kinds, one hard and close, and the other woolly—the wool preponderating in proportion as the animal is domesticated. The sheep is principally distinguished from the goat by his convex forehead, by his spiral horn not projecting posteriorly, and more especially, and that in proportion to the care which is bestowed upon him, by the preponderance of wool over the hair, with which, in despite of every effort, the Cashmere goat is covered.

The history of the sheep may be traced to the remotest antiquity, for the care of it was committed to the younger son of the first man. 'Abel was a keeper of sheep.' What other animals were then domesticated is not known; but one purpose to which the sheep was devoted is recorded in the sacred volume 'Abel brought as an offering to the Lord the firstlings of his flock, and the fat thereof.' Not a word is said of this animal being used for human food until after the flood. Man ate of 'the herb of the field,'—'in the sweat of his face he ate bread;' but to Noah it was first said, that 'every thing that liveth shall be meat for him.' The probability however is, that the flesh of the sheep and other animals formed, even in the earliest period, a portion of human food; and it is recorded of Jubal, a son of Cain, that he 'was the father of such as dwell in tents and have cattle.' The tents were formed of the skins of the animals which they bred; and it can scarcely be imagined, that when the skins were thus disposed of, the flesh would be entirely thrown away. The sheep mentioned in holy writ were horned; for when Abraham had led his son Isaac to the mount of sacrifice, he was arrested by a heavenly voice, and saw behind him a ram caught in a thicket by his horns.

There is a breed of sheep now extending over the north and south of Asia, and Palestine, and Russia, and of which the flocks of the Calmucks and Tartars of the present day are almost entirely composed. They are distinguished by two hemispheres of fat commencing at the loins, gradually swelling into a considerable mass towards the rump, and presenting behind two enlargements of a more or less globular form. The owners of the modern improved breeds would find great fault with some points about them; but many of their defects have doubtless been the result of neglect.

Some naturalists have traced the origin of the sheep to the Argali or the Mouflon. The Argali is a species of mountain-sheep, found in small flocks on the high grounds of Asia, extending from the precipices of Khamtchatka in the north, to those of Mongolia in the centre, and of Caucasus in Western Asia. The Mouflon is an inhabitant of Southern Europe, Corsica, Crete, and the islands of the Grecian archipelago. They congregate in large groups, and possess all the wildness of the Argali. Neither of these however has the slightest claim to being the original parent of the sheep. They are descendants of those who have escaped from the dominion of man, and are retreating from desert to desert in proportion as the population of the country increases.

Mouflon, or Musman, of Corsica. From a specimen in the British Museum.

It will be most satisfactory to the reader to commence with the history of the British sheep, and then compare with them the breeds and management in other countries. The records of olden times are very unsatisfactory with regard to the existence of the sheep in Britain. No early historian makes the slightest mention of them. Even Cæsar, who describes so much at length the employments and habits of the British, never alludes in the most distant manner to the sheep, or the employment of its wool. The subjugation however of Britain being completed, the conquerors turned their attention to the improvement of the country; and among other things they established a woollen manufactory at Winchester, supplied by the native fleeces of the country, for from no other source could it be obtained. So well did this succeed, that the woollen cloths of Britain soon began to vie with and excell the productions of every other part of the Roman empire. The finest and most expensive dresses used on days of festivity or ceremony were procured from Britain. The sheep employed in furnishing the material of these productions were *the short-woolled breed*. Winchester was situated in the centre of a country which then, as now, could support short-woolled sheep alone.

After this, history is silent as to the sheep and its productions for some centuries, until an old chronicler gives a pleasing picture of the manners of the age when Alfred reigned, of whom it is said—

> 'His godemether ofte smal gyftes to him she kindly toke
> Vor to leve other plé, and loke upon his boke.

This godmother is described as being skilled in the spinning of wool herself, and busied in training her daughters to the same employment.

It would appear from this that *the long wool* had now begun to be employed, although the manufactures of the Winchester mills continued to be duly estimated, and, in point of fact, the cultivation of the various breeds of sheep, and the manufacture of the fleece into many different kinds of cloth, had begun to constitute the chief employment and wealth of the country; and so it has continued to the present day.

Different names are given to the sheep, according to its sex and age. The male is called a *ram* or *tup*. After weaning he is said to be a *hog*, a *hogget*, or *hoggerel*, a *lamb-hog*, or *tup-hog*, or *teg*; and if castrated, a *wether hog*. After shearing, and when he is probably a year or a year and a half old, he is called a *shear hog*, or *shearling*, or *dinmont*, or *tup;* and when castrated, a *shearing wether*. After the second shearing, he is a *two shear ram*, or *tup*, or *wether*. At the expiration of another year, he is a *three-sheer ram*, &c.

The female is a *ewe* or *gimmer lamb* until weaned, and then a *gimmer* or *ewe hog* or *teg*. After being shorn, she is a *shearing ewe* or *gimmer*, or *theave* or double-toothed ewe; and after that, a *two* or *three* or *four shear ewe or theave*. The age of the sheep is reckoned, not from the period of their being dropped, but from the first shearing.

The teeth give certain indications as to the age. The sheep has no incisor teeth in the upper jaw; but there is a dense elastic cushion or pad, and the herbage, firmly held between the front teeth in the lower jaw and this cushion, is partly bitten and partly torn asunder. The sheep has the whole of the incisor teeth by the time that he is a month old, and he retains them until the fourteenth or sixteenth month. They then begin to diminish in size, and are displaced. The two central ones are first shed, and the permanent ones supply their place, and attain their full growth when the animal is two years old. Between two and three, the next pair are changed; the third at three years old; and at four, the mouth is complete. After this there is no certain rule, until, two years more having passed, the teeth one by one become loosened and are lost. At six or seven years of age the mouths of the ewes should be occasionally examined, and the loose teeth removed, and then, by good pasture and good nursing in the winter, they may produce lambs until they have reached the ninth or tenth year, when they begin rapidly to decline. Some favourites have lingered on to the fifteenth or sixteenth year; but the usual and the most profitable method is to fatten and dispose of the ewes when they are five or six years old, and to supply their places by some of the best shearing ewes.

The rings at the base of the horns afford very imperfect indications of the age of the sheep. When untouched, they are little to be depended upon, and their natural irregularities are too often filed away by dishonest dealers.

The history of the British sheep will be most naturally divided according to the quantity and quality of the wool of the different breeds, the uses of the skin, and the quantity and quality of the flesh. The covering of the original sheep consisted of a mixture of hair and wool; the wool being short and fine and forming an inner coat, and the hair of greater length, projecting through the wool, and constituting an external covering. When the sheep are neglected or exposed to a considerable degree of cold, this degeneracy is easily traced. On the Devonshire moors, the mountains of Wales, and the highlands of Scotland, the wool is deteriorated by a considerable admixture of hair. Even among the South Downs, the Leicesters, and the Ryelands, too many *kemps* occasionally lessen the value of the fleece. It is only by diligent cultivation that the quantity of hair has been generally diminished, and that of wool increased in our best breeds.

The filaments of wool taken from a healthy sheep present a beautifully polished and even glittering appearance. That of the neglected or half-starved animal exhibits a paler hue. This is one valuable indication by which the wool-stapler is enabled to form an accurate opinion of the value of the fleece. The mixture of hair in the wool can often be detected by close examination with the naked eye, but most readily by the assistance of a microscope.

Among the qualities which influence the value of the wool are *fineness*, and the uniformity of that fineness in the single fibre and in the collected fleece. This fineness however differs materially in different parts of the fleece. It prevails on the neck, the shoulders, the ribs, and the back. It is less on the legs, thighs, and haunch, and still coarser on the neck, the breast, the belly, and the lower part of the legs. The fineness of the wool is considerably influenced by the temperature. Sheep in a hot climate yield a comparatively coarse wool; in a cold climate, they carry a closer but a warmer fleece.

The fineness of the fleece is also much influenced by the kind of food. An abundance of nutriment will increase both the length and the bulk of the wool. This is an important consideration with the sheep-breeder. Let the cold of winter come—let it continue for a considerable period, yet if the sheep is well kept, although the fleece may lose a little weight, this will be more than compensated by its fineness and increase of value. If the sheep however is half-starved while he is exposed to unusual cold, the fibre of the wool, although perhaps somewhat finer, will be deficient in weight and strength and usefulness.

That which is called *trueness of staple*, or the fibres being of an equal size, is of much importance in the manufacture of wool, for whenever the wool assumes an irregular and shagged or *breachy* appearance, there is a weakness in the fibre and will be an irregularity in the manufacture, especially if the fleece is submitted to the operation of the comb. Connected with this, and a most important quality, is the *elasticity* of the woolly fibre—the disposition to yield, or submit to some elongation of substance, some alteration of form, when it is distended or pressed upon, and the energy by means of which the original form is resumed as soon as the external force is removed.

Referrible to this elasticity or yielding character of the wool is its *pliability* and *softness*, and without which no manufacture of it can be carried to any degree of perfection. The last quality which it is necessary to mention is its *felting* property, that quality by which it may be beaten or pressed together and worked into a soft and pliable substance of almost any size and form. It would seem that the process of felting is of far older date than that of weaving, and it is still continued not only by the nomadic tribes of south-eastern Europe and of Asia, but it is made occasionally to vie with the finest productions of the loom.

Some late microscopic observations have unravelled the whole mystery of felting, and of the employment of wool in almost every form. The fibre, examined under a powerful microscope, appears like a continuous vegetable growth, from which there are sprouting, and all tending one way, from the root to the other extremity, numerous leaves, assuming the appearance of calices or cups, and each terminating in a sharp point. It is easy to conceive how readily one of these fibres will move in a direction from the root to the point, while its retraction must be exceedingly difficult, if not impossible. It was a fibre of Merino wool that was first submitted to microscopic observation, and the number of these serrations or projections counted. There were 2400 in the space of an inch. A fibre of Saxon wool finer than that of the Merino, and of acknowledged superior felting quality, was substituted. There were 2720 serrations. A fibre of South Down wool, in its felting power well known to be inferior to that of the Saxony and the Merino, was placed in the field of vision. There were only 2080 serrations in the space of an inch, or 640 less than the Saxony exhibited. The Leicester wool is acknowledged to possess a less felting property than the South Down. There were only 1860 in the space of an inch.

There can be no doubt as to the structure of the woolly fibre. It consists of a central stem or stalk, from which there spring at different distances circlets of leaf-shaped projections, possessing a certain degree of resistance or of entanglement with other fibres, in proportion as these circlets are multiplied and they project from the stalk. They are sharper and more numerous in the felting wools, and in proportion as the felting property exists. They are connected with, or, it may be confidently asserted, they give to the wool the power of felting, and regulate the degree in which that power is possessed.

The skin of the sheep is often partially tanned, and then used in the common sorts of book-binding; or it is manufactured into parchment, and becomes exceedingly valuable on account of its durability. Immense numbers of lambskins are dressed in a peculiar way, and converted into gloves with the wool remaining on them, or used in some countries for the linings of valuable garments. It is scarcely credible to what degree vanity and cruelty are sometimes carried. The ewe is slaughtered a little before the time when her pregnancy would have expired, and the lamb is taken from the womb and immediately destroyed. It is supposed that the fur nearest to the skin is more beautiful than could have been obtained from the same animal after birth.

As for the carcase of the sheep, it is comparatively lately that even in Great Britain it has been regarded in the light that it deserves. In many foreign countries it is disliked, or at least rarely eaten. The Calmucks and Cossacks seldom touch it. Even in some parts of America there is a prejudice against it. It is an object of little or no value in Spain; and, except among the poorest, it is not there considered fit for food. Since the British sheep-master has begun, and judiciously, to look more to the profit to be derived from the carcase—since the system of artificial feeding has been brought to so great perfection, and a far greater number of sheep can be fed and perfected on the same number of acres, perhaps the wool may have somewhat altered in character. It has grown in length, and it has increased in bulk of fibre. It has not deteriorated, but it has changed. If no longer fit for the purposes to which it was once devoted, it has become suited to others. The increase of the number of fleeces and the increase of weight in each fleece go far to compensate for the diminution of price, while the improvement of the carcase more than supplies the deficiency, if in truth there was any deficiency to supply.

It has been proved by authentic documents, that the number of sheep in the united kingdom has been more than trebled in the last 150 years. How was this managed? for it was supposed that no more than a given number of sheep could be kept on a certain space of ground. The quantity of ground was rapidly increased, and much that was formerly deemed unworthy of cultivation was rendered productive; but more effective than this was the new system of husbandry that was introduced—the artificial or turnip husbandry, by which a regular supply of food could be provided for every season. With this was connected the attempt to fatten sheep still more expeditiously than could be accomplished by any former method. This succeeding beyond his most sanguine expectations, the sheep-master next attempted to increase the size of the breed. He had not however sufficiently taken into account a consequence of this. As the carcase increased in size, the wool became longer, heavier, and coarser. The breeder would not see this at first; but he soon began to find that the manufacturer would not purchase it, for it could not be used for the purposes to which it was formerly applied. His stock accumulated. It weighed heavily on his hand. Still he would not believe that his once favourite and yet valuable wool was deteriorated, although he was compelled to sell it at a diminished price. And what was the consequence? Why that he had no just reason to complain; for the early maturity of the sheep and the continued value of the wool for many important purposes rendered his profits greater than they were before he had begun to alter his system.

It will now be proper to take a rapid survey of the different breeds of sheep, commencing with the *South Downs;* for by them or their congeners the first manufactory at Winchester was supported. The South Downs, and the Hampshire and Wiltshire breeds, were formerly, according to Mr. Ellman, of 'a very small size, and far from possessing a good shape, being long and thin in the neck, high on the shoulders, low behind, low on the loins and on the rumps, the tail set very low, perpendicular from the hip-bones, sharp on the back, the ribs flat but good in the leg, although having big bones.'

It is pleasing to compare this with the account given by the same breeder of the South Downs of the present day—the change being effected by him and a few spirited individuals. 'The head small and hornless; the face speckled or grey, and neither too long nor too short; the lips thin, and the spaces between the nose and the eyes narrow; the under-jaw fine and thin; the ears tolerably wide, and well covered with wool; the forehead also, and the whole space between the ears well protected by it, as a defence against the fly.

'The eyes full and bright, but not prominent; the portion of the frontal bone arching the eye not too prominent, that it may not form a fatal obstacle in lambing.

'The neck of a medium length, thin towards the head, but enlarging towards the shoulders, where it should be broad and high, and straight in its whole course above and below; the chest wide, deep, and projecting between the fore-legs, indicating a good constitution and a disposition to thrive. The shoulders on a level with the back, and not too wide above, but bowing outward from the top to the breast, leaving room for the springing rib behind.

'The ribs coming out horizontally from the spine, extending far backwards, and the last rib projecting more than the others. The back flat from the shoulders to the setting on of the tail; the loin broad and flat; the rump long and broad, and the tail set on high, and nearly on a level with the spine; the hips wide; the space between them and the last rib on either side as narrow as possible, and the ribs presenting a circular form like a barrel.

'The belly as straight as the back.

'The legs neither too long nor too short; the fore-legs straight from the breast to the foot, not bending inward at the knee, and standing far apart both before and behind; the hocks having a direction outwards, and the meeting of the thighs being particularly full; the bones fine, but having no appearance of weakness; and the legs of a speckled dark colour.

'The belly well defended with wool, and the wool coming down before and behind to the knee and to the hock; the wool short, close, curled, and free from spiry projecting hairs.

'The South Down is adapted to almost any situation in the midland part of England. It has a patience of occasional short keep, and an endurance of hard stocking equal to any other sheep; an early maturity scarcely inferior to the Leicesters, and the flesh finely grained, and of good flavour.'

These sheep occupy the whole of the upper and under-hill grounds of Sussex. Mr. Luccock calculated that within a certain distance from the downs, there were 864,000 sheep of this breed, a number which is only to be accounted for by the great quantity of artificial food that is raised on the arable part of every farm. It has often been attempted to introduce the Leicesters into the neighbourhood of the South Downs, but they could not be driven two or three miles twice every day from the pasture to the fold, and the fold to the pasture.

According to Mr. Ellman, the artificial food resorted to at the beginning of spring, and soon after lambing, is green rye; but it must be very cautiously given, on account of its occasionally producing diarrhœa or dysentery. This bad effect however may be prevented by removing the ewes once in the day to old pasture-ground.

The rye being fed off or running to seed, the ground is ploughed in May for turnips or rape. Rye-grass succeeds to the rye until the latter end of June, when the winter tares will come in, and which should be sown from the beginning of October to that of May, in order that one crop may follow another in proportion as it is wanted.

Tares, clover, or rape next take their turn; the tares perhaps are somewhat inferior to the others. As a winter food, the Swedish turnip comes in until lambing time; but not after that, lest it should produce purging in the lambs.

About the middle of October the rams are admitted to the ewes, and a plentiful allowance of nutritious and stimulating food will have considerable influence in increasing the number of lambs. Much to the credit of the breeder, great care is taken of the sheep during the lambing time. The ewes are either driven home, or there are sheltered places constructed in the fields.

The average dead-weight of the South Down wether varies from 8 to 11 stones; but at the Christmas show there are usually some pens in which the weight is double that. The average weight of the fleece used to be 2 lbs.; but from the altered system of management it is now at least 3 lbs. in the hill-sheep, and nearly 4 lbs. in the lowland-sheep. This wool has likewise changed its character. It has become a combing instead of a carding wool. Formerly devoted to the manufacture of servants' and army clothing, or being sparingly mixed with other wool, it is now used for flannels and baizes, and worsted goods of almost every description, thus becoming of considerably increased value. The hogget wool is particularly improved· it is finer than the other long wools, and is applicable to many new and valuable purposes.

The South Down sheep have succeeded admirably in all the southern districts of the kingdom; but the northern hills have occasionally been too cold for them. Crosses between the South Down and almost every breed of middle-wool sheep have answered well; while in counties where it could have been least expected, the old breed is in a great measure superseded by the South Downs.

In the adjoining county of Kent many South Downs are kept, and much prized; but in others, and on the marshes and their neighbourhood, they have given way to the Romney Marsh sheep.

The South Down differ materially in the different districts of Surrey. In some of the lofty and barren heaths a small and profitable sheep, distinguished by the name of 'the Bagshot,' still prevails. 'The old Wiltshire sheep' are occasionally seen here, while 'the Dorsets' have possessed themselves of many extensive districts, and are employed in supplying the London market with early lambs. Still however the South Downs are numerous, and vie with any of the others in excellence and profit.

The old Berkshire breed is now rarely seen; the South Downs have usurped their place, and especially in the chalky districts. In Hampshire we can imagine that we recognize some of the old and valuable breed that supplied the Winchester manufactory. They are in a great measure the South Downs of the present day, or are very deeply crossed by them. The West Counties Down sheep is an importation from some of the western counties, particularly from Somersetshire; but it is gradually yielding to the South Downs.

The old Wiltshire breed of sheep, the largest and the heaviest of the fine-woolled sheep, has gradually passed away. They were crossed by the South Downs until every trace of the old breed had vanished, and a useful variety remained, which would have been called true Sussex sheep, only they were of a somewhat larger size, and lighter colour, and a lighter finer fleece. This breed is now rapidly yielding to the true South Downs. In the lower-land pastures of Wilts a breed is found evidently derived from the South Downs, but larger in size, and with a heavier fleece.

We pass into Dorsetshire, and we find a very different and valuable breed of sheep. They are white; the face long and broad, with a tuft of wool on the forehead; the shoulders low but broad; the chest deep; the loins broad; and the bone small; a hardy and useful sheep. Their chief peculiarity is the forwardness of the ewes, which supply the market with lamb, when it produces the highest price. If they have plenty of nutritious food, the ewes will be in lamb as early as April, so that the young one will drop in September, and be ready for the market at Christmas.

A very profitable variety is found in a cross between the South Down and the Dorset sheep. The carcase is increased, and the wool is rendered more valuable. The greater part of Dorsetshire is however occupied by the South Down sheep, and, on the whole, it is a far more profitable sheep than the pure Dorset.

Various breeds of short-wool sheep still prevail on the hills of Devonshire and Cornwall. They are evidently allied to or descended from the Dorset, although it must be confessed that the resemblance is not very flattering to the latter. The fleece is short, and mingled with too many kemps, but the mutton is supposed to possess a peculiarly delicate flavour, and great quantities of it are sent to the London market. They are much improved by a cross with the Leicesters. The South Downs have rarely succeeded in either county, except in the most cultivated parts. In Cornwall especially the varied and humid climate has been very unfavourable to them.

Returning through Somersetshire, we again meet with the South Downs, either pure or materially improving the native breeds. The Wiltshires and the Dorsets have also established themselves with advantage in many parts of the county. These breeds have even penetrated to the hills of Mendip, and the wild sheep of the district have nearly or quite disappeared. In Gloucestershire, except on the hills on the northern and eastern parts of the county, the short-woolled sheep, even those belonging to the Ryeland breed, have given way to the Cotswolds or the Leicesters. In Monmouthshire, with the exception of the small native breed on the hills, and a few flocks of South Downs which yet remain in different parts, the short-woolled breeds have materially diminished.

In Herefordshire we still meet with a few flocks of that breed of sheep, which was in former times the pride of the agriculturist—the Ryelands. They are small, polled, with white faces, the wool growing close to and almost covering the eyes, the carcase round and compact, the animal quickly fattening, and the superabundant fat accumulating within. They are hardy, and peculiarly free from disease. They are particularly distinguished by the fineness of their wool. The number and the nature of the serrations place it precisely where the manufacture had long done. It is decidedly superior in fineness and in fullness to the South Down, but yields in both of these qualities to the Merino wool. It was attempted to cross the Ryeland sheep with the Merino, in order to increase the value of the wool. To a certain extent this was accomplished, but it was at the expense of the carcase. The Merinos were then crossed by the Ryelands, with a view to the improvement of form, and greater tendency to fatten, but this also failed. While these experiments were proceeding, arrived the period when the fleece of the short-woolled sheep, both the South Down and the Ryeland, was materially changed by the altered system of sheep-husbandry that was introduced, and the wool of both was rejected by the manufacturer for the purposes to which it had hitherto been applied. The author of 'Sheep,' published by the Society for the Diffusion of Useful Knowledge, states, that in the year 1500 Herefordshire contained 500,000 short-woolled sheep, furnishing 4,200 packs of wool, the weight of the fleece being two lbs. No long wool was then to be found in the county. In 1828 the number of packs of short wool had diminished to 2800, but no fewer than 5550 packs of long wool were grown, and the average weight of all the fleeces was four lbs. Such was the effect produced in the very territory and domicile of the finest-woolled sheep that England could produce. This fact speaks volumes as to the revolution that is going forward, and plainly points out the farmer's interest and duty.

Shropshire once contained several varieties of the short or middle-woolled breeds of sheep, and among them were the old Shropshires, the Mountain sheep, the diminutive Shawberry, the Mynæ or Mouna sheep, and more particularly the Morfe Common, whose fleece was once scarcely equalled even by the Ryeland. It was the country of the short-wools, but now they have rapidly diminished, or almost disappeared before the Cotswolds and the Leicesters.

It is the same with the Cannock-heath breed in Staffordshire. Even the Tedderly breed has shared the same fate. Some few short-woolled sheep remain on the commons, and some valuable flocks of the South Downs are sparingly scattered over the country.

The Delamere sheep is the only short-woolled breed deserving of notice in Cheshire. The wool is short and fine, and still used by some manufacturers, but it is no longer used for any of the fine cloths.

The different districts of South Wales afford a small and valuable breed of sheep, principally used for the supply of the London market, where the Welsh mutton is in considerable request. These sheep seem scarcely to have changed their character for many centuries, but some crosses of the South Downs have been lately introduced, and even some flocks of this sheep have begun, and with much prospect of advantage, to spread over the lower part of the country.

In North Wales, and particularly in Anglesea, the old South Down re-appears, or a sheep whose likeness to the unimproved South Down is too striking to escape observation. The purest and best blood that the mountains of Wales are now supposed to be capable of producing is found at the foot or on the declivities of Cader Idris. Al. the hills of North Wales are covered with sheep, which are sent in the spring from all parts of the low country. The strongest wethers remain on the mountains during the winter, and without the slighest artificial provision for their support. The others are brought down to the low ground about Michaelemas to be returned in the spring.

Lancashire contains few sheep. The principal middle-woolled breed is the Woodland horned sheep, spreading from the Yorkshire side of the county to the very extremity of Scotland, intermingling with, and improving or deteriorating every other breed, and themselves indebted for their best qualities to the South Downs or the Leicesters. The short-woolled sheep of Westmoreland scarcely deserve notice, except as connected with the Herdwicks and the Cheviots. The former are of Scottish origin. They were brought by a ship from the north which was stranded on the coast of Cumberland. They were said to be small, active, polled, with speckled legs and face, of a finer fleece than the common black sheep, hardy, and defying any degree of cold. This peculiar quality was early noticed, and gave them a value which was not overrated. By degrees they spread over the mountainous districts, and other breeds were crossed by them on account of this valuable property.

At three or four years old they weigh nine or ten lbs. per quarter, and the wool is finer than that of the common black sheep.

The Cheviots extend from Westmoreland far into Scotland. Their birth-place, or where they were originally observed, and are still found in their greatest purity, is the Cheviot Hills, in Northumberland. They differ essentially from both the black and the dun-faced breeds by which they are surrounded, but neither history nor tradition has given the slightest clue to their origin. The following is a description of the pure breed, thirty years ago, before they began to be crossed by the Leicesters:—'The head polled, bare and clean, with jaw-bone of a good length; ears not too short, and countenance of not too dark a colour; neck full, round, and not too long, well covered with wool, but without any coarse wool depending beneath; shoulders deep, full, and wide; chest full and open; chine long, but not too much so; straight, broad, and wide across the fillets; horns round and full; the body in general round and full, and not too deep or flat either in the ribs or flanks; the fleece fine, close, short, and thick-set, of a medium length of pile, without hairs at the bottom, and not curled on the shoulders, and with very little coarse wool on the hips, tail, or belly.'

Sir John Sinclair adds the following account of them:—'Perhaps there is no part of the whole island where, at first sight, a fine-woolled breed of sheep is less to be expected than among the Cheviot Hills. Many parts of the sheep-walks consist of nothing but peat-bogs and deep morasses. During winter the hills are covered with snow during two, three, or even four months, and they have an ample proportion of bad weather during the other seasons of the year, and yet a sheep is to be found that will thrive even in the wildest part of it. Their shape is excellent, and their fore quarters in particular are distinguished by such justness of proportion, as to be equal in height to the hinder ones, which enables them to pass over bogs and snows through which a shorter legged animal could not penetrate. They have a closer fleece than the Tweeddale and Leicester breeds, which keeps them warmer in cold weather, and prevents either rain or snow from incommoding them. They are excellent snow-travellers, and are accustomed to procure their food by scraping the snow off the ground with their feet. They have never any other food but the grass and natural hay of their own fields, except when it is proposed to fatten them. They weigh from twelve to eighteen lbs. per quarter, and their meat is fully equal to any that the highlands can produce.'

The wool is inferior to that of the South Downs. It is not so fine as before the attempted improvement of the carcase, and the use of it is abandoned in the manufacture of fine cloth.

There are many flocks of pure Cheviots, but in the majority of the flocks there is a cross of Leicester blood.

The other breed of short-woolled sheep which contend with the Cheviots in number and value, is the *black-faced Scots*. They extend from Lancashire to the very north of Scotland. The males are mostly horned, the horns of a spiral form, but the females are frequently without horns. The faces and legs are always black or mottled: they are covered with wool about the forehead and lower jaw: the fleece is long and somewhat coarse. The carcase is peculiarly compact; so much so, that on account of the shortness, roundness, firmness, and handsomeness of the carcase, it is called the *hort* sheep, in opposition to the Cheviots or *long* sheep. Great numbers of these sheep are sent to the London market. The weight of the carcase does not differ materially from that of the Cheviot, and the fleece weighs about three pounds after it is washed. These sheep have been improved by selection, but have derived little advantage from any of the crosses that have been tried.

As these are the prevailing breeds in the northern parts of the kingdom, if not to the exclusion of the short horns and the Leicesters, yet being far more numerous than they, it may not be interesting to institute a brief comparison of their respective merits. The three important points with respect to sheep in such localities are the weight and value of the wool, the carcase, and the degree of hardihood.

As to the wool there can be no question. The weight of the individual fleece may be somewhat, but not a great deal, in favour of the black-faced breed; but in point of value and the price which the wool will obtain, the advantage is most decidedly in favour of the Cheviots. As to the carcase, the Cheviot is ready for the market a full twelvemonth before the other. If so many sheep cannot be kept on the same quantity of ground, the quantity of meat that can be produced is greater, and consequently the profit of the farmer is greater; and as to hardihood, they are both of them excellent breeds, and it might be difficult to decide which wool would most successfully endure the hardships of a Highland winter. The adjudication on the whole is most decidedly in favour of the Cheviot breed, with this exception perhaps, that on the wildest of the Grampian or other similar hills the black-faced mountain sheep may have the best chance of doing well; and the acknowledged fact is, that in almost every northern district the Cheviots are rapidly superseding the native black-faced sheep.

One other breed of short-woolled sheep must be mentioned before we return to the southern part of the kingdom—those which inhabit the Shetland Islands. They frefrequently weigh not more than seven or eight pounds a quarter, and yield from one and a half to two pounds of fine and soft wool, either of a white, or grey, or even black colour. It is the finest wool which Great Britain can produce, and is used for the better sort of stockings, and for several light and extensive manufactures.

In Northumberland the *mugg* sheep, so called from their faces being completely covered with wool, have disappeared. In Durham there are few besides long-woolled sheep. The eastern and western moorlands of Yorkshire contain many short-woolled sheep—the Cheviots, the black-faced Scots, the South Downs, and some flocks peculiar to the moorlands, as the Penistone sheep with mottled or coloured faces and legs. In Lincolnshire some flocks of true South Down sheep are still to be found, in the northern and western districts, but the greater part of them have mingled with or given way to the long-woolled sheep. The beautiful little sheep on Shirwood Forest, not yielding more than eight or nine pounds to the quarter, and the delicate fleece which covered them, have passed away. In Derbyshire, Leicester, Rutland, Warwick, Northampton, Huntingdon, Cambridge, Bedford, Hertford, Buckingham, and Oxford, some flocks of the middle-woolled sheep are to be found, and many valuable crosses between the South Downs and the Norfolks, but on the whole the short-woolled sheep have declined.

Norfolk and Suffolk used to possess their peculiar breeds, with the face long and thin, flat on the forehead, and flattened at the muzzle, the legs long, the face and legs mottled, or liked the more if they are of a pure black, the fore-quarters deficient, the hind ones sufficiently developed; fattening readily at two years old; bearing without fatigue a journey to a distant fold, and therefore of great value to the farmer in rendering many a plot of land productive by occasionally affording almost the only manure that could be obtained. These, together with the disposition to feed even on the coarsest pastures, were qualities which rendered the Norfolks great favourites in their own country. Presently however came the comparison with the modern South Downs, who were remarkable for their quiet and contented disposition, compared with the wild and restless character of the Norfolks; the smaller quantity of food which they were thus enabled to consume in proportion to their size; the superior weight which they acquired in proportion to the food which they consumed; the greater quantity of wool which they yielded; the superior quality of that wool; the greater number of lambs that were produced; the tender and more attentive nursing of these lambs; all these circumstances united to prove the superiority of the South Downs. It was attempted to cross the rival breeds, and the experiment was attended by evident advantage to the Norfolks; but by degrees the pure breed was valued as it deserved to be, and the breed of the old Norfolks evidently and extensively diminished.

Most of the Norfolk flocks have now been crossed by the South Downs or the Leicesters. The animal has, in consequence of this, increased in size and in early perfection, and weight of fleece; and that fleece, more useful for many purposes, is almost doubled in value. Lord Western has obtained a cross of the South Down and Hampshire, omitting entirely the Norfolk, and with apparent advantage.

We now arrive at the *Long-Woolled Sheep*. Their early history is obscure; but in the twelfth century there are accounts of exportations of wool and of sheep, evidently belonging to the long-woolled variety, as appears from the manufactures in which these fleeces were employed. In the thirteenth century, certain Florentine merchants were permitted to export to Flanders more than a thousand sacks of combing or long wool. In the fourteenth century the thousand had extended to a hundred thousand, and that continued during many years; and in the fifteenth century Edward IV. permitted his sister Margaret to export annually during her life 2000 rams to Flanders and Holland. This well explains the resemblance between the sheep on the two shores; and the traveller will cease to wonder that on the northern coast of France, and through nearly the whole of Flanders, he fancies that he recognizes the identical sheep of the Kentish pastures. In the same century, a royal present of Cotswold wool was sent to the king of Portugal.

There is much more similarity between the varieties of the long-woolled sheep than those of shorter fibre. The deficiency of horns, the form of the head, the expression of the countenance, and the white faces and legs show that they had one common origin; while the colour and weight and uses of the wool speak their common origin.

The following description of the *new Leicester* by Mr. Culley will, to a very considerable degree, serve for all the varieties of the long-woolled sheep. The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forwards. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backwards; the neck full and broad at its base, but gradually tapering towards the head, and particularly fine at the junction of the head and neck. The neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the poll. The breast broad and full; the shoulders also broad and round, and no uneven or angular formation where the shoulders join either the neck or the back, particularly no rising of the withers, or hollow behind the situation of those bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the legs small, standing wide apart, no looseness of the skin about them, and comparatively bare of wool. The chest and barrel are at once deep and round in the ribs, forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home. No irregularities of line on the back or the belly; but on the sides the carcase very gradually diminishing in width towards the rump. The quarters long and full, and as wide as the fore-legs. The muscles extending down to the back, the thighs also wide and full. The legs of a moderate length; the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer.

Such is the Leicester sheep as Bakewell made him. He found him as different an animal as it was possible to conceive—flat-sided, large-boned, coarse-woolled, slow to fatten, and his flesh of little value. Were there room for its insertion, a detailed history of the different steps of the changes would be most interesting to the reader. The means were simple, and the effect was almost magical The principle was, that 'like produces like;' and therefore he selected a few sheep with aptitude to fatten, with a disposition to produce an unusual quantity of valuable meat, with little bone and offal, and with quietness of temper; and from these he exclusively bred. He cared not about near or distant affinities, but his object was to increase every good point, and gradually to get rid of every bad one. They were not different sorts of sheep that he selected, but the best of the breed to which he had been accustomed.

His sheep were smaller than those of his neighbours, but they retained every good point, and had got rid only of the bad ones. The alteration was rapid as well as great in his own flock, and the practice which he introduced of *letting* some of his rams quickly extended the benefit of his system far and wide. The first ram which he let was in the year 1760, at 17*s.* 6*d.* for the season. In 1789 he let one ram for 1000 guineas, and he cleared more than 6000 guineas in the same year by the letting of others. After that, so great was the mania, or rather the desire for improvement, that Mr. Lawrence calculates that 100,000*l.* were annually spent by the midland farmers in the hiring of rams.

Such was the origin and the eventual triumph of the new Leicester breed of sheep. They have spread themselves to every part of the United Kingdom. There are few other varieties of long-woolled sheep which do not owe much of their excellence to the new Leicesters, and even some of the short-woolled flocks are deeply indebted to the breed introduced by Bakewell. There is no other species of sheep that possesses so decided a propensity to fatten—or that is prepared for the butcher at so early an age. It will not however thrive on a poor soil, nor if it is compelled to travel far in order to procure its food; but on soils of a moderate quality there is no other sheep so profitable. Other breeds, as the Teeswater and the Lincoln, may be superior in size, but it is at an expense of time and of food, and eventually a palpable deterioration of flesh and diminution of profit. The new Leicesters on fair keep will yield a greater quantity of meat, for the same quantity of food, than any other breed of sheep. The meat is of a peculiar character. It is disliked by some on account of a supposed insipidness. The fatty matter is too much introduced between the muscular fibres, and there may be the appearance and the taste of a mass of luscious fat. This however is the fault of the breeder, and not of the animal; it marks the point to which the fattening process should be carried, and where it should stop. It is the fault of the grazier if he converts that which is an excellence into a fault.

There are accounts of the Leicester sheep attaining a very great weight. Two prime wethers exhibited by Mr. Painter at the Smithfield cattle-show in 1835 weighed 165 and 155 lbs. It should however be remarked that the new Leicester sheep has a smaller quantity of bone in proportion to its weight than any other sheep.

The deficiency of the fleece was formerly objected to in the new Leicester sheep. The truth of the matter was that, with the early breeders, the fleece was a perfectly secondary consideration, and comparatively disregarded. There is now little cause for complaint on this head. The wool has considerably increased in length, and it has improved both in fineness and strength of fibre. It averages from 6 to 7 lbs. the fleece, and the fibre varies from five to more than twelve inches in length. Like all other British wools it is applied to a purpose different from that to which it was formerly devoted, and is mostly used in the manufacture of serges and carpets.

The chief value of the new Leicester breed consists in the improvement which it has effected in almost every variety of sheep with which it has been crossed. Most of the breeders of the South Downs were at first averse to admit a cross with the Leicesters; but when the wool of the South Downs began to be applied to purposes very different from those to which it had been formerly devoted, a cross with the Leicesters was reluctantly attempted. A sheep was produced, probably not so hardy, but coming earlier to the market, yielding a longer and a finer fleece, of nearly double the weight and with a combing wool adapted for many valuable purposes.

Many of the Dartmoor and Exmoor sheep have obtained earlier maturity, an increased size, and a more valuable fleece by a cross with the Leicesters. In Somersetshire the Bampton sheep have decidedly increased in value by a cross with the Leicesters. The Ryelands, now that their wool is no longer employed in the manufacture of fine cloth, have materially profited by crosses with the Leicesters: the profit from the carcase is increased, and the wool has a readier sale. In Worcestershire and Staffordshire the advantage of a cross with the Leicesters is acknowledged by every one who has ventured to make the experiment. In South and in North Wales they have found powerful antagonists in the Cotswolds; but in Lancashire, in Westmoreland, and in Cumberland, the native short-woolled sheep have been crossed by the Leicesters with considerable benefit.

In Northumberland the black-faced sheep are numerous, and it is the native country of the Cheviots; but the valleys and plains, and these are numerous and fertile, will bear the larger Leicester breed. Some attempts have been made in Northumberland to cross the Leicester breed with the large and coarse rams of Teeswater or old Lincolnshire breeds, but the experiment has almost uniformly failed, for the produce has had inferior wool and inferior flesh, and has been defective in form and slower in growth, with a much lighter carcase.

It is however difficult to select any part of the kingdom into which the Leicester and the South Down sheep have not penetrated, and where they have not materially improved the native breed. The weight both of the sheep and of the fleece have been increased, and the farmer actually derives a better remuneration from his flock than when the wool was short and fine and of little weight, although it obtained a better price.

A short account must be given of the other breeds of long-woolled sheep, although some of them are rapidly passing away. The Teeswater, inhabiting the southern districts of Durham and the north of Yorkshire, was once in considerable request on account of the weight of its carcase, the goodness of its flesh, and the remarkable degree in which the ewes were prolific. Its greatest fault was that it was too heavy for the lowlands in which it was placed, and the pasture was trodden down and destroyed. Some of the Leicesters found their way to the banks of the Tees, and the old breed was crossed by them. The carcase became somewhat smaller, but it was more compact and profitable. More mutton was produced on the same quantity of land, and, after a considerable time, for the improvement was always slower with regard to the wool than the flesh, the fleece became finer and closer. The old breed of this and the neighbouring counties gradually diminished and almost disappeared.

The largest and most ungainly breed of sheep was the Lincolns, 'hornless, with long, thin, and weak carcases, large bones, weighing from 20 to 30 lbs. a quarter; the wool averaging from 8 to 14 lbs. the fleece; the sheep a slow feeder, and the flesh coarse-grained.' This is the account given of them by a good, but a prejudiced observer, Mr. Culley. In fact, while Bakewell and his admirers were almost neglecting the fleece, the Lincolnshire farmer was quite as inattentive with regard to the carcase. Both parties were wrong. The old Lincolnshire sheep yielded a wool which in quantity and in quality was unrivalled, while the Leicesters could boast of a disposition to fatten which the other could never equal. At length the attempt was honestly made to amalgamate the valuable qualities of the two breeds. In consequence of the cross, the wether attained its maturity a full year sooner than it was accustomed to do, and the fleece became finer and improved in colour, but it was shorter and more brittle, and not fitted for some of its former purposes. On the whole, a great improvement has been effected both in the carcase and the fleece, and so satisfactory did this prove, that it is now difficult to find any sheep in Lincolnshire that have not been crossed with the Leicesters. This cross is deeper on the wolds than in the marsh lands, which may serve to account for the difference of the fleece in the two. The breed of these sheep generally has been greatly increased since the introduction of the turnip system.

Among the long-woolled sheep that have been improved by the admixture of the old and new long-woolled breeds and the altered system of husbandry, the inhabitants of Romney Marsh must not be forgotten. From time immemorial a peculiar and highly valuable breed was cultivated there. The produce in wool and the thickness in stocking were scarcely equalled in any other breed or situation. The Kentish men obstinately resisted every encroachment on their favourite breed, and predicted disappointment and loss in every possible form. 'For a while,' says the author of the work on Sheep already referred to, 'it seemed as if they had reason on their side, for the size of the sheep was considerably lessened, and the wool was not so valuable, nor yielded in its former quantity. By degrees however it began to be found that these smaller, deeper, closer and more compact sheep weighed heavier than the old long-legged and long-bodied ones; that they did not consume so much food, that the hard stocking of former days might be increased, that they were ready a full year sooner for the market, and therefore became far more profitable. That the fat formed more on the exterior of the animal, where it was advantageously placed for the farmer and the consumer, and did not accumulate within for the profit of the butcher alone; and that, by careful selection, although the wool was somewhat shorter and lighter, it was improved in firmness and colour and felting property.'

Some valuable breeds of long-woolled sheep are found in the South Hams in Devonshire, extending from Axminster to Dartmoor, and from the north of Devon to the vale of Taunton, under the name of the Bampton sheep, and also, but smaller in number and size, in the neighbourhood of Exmoor.

The Cotswold sheep, so called from the cots or sheds in which they were housed, formerly inhabited the counties of Gloucester, Hereford, and Worcester. They were a long-woolled breed, yielding in the fifteenth century a description of wool much valued on account of the fabrics in the construction of which it was employed. Both the sheep and the wool were largely exported. Even they, like the rest, have amalgamated themselves with and been in a manner lost among the Leicesters. They were taller than the present sheep, flat-sided, deficient in the fore-quarter, but full in the hind-quarter, not fattening so early, but yielding a long and heavy fleece. Many of these good qualities have been preserved, and to them have been added that which is of so much importance to the farmer, the capability of rearing and fattening so many more sheep on the same quantity of land, and of bringing them so much earlier to the market.

The *Irish* sheep, like those in Great Britain, are divided into the short and long-woolled breeds. The *short-woolled* are most numerous in the mountains of Wicklow. The head is small and bare; the general proportions good if there were somewhat more substance; the legs small and clean; the fleece coarse and wavy, or occasionally matted, and yielding a fleece of from 2 to 3 lbs., which is appropriated chiefly to the manufacture of flannel. Many of the flocks have with much advantage been crossed with the South Downs, in defiance of, the prejudice and jealousy of a proportion of the Irish farmers. The progenitors of the *Irish long-woolled sheep* seem to have been as ill-bred and as unprofitable as the worst of the class in England; but the Leicester breed has found its way to Ireland; it struggled for a while against prejudices and difficulties of every description, and at length has completely triumphed. The Irish sheep which are now brought so plentifully to the English market will scarcely yield to the best improved Leicesters that any part of Great Britain can produce.

The English wool being, from the increased coarseness of the fibre, rejected by the manufacturer in the construction of fine cloths, recourse was had to foreign wools, and to those chiefly that were derived from the Merino sheep. As early as the commencement of the Christian æra, the wool of the Spanish sheep was in great request for the production of the most costly dresses. In less than half a century afterwards we find Columella busily employed in improving the Spanish sheep, and the effect of his labours remained during the long dark ages that succeeded. [COLUMELLA.] The Merino flocks withstood the baneful influence of almost total neglect, and continued, to a greater or less degree, to furnish the finest and the choicest wool.

By degrees the Merino sheep found its way to almost every part of the European continent, and by careful management its fleece rapidly increased in fineness and in usefulness. In 1834 the prime wool produced in Spain readily found a sale at from 3*s*. 6*d*. to 4*s*. per lb. In Saxony it reached to 5*s*. 3*d*. per lb., and in some parts of Hungary to 5*s*. 6*d*. In Australia the cultivation of the Merino sheep and its fleece has proceeded most rapidly and prosperously. The best of its wool when it reached England was sold at 4*s*. 6*d*. per lb. That from Van Diemen's Land was not half so highly estimated, but it has since improved. The wool of our primest South Down hoggets would at that time rarely produce more than 2*s*. 2*d*., and yet the farmer was better off, for he obtained an earlier and a better and a larger carcase, and a greater quantity of wool.

Our notice of the sheep in other countries must be exceedingly brief. Along the western coast of France the traveller continually meets with the semblance of those noble animals which Edward IV. permitted to be annually sent to improve the breed of foreign sheep on the other side of the Channel. The wool is now about the same in value as that of our inferior Lincoln or Kentish. In Normandy is a larger and a coarser variety of the same breed. In the old province of Maine succeeds the old unimproved, long, and thin-carcased native French breed. In Bretagne and Gascony will be recognised the native short-wools, some of them exceedingly valuable; in Navarre, a mountain breed, with its *kempy* fleece; in the Lower and the Higher Pyrenees, the two essentially different breeds which countries so different yet so near to each other produce. On entering Rousillon some migratory breeds scarcely inferior to the Merinos are found, and also in Languedoc and Arles. The whole number of sheep in France is calculated at about 30,000,000.

Notwithstanding the accounts given by some authors of the *Italian* sheep and of the care bestowed on them, there are few deserving of notice except a few Merinos. With the exception of a few of the valleys, the same may be said of the *Swiss*, and also of the *Savoy* sheep, but in *Piedmont* there has been from time immemorial a breed of sheep inferior only to the Merinos. In most of the *German States* the Merino is almost the only sheep that is cultivated. It is the same in *Prussia*, except that the sheep are somewhat diminished in size, while the wool retains all its value. The chief wealth of *Hungary* is derived from the cultivation of the Merino sheep. Of the two *Hanoverian* breeds the larger one has almost disappeared; the smaller has been crossed with the Merinos, and yields a wool of some value for ordinary purposes. The *Dutch* and *Flemish* breeds are of English origin, although some of them have considerable resemblance to the Irish long-woolled breed. Their wool is used for the production of the coarser kinds of goods.

This will be the proper place to speak of the *shearing* of the sheep, or the separation of the fleece from the animal. The time for this operation will vary much with the state of the animal, and of the season. After a cold winter, and the animal having been neglected, the sheep will be ready at an early period, for the old coat will be loosened and easily removed. The operation should never be commenced until the old wool has separated from the skin, and a new coat of wool is sprouting up. The coldness or warmth of the spring will also make a great difference. The usual time for shearing is about the middle of June, and the sheep master will in a moment perceive when the fitting time is come. It is a bad practice to delay the shearing, for the old fleece will probably have separated, and the fly will have longer time to do mischief, and the growth of the new fleece will have been stinted, or a portion of it will be cut away by the sheers.

Custom has very properly required that the old fleece shall be cleansed before its removal, by washing the animal in some running stream. Two or three days are then allowed for the drying of the wool previous to its being shorn, the sheep being turned into a clean rick-yard, or field or dry pasture, and remaining there until the fleece is dried, and that the new yolk, which is rapidly secreted, may penetrate through it, giving it a little additional weight and a peculiar softness. As soon as the sheep is shorn, the mark of the owner is placed upon it, consisting of lamp-black and tallow, with a small portion of tar, melted together. This will not be washed away by any rain, but may be removed by the application of soap and water.

On the score of humanity, one custom must be decidedly protested against—the shearing of a flock of sheep before they are driven to the market in an early part of the spring. The farmer thinks that he shall get nearly or quite the same price for the sheep whether the wool is off or on. But does he find this to be the case? When the poor animals are shivering under the influence of the cold air, do they look so attractive? Do they handle well? Is there not an appearance of disease about them? Does not the rheum that hangs about the nostrils indicate the actual commencement of disease?

Few rules can be laid down with regard to the rearing and feeding of sheep that will admit of anything like general application. A great deal depends on the kind of sheep, and the nature of the pasture and the food.

Suppose the larger kind of sheep, and on arable ground. The ewes are generally ready to receive the ram at the beginning of October, and the duration of pregnancy is from about twenty-one to twenty-three weeks, bringing the period of parturition to nearly the beginning of March, at which time most of the lambs will be dropped. The ewes should be fed rather better than usual a short time previous to the male being introduced. Rams are fit to propagate their species in the autumn of the second year, and that is also the proper period for the impregnation of the ewes. The ewe is, after impregnation, suffered to graze on the usual pasture, being supplied, as occasion may require, with extra food, and especially in case of snow, until within five or six weeks of lambing, when turnips are given to her, and continued from that time until the spring of grass renders them no longer necessary. The turnips are laid out for the ewes in the grass fields in certain quantities each day, but by no means so many as they would consume if permitted to feed without restriction, as it is considered to be most important that they should not be too fat when the lambing season approaches. The hogs and the fattening sheep of the previous year, now one year and a half old, are put upon the turnips in October, or whenever the pastures cease to improve their condition. The turnips required for the cattle, or the ewe-flock, are then drawn off in alternate rows, in the proportion of one-half, one-third, or one-fourth, as the convenience of the situation, the goodness of the crop, or the quality of the land may dictate. The remainder are consumed on the ground by the other sheep.

As the period of parturition approaches, the attention of the shepherd should increase. There should be no *dogging* then, but the ewes should be driven to some sheltered inclosure, and there left as much as possible undisturbed. Should abortion take place with regard to any of them, although it does not spread through the flock as in cattle, yet the ewe should be immediately removed to another inclosure, and small doses of Epsom salts with gentian and ginger administered to her, no great quantity of nutritive food being allowed.

The ewes should now be moved as near home as convenience will permit, in order that they may be under the immediate observation of the lamber. The operation of *clatting*, or the removal of the hair from under the tail and around the udder, should be effected on every long-woolled ewe, otherwise the lamb may be prevented from sucking by means of the dirt which often accumulates there, and the lamber may not be able at all times to ascertain what ewes have actually lambed. The clatting before the approach of winter is both a useless, cruel, and dangerous operation.

The period of lambing having actually commenced, the shepherd must be on the alert, yet not unnecessarily worrying or disturbing the ewes. The process of nature should be permitted quietly to take its course, unless the sufferings of the mother are unusually great, or the progress of the labour has been arrested during several hours, or eighteen or twenty hours or more have passed since the labour commenced. His own experience, or the tuition of his elders, will teach him the course which he must pursue. In the work on 'Sheep' these things are fully explained.

If any of the newly dropped lambs are weak, or scarcely able to stand, he must give them a little of the milk, which at these times he should always carry about him, or he must place them in some sheltered warm place; in the course of a little while, the young one will probably be able to join its dam. The lambing field often presents at this period a strange spectacle. 'Some of the younger ewes, in the pain and confusion and fright of their first parturition, abandon their lambs. Many of them, when the udder begins to fill, will search out their offspring with unerring precision; others will search in vain for it in every part of the field with incessant and piteous bleating; others again will hang over their dead offspring, from which nothing can separate them; while a few, strangely forgetting that they are mothers, will graze unconcernedly with the rest of the flock.'

The shepherd will often have not a little to do in order to reconcile some of the mothers to their twin offspring. The ewe will occasionally refuse to acknowledge one of the lambs. The shepherd will have to reconcile the little one to its unnatural parent, or to find a better mother for it. If the mothers obstinately refuse to do their duty, they must be folded by themselves until they are better disposed; and on the other hand, if the little one is weak and perverse, he must be repeatedly forced to swallow a portion of her milk until he acknowledges the food which nature designed for him.

The operation of castration should be performed nine or ten days after the birth of the lamb; that of spaying, if it is intended to be practised, should be postponed until the animal is about six weeks old.

Unless the pasture on which the ewes are placed is very good, it will be advisable to continue the use of the turnips. A moderate quantity may be given twice in the day, care being taken that the whole of one quantity shall be eaten before any more is placed before them. This is a better practice than hurdling off certain portions of the field for the sheep, unless the land is perfectly dry.

A little hay will always be serviceable while the flock is fed on turnips. It corrects the occasional watery quality of the turnips, and the sheep usually thrive better than if they are fed either on hay or turnips alone. Bran and oats, with oil-cake, have been recommended for the ewes before weaning time, but this is an expensive measure, and its cost can hardly be repaid either by the ewe or the lamb.

By the end of March or the beginning of April the turnips are generally nearly consumed, and the farmer is occasionally a little puzzled to find sufficient food for his flock. He should have had some plots of rye to support them for awhile. Rye-grass and clover are very serviceable. Swedish turnips that have been carefully stacked on dry straw will be most useful, for the Swedes, properly prepared and stacked, will retain their nutritive quality until the flock can be conveniently supplied with other food. Ruta-baga and burnet are always useful for spring food. The good qualities of the latter are not sufficiently estimated. It will generally be ready by the middle of February if required. The rowen, or after-grass, likewise furnishes plentiful and wholesome food for the lambs.

At length comes the time for weaning. In a poor country it takes place before the lambs are much more than three months old. In a more plentiful one the lambs may be left until the fourth month is nearly or quite expired. If the pasture is good, and it is intended to sell the lambs in store condition, the weaning may be delayed until six months. Whichever time is selected, it is of essential consequence that the mothers and the dams should be placed so far apart that they cannot hear the bleatings of each other. The ewes should be somewhat carefully looked after, and if any of them refuse to eat, they should be caught, the state of the udder ascertained, and proper measures adopted.

The lambs should not be put on too stimulating food. The pasture should be fresh and sweet, but not luxuriant. It should be sufficient to maintain and somewhat increase their condition, but not to produce any dangerous determination of blood to any part.

The Diseases of Sheep.—The rapid progress which the veterinary art has lately made, has thrown great light on the maladies to which the sheep is liable, and the mode of preventing or removing them.

Commencing with the muzzle and head, there is a disease, or rather, annoyance to which sheep are exposed by the persecution of a fly, the *Œstrus Ovis*, or *Gadfly* of the sheep. At some uncertain period between May and July, this fly is perseveringly endeavouring to lay its eggs on the inner margin of the nostril of the sheep, whence, hatched by the warmth and moisture of the situation, and assuming its larva form, it crawls into the nostril in order to reach the frontal sinus. Instinctively alarmed by the buzzing of the fly, or the motions of the larvæ, the sheep congregate with their heads in the centre, pawing continually with their feet, and expressing their dislike and fear in every possible way. It remains in the sinus a certain period, until it has attained its full growth, when it endeavours to escape in order to undergo another transformation. It escapes from the nostril, burrows in the earth for awhile, assumes its pupa state, undergoes its final change, and assumes the form of a fly, and then becoming impregnated, seeks again the nostril of the sheep. All that can be done with regard to this nuisance is to destroy the flies, which are generally to be seen on the walls or pales in the neighbourhood of the flock, and which the shepherd, or shepherd's boy, should be taught to recognise. [Œstridæ.]

Another parasite is a species of hydatid, the *Cœnurus* or *Hydatis Polycephalus Cerebralis*. It has the appearance of a bladder sometimes filled with pellucid water, or, occasionally, with myriads of minute worms, or smaller hydatids. Its residence is the brain, either beneath the inner membrane of the brain, or in the scissure between its two hemispheres. The origin of it is not clear, except that it is connected with bad management, being scarcely known in upland pastures or in grounds that have been well drained. As the parasite grows, it presses upon the neighbouring substance of the brain, and interferes with the discharge of its functions. There is an aberration of intellect; the sheep is frightened at any trifling or imaginary object; he separates himself from his companions; he commences a strange rotatory motion even while he grazes, with the head always turned towards the same side. This is the characteristic symptom, and as soon as it is perceived the animal should be destroyed, for there is no certain cure, and many of the operations that some persons have described are cruel and inefficient. The duty of the farmer is to destroy the *sturdied sheep* as soon as the disease is ascertained, however poor it may be in condition.

A somewhat similar disease, but with which the hydatid has nothing to do, is *Hydrocephalus*, or *water in the head*, generally indicated by a little enlargement of the skull; a disinclination to move; a slight staggering in the walk; a stupidity of look, and a rapid loss of condition. This disease seldom admits of cure or palliation. If any amendment can be effected, it will be by the administration of good food, tonic medicine, and gentle aperients. When water in the head is an occasional visitant in a stock of sheep, there is something wrong in the land, or its management, or in the nature of the food, or the character of the sheep.

Another species of pressure on the brain is of too frequent occurrence—*Apoplexy*. A flock of sheep shall be in apparently as good and fine condition as the farmer can desire. They have for a considerable period grazed on the most luxuriant pasture, and are apparently in the highest state of health. By and bye, one or more of them is, without any previously observed change, suddenly taken ill. He staggers, is unconscious, falls and dies, and perhaps within a quarter of an hour from the first attack. With regard to how many overfattened sheep is this the case? The owners taking them to some cattle-show, say that they died of inflammation. Inflammation had nothing to do with it. The sheep had been brought to the highest and most dangerous state of condition. Every vessel was overloaded with blood, and then some trifling exertion being required, or the animal being a little disturbed, the nervous functions were suspended, and the vital current suddenly arrested. Very few persons have gone into a cattle-show without being painfully struck with the evident distress exhibited by some of the overgorged animals.

If there is time for resorting to curative means, the jugular vein should be opened, and aperient medicine administered.

Inflammation of the brain is a frequent consequence of this strange over-feeding. It is ushered in by dullness and disinclination to move: but presently the eye brightens, and the animal attacks everything within his reach. If it can be managed, the same treatment must be adopted—bleeding, physic, and low feeding.

Locked-Jaw is not an unfrequent disease among sheep. It commences with an involuntary spasmodic motion of the head, accompanied by grinding of the teeth, but the latter symptom is presently succeeded by fixedness of the jaws. The disease often runs its course in a little more than twelve hours. The principal cause is cold and wet. After an unusually cold night, it is not uncommon to find many ewes that have lately lambed, and many lambs recently dropped, dead and stiffened. It sometimes occurs after castration, and at weaning time. Bleeding, aperient medicine, an opiate given an hour after the physic, and also a warm bath, are among the most likely means of cure.

Epilepsy is a not unfrequent disease among young sheep which are exposed too much to cold or dismissed from the fold too soon in the morning. Care and nursing will sometimes recover them, or a little exercise forced upon the patient.

Palsy.—The appearance of this disease is mostly confined to the ewe and lamb at weaning time, or when they are left at night in a bleak and exposed situation. The vital heat is abstracted by the cold bed on which they lie, and the cold air around them, and there follows a compound of rheumatism and palsy, the latter predominant and most obstinate. In the majority of cases they will never regain their former condition or value, but continue a disgraceful exhibition of the carelessness and inhumanity of the owner. It is dreadful to think how many animals in some districts are thus destroyed. No little art and kind treatment are in some cases requisite in order to recover these neglected and abused creatures. Warm gruel or milk, and a moderate degree of warmth, are the chief restoratives that can at first with safety be applied. A little ginger and spirit of nitrous ether may be added to the gruel when the patient begins to recover.

Rabies.—The rabid dog seems to have an irresistible propensity to worry sheep, and the poison is as fatal in this as in any other animal. There are cases on record in which from twenty to thirty have been bitten by the same dog, and all have died. If it can be proved that the flock has been attacked by a mad dog, every sheep should be most carefully examined, and if the slightest wound is found upon him, he should be destroyed. The carcase is not injured for the butcher, nor is there at that time any danger in eating the flesh; but, when the disease has broken out in the flock, no sheep that has exhibited the slightest trace of it should be used for human food.

There is no cure for rabies, and he will incur fruitless expense who has recourse to any pretended nostrum for this purpose.

Ophthalmia is a very frequent disease among sheep. The old people used to say that the animal had disturbed a lark's nest, and that the lark had spurred him blind. If any inflammation of the eye is detected, that organ should be frequently bathed with a weak solution of Gowland's lotion to which a few drops of laudanum have been added. It is sometimes difficult to get rid of this affection, and cataract and permanent blindness will ensue. The Ettrick shepherd says that 'a friend will generally attach itself to the sufferer, waiting on it with the most tender assiduity, and by its bleating calling it from danger and from going astray.'

Hoove is a morbid distension of the paunch with food, and the extrication of gas from that food. An account has been given of this disorder in the article Ox, vol. xvii., p. 81, so that every purpose will be answered by referring to it. The same may be said of all the diseases of the digestive organs. Their structure is the same in cattle and in sheep; and the causes and appearances and treatment of disease are the same.

There is however a disease of the liver—*the Rot*—far more frequently occurring in sheep than in cattle, and bearing a peculiar and more destructive character.

In the very earliest stage alone does it admit of cure. The decisive symptom, at that time, is a yellow colour of the eye that surrounds the pupil and the small veins of it, and particularly the corner of the eye, which is filled with a yellow serous fluid, and not with blood. There is no other apparent morbid appearance until it is too late to struggle with the malady; on the contrary, the sheep, although perhaps a little duller than usual, has an evident propensity to fatten.

The rot is a disease of the liver—inflammation of that organ; and the vessels of it contain fasciolæ (*flukes*). The flukes are probably more the effect than the cause of the disease. They are taken up in the food; they find their way to the liver as their destined residence, and they aggravate the disease by perpetuating a state of irritability and disorganization. The rot is evidently connected with the state of the pasture. It is confined either to wet seasons or to the feeding on ground that is moist and marshy. In the same farm there are fields on which no sheep can be turned without getting the rot, and there are others that never give the rot. After long continued rains it is almost sure to appear. The disease may be communicated with extraordinary rapidity. A flock of sheep was halted by the side of a pond for the purpose of drinking; the time which they remained there was not more than a quarter of an hour, yet two hundred of them eventually died rotten. In the treatment of the rot little that is satisfactory can be done. Some sheep have recovered, but the decided majority perish in despite of every effort. The patients however may, as giving them a little chance, be moved to the driest and soundest pastures; they may undergo a regular course of aperient medicine. Mercurial friction may also be used, but, above all, plenty of salt should be placed within the animals' reach, and given to them in the way of medicine.

In the way of prevention the farmer may do much; he may drain the most suspicious parts of his farm. No money would be more profitably expended than in accomplishing this. Some of the little swampy spots which disgrace the appearance of his farm possibly lie at the root of the evil.

Redwater, or the effusion of a bloody serous fluid in the cavity of the abdomen, is a frequent and very fatal disease among sheep. The cause of it is a sudden change from one pasture to another of almost opposite quality, or the moving of the flock from a dry and warm to a damp and cold situation. It is most destructive to lambs if exposed to a hard frost or suffered to lie on a damp and cold soil. The sheep will separate himself from the rest of the flock; he will evince a great deal of pain, by rolling about, and frequently lying down, and immediately getting up again; and, sometimes, he dies in less than twenty-four hours from the first attack. The belly will be found swelled and filled with the red water, or serous fluid tinged with blood, from which the disease derives its name. The treatment should consist of mild aperients, with gentian and ginger, and a liberal allowance of hay and corn. Inflammation of the coats of the intestines (*Enteritis*) would not always be readily distinguished from the last disease, except that there is more stamping on the ground and striking the belly with the hind legs, and occasional lying on the back. The principal causes of enteritis are improper food, or an excess of that which is healthful, or exposure to cold and wet. Here also bleeding is imperatively required, but the purgative should not consist of anything stronger than sulphur. *Diarrhœa* is a very prevalent disease among lambs, and especially after a change of diet or of situation. When it is not violent, and does not seem to be attended by colic, a little absorbent and astringent medicine, with a few grains of opium, may be administered. The diarrhœa of sheep may be similarly treated, but when the disease is assuming the character of *dysentery*—when the discharge is more frequent and copious, and mingled with mucus, a larger quantity of this medicine should be given, and some blood abstracted if there is any degree of fever.

The diseases of the *respiratory organs* are often of a serious character. During the greater part of the winter the nostrils will sometimes be filled with mucus, and the sheep is compelled to stop for a moment at every second or third bite, and snort violently, and stand with his muzzle extended and labouring for breath. If his general health does not seem to be affected, this *nasal gleet* will all pass away as the spring approaches. If however any of the flock should now appear to be losing flesh and strength, it is too probable that *consumption* is at hand. The only chance of saving or doing them any good will be to place them in some comfortable pasture, letting them have salt within their reach, and giving them the hydriodate of potash, in doses gradually increasing from three grains to twelve, morning and night.

Lambs, when too early and too much exposed, are subject to diseases of the upper air passages (*laryngitis* and *bronchitis*), the one attended by a ringing cough, and the other by one of a more wheezing sound. Bleeding will always be necessary for the first, with aperient medicine. A mild purgative will usually suffice for the second, or possibly an ounce or an ounce and a half of common salt may be given dissolved in six ounces of lime-water.

Inflammation of the lungs, recognised by difficulty of breathing, heaving at the flanks, and distressing cough, is a disease of frequent occurrence in sheep. It speedily runs its course, and the lungs are found to be one disorganised mass. Bleeding and purging are indispensable; but as soon as the violent symptoms seem to remit, tonics, composed of gentian and spirit of nitrous æther, must follow.

Epidemics.—Sheep are not so liable to the attack of these diseases as horses and cattle. At the time however at which these records are attempted, the sheep are suffering from a somewhat serious epidemic. They have cough and discharge from the nose and eyes. The appetite has ceased. Those that are affected by the disease separate themselves from the rest of the flock; they are continually lying down, and many of them die. They exhibit after death inflammation through all the contents of the chest and abdomen, with effusion into the cavities of both. The disease is most rapid in its course. The shepherd may leave his flock in the morning free apparently from any immediate danger, and when he returns in the afternoon he will find two or three of them dead. Epsom salts with nitre may be given. Blood was abstracted if the case seemed to require it; and the medicine repeated sufficiently often to keep the bowels gently open. If the purging becomes considerable, a little starch with chalk and cinnamon may be serviceable. Those that will eat should be foddered with good hay, and the others forced with gruel, being kept dry and comfortable with plenty of clean straw under them. The detached horn should be pared from the feet where there was any separation, and the parts washed with a solution of blue vitriol, and then smeared over with melted tar. The mouth and tongue, on which there generally are some ulcers, should be dressed with a strong solution of alum in water. Under this treatment most of the patients rapidly recovered.

Garget.—Inflammation of the udder is more frequent in the ewe than in the cow. The udder should be well fomented with warm water, and then, if there are no large knots or kernels, she should be returned to her lamb, whose knocking about of the udder will generally be productive of good rather than harm. If, however, she refuses the lamb, a drachm of camphor and mercurial ointment may be well incorporated with an ounce of elder ointment, and a little of it well rubbed into the udder every morning and night. If the udder should still continue to enlarge, a free incision must be made into that part where the swellings are largest. A weak solution of chloride of lime should then be applied, and when the putrid smell is gone, the Friar's balsam should be used. In a few days the wound will generally be healed, and the lamb may be returned to its mother.

Diseases of the Feet.—There is a small opening at the bifurcation of the pasterns, which leads to a canal running down the inner face of each to the commencement of the hoof. The function of this canal is a matter of doubt; but dirt or gravel or other foreign bodies sometimes get into these canals, and produce considerable pain, inflammation, and ulceration. The treatment consists in the extraction of any of those extraneous substances that can be got at, and the fomenting and poulticing, or scarifying the parts, or effecting incisions into the canal, and applying a caustic or a balsam, as the case may require.

The treatment of *foot-rot* essentially consists in paring away all loose and detached horn. This is the corner-stone of skilful and successful practice. All fungous granulations must either be cut away, or destroyed by the muriate of antimony, and the foot well washed with a solution of chloride of lime. The muriate of antimony must then be lightly applied over the whole of the denuded surface. This must be repeated daily until the whole of the foot is covered with new horn. The diseased sheep must not be permitted to join his companions until the cure is complete, for it is a sadly infectious disease, and may easily spread through the whole flock.

The Scab is a very troublesome disease, common in the spring and summer. The sheep is continually scratching himself with his feet, tearing off the wool, and violently rubbing himself against every protruding substance. The disease first appears in the form of minute pustules, but several of these unite and form a scab. The health of the sheep becomes rapidly affected under this disease, and some of them pine away and die. It is a very infectious disease, for every place against which the sheep can rub himself becomes tainted with the poison. The sheep must be housed and shorn as closely as possible, and then well washed with warm water. An ointment composed of one part of mercurial ointment and seven of lard must then be procured, and such a quantity of it as the diseased parts seem to require rubbed in on every second day. Every place in the field and in the fold against which he can possibly have rubbed himself must be well cleaned and painted before he is permitted to return. The cause of scab consists in the presence of a minute insect or tick, which may be conveyed from one sheep to another when an infected sheep comes in contact with a sound one; or it may be left on the rubbing-post, and entangled in the wool of the next animal that comes in contact with it; or it may be the product, and is too often so, of disease of the part. It is of spontaneous origin, as well as the product of contagion, and is called into existence by the derangements which our neglect, or accident, or disease has made in the skin. This is a view of the case that should never be forgotten by the sheep-owner.

Lice and *Ticks* will be best got rid of by the application of the mercurial ointment just recommended.

The Fly.—Several species of fly frequently deposit their ova on the wool of the sheep. If there are any sore places, they are selected for the habitation of the larvæ. The head, as the most exposed part, is the one oftenest attacked, and the sheep are sadly tormented by the fly and the larvæ. The best preservative or cure is the application of a plaster composed of a pound of pitch and a quarter of an ounce of bees' wax, spread on soft leather or linen. The attack may however be generally prevented by the application of a small quantity of spirit of tar to the head, or any bare or sore part. Two or three applications of this will be sufficient for the whole of the summer, and not a fly will approach a sheep thus guarded.

SHEERNESS, a town in the isle of Sheppey, in Milton hundred, in the lathe of Scray, in the county of Kent. It is 48½ miles from London, by Dartford, Gravesend, Rochester, and by the King's ferry over the West Swale; in 51° 27′ N. lat., 0° 45′ E. long. It stands at the north-west point of the Isle of Sheppey, on the east side of the Medway, at the junction of that river with the Thames. In the time of Charles I. the site of the town was a swamp, at the extremity of which, after the Restoration, a fort was built, and mounted with twelve guns to secure the passage up the Medway. When the Dutch war broke out, it was intended to augment the fortifications; but on the 10th July, 1667, the Dutch forced their way up the Medway, beat down the defences, and took the fort, which was incomplete. It was however soon restored on an enlarged scale, and has been from time to time augmented by additional works; and a dockyard has been established, which has given increased importance to the place. In 1798 the mutiny of the fleet at the Nore excited great alarm; and in 1827 the town suffered seriously from a fire, which destroyed forty-five houses, chiefly of wood, and destroyed property to the value of 50,000*l.*

The town consists of three parts—Sheerness proper, including the fortress and dockyards, and the suburbs of Blue-town and Mile-town: an outer line of fortifications comprehends Blue-town within its enclosure, but not Mile-town. The place has been much enlarged within these last few years, and new streets have been laid out. The streets are generally paved, and lighted and cleansed under local acts of parliament. The 'garrison' or fortress occupies the extreme point of the island; the principal batteries front the Thames. The dockyard was originally designed for the repair of vessels which had been injured by any sudden accident; and for the building of ships of war of smaller size, such as frigates and fifth and sixth rates; but it has been improved and extended at a heavy expense since the peace, and is now one of the finest in Europe. The wharf fronts the Medway. The yard is surrounded by a well-built brick wall, and has docks sufficiently capacious to receive men-of-war of the first class. There are a fine basin with 26 feet of water in depth, and two smaller basins; an immense storehouse, victualling-storehouse, mast-house, rigging-house, sail-loft, smitheries, &c.; together with a navy pay-office, and residences for the port-admiral, the commissioner, and other principal officers of the establishment. The whole occupies an area of 60 acres. Blue-town is close outside the dockyard wall, on the south side, and Mile-town is more distant to the south-east.

There is a handsome chapel just close to the dock-gates, the appointment to which is in the Board of Admiralty; and a new church of Gothic architecture in the town; there are several places of worship for dissenters. The trade of the town is chiefly dependent on the dockyard; but some shipments of corn and seed, the produce of the island, are made to London; and the oyster fishery is prosecuted on the adjacent shore in the creeks. There are copperas-works at no great distance. Saturday is the market-day. The population is very dense; that of Sheerness proper was, in 1831, only 61; but the parish of Minster, in which Blue-town and Mile-town are included, had 1430 houses inhabited by 1695 families, 76 houses uninhabited, and 13 building, with a population of 7922, the greater part of which by far was in the two towns. This population is exclusive of the troops in garrison, and, we presume, of the convicts employed in the dockyard. Some years since there were a number of families residing in the old ships of war which had been stationed as breakwaters along the shore. They had chimneys raised of brick from the lower-deck.

The living of Minster is a perpetual curacy in the deanery of Sittingbourne and archdeaconry and diocese of Canterbury, of the clear yearly value of 169*l*., with a glebe-house: the minister presents to the perpetual curacy of the district church at Sheerness.

The whole parish contained, in 1833, an infant school partly supported by subscription, with 160 children, 86 boys and 74 girls; twenty infant or dame schools, with about 200 children of both sexes; an endowed day-school, with 12 boys; a free school in the poor-house, with 10 boys and 12 girls; a proprietary school, with 38 boys; twenty-three other day-schools (including three boarding-schools), with 637 children, 368 boys and 269 girls; and three Sunday-schools, with 992 children, 483 boys and 509 girls.

SHEFFIELD is situate in the district of Hallamshire, in the upper division of the wapentake of Strafforth and Tickhill in the West Riding of the county of York. It is in the southern part of the West Riding, being only one mile and a half distant from Derbyshire, 33 miles south of Leeds, 50 miles south-west of York, and 163 miles north-north-west of London. The name is derived from the Sheaf, one of the rivers on which the town is situated, and 'field.'

Sheffield became a parliamentary borough and acquired the privilege of returning two members under the Reform Act. In population and commercial importance it is the second town of the county. It lies at the eastern foot of that extensive range of hills which form a huge back-bone running along the centre of the island from Staffordshire to Westmoreland; and it occupies and is now spread over various uneven but gradually subsiding tongues of land lying between the Porter, the Riveling, the Loxley, the Sheaf, and the Don, which, rising from various points of the mountainous range, here unite their waters into one considerable river, the Don, which hence pursues a more steady course through the level country to Doncaster. With the exception of the single level outlet towards Doncaster, it is encompassed and overlooked by an amphitheatre of hills—some verdant, some wooded, and some in the distance with a clear outline of blue heath. The neighbourhood indeed presents a variety and beauty of prospect which can seldom be met with so near a large manufacturing town. The parish of Sheffield comprises the six several townships of Sheffield, Ecclesall Bierlow, Upper Hallam, Nether Hallam, Brightside Bierlow, and Attercliffe-cum-Darnall, and contains an area of rather more than 22,000 acres: the parliamentary borough is co-extensive with the parish.

Hallamshire, which, though its limits be not exactly determined, has been considered to include the parish of Sheffield and the adjoining parishes of Handsworth and Ecclesfield, forms a district or liberty, the origin and history of which may be traced back to Saxon, Roman, and even British times, whilst the importance of the town of Sheffield is of comparatively recent date.

The manor of Sheffield however appears in Domesday-book as the land of Roger de Busli; but the greater part of it was held by him of the Countess Judith, widow of Waltheof the Saxon.

At what period or how it passed into the family of De Lovetot is uncertain; but it is found to be in their possession in the early part of the reign of Henry I. The Lovetots selected this part of their extensive possessions for their baronial residence, and promoted the interests and aided the industry of their tenants. They founded an hospital, called St. Leonard's (suppressed in the reign of Henry VIII.), upon an eminence still called Spital Hill, established a corn-mill, and erected a bridge over the river Don, then and still called the Lady's Bridge, from the chapel of the Blessed Lady of the Bridge, which had previously stood near the spot; and by their exertions and protection fixed here the nucleus of a town, which the natural advantages of the locality afterwards sustained and swelled into importance. The male line of the Lovetots became extinct by the death of William de Lovetot, leaving an infant daughter, Maud, the ward of Henry II. His successor, Richard, gave her in marriage to Gerard de Furnival, a young Norman knight, who by that alliance acquired the lordship of Sheffield. There is a tradition that King John, when in arms against his barons, visited Gerard de Furnival, who espoused his cause, and remained with him for some time at his castle in Sheffield.

On 12th Nov. 1296, King Edward I. granted to Thomas, lord Furnival, a charter to hold a market in Sheffield on Tuesday in every week, and a fair every year about the period of Trinity Sunday. This fair is still held on the Tuesday and Wednesday after Trinity Sunday, and another fair on the 28th of November. The same Lord Furnival, in 1207, granted a charter to the town, the provisions of which were of great liberality and importance at that period, viz. that a fixed annual sum should be substituted for the base and uncertain services by which the inhabitants had hitherto held their lands and tenements, that courts-baron should be held every three weeks for the administration of justice, and that the inhabitants of Sheffield should be free from all exaction of toll throughout the entire district of Hallamshire, whether they were vendors or purchasers. Sheffield had about this time acquired a reputation for iron manufactures, especially for faulchion heads, arrow piles, and an ordinary kind of knives called whittles. Chaucer thus describes the appearance of the miller:—

> 'A Shefeld thwytle bare he in his hose,
> Roude was his face, and camysed was his nose.'

In no situation indeed could such manufactures have been expected more naturally to arise; iron-ore, stone, and coal were found here in great abundance. The upper bed of coal immediately under a part of the town has long been exhausted, but the pits now working are very near; and in 1841 a lower and thicker bed of coal was reached, and is now in course of working, which comes up to the mouth of the pit in the very town itself. To these local products of ironstone and coal, the several mountain streams which unite at or near the site of the town became afterwards, and still are, an important auxiliary in the process of manufactures; from them an extent of water-power is obtained, which probably few other localities could furnish; and the present manufactures of the place became thus permanently settled here before the introduction of steam, which has since been employed to sustain and carry them forward.

Another only daughter and another Maud caused by her marriage the transfer of the lordship of Sheffield to the more noble family of Talbot, earl of Shrewsbury. William, lord Furnival, died 12th April, 1383, at his house in Holborn, where now stands Furnival's Inn, leaving an only daughter, who married Sir Thomas Nevil, and he, in 1406, died, leaving an only daughter, Maud, who married John Talbot, earl of Shrewsbury, a soldier and a statesman of considerable reputation. George, the fourth earl of Shrewsbury, built the lodge called Sheffield Manor, on an eminence a little distance from the town, and he there received Cardinal Wolsey into his custody soon after his apprehension. It was on his journey from Sheffield Manor up to London, in order to attend his trial, that the Cardinal died at Leicester abbey. The same place acquired a greater celebrity in the reign of Elizabeth, by the imprisonment there of Mary Queen of Scots. This ill-fated lady was committed by the Queen to the custody of George, sixth earl of Shrewsbury. After being for some time confined in his castle of Tutbury in Staffordshire, she was, in 1570, removed to Sheffield castle, and shortly afterwards to the Sheffield manor-house. She left Sheffield in 1584, and consequently spent fourteen years of her imprisonment in this neighbourhood. It was for the alleged intention of removing her hence, that Thomas, duke of Norfolk, suffered on the scaffold; and it is remarkable that the grandson of this duke of Norfolk, at whose trial and condemnation the Earl of Shrewsbury presided as high steward, afterwards married the grandaughter of the earl, and thereby became possessed of this castle and estate.

Francis, fifth earl of Shrewsbury, obtained from Queen Mary a charter *restoring* to the church burgesses certain property (which had been sequestered in the previous reign of Edward VI.) upon the original trusts for the benefit of the church and town, and creating them a body corporate.

About this period occurred a circumstance which added skilful artizans to this aptitude of site and natural products. The duke of Alva had caused many artizans to emigrate from the Netherlands into England, where they were well received by Queen Elizabeth, and the general rule was adopted of settling all of one craft in one spot; the workers in iron were, by the advice of the queen's chamberlain, the earl of Shrewsbury, settled on his own estate at Sheffield, and the neighbourhood from this time became known for the manufacture of shears, sickles, knives of every kind, and scissors.

Gilbert, the seventh earl of Shrewsbury, and the last of the male line of the house of Talbot who inherited the Hallamshire estates, died on 8th May, 1616, leaving three daughters and coheiresses. The lady Alethea Talbot, the youngest, married the earl of Arundel, and the other two dying without issue, the entirety of the Sheffield estates vested, in 1654, in her grandson, Thomas Howard, earl of Arundel, who, on the restoration of Charles II., was restored to the title of duke of Norfolk, forfeited by his ancestor in the reign of Elizabeth. Sheffield about this time (by a survey in 1613) contained about 2207 inhabitants, of whom the most wealthy were '100 householders which relieve others, but are poore artificers, not one of whom can keep a team on his own lande, and not above ten who have grounds of their own which will keep a cow.' In 1624 an act of incorporation of the cutlers was passed, entitled 'An Act for the good order and government of the makers of knives, sickles, shears, scissors, and other cutlery wares in Hallamshire and parts near adjoining.'

In the contest between Charles I. and his parliament, the town became on more than one occasion the theatre of war, and consequently experienced its casualties. Sir John Gell, with troops from Derbyshire, took military possession of the town and castle; but the duke of Newcastle, at the head of the royal army, having taken Rotherham by storm, and marching forward to Sheffield, the parliamentarians fled into Derbyshire. The people of Sheffield submitted to the royal army, and a garrison was left in the castle under the command of Major Thomas Beaumont, who held the town and castle till, on 1st August, after the battle of Marston Moor, in 1644, the earl of Manchester despatched 12,000 parliamentary infantry to attack the castle of Sheffield. After a siege of some days the castle was obliged to capitulate, on 10th August, 1644. It was then demolished by order of parliament, and though some attempts were afterwards made to restore it, there are no vestiges of it remaining above ground; but the names of Castle hill, Castle green, and Castle folds, still mark its site. The earl of Arundel, who had been of the royal party, retired to the Continent, and his estates at Sheffield were seized by the parliament, but restored in November, 1648, on payment of 6000*l.* as a composition. The Manor did not suffer from these hostilities, but continued to be the occasional residence of its noble owner, and afterwards of his agent, till, in 1706, Thomas, duke of Norfolk, ordered it to be dismantled; 'the park' ceased to be such except in name, its splendid and even far-famed timber was felled, and its wide range of undulating hill and dale divided into farms. The district however still retains its antient names, and even a populous and increasing portion of the town itself on the east side of the river Sheaf is yet called 'the park.'

Though Sheffield maintained its staple manufactures, it did not during the seventeenth century increase much in commercial importance. The manufacturers were men of very small means; they were without water conveyance to either the eastern port of Hull or the western port of Liverpool; pack-horses were the usual means of transit for their heavy goods; and such a character as a merchant or trader to foreign countries was altogether unknown amongst them. It was with the eighteenth century that the business of the town began rapidly to improve. In 1700 the town-hall was built, where the town business was transacted and the sessions held. In the early part of this century an Act was obtained for making the river Don navigable up to Tinsley, within three miles of Sheffield; and the work was completed in 1751. It was not however till 1819 that the water communication was continued through these three miles by the opening of the Sheffield and Tinsley canal. The new church of St. Paul's was erected in 1720; and during this century the art of silver-plating was invented by Thomas Bolsover, an ingenious mechanic, and extensively applied a few years after by Mr. Joseph Hancock.

The introduction of this manufacture speedily gave rise to the invention of a compound called Britannia Metal, in imitation of it. A silk-mill was also erected in 1758, and subsequently cotton-spinning was carried on upon the same premises; but though perseveringly continued in spite of two conflagrations, this trade did not appear to thrive, and has now been for some time entirely abandoned, and the mill is converted into an excellent workhouse. In the same year (1758) lead-works were established on the river Porter, which are still in operation.

In 1750 Mr. James Broadbent first entitled himself to the style of merchant by opening a direct trade to the Continent, and the example was soon followed. Attention was now also turned to the formation or improvement of roads, and the establishment of convenient and regular means of communication with the chief marts of commerce. A stage coach first started from Sheffield to London in 1760, a stage waggon having been on the road a few years previous; and in 1762 the first bank was opened in Sheffield by Mr. Roebuck. The duke of Norfolk, under the authority of an Act of Parliament obtained in 1784, erected the present suite of shambles and other market buildings; and towards the close of this century reservoirs were formed in the neighbouring hills whence to distribute water for the regular supply of the town. The machinery employed in the manufactures had hitherto been propelled by water only; in 1786 the ingenuity of Mr. William Dunn suggested the application of steam-power to the purposes of grinding, and the first steam grinding-wheel was erected in 1786.

In the beginning of the seventeenth century Sheffield was only a large village; it now displays all the features of a manufacturing and commercial community of the first importance, comprising within its parish a population of 110,891. If it present few of the venerable remnants of antiquity, it is one of the most remarkable instances of the rapid progress of industry. But its wealth, though of speedy growth, is not accumulated in a few large masses; it is spread and divided in moderate accumulations amongst a numerous class, and is of a peculiarly steady and substantial quality. In times of financial pressure Sheffield presents fewer instances of bankruptcy, and altogether suffers less than most other towns of equal manufacturing and commercial importance; and from the rare combination and advantages which it possesses for the conduct of its staple manufactures, it can calculate with as much confidence upon its future welfare as perhaps any town in the kingdom.

As to its local government there is none, not even a magistrate resident within the parish. As it increased in population, and its various wants multiplied correspondingly, it adapted itself, from time to time by various means, to the urgency of circumstances. There is a master cutler, who is by common consent and established custom recognised as the head of the town, but the only occasion on which he legally acts as such is in the election of members of parliament for the borough, under an authority so recent as the Reform Act; otherwise he is simply the master or president for the year of the corporation which was established by the Act of 1624 for the good order and government of a particular trade, but was deprived by another Act, passed in 1814, of the principal powers given for that purpose, which became rather injurious than useful, and now exists only for purposes comparatively unimportant. There is a Local Police Act for the better watching, lighting, and cleansing the town, obtained in 1818, and which is now by all acknowledged to be in many respects inefficient, and even its operation is confined to the area lying within a boundary line drawn at the distance of three-quarters of a mile round the parish church, beyond which boundary the town has now stretched itself considerably in many directions. The expenditure under this Police Act is about 5000*l.* a year. The onerous duty of administering justice amongst so large a manufacturing community is discharged by the county magistrates, who attend at the town-hall on Tuesday and Friday in each week for that purpose. Various suggestions have recently been made for the due and improved administration of the affairs of the town, and a petition for a Charter of Incorporation is now pending before the Privy Council.

The situation of the town causes it to be well drained, except in a few confined localities. The streets and buildings do not generally present an opulent or handsome appearance; but from the abundance of excellent stone in the neighbourhood, the former are throughout well pitched and paved. There are very few good dwelling-houses in the town, almost all the merchants and principal manufacturers residing in the country; but within the last few years the shops in the principal streets have assumed generally a much more ornamental front, and various public buildings of some architectural pretensions have been erected. There are six churches in the town of Sheffield, of which two were built in the last century, and three since the commencement of the present one. There is also a church at Attercliffe, one at Darnall, one in Upper Hallam, and one in Nether

Hallam, and a chapel-of-ease at Ecclesall. Chapels for the various bodies unconnected with the establishment are also very numerous; they are generally capacious, but few of them display any architectural ornament.

The public buildings consist of the town-hall, the Cutler's hall, the corn-exchange, recently erected by the Duke of Norfolk, who owns the ground upon which no inconsiderable part of the town is built, and whose liberal conduct in the management of his estates here has been of the utmost advantage to the inhabitants; the fire-office, the assay-office, the assembly-rooms and theatre, the music-hall, two news-rooms, and the public baths, which are a very complete establishment; the cemetery (an extensive piece of ground on the slope of a hill about a mile from the town, laid out for its present purpose with much taste and at considerable expense), and the botanical gardens, which are of considerable extent and for beauty of situation are unrivalled.

Among the charitable institutions are the infirmary, a noble building, near to which fever-wards are now in course of erection; the dispensary, and the Shrewsbury hospital, established and munificently endowed by the Earl of Shrewsbury, pursuant to the will of Gilbert, seventh and last earl of Shrewsbury, who owned the Sheffield estates, and which have been recently re-erected on a new site in a particularly simple yet elegant style of architecture.

The town is well supplied with water, light, and fuel. The competition of two gas companies ensures a cheap and good supply of light.

There are two public bodies which are in possession of property applicable to the benefit and general improvement of the town, viz. the town trustees and the church burgesses. The principal manufacture is that of cutlery in all its branches, indeed of everything that can be fabricated of iron or of steel. The vast buildings used for grinding by steam form one of the curiosities of Sheffield. A peculiar and fatal disease, called the grinder's asthma, is caused by the inspiration of the minute particles of steel and stone thrown off in the rapid process of grinding. So fatal is this disease, that though thousands are so employed, very few grinders are known to survive the age of 45. Various means of diminishing the evil have been suggested, and some adopted, but there is too much inclination among the men to neglect whatever appears to give the least additional trouble, even though death be the penalty of neglect.

Silver-plate and plated-goods form also one of the staple manufactures of Sheffield. Its plated goods have a deserved reputation for strength and durability. Brass-founderies are also numerous. Britannia metal, a superior kind of pewter composed of tin, antimony, and regulus, forms a cheap article of common use and great consumption, the manufacture of which occupies many hands. Latterly a much superior but more costly kind of white metal has been introduced, called German silver. Brushes, buttons, combs, and optical instruments are also made here to a considerable extent; and various other manufactures which arise out of or are connected with the staple commodities of the town, such as cabinet-case makers, engravers, haft and scale pressers and cutters, powder-flask and shot-belt makers, silver-refiners, wood-turners, &c. There are also many mercantile houses, some of which confine themselves to the home markets, while others export to the Continent, to Brazil, the Cape, and various other parts of the world, but far beyond any other in importance, to the United States of America. In a memorial to government on 16th December, 1839, respecting the admission of American flour duty free, it was stated that the Americans were then owing to the manufacturers of Sheffield 600,000*l.*

The following tabular statement of the population of the parish of Sheffield displays a remarkably high ratio of increase between the years 1821 and 1831:—

	1801.	1811.	1821.	1831.	1841.
Males	22,888	26,160	32,446	45,645	54,792
Females	22,888	27,070	32,733	46,047	56,099
Total	45,776	3,230	65,179	91,692	110,891

The number of families in the parish in the year 1831 was 19,998, of whom 14,734 were returned as employed in trades, manufacture, or handicraft, 443 in agriculture, and 4821 either in professional pursuits or unemployed.

The establishments for education and for the diffusion of knowledge are various, and though inadequate to the numbers who need instruction, are perhaps sufficient for those who endeavour to obtain it. Sunday-schools are connected with almost all the places of religious worship. There are also national schools in several districts of the town; a Lancasterian school for about 400 boys, and another for 250 girls; an endowed boy's charity school for 90 boys, and a similar establishment for 70 girls. The foregoing schools are chiefly maintained by subscription. There is also a grammar-school, and a free writing-school where there are 33 free scholars. At a short distance from the town a handsome Gothic building called the Collegiate School has recently been erected by a body of proprietors, and another still larger building on the same side of the town is more recently completed, called the Wesleyan Proprietory school. There is also a Roman Catholic day-school for the poor, and there are several infant-schools, and many private establishments for education.

The Subscription Library has upwards of 7000 volumes; the mechanics' library has 5000 volumes; a literary and philosophical society has been established for many years, and a mechanics' institution for a few years. The medical gentlemen of the town have also established a medical school, and certificates of attendance at its lectures are received by the College of Surgeons in London.

SHEFFIELD. [Buckingham, Duke of.]

SHEHALLIEN. [Maskelyne.]

SHEIKH. [Arabia, vol. ii., p. 213.]

SHEKEL (שֶׁקֶל), the principal weight and coin of the Hebrews. The subject of Hebrew weights and money is involved in great obscurity, from the fact that we have no weights or coins of the period before the Captivity. Our only course therefore is to examine the testimonies of antient authors and the extant coins of the period after the Captivity, and then to inquire whether, from the information so gained, we can draw any conclusions respecting the more antient standards.

1. *The Shekel as a Weight.*—The almost uniform testimony of antient authors is that the shekel was equal to the Attic tetradrachm, or to the stater (which was the same thing), or to half the Roman ounce, that is (since the authors referred to lived in the period after Augustus, when 96 denarii went to the pound), to 4 denarii, which were reckoned at the same period equal to four Attic drachmæ. The Septuagint indeed commonly renders the shekel by the didrachm; but the disagreement between this and the other authorities is only apparent, since the drachma of the Septuagint is that current at Alexandria, which was double of the Attic. Hesychius, in one passage, makes it equal to four, and in others to two Attic drachmæ; and Suidas, differing from all other writers, makes it five drachmæ. But the testimony of Hesychius and Suidas is of no value against that of St. Matthew, Josephus, Philo, and the other authorities for the value given above. (See the testimonies examined in Hussey's *Antient Weights and Money*, c. 11.)

The genuineness of the Hebrew coins has been much disputed, but the best numismatists are agreed in rejecting all those which bear inscriptions in the modern or Chaldee character, while they consider those genuine that have inscriptions in the Samaritan or old Hebrew character. The average weight of the shekels of Simon Maccabæus is about 218 English grains, which is about equal to half the English avoirdupois ounce, and only 2 grains more than the Roman ounce, or the weight assigned to the shekel by antient writers. But the full weight of the Attic tetradrachm, to which the shekel is said to have been equal, was 266 grains. The best explanation of this discrepancy is that given by Mr. Hussey, who remarks that we are not to look to the full Attic drachma of the time of Pericles or Xenophon, but to the reduced one under the Roman emperors, which was always considered as equivalent to the denarius.

With respect to the shekel of the time before the Captivity, we have no certain information. The Rabbins say that after the Captivity all weights were increased by one-fifth; but there are many circumstances which prove this tradition to be of no value. On the contrary, from the separate state in which the Jews still remained during the Captivity, and from the tenacity with which they clung to all their antient usages, it is most probable that they preserved their standards of weight and measure during that period. Besides, many of the sacred vessels restored to them by Cyrus were probably of known weight, and these would determine the true standard of the shekel. On the whole, in the absence of trust-worthy information to the contrary, it is most probable that the antient and the modern shekel were of the same weight, namely, about 218 grains.

The shekel formed the foundation of the Hebrew weights, of which there were three principal denominations: the shekel (שֶׁקֶל), meaning *weight;* the maneh (מָנֶה), *number,* that is, a certain number of shekels or weights; and the kikkar (כִּכָּר), *a round number*, or *sum total*, that is, a certain collection of manehs. The last weight is commonly translated by the word 'talent' in the Septuagint, Vulgate, and modern versions. There is a remarkable resemblance between this system and that of the Greeks, the shekel, maneh, and kikkar corresponding respectively to the stater, mina, and talent. The words *maneh* and *μνᾶ* are apparently the same, and *shekel* and *στατὴρ*, have the same meaning, the only difference being that whereas the Hebrew unit was the shekel, the Greeks took for their unit not the stater, but the drachma, which was a fourth of it. There is another weight mentioned in the Bible called adarkon (אֲדַרְכֹּן) or darkemon (דַּרְכְּמֹן), which seems to have been used for gold only, and is only mentioned in the later books, Chronicles, Ezra, and Nehemiah. Of its value we know nothing more than that it was probably less than three-tenths of the shekel. Some writers consider it to be only the Hebrew form of the Persian coin daricus; but Mr. Hussey, with more probability, takes it to be an antient Hebrew weight, corresponding to the Greek δραχμή, with which word the name *darkemon* may be connected. (Hussey, *On Ant. Weights, &c.*, p. 178-183.)

The kikkar was equal to 3000 shekels. (*Exod.*, xxxviii. 25.) There is a difficulty about the maneh, since from 1 *Kings*, x. 17, compared with 2 *Chron.*, ix. 16, it would seem to have contained 100 shekels, while in *Ezekiel*, xlv. 12, it is ordered to contain 60 shekels. There are great difficulties in adopting the former value, and on the other hand the meaning of the passage in Ezekiel is very doubtful. If the latter value be adopted, the kikkar would contain 50 manehs. The shekel was subdivided into the beka (בֶּקַע, *half*), or half-shekel, the reba (רֶבַע, *quarter*), or quarter-shekel (the zuz or zuza of the Talmudists), and the gerah (גֵּרָה, *a kind of bean*), or the twentieth of the shekel. The following table therefore represents the Hebrew weights:—

Name.	Value in Shekels.	Value in English Avoirdupois Weight. lbs.	oz.	grs.
Gerah . .	$0\frac{1}{20}$	0	0	10·94
Reba or Zuza .	$0\frac{1}{4}$	0	0	54·71
Beka . .	$0\frac{1}{2}$	0	0	109·43
Shekel . .	1	0	$0\frac{1}{2}$	
Maneh . .	60?	1	14	
Kikkar or Talent .	3000	93	12	

There appear however to have been at least two standards of the shekel, the *shekel of the sanctuary* and the *royal* or *profane shekel*. (*Exod.*, xxx. 13; 2 *Sam.*, xiv. 26.) The former was used in calculating the offerings to the Temple, and all other sums connected with the sacred law; the latter, for the tribute and civil payments. Michaelis and Winer think that the shekel used in commercial transactions was different from both these, but there seems to be no sufficient ground for this opinion. We do not know the relative value of the two standards. The tradition of the Rabbins is that the shekel of the sanctuary was double the profane shekel. Michaelis gets at the proportion by comparing the passages in *Kings* and *Ezekiel* quoted above, understanding the former of the profane shekel, and the latter of the shekel of the sanctuary. This process gives 100 : 60 or 5 : 3 for the ratio of the shekel of the sanctuary to the profane shekel.

2. *The shekel as a coin.* It is scarcely worth while to discuss the question whether the Jews had money of their own before the Captivity. The presumption certainly is that they had, considering the state of civilization among them. In the earliest mention of money in the Bible (*Gen.*, xxiii. 16) the shekels of silver which Abraham paid to Ephron seem, from the expression 'current money with the merchant,' to have been impressed with some mark, which made it coin, of however rude a description. (Hussey, c. 12.) The currency of the Jews from the earliest ages was silver, and the word *silver* is the common Hebrew name for money. Brass money is not mentioned in the Bible. Gold money is first mentioned in David's reign (1 *Chron.*, xxi. 25), and by the time of Isaiah it seems to have been common (*Isaiah*, xlvi. 6). The proportion of the value of gold to that of silver among the Jews is very uncertain. Bochart, from comparing 2 *Sam.*, xxiv. 24, with 1 *Chron.*, xxi. 25, makes it 12 to 1 in David's time; but this computation rests on very slender grounds. The conjecture, derived from 2 *Kings*, xviii. 14, that it was 10 to 1 in Hezekiah's time, seems not improbable.

The earliest Jewish coinage of which we have historical knowledge was that of Simon Maccabæus (1 *Macc.*, xv. 6), which was in silver, and of which several specimens remain. The denominations of the Hebrew money were the gerah, or twentieth of the shekel, which the Septuagint renders by ὀβολός, but which is nowhere expressly mentioned as a coin; the reba, or quarter-shekel (1 *Sam.*, ix. 8); the third part of a shekel is mentioned by Nehemiah (x. 32), but it is not clear that there was a coin of this value; the beka, or half-shekel, which was the poll-tax paid by every Israelite when the census was taken (*Exod.*, xxx. 15); the shekel, which appears to have been the largest coin in use, though some understand the amounts of 15, 20, and 25 shekels, mentioned in the passage of *Ezekiel* already quoted, to mean coins of that value; the maneh, and the kikkar or talent, were respectively sums of 60 shekels (though this, as already observed, is uncertain), and of 3000 shekels.

The worth of the shekel in our money depends of course upon the quality of the silver, which, for the earlier periods at least, cannot be ascertained. For the later periods, if we assume that the standard was about the same as that of the Roman money, namely, $\frac{1}{28}$th of the weight alloy, the shekel of half an avoirdupois ounce would be equivalent to 210·983 grains of pure silver, or $\frac{210·983}{80·7}$ of a shilling, that is, to 2*s.* 7*d.* 1·49 farthings. According to this calculation, the following table represents the value of the Hebrew money

					£	s.	d.	farthings.
Gerah	=	$\frac{1}{20}$ shekel	=		0	0	1	2·27
Reba	=	$\frac{1}{4}$,,	=		0	0	7	3·36
Beka	=	$\frac{1}{2}$,,	=		0	1	3	2·72
Shekel	=		=		0	2	7	1·49
Maneh	=	60 shekels	=		7	16	10	·8
Kikkar or Talent	=	3000 shekels	=		396	5	10	

(Hussey, *On Antient Weights and Money;* Winer's *Biblisches Realwörterbuch*, art. 'Sekel;' Calmet's *Dictionary;* Jahn's *Archäol. Bibl.;* Jennings's *Jewish Antiquities.*)

SHEKI. [GEORGIA.]

SHELBURNE, LORD. [GEORGE III.]

SHELDON, GILBERT, archbishop of Canterbury, was born July 19, 1598, at Stanton in Staffordshire. He received the name of Gilbert from his godfather Gilbert, earl of Shrewsbury, to whom his father Roger Sheldon was then a menial servant, although descended from an antient Staffordshire family. In the latter end of the year 1613 he was admitted into Trinity College, Oxford; November 27, 1617, he took the degree of Bachelor of Arts, and that of Master, May 28, 1620. He was elected fellow of All-Souls College in 1622; and about the same time taking holy orders, he became afterwards domestic chaplain to Thomas, lord Coventry, keeper of the great seal, who gave him a prebend of Gloucester; and finding him to be a man of parts, recommended him to king Charles I. as a person well versed in political affairs. On the 2nd of May, 1633, he was presented by his majesty to the vicarage of Hackney in Middlesex. He was also rector of Ickford in Buckinghamshire, and archbishop Laud gave him the rectory of Newington in Oxfordshire. Having proceeded Bachelor of Divinity, November 11, 1628, he took the degree of Doctor in Divinity June 25, 1634.

In March, 1635, Sheldon was elected warden of All-Souls College; and being esteemed a learned man, he was appointed chaplain in ordinary to the king; he became afterwards clerk of his closet, and was designed by him to be made master of the Savoy Hospital and dean of Westminster, but the civil wars which ensued prevented those promotions. During these he adhered firmly to the king, and was one of the chaplains whom his majesty sent for to attend his commissioners at the treaty of

Uxbridge, in February, 1644, where he argued so earnestly in favour of the church of England as to draw upon him the envy and resentment of the parliamentarians, which they made him afterwards sufficiently feel. He attended the king at Oxford, and was witness to the following remarkable vow made there by his majesty, which was preserved by archbishop Sheldon thirteen years underground, and first published by Echard, in the Appendix to his 'History of England,' p. 5. 'I do here promise and solemnly vow, in the presence and for the service of Almighty God, that if it shall please the Divine Majesty, of His infinite goodness to restore me to my just kingly rights, and to re-establish me in my throne, I will wholly give back to His church all those impropriations which are now held by the crown, and what lands soever I do now or should enjoy, which have been taken away either from any episcopal see or any cathedral or collegiate church, from any abbey or other religious house. I likewise promise for hereafter to hold them from the church, under such reasonable fines and rents as shall be set down by some conscientious persons, whom I propose to choose with all uprightness of heart to direct me in this particular. And I most humbly beseech God to accept of this my vow, and to bless me in the design I have now in hand; through Jesus Christ our Lord. Amen. Charles R., Oxford, April 13, 1646.'

He also attended, in 1647, as one of his majesty's chaplains at Newmarket and other places. The 30th of March he was ejected from his wardenship of All-Souls College by the parliamentary visitors, who forcibly took possession of his lodgings, April 13, and imprisoned him, with Dr. Hammond, in Oxford and elsewhere. He remained confined above six months, and then the Reforming Committee set him at liberty, October 24, 1648, upon condition that he should never come within five miles of Oxford; that he should not go to the king in the Isle of Wight; and that he should give security to appear before them at fourteen days' warning whenever cited. Upon his release he retired to Snelston in Derbyshire, and lived among his other friends in Staffordshire and Nottinghamshire, whence, from his own purse, and from collections made by him amongst the royalists, he sent constant supplies of money to king Charles II. abroad, and followed his studies and devotions until the approach of the Restoration.

Upon the death of Dr. Palmer (March 4, 1659-60), he became again warden of All-Souls, without however taking possession, and continued so till the January following. On king Charles II.'s return, he met his majesty at Canterbury, and was soon after made dean of the chapel royal; he was also, upon bishop Juxon's translation to Canterbury, advanced in his room to the bishopric of London, and consecrated October 28, 1660. He also obtained the mastership of the Savoy, which he kept till 1663; and it was at his lodgings there that, in 1661, the famous Conference was held between some of the Episcopal clergy and Presbyterian divines concerning alterations to be made in the Liturgy, which thence came to be distinguished by the name of the 'Savoy Conference.' His conduct there and afterwards is much blamed by the Presbyterians, and it certainly appears to have been anything but conciliating. As some excuse however for any unnecessary severity that he may have exercised, it is but fair to remember the injuries and sufferings that he had himself undergone. He rejected the proposal of an amicable conference, and told the Presbyterian divines, 'That not the bishops, but *they* had been seekers of the Conference, and desired alterations in the Liturgy; and that therefore there was nothing to be done till they had brought in all they had to say against it in writing, and all the additional forms and alterations which they desired.' During the course of that Conference he did not appear often, and did not engage in all the disputation, and yet was well known to have a principal hand in disposing of all such affairs.

In 1663 he was translated to the archbishopric of Canterbury, vacant by the death of archbishop Juxon. In 1665, during the time of the Great Plague, he firmly continued at Lambeth, notwithstanding the extremity of the danger, and with his diffusive charity preserved great numbers alive that would otherwise have perished. Also by his affecting letters to all the bishops he procured great sums to be returned out of all parts of his province. The same year he was one of those who promoted the Corporation or Five-Mile Act. On the removal of Lord Clarendon from the chancellorship of the university of Oxford he was chosen to succeed him, on December 20, 1667, but resigned that office the 31st of July, 1669. He had before honourably lost the king's confidence by advising him to put away his mistress Barbara Villiers, and never recovered it. He soon after retired from public business, and for the last years of his life he resided chiefly at his palace at Croydon. He died at Lambeth, November 9, 1677, in the eightieth year of his age; and, according to his own direction, was buried in Croydon church in Surrey, where a stately monument was soon after erected to his memory by his nephew and heir Sir Joseph Sheldon, who had shortly before been lord-mayor of London, son of his elder brother Ralph Sheldon, of Stanton in Staffordshire.

Dr. Sheldon's character has been represented with the discordance that must be expected in the reports of contending parties. Dr. Samuel Parker, bishop of Oxford, who had been his chaplain, says in his 'Commentarii de Rebus Sui Temporis,' that 'he was a man of undoubted piety; but though he was very assiduous at prayers, yet he did not set so great a value upon them as others did, nor regarded so much worship as the use of worship, placing the chief point of religion in the practice of a good life. In his daily discourse he cautioned those about him not to deceive themselves with a half religion, nor to think that divine worship was confined within the walls of the church, the principal part of it being without doors, and consisting in being conversant with mankind. He had a great aversion to all pretences to extraordinary piety, which covered real dishonesty, but had a sincere affection for those whose religion was attended with integrity of manners.' Bishop Burnet, in his 'History of his own Time,' does not give him so favourable a character. He says that he was a very dexterous man in business, had a great quickness of apprehension, and a very true judgment, but thinks he engaged too deeply in politics. 'He had an art, that was peculiar to him, of treating all that came to him in a most obliging manner; but few depended much on his professions of friendship. He seemed not to have a deep sense of religion, if any at all; and spoke of it most commonly as of an engine of government and a matter of policy.' In public spirit and munificence he sustained after an exemplary manner the character of a great prelate; and it is chiefly on this account that his name will be handed down to posterity with the highest honours. He expended large sums upon the Episcopal houses of the sees of London and Canterbury, and particularly the palace at Lambeth, where he rebuilt the library and made additions to its contents. At Oxford, besides several sums given to different colleges, he immortalised his bounty to that University by the erection at his sole expense of the celebrated theatre which bears his name. The architect employed was Sir Christopher Wren; the building was completed in about five years, and was opened with great solemnity, July 9, 1669, before the vice-chancellor, heads of houses, &c. The expense of this building was more than fourteen thousand pounds, and he bequeathed 'two thousand more, to be employed,' says Wood, 'in buying land, whose revenue might support the fabric, and the surplusage be applied to the learned press.' In this theatre are held public meetings of the University for the annual commemoration of the benefactors and the recitation of prize compositions, and occasionally for conferring degrees on distinguished personages; sometimes also public concerts are performed in it. In short, we are assured that from the time of Sheldon's being bishop of London to that of his death, it appeared in his book of accounts that upon public, pious, and charitable uses he had bestowed sixty-two thousand pounds; according to others, he disposed to public pious uses, in acts of munificence and charity (in his life or by his last will and testament), the sum of seventy-two thousand pounds. As a writer he is only known by 'A Sermon preached before the King, at Whitehall, upon June 28, 1660, being the day of Solemn Thanksgiving for the Happy Return of his Majesty, on Psalm xviii., 49,' London, 1660, 4to. (*Biogr. Britann.*)

SHELDRAKE, one of the English names for the *Anas Tadorna* of Linnæus, *Tadorna Vulpanser* of Leach and others.

Description.—Male.—Head and neck of sombre green or greenish-black. Lower part of the neck, coverts of the wings, back, sides, rump, and base of the tail, pure white. Scapulars, a large band girding the middle of the belly, abdomen, quills, and extremity of the caudal feathers, deep black. A large bay-coloured gorget adorns the breast, and rises to the upper part of the back. Beauty-spot on the wing purple-green. Lower coverts of the tail bay. The bill, and the fleshy protuberance or knob at the base of the bill, blood-red. Feet of a flesh-colour. Irides brown. Length upwards of two feet. Weight two pounds and a half and upwards.

Female.—Smaller than the male. No fleshy protuberance at the base of the bill, but, in its stead, a small whitish spot. All the colours more obscure. The bay-coloured band less, and that which girds the belly very narrow, often marked with large white spots.

Young of the Year.—Forehead, face, front and lower part of the neck, back, and lower parts white. Head, cheeks, and nape brown, dotted with whitish. Breast very bright reddish. Scapulars blackish ash, bordered with bright ash. Lesser coverts of the wings white, bordered with ash. Tail terminated with ashy-brown. Bill reddish-brown. Feet livid ash-colour.

This elegantly-marked duck is the *Tadorne* of the French, and is not badly described in the old quatrain:

> 'Cest oyseau cy est appellé Tadorne
> Que rarement se voit en nostre France;
> Plus qu' un Grisard est gros en corpulence,
> Ses couleurs sont blanc, noir, roux, pale, et morne.'

It is supposed to be the *Chenalopex* of Pliny and of Herodotus (*Nat. Hist.*, x. 22): it is the *Jugas* of the Swedes; *Brand-Gaas* and *Grav-Gaas* of the Danes; *Ring-Gaas*, *Fager-Gaas*, *Ur-Gaas*, and *Rodbelte* of the Norwegians; *Hav-Simmer* of the Feroe Islanders; *Avekong* of the Icelanders; *Kracht-Ente* and *Brandente* of the Germans; *Die Höcker Kusten und Ufer Brandgansente* of Brehm; *Grafgas* of Nillson (*Skand. Faun.*); *Volpoca* of Savi and 'Stor. degl. Ucc.;' *Hwyad yr eithin* and *Hwyad fruith* of the antient British.

The provincial names among the modern British are very numerous, and one of them alludes to its reputation for cunning, which, if it be the bird mentioned by the Greeks and Romans, gave it, most probably, its antient appellation. It is called in different parts of Britain *Bargander*, *St. George's Duck*, *Burrow Duck*, and *Burrough Duck; Sly Goose*, *Skeel Duck*, and *Skeeling Goose*.

Food, Habits, &c.—This species may often be seen about our tidal rivers (we have often watched it feeding on the mud-banks of the Severn). Its food consists of small testaceous mollusks, bivalves principally, small fish, fry of fish and spawn, small crustaceans, and marine plants. Pennant says, 'These birds inhabit the sea-coasts, and breed in rabbit-holes,' hence their name *Burrow Duck*. 'When a person attempts to take their young, the old birds show great address in diverting his attention from the brood; they will fly along the ground as if wounded, till the former are got into a place of security, and then return and collect them together. From this instructive cunning, Turner, with good reason, imagines them to be the *chenalopex* or *fox-goose* of the antients; the natives of the Orkneys to this day call them *sly goose*.' The nest is not always formed in burrows. Where there is not this convenience, the sands and fissures and cavities of rocks are made the place of nidification. The eggs, ten or twelve in number, are of a pure white. Sheldrakes may be domesticated, and are pretty ornaments in poultry-yards; but are apt to fly away if not pinioned. They have been known to breed, but very rarely, in captivity. Their flesh is rank and altogether bad.

Geographical Distribution.—The north and the western countries of Europe along the sea-coasts. Very abundant in Holland and on the coasts of France:* accidentally, during its passage, in Germany and on the rivers of the interior. The birds from Japan are identical with those of Europe. (Temminck.)

SHELL. The hard calcareous substance which protects either partially or entirely the testaceous mollusks externally, or supports certain of them internally, is termed *shell*.

This substance, when external, may be considered as the exo-skeleton of the animal; when internal, as its endo-skeleton.

The common or waved welk of our shores (*Buccinum undatum*) [ENTOMOSTOMATA, vol. ix., p. 454], and the common oyster (*Ostrea edulis*), may be taken as examples of external shells; and the internal support, or cuttle-bone, as it is generally called, of the common cuttle-fish (*Sepia vulgaris*) [SEPIADÆ, ante, p. 254], affords an example of an internal shell; for it is not bone, though so termed, but true shell.

Structure.—Shells are either crystalline or granular, according to Mr. Hatchett, who proposed this division in his interesting papers containing his Experiments on Shell and Bone (*Phil. Trans.*), vol. 89 (1799), and his Experiments on Zoophytes (*Phil. Trans.*), vol. 90 (1800).

Crystalline Shells.—The Porcellaneous shells—take a common Cowry (*Cypræa Tigris*) as an example—are crystalline shells.

Crystalline shells are either *rhombic* or *prismatic*.

Those of the *rhombic* crystalline structure, observes Mr. Gray, in his valuable paper On the Economy of Molluscous Animals and on the Structure of their Shells (*Phil. Trans.*, 1833), exhibit, on fracture, three distinct layers of calcareous matter. The cubic pieces into which spiral univalves generally break, mostly present, on two of the fractured sides, flat surfaces on the inner and outer edges, separated from each other by a shelving portion in the centre; and, on the two intermediate broken sides, shelving external and internal edges, connected by a flat central portion, these differences of surface being produced by the different position of the crystals in the different layers. 'Each of the three layers,' continues Mr. Gray, 'thus rendered obvious, is composed of very thin laminæ, placed side by side, as high as the thickness of the plate, and perpendicular to its surface. When these laminæ are minutely examined, they will be found marked with obscure oblique lines, in the direction of which they separate when broken into long narrow rhombic crystals. The lines of cleavage in the succeeding laminæ are placed in contrary directions, so that when two of these plates united are examined under the microscope, the lines of cleavage appear to cross each other at right angles, whilst those of the alternate laminæ follow the same direction. The laminæ of the outer and inner plates are always directed from the apex of the cone of which the shell is formed towards its mouth; in the spiral shells they consequently follow the direction of the spire. On the contrary, the laminæ of the plate situated between the other two, form concentric rings round the cone parallel with its base, and cross at right angles those of the inner and outer layer. This decussation of the laminæ of the plates, and of the crystals of the laminæ themselves, adds considerably to the strength of the shell, and accounts for the great difficulty that is found in breaking many shells of this structure, more especially the cones and olives, in which however nearly the whole of the strength resides in the outer whorl and in the spire. A good illustration of this structure may be obtained by examining with a pocket-glass the fractured edge of a cone [CONUS, vol. vii., p. 485], olive, or other spiral shell, in which the *extremities* of the laminæ of the outer and inner plates, and the *sides* of those of the central layer, or the converse, will be observed, according to the direction of the fracture, the extremities of the laminæ showing the angles of the crystals; while their sides, when closely examined, will often exhibit the crystalline flakes. In order to observe the lines of cleavage, the best mode of proceeding is to bruise part of a shell with a hammer, and to examine the fragments moistened under a microscope, until one is discovered which exhibits two laminæ in conjunction. The plates and their structure are also well seen in the polished surfaces of shells which have been slit or ground down to exhibit the internal structure of their cavity. The relative thickness of the three plates varies in different species; but as far as I have yet examined, the central plate is generally rather the thickest, and the outer one the thinnest. The Italian cameo-cutters appear to be aware of this circumstance, and avail themselves of it in cutting the cameos, the ground being always formed of the innermost layer of the three, which is also generally the most transparent. The layers increase in thickness from their inner to their outer edge, each of them being formed by successive depositions of their coats of animal and calcareous matter on its inner surface, until it acquires the proper thickness for the shell, the outermost edge of which is very thin, and has during the progress of the growth little calcareous matter, but gradually passes into periostracum.'

The glassy or porcelain-like coat of the Olives, &c., is well known, and the outer layer, although it is as crystalline as the rest, is very thin; but it is, as Mr. Gray remarks, harder and much more compact than the others, and between it and the central layer an opake, white, powdery film is deposited, which often causes it to break off in splintery flakes, while the rest of the shell separates into fragments, generally more or less cubical, their shape depending doubtless on the rectangular disposition of the laminæ of which the plates are formed.

---

* But see above—the quatrain.

Shells of the *prismatic* crystalline structure are formed of several layers, sometimes, as in the *Pinnæ*, separated from each other. If, however, observes Mr. Gray, the shell be cracked transversely to its layers, the crystals will be found continued across the line which separates them; and he alludes to the analogous structure existing in some minerals, Hæmatite for instance, the balls of which appear to be formed of separate concentric coats; but nevertheless when they are broken, exhibit the crystals radiating from the centre to the circumference without interruption.

If a prismatic crystalline shell be broken, a number of short fibres perpendicular to the surface appear: these, on examination, prove to be hexagonal prisms principally, and interposed among these are a few smaller polyhedral prisms. The tubes of the great Sumatran *Teredo* and *Magilus* are examples of this structure; and the *Mytili*, *Meleagrinæ*, and *Inocerami*, as well as the *Pinnæ*, may be selected with advantage from among the bivalve shells for observing it.

Granular or Concretionary Shells, when fractured, display a texture which is nearly uniform. The plates of which they are formed are very thin, and closely applied to each other; thus making the whole fabric compact and hard. Mr. Gray, after noticing that the pearly or iridescent lustre appears to be confined to shells of this texture, states that he is induced to believe that this lustre depends in great measure on the thinness and number of the *laminæ* of which the shell is formed. The *Placunæ* and *Anomiæ* exhibit this structure throughout their shells, and it is present in the inner or pearly coating of the *Turbines*, *Haliotides*, and *Uniones*, as well as in the *Pinnæ* and *Meleagrinæ*. In some shells of this structure, as Mr. Gray observes, the layers are thicker, and the animal matter is deposited in larger quantities, thus presenting a foliaceous appearance; and in these the calcareous particles are large, opake, white, and earthy, like chalk. The common oyster is a good example of this modification. Mr. Gray remarks that the animal matter between the laminæ is sometimes very unequally deposited, and notices its occurrence in the form of large brown spots in the pearly coat of many of the *Haliotides*, producing beautiful variations in the colouring and pearliness of the shell.

The occurrence of water between the plates of the shell will be more particularly alluded to in the article SPONDYLIDÆ.

Chemical Analysis.—Before we proceed to inquire into the component parts of shell, it will be as well to advert to the process employed by Mr. Hatchett in investigating its nature, not only as affording evidence of the value of his tests, but also in order to assist those who wish to pursue the inquiry.

Mr. Hatchett states that when shells were examined, they were immersed in acetous acid, or nitric acid diluted, according to circumstances, with four, five, six, or more parts of distilled water; and the solution was always made without heat. The carbonate of lime was precipitated by carbonate of ammonia or of potash; and phosphate of lime (if present) was previously precipitated by pure or caustic ammonia. If any other phosphate, like that of soda, was suspected, it was discovered by solution of acetate of lead. Bones and teeth were also subjected to the action of the acetous or diluted nitric and muriatic acids. The dissolved portion was examined by the above-mentioned precipitants; and in experiments where the quantity of the substance would permit, the phosphoric acid was also separated by nitric or sulphuric acid. The phosphoric acid thus obtained was proved after concentration by experiments which, being usually employed for such purposes, are too well known to require description. He adds that it is necessary moreover to observe that as the substances examined were very numerous, and his principal object was to discover the most prominent characters in them, he did not attempt in general to ascertain minutely the proportions so much as the number and quality of their respective ingredients.

'The greater part, if not all, of marine shells,' says Mr. Hatchett, 'appear to be of two descriptions in respect to the substance of which they are composed. Those which will be first noticed have a porcellaneous aspect, with an enamelled surface, and when broken are often in a slight degree of a fibrous texture. The shells of the other division have generally, if not always, a strong epidermis, under which is the shell, principally or entirely composed of the substance called *nacre*, or mother-of-pearl. Of the porcellaneous shells, various species of *Voluta*, *Cypræa*, and others of a similar nature were examined. Of the shells composed of *nacre*, or mother-of-pearl, I selected the Oyster, the river Muscle, the *Haliotis Iris*, and the *Turbo olearius*.'

Mr. Hatchett found that in the porcellaneous shells, such as the *Cypræœ*, &c., the animal matter was much less in quantity; and although of a quality which, like a cement or gluten, served to bind and cement the particles of carbonate of lime firmly together, so small was the degree of natural inspissation, and so little advanced was the degree of organization, that when the carbonate of lime was dissolved, even by very feeble acids, little or no vestige of jelly, membrane, or cartilage could be perceived; nor indeed could any be detected but by the small portion of animal coal which was formed when those shells had been exposed for a short time to a low red heat. When he proceeded however from shells of this description to others tending to the nature of nacre, or mother-of-pearl, such as some of the *Patellæ*, a substance was left untouched by the acids which had the appearance of a yellowish transparent jelly, but which was very different from the varieties of animal jelly called gelatin; so that the substance which served merely as a gluten in the porcellaneous shells was not only more abundant in these *Patellæ*, but, being more inspissated, was become immediately visible and palpable. These qualities were more strongly marked in the common oyster; and in the river-muscle, and in the shells composed of the true nacre, or mother-of-pearl, this substance was found not only to constitute a large part of the shell, but even to be more dense, so as no longer to appear gelatinous; and in addition to these, strong and visible marks of organization were stamped on every part, and a perfect membranaceous body remained composed of fibres arranged parallel to each other according to the configuration of the shells. (*Phil. Trans.*)

Mr. Hatchett presented to the Museum of the Royal College of Surgeons in London many of the results of his experiments, and the following preparations may be seen in the *Physiological Series*. No. 94 is one of the valves of the common muscle (*Mytilus edulis*, Linn.) which has been steeped in acid to dissolve and separate the earthy part (carbonate of lime), and show the animal part retaining the membranaceous form. No. 94 A is one of the valves of the fresh-water muscle (*Anadon cygneus*) similarly treated, and with the same results. No. 95 is the shell of an oyster (*Ostrea edulis*) similarly treated, showing the succession of laminæ of animal membrane in and upon which the earthy matter is deposited. No. 96 is the shell of a common snail (*Helix hortensis*) which has undergone the same process. Nothing but the animal part remains, and that still retains in some measure the form of the shell. No. 97 is a specimen of *Limnæa*, which has been subjected very little, if at all, to the action of acid. No. 97 A exhibits two species of *Neritina* treated with acid, but in different degrees. In the specimen at the bottom of the jar very little of the earthy matter remains. No. 98 shows portions of a *Haliotis* which have been treated with acid; and No. 98 A, other portions more completely deprived of the earthy material. No. 98 B is the shell of *Haliotis tuberculata*, part of which only has been steeped in an acid, to show that the animal matter retains the characteristic marks of the shell after the earthy part has been removed. Below this is suspended a portion of mother-of-pearl (*Meleagrina*, probably) similarly treated; and No. 98 C is the membranaceous part of a piece of mother-of-pearl.

Mr. Hatchett remarks (*loc. cit.*) that the wavy appearance and iridescence of mother-of-pearl, as well as pearl, are evidently the effect of their lamellated structure and semi-transparency, in which in some degree they are resembled by the lamellated stone called ADULARIA.

To return to the specimens preserved in the College of Surgeons. No. 99 is the shell of a *Turbo Pica*, with the operculum, which has been partially submitted to the action of an acid. No. 100 exhibits portions of the shell of a *Turbo* which have been submitted to the action of an acid for a longer time, so as to leave little else but the animal matter. No. 100 A is a turbinated shell which has been similarly treated, showing the strong outer epidermis, and the bright nacre or mother-of-pearl substance of which the shell is chiefly composed. No. 100 B exhibits portions of the animal substance of a turbinated shell. No. 103 A shows portions of the tube of a *Teredo gigantea* which have been submitted to the action of an acid, and the proportion of animal matter in that shell; and No. 103 B exhibits portions of the tube of a marine animal similarly treated.

The *cuttle-bone*, as it is erroneously termed, consists of various membranes hardened by carbonate of lime, without the smallest mixture of phosphate. The following preparations were made by John Hunter, many years before the experiments of Mr. Hatchett, and the menstruum employed by the former in separating the earthy from the animal matter was dilute muriatic acid. No. 106, a longitudinal section of the dorsal plate of a cuttle-fish which has been steeped in dilute muriatic acid and deprived of its earthy part to show that the proportion of animal matter that remains is sufficiently well organized and abundant to preserve the form and structure, which are exhibited in Nos. 104 and 105. No. 107 is the outer lamina of the dorsal plate of a cuttle-fish entirely deprived of its earth and dried. In the preceding section, which is the counterpart of this preparation, it is seen *in situ*. No. 108 is the membranaceous constituent of the dorsal plate of a cuttle-fish; and No. 109, a large portion of the membranaceous constituent of the same substance, which shows very distinctly its laminated structure.

Growth.—Although it is true, generally speaking, that shells cover the embryo of the testaceous mollusk in the egg, as observed by Swammerdam, Pfeiffer, and others, such is not its condition in all cases. In *Argonauta*, for instance, the shell is not coeval with the first formation of the animal. [Paper Nautilus, vol. xvii., p. 211.]

Mr. Gray, who states that the shells of Mollusca appear to be coeval with the first formation of the animal, observes that the cephalopodous mollusca form no exception; their bone, composed of two or three calcareous plates, being found fully developed in the cuttle-fish some time before the young animal is hatched. These observations, he adds, are directly at variance with the theory maintained by the late Sir Everard Home (*Phil. Trans.*, 1817), namely, that the shell is formed after the animal has quitted the egg; and, as regards the cuttle-fish, they are opposed to the remark made by Baron Cuvier, that the young cuttle-fish, when first hatched, has only a cartilaginous plate like the *Loligo*.

The shell, when first observed on the embryo (even of the animals of spiral shells) forms, Mr. Gray observes, a short blunt, more or less curved, subcylindrical cone, covering the hinder part of its body: as the organization of the embryo becomes developed, and the hinder part of the body extended, the shell, he remarks, increases in size, till the body and shell together occupy nearly the whole of the egg. 'While in the egg,' says Mr. Gray in continuation, 'the embryo shells are generally of a pale horn colour, and destitute of markings; when therefore they remain attached to the apex of the spire of adult shells, they may be easily distinguished by their appearance from the part formed after their exclusion; and as in such cases they offer some characters of importance, it has been proposed to designate them by the name of the nucleus of the shell. The effect of the atmosphere on the shell is almost instantaneous; in some young *Helices* and in a species of *Voluta* in my collection, the very first line of calcareous matter deposited after their exclusion from the egg is marked nearly as the adult shells of the species.'

The same author remarks that the *nucleus* which forms the original apex in all shells, and frequently remains attached to them during all the periods of their growth, is largest in those shells the animals of which are viviparous, and is consequently very distinct in the *Volutæ*, *Paludinæ*, and *Cyclades*. In the oviparous species, he observes, it agrees in size with the egg of the animal; thus *Achatina octona*, which has an egg nearly equal in dimensions to the mouth of the shell, and *Bulini ovatus* and *bicarinatus*, which lay large eggs, have large nuclei, the magnitude of the nucleus in general rendering the top of the spire blunt. Some, on the contrary, as *Stylina* generally, and *Pupa purpurea*, have, he adds, a very long, slender, acute, turreted nucleus: the form and size of the eggs of these mollusks do not appear to be known.

The nucleus consists of two coats or parts: the external coat or layer, *Epidermis* and *Periostracum* of authors, is of a somewhat horny or membranaceous character: the inner layer constitutes the true shell. This epidermis is thinnest in such shells as are enveloped in the mantles of their animals. The gradual growth of the shell so constituted is effected by the secretion from the mantle. The preparation No. 93 A, in the Museum of the College of Surgeons, exhibits a *Cypræa Tigris* with the soft parts. One of the lobes of the mantle, the secreting organ of the shell, is protruded. There are glands at intervals in the mantle of those shells that are ornamented with coloured patterns in the form of necklaces or stripes, which produce those patterns in many cases with all the correctness of a design. But though the mantle is the ordinary secreting organ, the vitreous external coat giving the highly glazed appearance to which the olives owe so much of their beauty is secreted by the foot, and not by the mantle.

The plates which form the rhombic crystalline shells are, Mr. Gray observes, deposited in succession, each gradually increasing in thickness as the shell enlarges. As the animal waxes in size, the lip gradually shelves, becoming thinner from the inner to the outer edge, the innermost part being formed of three layers, the next of two, and the outer and thinnest part (that which is first formed) of only a single layer. At the approach of the periodical stoppage of the growth of the animal, the second layer of shell, and afterwards the innermost layer, is deposited up to the edge of the mouth, which is thus completed. By this process a spiral shell, a cone for instance, becomes as it were rolled on itself.

But besides this gradual onward increase, another process is called into action in certain cases, in order to the symmetrical growth of the spiral shell. Take a *Triton* or a *Murex* for instance. The intervals of growth are marked by the elevated *varices*. In the direction in which the shell is, so to speak, to be rolled on itself, there will be found a thickened spreading inner lip, into which a varix descends. Now both these must be removed, in order to insure the uninterrupted progress of the shell; for if these shells be examined internally, they will be found to be smooth and uninterrupted, and what is now inside was once outside. The power of absorption then must be great to remove the masses of shell which are contained in the highly elevated and wrought varices, for such in many shells they are, to say nothing of the thickened and patulous lip.

In the smooth shells, cones for instance, where the animal has no obstacle to remove in the enlargement of the shell, the internal volutions are often so much absorbed as to be as thin as paper, and not unfrequently have vanished altogether. In both these cases, may not the animal derive from its own shell the means of increasing it?

The *operculum* would in itself almost justify a treatise, which our limits forbid. It is a horny or shelly plate, which closes more or less completely the aperture of the spiral shell; so that those spiral shells which are so furnished are in fact bivalves. They are developed with the embryo in the egg. We must refer our readers for details to the interesting papers of Mr. Gray, who has for some years paid great attention to this subject. In the *Medical Repository* for 1821 he first urged the importance of this adjunct as a generic and family distinction, and he pursues the subject in the memoir from which we have quoted in this article; nor has the study of this interesting part of the conformation of many testaceous mollusks been neglected by M. de Blainville and other French zoologists, who have followed it out with great assiduity.

The nucleus, spire, and indeed the upper whorls of many shells, of the volutes for instance, and, most especially, of Magilus, become, as they advance in growth, filled more or less by a transparent calcareous secretion; and Mr. Gray remarks that the distinction between such shells and those which are decollated, such as *Bulinus decollatus*, *Cerithium decollatum*, &c., is, that in the latter the animal, instead of lining the upper whorls with an internal coat, suddenly withdraws its body from them, and forms behind its extremity a concave septum: the vital communication between the body and the apex of the shell being thus cut off, the latter part, he observes, decays in the manner of a dead shell, and falls off in particles; but M. de Blainville refers the decollation of the spire to the filling up of the inner surface of the cavity of the shell with a very brittle vitreous deposit.

Mr. Gray remarks that in many fresh-water bivalves there is deposited between the layers of the shell a lamina of animal matter, similar to the periostracum; and that in the genera *Etheria* and *Mulleria* such a coat is deposited between nearly all the layers, giving them a very peculiar olive-green colour, and having minute dots on its surface. The erosion of these shells must be familiar to all who are conversant with the subject; and Mr. Gray states that these successive depositions of animal matter enable them to offer a new layer of periostracum for the protection of each succeeding plate, as the plate above it yields to the destructive influence of the medium in which the animal resides. A similar deposit of animal matter is also found, he adds, forming green stains in the pearly inner coat of the various species of *Uniones*, and protects from the action of the water the inner part of the umbones of shells which have been eroded. Mr. Gray has observed the thick inner layer in the upper valve of *Ostrea Cornucopiæ* to be prismatic, and the outer part of the laminæ to be separated by layers of periostracum.

The disintegrated thin, lamellar, pearly grey, silvery scales of iridescent shells, when reduced to powder, may be used as a pigment to imitate the silvery appearance of fishes, &c., and indeed the disintegrated and powdered scales of the *Placunæ* (moon-shells, Chinese-window oysters, as they are called by collectors) are so used by the Chinese in their water-colour drawings.

Pearls.—Mr. Hatchett made the same experiments on pearls as those to which he submitted shells, and the former proved to be similar in composition to the mother-of-pearl. He presented to the Museum of the Royal College of Surgeons in London numerous small pearls which had been immersed in acetous acids and thus reduced to their membranaceous constituent. (*Preparation*, No. 98 D.) So far as their size would enable Mr. Hatchett to discern, they appeared to be formed by concentric coats of membrane and carbonate of lime: by this structure, he adds, they much resemble the globular calcareous concretions, found at Carlsbad and other places, called Pisolithes. When pearls were swallowed by the antients in the absurd profligacy of their luxury, they appear to have been treated like those in the preparation last above noticed.

The term shell is also commonly applied to the covering of crustaceous animals and the crusts of *Echini*: thus people familiarly talk of the shell of a lobster or crab and of the shell of a sea-egg. Mr. Hatchett remarks that there is reason to conclude that phosphate of lime mingled with the carbonate is a chemical characteristic which distinguishes the crustaceous from the testaceous substance; and that the principal difference of the qualities of each, when complete, is caused by the proportion of the hardening substances, relative to the gluten by which they are cemented; or by the abundance and consistency of gelatinous, membranaceous, or cartilaginous substance, in and on which the carbonate of lime, or the mixture of carbonate and phosphate of lime, has been secreted and deposited. Thus the presence of phosphate of lime mingled with carbonate appears to be a chemical character of *Crustaceans* and *Echini*. No. 110, in the College Museum, is the outer crust of an Echinus (*Siderites Hystrix*, Lam.) from which the earthy constituent has been partially removed by the action of acid; and No. 111 is a section of the crustaceous covering of the claw of a lobster which has been similarly treated, and has become soft and elastic and of a yellowish-white colour, but still retains its original figure. (*Cat.*, vol. i.) [AVICULA; PEARL FISHERY; PEARLS.]

For an account of the power of excavating and perforating stone, shell, and wood possessed by the testaceous Mollusca, see the articles CLAVAGELLA, GASTROCHÆNA, LITHOPHAGIDÆ, PHOLAS, and TEREDO; for their value as records by which the stratification of the earth's crust may be demonstrated, and its geological history deciphered, see the articles MALACOLOGY, GEOLOGY, and ORGANIC REMAINS.

SHELL, PEARL. [SHELL.]

SHELL, a hollow globe of iron, containing gunpowder, which is introduced at an orifice formed in the ball. In this orifice is driven or screwed the fuze or tube containing the composition by which the powder in the shell is ignited [FUZE]; and the shell, after being discharged from a gun, howitzer, or mortar, is consequently made to burst in pieces when it falls upon or near the object to be destroyed. The diameters of shells for guns vary from 3⅝ inches to 10 inches, and the weight of a 10-inch shell is 70 lbs. The diameters of shells for mortars and howitzers vary from 4½ to 13 inches, and the weight of a 13-inch shell is 200 lbs. The diameters for carronades vary from 3⅔ inches to 8 inches. [BOMB; CASE-SHOT.]

SHELLEY, PERCY BYSSHE, was the eldest son of Sir Timothy Shelley, Bart., of Castle Goring in Sussex. The Shelley family is of old standing,* branching out into three several baronetcies, one of which has become the representative of the kindred of Sir Philip Sidney, a connection Shelley was justly proud of, though he set little value on family distinctions. Percy Bysshe was born in Field Place, Sussex, on the 4th August, 1792, where he was brought up with his sisters till the age of eight years, receiving the same education, and always exhibiting disinclination for boyish sports. He was shy, bashful, and reserved. He was then sent to school at Sion House, Brentford, where his delicate constitution and girlish disposition drew on him all the petty tyrannies and horrors of school. He depicts them with tearful eloquence in the introductory stanzas to his 'Revolt of Islam.' At the age of thirteen he was removed to Eton, where his spirit, which through life revolted at oppression, rose up against the system of *fagging*. He gained no distinction at Eton, though he proved himself even there a tolerably good scholar by translating several books of Pliny's 'Natural History;' but he stopped at the chapters on astronomy, which his tutor owned his inability to explain. His novels of 'Zastrozzi' and the 'Rosicrucian' are said to be extraordinary productions for the age at which they were written (fifteen). They have been reprinted in the 'Romancist' collection.

In 1808 he went to Oxford; and here we cannot but refer to the exquisite series of papers called 'Shelley at Oxford,' which appeared in the 'New Monthly Magazine' during 1832, written by his friend and schoolfellow, for those anecdotes which exemplify his character. During his last term at Oxford he published a pamphlet with the startling title of 'The Necessity of Atheism,' wherein he put forth certain propositions to which he demanded answers from the heads of the Colleges. The answer was, as might be expected, expulsion. We have never seen this very rare pamphlet, but the title alone betrays youthful presumption and recklessness. His expulsion was the cause of great dissension with his family, and in consequence he came up to London, where he amused himself with addressing letters to all whose works pleased him; among others, to Mrs. Hemans, who had just arisen on the poetical horizon. It was about this time that 'Queen Mab' was completed. He never published it; he felt that he was too young to decide on such matters whereon 'all doctors disagree,' and he was desirous of acquiring 'that sobriety of spirit which is the characteristic of true heroism.' He had therefore only a few copies struck off for private circulation, and was much annoyed when a piratical bookseller published it. He endeavoured to stop its publication, but failing, he disavowed any participation in it, through the columns of the 'Examiner.' Of this 'Queen Mab' his latest reviewer says, 'Like most poems produced at this age, it is remarkable for a strange mixture of poetic beauty and crude deformity—of clear insight and heated extravagance, of deep views and chimerical absurdities. We may compare it to 'Die Raüber' of Schiller, or 'Werthers Leiden' of Gōthe, as possessing the same strong feeling of the rottenness of existing things, the same passionate sympathy with more idealised views, and the same distorted views of the causes of evils. It is the production of a boy, but the boyhood is that of a giant. One of the cardinal points in the philosophy of 'Queen Mab' is that all the evils tearing the great heart of the world up by its bloody roots, and turning earth, which should be the 'the reality of heaven,' into a 'dark continuance of the hell within us,' are owing to priests and kings. This was the current doctrine of the time. He was writing fiercely against his own chimeras; this was his mistake. He did not write anything really applicable to these offices, but at the same time he used their names and offended all the sacred feelings which 'hedge the king,' without having 'a show of reason on his side;' it appeared therefore as mere blasphemy or wantonness, though it was far different.' (*Westminster Rev.*, lxix.) When Shelley, thus thrown upon the world, had rejected current ethics, he was anxious to find a system more consonant to his views. This he found in Godwin's 'Political Justice,' a book which made a great impression in its day, and from which Shelley drew the resolution 'to square all his actions by what he conceived to be the strictest justice, without any consideration for the opinions of others.' 'That he did some extraordinary things in consequence, is admitted; that he did many noble ones, and with all sincerity, is well-known to his friends, and will be admitted by all sincere persons.' It was this justice which made him reject an estate because he 'would not become a yea and nay man.' Drawing himself, he afterwards wrote,—

---

* The site of the present Bull Inn, Aldersgate Street, was formerly that of one of the Shelley mansions.

'Men wonder'd, and some sneer'd to see
One sow what he could never reap;
For he is rich, they said, and young,
And might drink from the depths of luxury.
If he seeks fame, fame never crowned
The champion of a trampled creed.'

Rosalind and Helen.

And yet he remained this champion. He shortly after completed the exasperation of his father, who entirely abandoned him, by his marriage with Harriet Westbrooke, the daughter of a retired coffee-house keeper. Various versions are given of the story: some say he was inveigled into the match; others, that she watched him during illness, and that he then fell in love with her. She was very beautiful, but giddy, coquettish, and weak-minded. The result of this union could not be other than unhappiness. For three years they dragged on a wearing and fretful existence, during which she bore him one child to sweeten their lot. But at length the want of sympathy, the misunderstandings, and some other more serious matter which intervened, occasioned a separation. She took the child, and he allowed her a sufficient income, which was paid quarterly; he confided her to the care of her relations, and in 1814 went abroad to recruit his health.

An account of this trip has been given in a charming little volume called a 'Six Weeks' Tour through a part of France, Switzerland, Germany, and Holland,' and reprinted in vol. ii. of Shelley's 'Letters and Essays.' Accompanied by two friends he performed the greater part of it on foot, and thus three of them travelled over a space of eight hundred miles at an expense of thirty pounds. The next eighteen months he passed in London, where he renewed his acquaintance with Leigh Hunt, who was then imprisoned for libel, and made him the princely offer of a hundred pounds as an expression of his sympathy, which sum however Leigh Hunt fortunately did not need. In May, 1816, Shelley again visited the Continent, and reached Sécheron, near Geneva, on the 17th of that month, where he learned that Lord Byron was stopping at the same hotel. Some correspondence on 'Queen Mab' had already passed between them, and they were so delighted with each other at the first interview, that Shelley took a villa immediately at the foot of the one occupied by Byron, in the Campagne Diodati. Early in July they went on a tour to Mellerie, Clarens, Schillon, Vevai, Lausanne, Chamouni, Montauvert, Mont Blanc, &c. (described with great beauty in his 'Letters and Essays,' vol. ii., pp. 61, et seq.). The summer of 1817 he spent on the Lake of Como.

In November, 1817, when Shelley was at Bath, the appalling news reached him of his wife's suicide. He hurried to London, to his friend Leigh Hunt, where he endeavoured to gain consolation, and got all that tenderness and sympathy could bestow. It tore his being to pieces, and for some time his reason was despaired of. Many were the stories that ran through the papers of the day pretending to be a true account of the matter, and the writer of this notice has not unfrequently been asked if 'Mr. Shelley didn't murder his wife.' We need scarcely add that these were the inventions of his enemies; that Shelley had been absent from his wife, and had been so for some time; that he had confided her to the care of her relations, and that all intercourse between them had ceased; and yet he bitterly reproached himself with not having watched over one so young and so weak. In truth Shelley was not without blame in the matter, though very different from what is usually attached to him.

Shortly after this event Shelley was deprived of the care and education of his children by an order of the lord chancellor. The case attracted considerable attention at the time, as being an instance of the interference of the Court of Chancery with the parental authority. The facts, as they appeared in the proceedings before the Court, are as follow. After the death of Shelley's wife a petition was presented, in the name of the children, in the Court of Chancery, which stated that Shelley and his wife were married in 1811; that about three years before the time of presenting the petition, Shelley had deserted his wife* and had since unlawfully cohabited with another woman; that therefore the mother returned to her father's house with the eldest of the infants, and the other was soon after born; and that since that time the infants had been maintained by their mother and her father, and that their mother had lately died. It was then stated among other things that the father avowed himself an atheist, and that since the death of his wife he had demanded that the children should be delivered up to him, and that he intended, if he could, to get possession of their persons and educate them as he thought proper. The grounds on which the lord chancellor (Eldon) restrained Shelley from taking possession of his infant children, and directing their education, were stated by himself in a written judgment, as follows:—'I consider that this is a case in which the father has demonstrated that he must and does deem it to be matter of duty which his principles impose on him, to recommend to those whose opinions and habits he may take upon himself to form, that conduct in some of the most important relations of life, as moral and virtuous, which the law calls upon me to consider as immoral and vicious—conduct which the law animadverts upon as inconsistent with the duties of persons in such relations of life, and which it considers as injuriously affecting both the interests of such persons and those of the community.' (Shelley *v.* Westbrooke, in Jacob's *Reports*, p. 266.)

After the death of his unfortunate wife he married Mary Wolstonecraft Godwin (the present Mrs. Shelley, author of 'Valperga,' 'Frankenstein,' &c., daughter of Mary Wolstonecraft and Godwin. They retired to Great Marlow in Buckinghamshire, where he was a blessing to the poor. 'His liberality was unbounded; he attended to the wants of the poor, not by liberal endowment of pence in the street, or by "subscriptions," but by actual inspection into their wants, relieving them with kind words and suggestions as well as money; regardless of infection—which once unhappily occurred in the form of a severe ophthalmia caught in these cottages; and moreover he studied medicine and walked the London hospitals in order that he might attend the sick in his neighbourhood!' (*Westminster Review*, lxix., p. 310.) It was here he wrote 'Alastor' and 'The Revolt of Islam.' Poems so well known to every lover of poetry as these require no comment. They are pregnant with his peculiar views and hopes for humanity, and they contain some of the most splendid writing in the language. The reviewer before quoted has examined them at length.

Early in the spring of 1818 Shelley and his family left England for Italy. The breach between himself and relatives had become irreparable: his name was coupled with every odium which the press and private malice could heap upon it. The publicity given to his extraordinary opinions, in consequence of the application to the Court of Chancery, had rendered him so unpopular, that it was impossible to remain in England, and his health was gradually declining. When at Pisa he went one day to the post-office to inquire for letters; an Englishman, on hearing his name, said, 'What, are you that d——d atheist Shelley!' and struck him with a stick so brutally that he fell stunned to the ground. On recovering Shelley found that the man had fled, and he never discovered him. In Italy he renewed his acquaintance with Lord Byron; and the testimony of the noble lord, 'who libelled his friends all round,' may not be uninteresting: 'You are all mistaken about Shelley,' he writes to Moore; 'you do not know how mild, how tolerant, how good he was in society; and as perfect a gentleman as ever stepped across a drawing-room.' And again: 'He is to my knowledge the least selfish and mildest of men; a man who has made more sacrifices of his feelings and fortunes to others than any man I ever heard of.' (Moore's *Life of Byron*, 4to., ii. 580.) It was while at Pisa, when the affray took place which will be remembered by all readers of Byron's 'Life,' that Shelley rushed in between the uplifted sword of the infuriated dragoon and his friend Byron, and received the blow himself which knocked him off his horse (*Rapporto sopra l'Accaduto al Nobile Lord Byron*); and which made Byron wonder how and 'upon what principle a man could be induced to prefer any other person's life in that manner before his own!'

During his residence in Italy, besides enriching his mind with the master-works of art, he began the study of Calderon, some fragments of whose 'Magico Prodigioso' he translated with rare felicity. He there produced in rapid succession his 'Prometheus Unbound;' 'Cenci;'

---

* The real facts of the case were that Shelley and his wife separated by mutual consent. She cohabited with another man; he with another woman.

‘Hellas;’ Julian and Maddalo; ‘Epipsychidion; Ode to Naples,’ &c. That marvellous but mysterious fragment ‘Epipsychidion’ was addressed to La Contessina Emilia Vilani, a lovely and accomplished girl who was immured in the convent of St. Anne by her parents. In her fate Shelley took a prodigious interest, and used every exertion to procure her release. They exchanged locks of hair and other little tokens of sympathy. The mention of this circumstance throws a new light on the poem, but it still remains in many parts impenetrable. The commencement,

> ‘Sweet spirit! sister of that orphan one
> Whose empire is the name thou weepest on!’

is utterly unintelligible as it stands, and yet there can be no doubt that to him it was clear enough: he knew the allusion; we do not. The ‘Prometheus Unbound’ is perhaps the finest lyric drama in the language. It is full of the spirit of beauty; and the inexhaustible play of fancy and imagination flashing through every part of it dazzles the mind so that we see but indistinctly. It is the most *ethereal* poem in the language; but it is also open to the charge of mysticism, and we agree with the critic that it is ‘of no use his being in the clouds, if he draw up his Jacob's ladder after him, and only leaves us gazing, conscious that he is there, but ignorant of what else may be there. His voice may be a pillar of fire ascending to unknown regions, but it is shrouded by a pillar of smoke, which nullifies both heat and light.’ The ‘Cenci’ is, after Shakspere, the grandest and most perfect drama of modern times; and it differs from all Shelley's other writings in its simplicity, distinctness, and unity, both of conception and execution. The subject is too awful and too horrible for our stage; and indeed it would require actors of a higher stamp than any we possess to render the personation endurable; but in the closet it remains a glorious monument to the author's genius.

In July, 1822, while crossing the Gulf of Lerici with his friend Edward Elleker Williams in a little pleasure-boat, they were overtaken by one of those tremendous squalls common to the Mediterranean, and were drowned. Shelley's remains were burnt by Lord Byron, Leigh Hunt, Trelawney, and one or two other friends, and then conveyed to Rome, where they were interred close to those of his friend and brother poet Keats, with this inscription, written by Trelawney:—

PERCY BYSSHE SHELLEY
COR CORDUUM.
NATUS IV. AUG. MDCCXCII.
OBIIT VIII. JUL. MDCCCXXII.

> ‘Nothing of him that doth fade
> But doth suffer a sea-change
> Into something rich and strange.’
>
> *Tempest.*[*]

Thus, in his twenty-ninth year, when just attaining maturity as a man, clearness and calmness as a philosopher, and artistic ordination of materials as a poet, died Percy Bysshe Shelley. His whole life was a tragedy, and a devotion of himself to the cause of humanity. In his youth, his recklessness of offending the opinions of others—the vehemence of his religious and political persuasions, which amounted to fanaticism—and the crude daringness of those opinions, made many enemies, but no one ever knew him personally without loving him devotedly. His errors were few, and sprang from the same soil as his virtues—enthusiasm and inflexible sincerity. He was the most truthful man we have ever heard of, and in philanthropy a perfect Howard. He has been known repeatedly to give away all his money to the distressed before he reached the coach-office, and so been obliged to walk up to town. He gave Leigh Hunt 1400*l.* to get him out of his difficulties. He allowed a poor man of letters an income of 300*l.* a year, his own being no more than 1000*l.* In a word, to cite instances of his generosity would lead us beyond all limits. In person he was ‘tall and slight, and his constitution consumptive. He was subject to violent spasmodic pains, which would sometimes force him to lie on the ground till they were over; but he had always a kind word to give to those about him, when his pangs allowed him to speak. Though well turned, his shoulders were bent a little, owing to premature thought and trouble. The same causes had touched his hair with grey; and though habits of temperance and exercise gave him a remarkable degree of strength, it is not supposed that he could have lived many years. Like the Stagyrite, his voice was high and weak. His eyes were large and animated, with a dash of wildness in them; his face small but well shaped, particularly the mouth and chin, the turn of which was very sensitive and graceful. His complexion fair and delicate, with a colour in the cheek. He had brown hair, which, though tinged with grey, surmounted his face well, being considerable in quantity and tending to curl. When fronting and looking at you attentively, his aspect had a certain seraphical character that would have suited a portrait of John the Baptist, or the angel whom Milton describes as holding a “reed tipt with fire.”’ (Leigh Hunt's ‘Lord Byron,’ p. 174.)

Shelley's translations from the Greek are exquisite, and drew loud praises from the ‘Quarterly.’ They may be considered as the best in our language. His version of ‘Faust,’ a fragment of which is published, though admirable in spirit and effect, is not faultless with regard to meaning. He had not quite mastered the language.

His reputation as a poet has gradually widened since his death, and has not yet reached its culminating point. He was the poet of the future—of an ideal futurity wherein earth became the reality of heaven—and hence it was that his own age could not entirely sympathise with him. He has been called the ‘Poet of Poets’—a proud title, and in some respects deserved.

SHENDY. [NUBIA.]

SHENSTONE, WILLIAM, an English poet, was born November, 1714, at the Leasowes, Hales Owen, Shropshire. He was sent to Pembroke College, Oxford, in the year 1732, and remained there some time, taking no degree. He amused himself in a desultory manner, travelling about and writing poetry, till 1745, when he commenced residing on his patrimony at his native place. The remainder of his life was spent in rural occupations. He took great pride and spared no expense in the cultivation of his garden, and in his latter years became much involved in consequence. He died Feb. 11, 1763. A very beautiful Latin epitaph on his cousin, and a stanza, quoted by Johnson in his Life of him, full of genuine and simple feeling, redeem his poems from the charge of utter insipidity and lifelessness. They consist of elegies, pastorals, and odes, &c. A spirit of mortified ambition, ill suited to the retirement which he professed to court, appears in all his writings. (Johnson's *Lives of the Poets*.)

SHEPHERD. [SHEEP.]

SHEPHERD'S NEEDLE. [SCANDIX.]

SHEPPEY, ISLE. [KENT.]

SHEPTON MALLET. [SOMERSETSHIRE.]

SHERARD, WILLIAM, better known as the patron and fellow-labourer of other botanists than by his own writings, was born at Bushby in Leicestershire, in the year 1659. He received his early education at Merchant Taylors' School, and was entered as a student of St. John's College, Oxford, in 1677, and became a fellow of the same college in 1683. He was travelling tutor successively to Charles, second viscount Townshend, and to Wriothesley, lord Howland, son of Lord Russell who was executed. During this period of his life he made two tours on the Continent, in Holland, France, Italy, &c.; and then made the acquaintance of Boerhaave, Hermann, Tournefort, Vaillant, Micheli, and of most others of the ablest botanists of the time. He is believed to have been the author of an anonymous work called ‘Schola Botanica,’ published at Amsterdam, in 1689, giving an account of the plants then growing in the botanic garden at Paris. In 1700 he communicated a paper to the Royal Society, on the making of Japan and Chinese varnishes, which was inserted in the 22nd volume of their ‘Transactions.’

In 1702 he was appointed British consul at Smyrna, having previously been one of the commissioners for the sick and wounded at Portsmouth. Smyrna afforded him an opportunity of pursuing botany; here he laid the foundation of his great ‘Herbarium,’ which is still a national treasure, and cultivated with great care and attention many rare and exotic species of plants. In 1718 he returned to England, and received the degree of LL.D.

In 1721 he returned to the Continent, and Vaillant, the African traveller, being then in a dying state, Sherard succeeded in transferring the manuscripts and drawings of this great traveller to Boerhaave, who published them in the ‘Botanicon Parisiense,’ in 1727. In this work Boerhaave was materially assisted by Sherard. In his various visits to the Continent Sherard became intimate with Dillenius, who was professor of botany at Giessen; and in 1721 he invited him to come over to England to superintend the botanic garden of his brother Dr. James Sherard, at Eltham. This invitation was accepted by Dillenius, and forms an important point in the history of botany in this country

---

[*] This inscription we find *literatim* in the Life of Shelley, prefixed to the German translation of his ‘Cenci,’ by Felix Adolphi (Stuttgart, 1837), who himself copied it at Rome.

Sherard was a quiet unassuming man, who loved the study of natural history for its own sake. He seemed to prefer assisting others in their labours to producing anything of his own. He was thus the fellow-labourer of Catesby, in the 'Natural History of Carolina,' and also of Dillenius, in the publication of the 'Hortus Elthamensis. He died in 1728, at the age of sixty-nine. At his death he bequeathed his great Herbarium, containing upwards of 12,000 species of plants, to the University of Oxford, and also left 3000*l.* for the purpose of endowing a botanical chair in the same university. This was undoubtedly the greatest service done by Sherard to botany; and although at present it may have produced little fruit, yet the perpetuity of the gift would lead us to anticipate in the future important results. When natural history is placed upon an equal footing with other departments of study in our universities, we may expect to derive benefit from the labours of professors who occupy its chairs.

Dillenius was the first who occupied the chair of botany founded by Sherard. He was born at Darmstadt in 1687. He came over to England in 1721. He published in this country a new edition of Ray's 'Synopsis,' illustrated with twenty-four plates, in 1724. The 'Hortus Elthamensis' appeared in 1732. His greatest work, and one which has had a most important influence on the study of botany, is the 'Historia Muscorum,' published in 1741. Although the name would indicate that the mosses were the only subjects treated on, it included observations on all the families of cryptogamic plants. It contains a fund of original research, and many modern observers would do well to consult this volume before announcing their observations as entirely new. Sherard during his life wished to have completed or continued Bauhin's 'Pinax,' a work intended to have been a description of all the plants then known, and for this purpose he collected a great mass of materials. It was his wish at his death that this should be done by the new professor at Oxford, but either Dillenius did not feel competent to the task, or was too much occupied with his 'Historia,' for the continuation of the 'Pinax' never appeared. Dillenius died in 1747. His Herbarium is now with that of Sherard at Oxford, which, containing as it does specimens from Linnæus, Tournefort, and other eminent botanists of that day, is, next to the Herbarium of Linnæus himself, one of the most authentic and valuable botanical records that exists.

SHERBET, a word adopted from the Persian. The French name is *sorbet*, which, as well as the Italian *sorbetto*, and the Spanish *sorbete*, are probably derived from the Latin *sorbere*, 'to sup.' Sherbet, in Persia, Turkey, and other eastern countries where it is chiefly used, is a beverage composed chiefly of water, lemon-juice, and sugar, with the addition of other ingredients to render it more pleasant to the taste, as the pulp of fruits, perfumed cakes, amber, rose-water, &c.

SHERBORNE, or SHERBOURNE, a market-town in the hundred of Sherborne and county of Dorset, on the Exeter mail-road, 121 miles from London by railway to Basingstoke, and from thence by Salisbury and Shaftesbury: in 50° 57′ N. lat. and 2° 31′ W. long.

This place was of considerable importance in the time of the Saxons, who called it 'Sciraburn,' or 'Sciraburn,' from *scir*, clear, and *burn*, a spring or brook. William of Malmesbury and Brompton write the name Schireburn, Schirebourne; and Henry of Huntingdon, Syreburn, or Scyreburn. Ina, king of the West Saxons, on the division of the diocese of Winchester, then the sole bishopric of the West Saxons, made Sherborne the seat of an episcopal see (A.D. 705). The first bishop was Aldhelm, a man of great repute for his learning; and among his successors were Alstan (Althstan or Ealstan), distinguished as a politician and a warrior in the reigns of Egbert and Ethelwulf; and Asser, the friend and biographer of King Alfred. The diocese originally comprehended the counties of Dorset, Berks, Wilts, Somerset, Devon, and Cornwall; but was diminished by the erection of new bishoprics, the dioceses of which were subtracted from it. The changes which this bishopric underwent have, from the obscurity of the period, been the subject of much discussion. The seat of it was removed, about A.D. 1075 or 1076, to Old Sarum. [SARUM.] A monastery for secular canons was established here after the conversion of the West Saxons. The rule of St. Benedict was afterwards introduced (A.D. 998), and it became an abbey, which continued to the dissolution, when its revenue was valued at 682*l.* 14*s.* 7½*d.*

There was an antient castle at Sherborne, which was built by Roger, bishop of Sarum, in the reign of Henry I., and changed hands once or twice in the civil war of Stephen and the empress Maud. At that time, and for some time after, the town appears to have gone very much to decay, but afterwards revived. In the reign of Edward III. it sent representatives to parliament, and at a later period the assizes were often held here. In the time of Leland and Camden, it was, with the exception perhaps of Poole, the most frequented town in the county, and the seat of a considerable woollen manufacture. After the Reformation the clothing-trade declined, and was replaced by the manufacture of buttons, bone lace, and haberdashery, which was succeeded, towards the middle of the last century, by the silk manufacture. In the great civil war the castle was held for the king by the marquis of Hertford; but on his retiring it was taken by the parliamentarians under the earl of Bedford (A.D. 1642). In the following year the parliamentarians again entered the town, after a smart action with the townsmen (who drove out the party which first entered), and took the castle, which the royalists had again occupied. In 1645 the royalists held it again, until it was stormed by Cromwell and Fairfax with their forces, notwithstanding the gallant defence of Sir Lewis Dives, the governor. After this the castle was demolished.

The town is pleasantly situated, partly on the slope of a hill, partly in the pleasant vale of Blackmore. It is irregularly laid out; part of it is well paved and lighted, and well supplied with water. The church is a large cross-church, with various portions of different dates. The south porch is a curious specimen of Norman. The largest part of the church is good perpendicular, and was partly erected in the reign of King Henry VI. The choir and its aisles have good buttresses, pinnacles, and flying buttresses, and a very good pannelled parapet. The belfry story of the central tower, rising above the roof, has eight windows with buttresses, which rise from a bold slope under the windows, below which the tower is plain. This church antiently belonged to the abbey; and some portions of the additional buildings remain, though very much mutilated, and converted to various purposes. Three sides of the lower part of the tower appear to be the original fabric, but the eastern side is of the same date with the choir. There are a few good early English windows in the north aisle of the choir or its chapel. The groining of most of the church is rich and good; the south transept has a wood ceiling. There are some remains of antient stalls and screen-work, and some portions of antient stained glass. The tower is said to be upwards of 150 feet high. Attached to the church are four antient chapels, one on each side of the south transept, and two on the east side of the north transept. The remains of two others form part of the house occupied by the head-master of the grammar-school.

At the east end of the church is the grammar-school. The head-master's apartments, which are part of the school premises, include several remains of the abbey buildings: the school-room was built in the time of Charles II., on the site of an antient chapel. On the south side of the churchyard is an almshouse with a small chapel. It is an antient building of perpendicular date, originally an hospital of the order of St. Augustin: the dormitories retain the same form as when erected in the fifteenth century. The remains of the monastic buildings on the north side of the church comprehend the refectory, which was some years since used as a silk manufactory, some part of the abbot's lodgings, the abbey gateway and barn, and the abbey-mill. A conduit belonging to the abbey has been removed into the market-place of the town; it is in a very mutilated condition. The building now called the abbey-house was erected out of the ruins of the abbey soon after the dissolution.

The remains of the castle are on a rocky eminence at the east end of the town; the whole area comprehends four acres, and is surrounded by a deep ditch, on the inner bank of which the foundations and fragments of the walls (six or seven feet thick) enclosing the greater ballium or court may be traced. The gate-tower and some parts of the buildings in the centre of the ballium remain, but the latter are in too ruinous a condition for the plan to be exactly traced. In the fine pleasure-grounds which surround the ruins of the castle is Sherborne Lodge, frequently called Sherborne Castle, the residence of the Earl of Digby; it was built by Sir Walter Raleigh, and contains some interesting portraits. There are some antient houses in the town of Sherborne, especially a large one built round a square court, and called the New Inn. The town-hall and market-house are near the church. There are meeting-houses for Independents, Wesleyans, and Quakers.

The parish comprehends an area of 4900 acres, and had in 1831, 762 houses, inhabited by 985 families; the population was 4075, about one-fifth agricultural. Various branches of the silk manufacture, especially the making of silk twist and buttons, are carried on. There are two weekly markets, on Thursday and Saturday, the latter the most important, and three yearly fairs. It is one of the polling-stations for the county.

The benefice is a vicarage in the peculiar jurisdiction of the dean of Sarum, of the clear yearly value of 258*l.*, with a glebe-house, a building of considerable antiquity.

There were in the parish, in 1833, the grammar-school, with 102 boys (32 on the foundation); the Blue-Coat school, with a small endowment, with 32 boys and 2 girls; a third endowed school with 23 girls; a national school with 137 boys; and ten other day-schools, with 60 boys and 169 girls; an evening Lancasterian school, supported by subscription, with 50 boys and 90 girls; and two Sunday-schools, with 35 boys and 171 girls.

SHERBURNE, SIR EDWARD, descended from an antient family residing at Stainhurst in Lancashire, was born in London, on the 18th of September, 1618. Wood mentions his grandfather as a member of Corpus Christi College at Oxford. In his younger days he had the advantage of the instructions of the celebrated Thomas Farnaby, who then taught a school in Goldsmith's Rents; but in 1636, Farnaby removed from London, and transferred his pupil to the care of Charles Aleyn, who had been one of his ushers, and who is known as the author of some very inferior historical poetry. In 1640 Sherburne set out on the grand continental tour, from which he was suddenly recalled to solace the few remaining days of his father, who died in 1641, leaving his son in possession of the post which he had enjoyed of the clerkship of his majesty's ordnance. The rebellion however prevented his retaining this situation for any length of time. Being indeed a Roman catholic and firm royalist, he was ejected by a warrant of the House of Lords in 1642,* and harassed by a long and expensive confinement in the custody of the usher of the black rod. After his release he entered actively into the service of the king, who created him commissary-general of the royal artillery. Various fortunes now awaited him. He witnessed the memorable battle of Edge-hill; he attended the king at Oxford, where he took his master's degree on Dec. 20th, 1642, and pursued his studies for some time; he went to London in 1646, where he was plundered of all his property, and finally compelled to hide himself for safety in the chambers of a relation in the Middle Temple. About 1651 fortune once more smiled upon him, and he was appointed by Sir George Savile, who had then recently returned from abroad, superintendant of his affairs, and shortly afterwards was made travelling tutor to Sir John Coventry, with whom he visited different parts of the Continent between the years 1654 and 1659. On the Restoration he obtained with considerable trouble his old situation in the Ordnance, which was again sacrificed at the Revolution of 1688, through his unflinching adherence to principle in refusing to take the necessary oaths. His unvarying good conduct however had previously procured him the honour of knighthood from his majesty, on Jan. 6th, 1682. There is every reason however to believe that his latter days were embittered by the evils of poverty, caused principally by his inability to change his opinions with the times, as we find him in 1696 presenting a supplicatory memorial to the earl of Romney, then master-general of the ordnance, and another to the king. Whether either of these applications was attended with success is not known. He continued his retirement till his death, which took place at London, on Nov. 4th, 1702.

Sherburne was the author of poetical translations of two pieces from Seneca, the 'Medea,' and the 'Troades,' published respectively in 1648 and 1679. These works procured him considerable reputation in his time; but his fame at present principally rests on the translation of 'Manilius,' published at London in 1675, in a handsome folio volume, and enriched by a valuable appendix containing lives of scientific men. This appendix is particularly valuable to the scientific historian as containing much information regarding Sherburne's contemporaries not to be met with elsewhere.

SHERIDAN, DR. THOMAS, translated the 'Satires of Persius' into prose, and also the 'Philoctetes' of Sophocles into verse; but neither of these translations is worthy of being rescued from the neglect into which they have fallen. His talents were more of a social nature,—punning, quibbling, and fiddling, according to Lord Cork, with an incescessant flow of animal spirits.

Dr. Sheridan was born in the year 1684 (Cibber's 'Lives of the Poets'), in the county of Cavan. His parents were poor; but he was placed by a friend at Trinity College, Dublin, where he made considerable progress in classical literature. He afterwards took orders, and then set up a school in Dublin. Swift, who was his friend, procured him, in 1725, a living in the south of Ireland of about 150*l.* a-year; but his recklessness or impudence, one knows not which, spoiled all his expectations; for he preached a sermon on the 1st of August (the anniversary of King George's birth-day), on the text 'Sufficient for the day is the evil thereof.' On this being known he was struck off the list of chaplains to the lord-lieutenant, and forbidden the castle.

Our punning fiddling parson however bore this with a light heart, and soon after changed his living for one in Dunboyne; but owing to the cheating of the farmers and other causes, the income was lowered to 80*l.* a-year. As this did not suit him, he speedily gave it up for the free school of Cavan, where he had a salary of 80*l.* a-year besides his scholars. He was through life indolent, careless, slovenly, and indigent. His animal spirits seemed to supply every other deficiency, and to have preserved him cheerful amidst all his poverty and distress; but his habits as well as his temperament were careless and ill-regulated, and prevented any strict attention to his duties. His indolence or imprudence made him sell his situation for 400*l.*, alleging as an excuse the 'moist and unwholesome air of Cavan;' but we find him afterwards making no attempt to establish himself elsewhere. This 400*l.* was soon spent, and the 'ill-starred, good-natured, improvident man,' as Lord Cork calls him, fell into sickness and distress, which was terminated by a speedy death in 1738.

Lord Cork, speaking of him, says 'Not a day passed without a rebus, an anagram, or a madrigal. His pen and fiddlestick were in continual motion.'

(*Biographia Dramatica*; *Life of Swift*, by Sheridan (his son); and *Swift's Works*; Cibber's *Lives of the Poets*; Chalmers' *Biog. Dict.*)

SHERIDAN, THOMAS, M.A., the author of the 'Dictionary of the English Language,' was the son of the above, and born at Quilca, the residence of Swift, in 1721. Swift was his godfather, and treated him with uniform kindness. His education was commenced by his father, who subsequently sent him to Westminster School, where he was a king's scholar. He afterwards entered Trinity College, Dublin, where he took his degree of master of arts. When his father died he was without a profession, and destitute of all expectations; but having conceived that exalted and extravagant idea of oratory which haunted him through life, he determined on its restoration. To this end he devoted himself to the stage as the first qualification for understanding the art of oratory. He appeared as Richard III. in January, 1743, and 'met with the greatest encouragement.'

In 1744, he accepted an engagement at Covent Garden Theatre; and in 1745 he played with Garrick at Drury Lane, where some of his friends, more kind than judicious, endeavoured to set him up as a rival of Garrick. The consequence was a quarrel between the two, which lasted for life. Sheridan then returned to Dublin, and became manager of the theatre there, and he effected a very praiseworthy reform in the 'goings on' behind the scenes. The young college students and others had long been in the habit of attending rehearsals, frequenting the green-room, and carrying on gallantries with the actresses, much to the annoyance of all, and to the impediment of business. After a strong struggle Sheridan reformed this abuse. For eight years he continued his management with success, till in 1754 he was driven from it by one of the popular tumults so common in those days. In this year, when 'the rancour of political party arose to the greatest height that it had almost ever been known to do in Dublin, Mr. Sheridan unfortunately revived Miller's 'Mahomet.' In this play were many passages respecting liberty, bribery, and corruption, which pleased the anti-courtiers as expressive of their opinions in regard to certain persons at that time in power, and therefore they insisted on those passages being repeated, which the actor complied with. The absurdity however of such repetitions, merely as destroying the effect of the tragedy, having occurred to the manager, the same speeches, when again called for by the audience on the succeeding night, were refused by the actor; and he being obliged to hint the cause of his refusal, the manager became the object of their resentment. On his not appearing to mollify their rage by some kind of apology, they cut the scenery to pieces with their swords, tore up the benches and boxes, and, in a word, totally despoiled the theatre; concluding with a resolution never more to permit Mr. Sheridan to appear on that stage.' (Chalmers's *Biog. Dict.*)

---

* Aubrey, in the Ashmolean MS., says May 1642, while other biographers assert that this event happened in the preceding month.

He afterwards (1756) returned to Dublin and his management—the agitation having subsided; but though he was received with great favour by the audience, yet Barry and Woodward having erected another theatre, and decoyed some of his principal performers, as well as a London company, this with other causes quite ruined him, and he was obliged to give up all concern in the theatre.

It was then that he again relied on his indestructible faith in oratory, and the immense advantages to accrue from it. He published a plan, in which he proposed to his countrymen the establishment of an academy for the accomplishment of 'youth in every qualification necessary for a gentleman.' In the formation of this design, he considered the art of oratory to be one of the essentials; and to give a stronger idea of the utility of that art, he opened his plan to the public in three orations, which were also to be the proofs of his fitness for the office of superintendant of the academy, for which post he offered himself. The proposal was in some degree carried into execution; but for some reason Sheridan was excluded from any share in conducting it.

Sheridan however was not a man to be daunted, especially on the question of oratory, so accordingly we find him in 1759 lecturing in England on that subject. He had published an 8vo. volume entitled 'British Education: the source of the disorders in Great Britain. Being an essay towards proving that the immorality, ignorance, and false taste which so generally prevail, are the natural and necessary consequences of the present defective system of education; with an attempt to show that a revival of the art of speaking and the study of our own language, might contribute in a great measure to the cure of those evils.' The title is highly amusing; but it seems to have imposed on the public, for the lectures which he composed in confirmation of it, and delivered in London, Oxford, and Cambridge, met with immense success: at the last place indeed he was honoured with the degree of Master of Arts. In 1760 he again appeared at Drury Lane, but disagreements with Garrick soon put a stop to his engagement.

On the accession of George III. a pension was granted him, which so enraged Doctor Johnson, that he exclaimed, 'What, give him a pension!—then I must give up mine.' This was of course repeated to Sheridan, and he never forgave it. Through the various volumes of 'Boswell' there occur many notices of Sheridan, but the Doctor's contempt is nowhere disguised. Sheridan continued to lecture, and was 'himself the great sublime he drew.' In Scotland he was honoured with so much attention that a society was formed, called 'The Society for Promoting the Reading and Speaking of the English Language in Scotland.' Among the directors were the names of Drs. Blair, Ferguson, and Robertson.

But by all his discussion and lecturing, his universal panacea for the ills of moral England came to be examined, and when in 1769 he proposed his 'plan of education for the young nobility and gentry of Great Britain,' he found the public enthusiasm already cooled. This plan was addressed to the king, in which with an amusing but lofty condescension he made a tender of his services, and offered to 'dedicate the remainder of his days to its execution,' observing, that 'if the design be not executed by myself, it never will be by any other hand.' But in spite of all this heroic dedication of services, he excited no notice. But this did not damp his ardour in the least. He endeavoured to support his plan by writing, by lecturing, and by tremendous sarcasms against the taste of the times which could so neglect him; and the whole farce is wound up by his resolution, on the declaration of the American Independence, of 'benefiting the new world with the advantages ungratefully neglected by his own country.'

In 1769, 1770, and 1776 he performed at the Haymarket and Covent Garden, his last appearance as an actor. On the retirement of Garrick the purchasers of the share in Drury Lane, of which his son was one, agreed to make him the manager; but he held the post only three years, when he relinquished it as not tenable except on ignominious terms. He then produced his 'Pronouncing Dictionary of the English Language,' which was ridiculed by Doctor Johnson, who thought an Irishman very unfit to teach the English their own language. But this was jealousy. His 'Life of Swift' followed—a heavy and indiscriminating performance. He died in the sixty-seventh year of his age, August 14, 1788.

His other works are the 'Course of Oratorical Lectures' and the farce of 'Captain O'Blunder.'

(*Life prefixed to the Dictionary*; Boswell's *Johnson*; *Biogr. Dramat.*; Chalmers's *Biogr. Dict.*; Moore's *Life of R. B. Sheridan.*)

SHERIDAN, FRANCES, wife to the above, was born in Ireland 1724, but of English parentage, being the granddaughter of Sir Oliver Chamberlayne. Her first acquaintance with Sheridan was curious enough. At one of his most embarrassing periods, when there had arisen a violent party dispute relative to the theatre in which he had newly embarked all his money and expectations, she published a well-written and forcible pamphlet in his favour, which disinterested kindness so excited his attention that he lost no time in being introduced to her—they were mutually pleased with each other, and the orator soon proposed marriage, and was accepted. She is uniformly described as a most accomplished and amiable woman, of whom Doctor Johnson was very fond (Boswell's *Johnson*, ii.), and whose novel of 'Sidney Biddulph' he greatly admired, addressing her the very flattering remark, that he doubted whether 'upon moral principles she was at liberty to put any one to so much pain as her story had put him.' Her 'Nourjahad' has delighted all readers of romance, and will continue to do so; though probably on other accounts than 'the excellent moral and inculcation of a future state of retribution' which so delighted James Boswell. She also wrote two comedies, 'The Discovery' and 'The Dupe,' but they are feeble and prosy, and are now become rarities.

She died at Blois, after a lingering illness, September, 1766. This date is on the authority of a letter of her husband's deploring that event, which is dated October, 1766; the 'Biographia Dramatica' and Chalmers's 'Biographical Dictionary' (which copies the former almost verbatim) place her death as late as 1767. Dr. Parr thus speaks of her in a letter: 'She was quite celestial; both her virtues and her genius were highly esteemed.'

(Moore's *Life of Sheridan*; *Biographia Dramatica*; Boswell's *Johnson.*)

SHERIDAN, RICHARD BRINSLEY BUTLER (for thus was he christened after Brinsley Butler, earl of Lanesborough, though he usually dropped the Butler), was the son of Thomas and Frances Sheridan. He was born in Dorset Street, Dublin (not at Quilca as the 'Biographical Dictionaries' declare), in September, 1751. He was educated at Dublin, and subsequently at Harrow, but at both places was pronounced to be 'an impenetrable dunce,' with whom neither severity nor indulgence could avail. On leaving Harrow indeed his ignorance was so great that he could not spell, and he wrote *think* for *thing*. At the age of eighteen however he joined his friend Halhed in a translation of the 'Epistles of Aristænetus.'

Sheridan's life was throughout a dramatic one; not in the high or poetical sense, but in that of intriguing comedy and practical joking, and he certainly displayed throughout as perfect a contempt for principle or sincerity as any comedy hero we could desire. His first important step in this life, marriage, was of this nature, and partakes of that intriguing spirit. His own brother and his friend Halhed were both in love with Miss Linley, an accomplished singer, then only sixteen; they confided their passion to him, but he outwitted them both, and eloped with the lady to France, where they were secretly married. He then fought a duel with a 'married blackguard who had worried and defamed her;' and then brought her back to England, where having extorted her father's permission, he repeated the nuptial ceremony by licence in 1773. They tell an anecdote of his driving her from the oratorios, disguised as a hackney coachman, during the interval of the two weddings, when she was residing with her angry friends and still pursuing her profession. Sheridan would not consent to his wife's employing her talents for their subsistence: it offended his pride, and this pride Dr. Johnson applauded, but very erroneously in our opinion. Yet Sheridan did not refuse to subsist, during the early part of their marriage, upon the three thousand pounds 'which a good-natured old gentleman had settled upon Miss Linley in default of being able to marry her.'

Necessity however soon drove him to literature, and in January, 1775, he produced his first comedy of 'The Rivals.' On the first night it was damned; but this was chiefly the fault of one of the actors and of those inexperiences which usually attend 'first nights,' and it soon met with the success which it so well deserved. In this comedy there is nothing new, and little that is true, but everything *tells* admirably. The incidents are various and bustling. The characters well opposed; though all, except the tetchy wayward Falkland, are copies of well-known originals. Mrs. Malaprop is not only a farcical exaggeration of Mrs. Slipslop (whose very jokes are easily perpetrated when once an author plunges into such a vein of impossible fun); but that mispronunciation which was natural in a housekeeper trying to be pedantic, is insupportable in the aunt of Lydia Languish. But Sheridan trusted very little to nature. Acres is quite as much a caricature; and Lydia Languish is so clumsily overdone as almost to fall pointless. Fag is a wit of the first order, dressed as a footman. Sir Anthony Absolute, though old, is nevertheless admirable, and cleverly sustained. To a severe criticism this comedy exhibits many faults, yet the same severity must admit its abundant merits of wit, animal spirits, situation, story, and selection of character.

The gaiety of success, and, as some say, gratitude to Mr. Clinch, who played Sir Lucius O'Trigger, but more probably the same pressing necessity, 'who has no law,' produced the farce of 'St. Patrick's Day, or the Scheming Lieutenant,' in the course of the ensuing spring. This farce turns upon the old trick of the lover deceiving the credulous father, a trick so often used by Molière, and imitated by every farce-writer since that immortal wit. The best thing in it is the character of Dr. Rosy, the sentimental physician, who moralises in the most imperturbable style: his lamentation for his departed wife is irresistible:—'Well, she's gone, never to return; and has left no pledge of our loves behind. No babe to hang like a label round papa's neck. Well, well, we all are mortal; sooner or later—flowers fade—flesh is grass.' The summer of that year was devoted to 'The Duenna,' which Hazlitt calls 'a perfect work of art. The songs are the best that ever were written, except those in the 'Beggar's Opera.' They have a joyous spirit of intoxication in them, and strains of the most melting tenderness.' But we must observe that neither incidents nor characters are new. The dialogue however is witty, terse, and polished. 'His table songs,' observes Leigh Hunt, 'are always admirable. When he was drinking wine, he was thoroughly in earnest.'

He was now in the full flush of popularity and prosperity, and became one of the proprietors of Drury Lane Theatre; but how, nobody can tell; for where he got the money, has ever remained an impenetrable secret. In the year 1777 he slightly altered Vanburgh's 'Relapse,' and produced it under the title of 'The Trip to Scarborough;' but his alterations are really so extremely trivial, consisting solely in one or two expurgations, that we wonder at the assurance of publishers who include it among his works, while at the same time they exclude 'The Stranger,' which is usually attributed to Mr. Thompson; yet Sheridan himself declared to Mr. Rogers, on two different occasions, that he wrote every word of it. (Moore's *Life of Sheridan*, ii., p. 275.)

In 1777 also he produced 'The School for Scandal,' of which Leigh Hunt remarks, 'with the exception of too great a length of dialogue without action in its earlier scenes, it is a very concentration and crystallization of all that is sparkling, clear, and compact, in the materials of prose comedy.' The characters, though not new, are generally well drawn, and inimitably selected. Selection is one of the first arts of a dramatist. Having to illustrate a moral or develope a problem, his great care should be that the characters which he selects do really of themselves go towards the building up and elucidation of the whole. Thus Sir Peter and Sir Oliver, Charles and Joseph, Mrs. Candour and Lady Sneerwell, with Sir Benjamin, Snake, Crabtree, &c., have each a distinct part in the drama. Of these we prefer Mrs. Candour, who is exquisitely drawn, and who serves to turn the balance in favour of Sheridan's scandal-scene, in comparison with the scene in Wycherley's 'Plain Dealer' (Act ii., sc. 1), from which it is imitated. Charles Surface is a very disagreeable and boasting character, and destitute of the honourable or gentlemanly feeling to which he pretends. He is not only an unprincipled spendthrift, but he attempts to carry it off with a high hand, and with maxims which may be well enough over the bottle, but are foolish sophisms when applied in life: thus when he has money, he prefers sending it to Mr. Stanley, who has applied to him for charity, than to his lawful creditors; and swaggers off with 'Justice is an old lame hobbling beldame, and I can't get her to keep pace with generosity for the soul of me.' His treatment of Lady Teazle in the screen-scene is still more offensive. Charles has a cant about him as well as Joseph; but he is always a favourite with the audience, because he is, or pretends to be, a dashing fellow of the very best intentions, and only addicted to cheating his tradesmen out of a little pardonable sociality. A rake is always sure of the sympathies of the pit and boxes; and the very tailor who perhaps in real life 'suffers' most from such characters, applauds the loudest. To him Charles Surface has a dashing captivating immunity from the laws of common honesty. 'The School for Scandal' however remains the finest model of the wit-comedy in the language: it has not the heartiness, the flesh and blood vitality of the 'Beaux Stratagem,' nor the more elaborate wit of Congreve; its language is more polished and exquisite than Farquhar's, and more easy and less obviously elaborate than Congreve's; but all three dwindle into insignificance beside the poetic comedy of Shakspere.

In 1779 he wrote the 'Critic,' one of the wittiest farces in the language. 'In some of its most admired passages, little better than an exquisite cento of the wit of the satirists before him. Sheridan must have felt himself emphatically at home in a production of this kind; for there was every call in it upon the powers he abounded in—wit, banter, and style; and none upon his good nature.' (Leigh Hunt, *Critical Sketch prefixed to Sheridan's Works.*) But indeed it has need of all its brilliant writing to support the length of the dialogue without action; and when it comes to the rehearsal of the tragedy, it soon becomes tiresome. Good acting however will always keep it on the stage.

Sheridan's political career was illuminated by a few bright flashes of eloquence and perpetual wit, but he had neither the depth nor the perseverance of a statesman; and consequently, though he sometimes helped his party with a promising effort, 'gradually degenerated into a useless though amusing speaker, familiarly joked at by the public, admired but disesteemed by his friends.' He had made the acquaintance of Charles James Fox, through whose good offices he got elected for the borough of Stafford in 1780. His connection with Fox, more than any decided opinions of his own, led him to support the Whig party, to which he continued faithful to the last. Under the Rockingham administration he became under-secretary of state, but resigned on the death of the marquis. His celebrated speech on the occasion of Warren Hastings's trial was a tremendous effort of eloquence, and will never be forgotten.

In 1792 Sheridan's wife died; and in 1795, being then in his forty-fourth year, he married Miss Ogle, the dean of Winchester's daughter—'young, accomplished, and ardently devoted to him.' She brought him five thousand pounds, and with this and fifteen thousand more which he contrived to raise by the sale of Drury Lane shares, an estate was bought in Surrey, where he was to live in love and happiness till his drink and his duns could endure it no longer. After an interval of nine years since his last play, he again, in 1798, contributed to the stage the 'Stranger' and 'Pizarro,' both adaptations from wretched pieces of Kotzebue 'It is observable,' says his last critic, 'however, and not a little edifying to observe, that when those who excel in a spirit of satire above everything else come to attempt serious specimens of the poetry and romance whose exaggerations they ridicule, they make ridiculous mistakes of their own, and of the very same kind, so allied is habitual want of faith with want of all higher power.'

Sheridan's theatrical career terminated with these pieces; and now his prospects seemed every day more lowering. His difficulties always great, became now insupportable from the want of health, youth, and animal spirits to prompt him to fresh exertions, or to enable him to bear them with better grace. He lived in a perpetual but inefficient struggle; resorting to many a degrading shift, which may tell well enough as jokes, but which preyed upon him seriously enough. His friends (among them the prince-regent, his former boon companion, whose dull pompous entertainments were enlivened by Sheridan's wit) had forsaken him now that sickness and distress had enfeebled the brilliancy and animation of his conversation. Money was no longer to be borrowed; duns were no longer to be pacified with promises; everything was indicating ruin, and he died near his dying wife, amidst the threats of bailiffs, and deserted by all but his physician Dr. Bain, and his poetical friends Mr. Rogers, Mr. Thomas Moore, and Lord Holland, on Sunday, the 7th of July, 1816, in Saville Row, Burlington Gardens, in the sixty-fifth year of his age.

'It is a remarkable and painful instance,' observes his critic, 'of the predominance of the conventional and superficial in his feelings, even when they were most strongly and deeply excited, that after going through life with a laughing carelessness as to troubles far more humiliating, he burst into tears, and complained of his 'person' being 'degraded' because a bailiff had touched him! That word 'person' expresses all."

Moore's *Life of Sheridan;* Leigh Hunt's *Biographical and Critical Sketch,* prefixed to Moxon's edition of Sheridan's *Works;* Boswell's *Johnson; Biographia Dramatica;* Hazlitt's *Lectures on the Comic Writers.*)

SHERIF, an Arabic word which means 'noble, illustrious,' and a title given throughout Arabia, Egypt, and Barbary, to those who are descended from the Mohammedan prophet. In Turkey they are called amírs, *i.e.* princes, and enjoy great privileges, such as not being subject to the payment of taxes; not being obliged to appear before a judge, unless he be one of their class; wearing a green turban and slippers; occupying a superior place in the mosque, &c. As men and women of this caste often contract marriage with persons who are not members of the same, and the title of sherif is inherited from either of the parents, the number of persons who enjoy this distinction has become very considerable in Turkey, Syria, and Egypt, where they may be found employed in the lowest offices. It is one of the privileges of Mecca to be governed by a sherif of the posterity of Hasan, son of Ali Ibn Abí Talib, which family enjoys the sole right to the throne. His dominions comprehend, besides the capital [MECCA] Medina, Jambo, Tayif, Sadie, Ghunfude, Hali, and thirteen other smaller districts, all situated in the Hejáz. His principal revenue consists of a tax imposed upon every pilgrim, and the presents made by Mohammedan princes.

About the beginning of the sixteenth century an adventurer, named Mohammed Ibn Ahmed, who pretended to be descended in a right line from Huseyn, son of Alí Ibn Abí Talib, the cousin and son-in-law of the prophet, became the founder of a dynasty known in history as the 'First Dynasty of the Sherifs,' to distinguish it from another more recent, which African writers designate under the name of *Daulah Ash-shorafá Al-filellíin* (' the Dynasty of the Sherifs of Tafile.') To the latter belongs Abú-l-fadhl Abdu-r-rahmán, who now occupies the throne of Marocco. Having obtained from Mohammed Al-watás, sultan of Fez, the investiture of the provinces of Dukelah and Sús, under the pretence of waging war against the Portuguese, who then occupied the greater part of that country, known under the antient name of Mauritania Tingitana, Mohammed declared himself independent in his government. At his death, in 1517, his dominions were divided among his three sons, Abdu-l-kebir, Ahmed, and Mohammed. The first was killed in a skirmish with the Portuguese. Ahmed became king of Marocco, which city he took from Abú-shantuf (Bujentuf). The other brother, Mohammed, who was king of Terudant, after considerably extending his dominions, made war on his brother Ahmed, whom he deprived of his states; and in 1548 he took possession of Fez. At his death, in 1557, Mohammed was succeeded by his son Abdullah, who reigned till 1574, when he was assassinated at Alguer by the Turks who composed his own body-guard. His son Mohammed II., surnamed Al-muntaser and Al-aswad (the black), because he was the son of a negress, was dethroned in 1576 by his uncle Abdu-l-málik, against whom Don Sebastian, king of Portugal, fought the battle of Alcassar. [SEBASTIAN.] Abdu-l-málik was succeeded by his son Ahmed, surnamed Abú-l-abbás Al-mansúr, the greatest monarch of his race, who died in 1603, after a long and prosperous reign. His son Abú Fáris Abdu-l-azíz succeeded; but he was dethroned in 1607 by his younger brother Zidán, who had with him a body of English auxiliaries under the command of John Gifford. Zidán was a just and benevolent monarch, and a patron of literature, which he himself cultivated with success. A large library which he had collected was taken by the Spaniards on board one of his galleys, and given to the monks of the Escurial. (Casiri, *Bib. Ar. Hisp. Esc.* vol. i., p. 5.) At his death, in 1630, his son Abdú-l malek II. succeeded him. The other sovereigns of this dynasty were Abdú-l-malik III. (1630-35), Al-walid (1635-46), and Ahmed II., surnamed Ash-sheikh (the old man), all three sons of Zidán. The last was put to death in 1665 by an adventurer named Krom Al-háj, who usurped the throne, but was assassinated in 1667, and succeeded by his son Muley Sheikh.

During the reign of Zidán (1607-30), Muley Ali, a native of Jambo in Arabia, and a descendant of the prophet, revolted at the city of Tefilel (improperly called Tafilet), where he resided, and assumed the title of sultan. This Ali pretended to be issued in a straight line from Yúsuf, the brother of Mohammed Ibn Ahmed, the founder of the first dynasty of the sherifs, whose posterity had remained in Arabia. At his death, in 1632, Ali was succeeded by his son Mohammed, who, in 1664, was dethroned by his own brother Ar-rashíd. This prince, who possessed mamy brilliant qualities, united under his rule all the dominions which had formerly belonged to the sherifs of the first dynasty. He died March 27, 1672, after a reign of eight years, and was succeeded by his brother Ismail, under whose reign, which lasted fifty-five years, Tangiers was evacuated by the English. At his death (March 27, 1727) his son Ahmed, surnamed *Adh-dhahebí* (the golden), owing to his great avarice and the considerable treasure he amassed, succeeded him. He was strangled in 1729, after a reign of nearly two years. The reign of his brother and successor Abdullah, at whose court the celebrated Ripperdá found an asylum [RIPPERDA], was one of perpetual strife and civil war. Five times he was deposed, or compelled to abandon the capital of his dominions, and as many times he regained possession of it. Having at last, in 1742, rid himself of all competitors for the crown, he reigned undisturbed until his death, in 1757. His son and successor Síd Mohammed was a very able monarch. He encouraged trade and agriculture, made treaties with several European nations, and admitted foreigners to his court. He died April 11, 1789, at the age of eighty-one. His eldest son Mohammed Mahdi Al-yezíd only reigned twenty-two months, being killed on the 15th Feb., 1792, in a battle against his own brother Hishám, who disputed the empire with him. He was succeeded by his brother Abú-r-rabi Suleyman, who occupied the throne till his death in 1822, when he appointed his nephew Abú-l-fadhl Abdú-r-rahman, son of Hishám, to be his successor, who now reigns over the whole of Western Africa, from the frontiers of the province of Telemsán to the river Nún in the desert.

There is a good history of the first sherifs by Diego de Torres, who was an eye-witness of most of the events which he describes (*Relaçion del Origen y Successo de los Xarifes y del Estado de los Reynos de Marruecos, Fez, y Tarudante,* Sevilla, 1586, 4to.). Much useful information may also be gleaned from the following works:—Marmol Carvajàl, *Descripcion General de Africa,* Granada, 1573, fol.; Meneses, *Historia de Tangere,* Lisb., 1732; Jackson's *Account of Marocco,* Lond., 1809, 4to.; Graberg di Hemso, *Specchio Geografico e Statistico dell' Impero di Marocco;* Chenier, *Recherches sur les Maures,* Paris, 1787, 8vo.

SHERIF-ED-DEEN (*Moollah Ali Sheríf-ed-deen Yezdi*) a native of Yezd in Persia, and a celebrated Persian historian, who flourished about the beginning of the fifteenth century of our æra. Few particulars have reached us as to his parentage or personal history. He was by profession a doctor of the Moslem law, and appears to have resided principally at the court of Shiraz, under the patronage of Ibraham Sultan, who acted as viceroy of Fars for his father Shah-Rokh, the youngest son and successor of Timour. Here Sheríf-ed-deen completed, A.D. 1424 (A.H. 328), the work on which his reputation is principally based, entitled the 'Zuffer-Nameh,' or 'Book of Victories,' which gives, in the Persian language, a detailed and copious account of the life, reign, and conquests of Timour, drawn from the authentic records in the possession of his descendants. The first part, or introduction, however does not exist in any copy found in European libraries; and we are acquainted with it only through the quotations of Hadji-Khalfa, who mentions it as containing an excellent account of the geography of Zagatai, or Turkestan, with genealogical notices of the various tribes. The style of the 'Zuffer-Nameh' is characterised by Sir William Jones as 'most beautiful and elegant;' and Khondemir compares the diction to 'a sparkling succession of pearls, diamonds, and precious stones;' but a European reader is fatigued by the endless metaphors and profusion of laboured ornaments with which every phrase is overloaded. 'His geography and chronology,' says Gibbon, 'are wonderfully accurate; and he may be trusted for public facts, though he servilely praises the virtue and fortune of his hero. His encomiums on Timour are indeed carried to the most fulsome extent of oriental panegyric; but both gratitude and interest would combine to produce this effect; and the bias thus shown is in some measure useful as enabling us to qualify the equally exaggerated invectives of another biographer of Timour, the Syrian Arabshah. A French version of the 'Zuffer-Nameh' was published at Paris, 1722, in four vols. 12mo., by M. Petis de la Croix, under the title of 'Histoire de Timur-Bec, connu sous le nom du grand Tamerlane, Empereur des Mogols et Tartares,' &c.; but it is far from being a close translation of the original. A Turkish version has also been printed at the imperial press of Constantinople.

SHERIFF, the Shire-Reve (scyr-gerefa), from the Saxon word *reafan*, 'to levy, to seize,' whence also greve. The German word is *graf*. The gerefa seems to have been a fiscal officer. In the Saxon period he represented the lord of a district, whether township or hundred, at the folkmote of the county; and within his district he levied the lord's dues, and performed some of his judicial functions. (Palgrave, *Rise and Progr.*, i. 82.) He was usually not appointed by the lord, but elected by the freeholders of the district; and (accompanied by four of them) was required to be present on its behalf, as well as on the lord's, at the folkmote or county court. In like manner the Saxon prince or king employed in the shires or larger districts his gerefa or reve, who levied his dues, fines, and amerciaments; to whom his writs were addressed; who exercised on his behalf regal rights in the shire, for the preservation of the peace and the punishment of offenders; presided over the courts-leet or views of frankpledge, and (at least in the absence of the earl in antient times, and since the Conquest instead of the earl) presided over the hundred and county courts. It is difficult to determine how far the functions of the sheriff were concurrent with and how far derived from the ealderman or earl of Saxon and Danish times; and the confusion between these offices has been increased by the translation, in our antient laws, of the word sheriff in the Latin into *vice comes*, and in Norman French into *visconte* or *viscount* (deputy of the earl); whereas certainly many of the sheriff's powers even in Saxon times were derived from the freeholders, or from the crown alone, and the word graf (gerefa) in German was equivalent to our earl. That before and for a century after the Conquest the sheriff had powers independent of the earl, is obvious from the fact, that in the circuit (tourn) which he made periodically (Spelman's *Gl.*, 'Vice Comes') of his shire for the administration of justice (as the Saxon king made a circuit of his realm), he was accompanied not only by the freeholders, but by the bishop, the earl, and barons, until these noblemen were exempted from the duty by statute 52 Henry III., c. 10 (A.D. 1267). [Earl; Courts; Shire.]

Sometimes the shrievalty, by grant of the crown, was hereditary; it was also often held for life, or for many years, and there were sometimes more sheriffs than one in a county, the persons chosen for the office being, according to Spelman, 'totius regni proceres:' but the sheriff was usually chosen by the freeholders of the shire. The statute 28 Edward I., c. 8, which says that 'the king hath granted unto his people that they shall have election of their sheriff in every shire (where the sheriff is not fixed in fee) if they list,' is rather declaratory of the people's right than a grant of a new privilege. By the 14 Edward III., c. 7, it is enacted that no sheriff tarry in his bailiwick more than a year, and then another, who hath land sufficient in his bailiwick, shall be ordained on the morrow of All Souls (3rd November) by the chancellor, treasurer, and chief baron of the exchequer, taking to them the chief justices of either bench if they be present.

At present the crown in most cases appoints the sheriffs, and also fills up any vacancy which is occasioned by the death of a sheriff during his year of office. To some corporations of cities which are counties of themselves charters have given the power to elect their own sheriffs; and the city of London has the perpetual right to elect the sheriff of Middlesex. In the county of Durham the bishop was sheriff until he was deprived of palatine powers in 1836; and in Westmoreland the office is hereditary in the family of the earl of Thanet as heir-general of the Viponts, to whom the shrievalty was granted by King John. The annual appointment of sheriffs is now in most counties made thus:—On the morrow of St. Martin (12th November), the lord chancellor, first lord of the treasury, and chancellor of the exchequer, together with all the judges of the three courts of common law, meet in the exchequer chamber, the chancellor of the exchequer presiding. The judges then report the names of three fit persons in each county, and of these the first on the list is chosen, unless he assigns good reasons for exemption. The list thus made is again considered at a meeting of the Cabinet held on the morrow of the Purification (3rd February), at the president of the council's, and attended by the clerks of the council, when the excuses of the parties nominated are again examined, and the names are finally determined on for the approval of the queen, who, at a meeting of the privy council, pierces the parchment with a punch opposite the name of the person selected for each county; and hence has arisen the expression of 'pricking the sheriffs.' The judges of assize annually add the requisite number of names to their lists by inserting those of persons recommended by the sheriff going out of office.

The sheriff derives his authority from two patents, one of which commits to him the custody of the county, and the other commands the inhabitants to aid him. He takes an oath of office, the greater part of which relates to his collection of the crown revenue, and he gives security to the crown that he will duly account. He then appoints an under-sheriff, by whom in fact the duties of the office are performed. These duties are various and important. Lord Coke quaintly says that the sheriff has a triple custody—1st, of the *life of justice*, because to him are addressed the writs commencing all actions, and he returns the juries for the trial of men's lives, liberties, lands, and goods; 2ndly, of the *life of the law*, because he executes judgments of the courts; and 3rdly, of the *life of the republic*, because he is in his county the principal conservator of the peace. He presides in his own court as a judge, and he not only tries all causes of 40*s*. in value, but also much larger questions under the writ of scire facias. [Scire facias.] By Magna Charta he is prohibited from holding pleas of the crown. He presides at all elections of members of parliament and coroners, and hence he cannot during the year of his office be elected a knight of the shire. He apprehends all wrong doers, and for that purpose, in criminal cases, he is entitled to break open outer doors to seize the offender; he defends the county against riot or rebellion or invasion [Lord Lieutenant], and to this end may require the assistance of all persons in it who are more than fifteen years of age, and who, when thus assembled under the sheriff's command, are called the *posse comitatûs*. [Posse Comitatus.] To refuse to the sheriff the aid which he requires is an offence punishable by fine and imprisonment. The sheriff takes precedence of all persons in the county. He seizes all lands which have fallen to the crown, and levies all fines and forfeitures; but he is not permitted to act as a justice of the peace. He executes all writs that issue from the superior courts, whether they are writs that commence an action or writs of execution; he is likewise responsible for the execution of criminals. He receives and entertains the judges of assize, on whom he is constantly in attendance whilst they remain in his shire.

To assist him in the performance of his duties, the sheriff employs an under-sheriff and also a bailiff and gaolers, from whom he takes security for their good conduct. He is prohibited by very antient statutes from selling his office or the profits of any part of it.

The liability of the sheriff for breach or neglect of his duties is a frequent source of litigation. Few assizes occur without actions being brought against him for illegal arrests or levies, or for wrongfully abstaining from executing the process addressed to him. Thus the decisions affecting him are numerous and complicated, and there are many treatises concerning the office, of which Dalton's 'Office and Authority of Sheriff' (1682) is the most relied on. [SHIRE; EARL.]

(Spelman's *Glossary*, articles 'Graphio,' 'Comes,' 'Vice-Comes;' *Coke upon Littleton*, Hargr. and Thomas's edition, vol. i.; Bacon's *Abridgement*; Palgrave's *Rise and Progress of the English Constitution*, i.)

SHERLOCK, WILLIAM, D.D., born about 1641, died 1707, father of Dr. Thomas Sherlock, bishop of London. Dr. Sherlock, the father, was born in Southwark, and studied at Peter House, Cambridge; at an early period of life he had the living of Saint George, Botolph-lane. In 1681 he obtained the prebend of St. Pancras, in the church of St. Paul's, London; and in 1684 or 1685 was elected master of the Temple. His political conduct at the Revolution is said to have been as ambiguous as that of his son on the accession of the house of Hanover, and he exposed himself to the severe censure of the Jacobite party, who had hoped to retain him. It was on this occasion that he published his 'Case of the Allegiance due to the Sovereign Powers.' He appears however to have been little favoured by the new government, for he remained with no other eminent preferment than that of master of the Temple till his death at the age of 66.

Dr. Sherlock was much occupied in the theological controversies of the time, of which the most remarkable was that in which he and Dr. South engaged on the nature of the Trinity. His writings are very numerous; but it may be sufficient to add that he is the author of the work entitled 'A practical Discourse concerning Death,' a very popular book, which has gone through numerous editions.

SHERLOCK, THOMAS, son of Dr. William Sherlock, born 1678, died 1761, an eminent prelate of the English church, of whom there is a Life prefixed to an edition of his Sermons published in 1775. He was born in London, and educated at Eton, from whence he passed to Catherine Hall, Cambridge, of which college in due time he became master, and in 1714 was vice-chancellor of the university. Before this time, namely in 1704, he had been made master of the Temple, on the resignation of his father, which office he held for nearly fifty years, constantly preaching and highly esteemed. His political conduct was thought to be a little ambiguous at the beginning of the reign of George I., but he soon gave in his adhesion to the new family, and in November, 1715, began his course of preferment in the higher dignities of the church, being made dean of the cathedral church of Chichester. Yet he was always devoted to Tory politics, defended strenuously the Test and Corporation Acts, and was the most formidable opponent whom Dr. Hoadly had to encounter in what is called the Bangorian controversy. His conduct in this controversy was so offensive at court that he was removed from the list of king's chaplains in 1717. In the controversies which arose at that period respecting the proofs of the divine origin of Christianity, Dr. Sherlock distinguished himself by his valuable writings, particularly his 'Use and Intent of Prophecy,' and his 'Trial of the Witnesses of the Resurrection of Jesus,' which is a masterly reply to the objections of those who reject the evidence of miracles, and particularly to those of Woolston. In 1727 he was made bishop of Bangor, and was translated to Salisbury in 1734. His learning and eloquence gave him considerable weight in the debates of the House of Lords, and his reputation both as a divine and a ruler in the church was so great that in 1747 the archbishopric of Canterbury was offered to his acceptance, but declined by him on account of the state of his health. In the next year however he accepted the bishopric of London, and became engaged in a dispute with the new archbishop (Herring) respecting the option, the archbishop having fixed on the church of St. George, Hanover-square. In 1753 he resigned the mastership of the Temple, being then old and infirm. In 1755 and 1756 he revised and corrected a large body of his sermons, which were published in those years, in four octavo volumes, to which a fifth was afterwards added. Duties such as these were at that period nearly all that he was able to perform, being almost wholly deprived of speech and of the use of his limbs. When he died, in 1761, he had completed his eighty-third year. He was buried in the churchyard of Fulham.

SHERWIN, JOHN KEYSE. The history of this artist presents an example of the power of talent to make its way through all obstacles. He was a native of Sussex, and of very humble origin. When about eighteen or nineteen* years old, he was employed as a woodcutter on the estate of Mr. Mitford, near Petworth. He had occasion to enter the parlour one day on business, when he saw some members of the family engaged in drawing, and, as it was observed that he paid more than ordinary attention to the process, he was asked whether he could do anything in that way. His answer intimated a desire to make the attempt; and a port-crayon was put into his hand. It is related that his hands were so stiff and callous with hard labour, that, when a penknife was offered him for the purpose of sharpening the point of his crayon, he was unable to use it, and it slipped through his horny fingers. He nevertheless produced a drawing which greatly surprised Mr. Mitford, and which, being sent to the Society of Arts, probably accompanied with an account of the circumstances under which it was executed, obtained their silver pallet as a reward. He then removed to London, and became a pupil of Ashley, a painter in some repute at that time; but who shortly afterwards married a lady of title, and abandoned the arts. Upon this Sherwin placed himself under Bartolozzi, and made rapid progress in designing and engraving. The biographical notice in the 'Gentleman's Magazine' states that he carried off both the silver and gold medals from all the students of the Royal Academy; and we learn from the records of the Society of Arts that in 1774 and 1775 he received two prizes of twenty guineas each for engravings from designs by himself, and in 1778 obtained their gold medal for excellence in engraving. On the death of Woollett, in 1785, Sherwin was appointed engraver to the king. Although he displayed considerable talent in design, it is as an engraver that his reputation stands highest. He engraved both historical subjects and portraits, and attained a degree of excellence that is truly surprising when the circumstances of his early life are considered. He commenced a very large picture in oil-colours, representing the installation of the knights of St. Patrick; but as far as it was proceeded with, it proved, according to Dayes, 'a wretched daub.' He died September 20, 1790.

It is to be regretted that the extraordinary talents of Sherwin, and the great encouragement he received, were not duly improved by him. Dayes, in his 'Professional Sketches of modern Artists,' states that he 'possessed all that impudent assurance necessary to pushing his fortune in society; but what his forwardness procured, his folly lost; as, in the end, he disgusted all his friends, among whom were some of the principal nobility;' and he adds that, by running into excesses, he impaired his constitution and embarrassed his affairs, and died under most melancholy circumstances.

(*Gent. Mag.* for 1790 and 1791; *Works* of Edward Dayes; Bryan's *Dictionary*, &c.)

SHETLAND, THE ISLES OF, form a distinct and the most remote and northerly group of islands incorporated with Great Britain. They are situate about 150 miles from the headland of Buchanness on the Aberdeen coast, and are nearly one hundred miles beyond the centre of the Orkney Islands. Excluding the two more detached islands of the group, called Foula and Fair Isle, the Shetland Isles lie between 59° 48′ and 60° 52′ N. lat., and between 52′ and 1° 57′ W. long. Foula is computed to be twenty miles to the west of the Mainland of Shetland, and Fair-Isle to be twenty-five miles south-south-west of the nearest headland of the Mainland.

The Shetland group consists of more than one hundred islands, islets, holms, and skerries, about thirty of which are inhabited; the others are either small verdant isles, on which cattle and sheep are pastured, or sterile masses of rock. The largest of the Shetland Isles, called the Mainland, is about sixty miles long, direct distance, from its northern extremity at Feideland to its southern termination at Sumburgh Head. The breadth of this island is very unequal, and varies in general from three to five and ten miles: at one part, from Sandness to the point opposite to the Noup of Nesting, the breadth is twenty-four miles; and at the narrow isthmus of Mavis Grind, the breadth is only about one hundred yards. The coasts of the Mainland are singularly irregular and broken, being indented with innumerable arms of the sea, or deep bays, universally distinguished by the provincial term of *Voes*, which penetrate

---

[*] The memoir in the 'Gentleman's Magazine' states that he was about *nineteen* at this time, but in Dossie's 'Memoirs of Agriculture and other Œconomical Arts,' vol. iii., where the first reward he received from the Society of Arts is recorded, it is stated to have been given in 1769, and Sherwin's age is given as *thirteen*. This is probably a misprint for *eighteen*, which would agree sufficiently with the ordinary account.

into and intersect the interior parts of this singular island in such a manner, that in traversing it, a traveller cannot find himself, at any one point, farther than three miles from one or more of these voes, or of the open sea. The next largest island is Yell, being about twenty miles in length and six miles in breadth. Unst is the third largest island, and is about eleven miles long and six miles broad. The other islands are comparatively small: the largest are Fetlar, Whalsey, Bressay, Papa-Stour, Meikle-Roe, Burra, Foula, and Fair-Isle.

All the Shetland Isles are at present divided into twelve parishes, which form two presbyteries of the church of Scotland, viz. the presbytery of Lerwick and the presbytery of Burravoe, and which, united, constitute the synod of Shetland. The parishes, with their population in 1831, are:—

	Population.	
In the presbytery of Lerwick.		
1. *Bressay*, including Burra and the government church of Quarff . .	1,699	
2. *Dunrossness*, including Coningsburgh, Fair-Isle, and the government church of Sandwick . . .	4,405	
3. *Lerwick*, including Gulberwick .	3,194	
4. *Sandsting*, including Aithsting, and the islands of Vemensting and Papa-Little	2,194	
5. *Tingwall*, including the old parishes of Whiteness and Weisdale . .	2,794	
6. *Walls*, including the island of Foula, and the old parishes of Sandness and Papa-Stour	2,146	
		16,432
In the presbytery of Burravoe.		
1. *Delting*, or Olnafirth, or South Kirk	2,070	
2. *Fetlar*, including North Yell . .	1,680	
3. *Nesting*, including the old parish of Lunnasting, and the islands of Whalsey and Skerries	2,103	
4. *Northmavine*, formerly Hillswick, and having annexed Olla Berry, Northrew, and Ashness . . .	2,386	
5. *Unst*, formed of the islands of Unst and Uyea	2,909	
6. *Yell*, formed of the old parishes of Mid and South Yell, and the islands of Biga, Samphrey, and Hascassy. It has three kirks—Hamnabo, or South Kirk; Retfirth, or Middle Kirk; and Glupe, or North Kirk . . .	1,812	
		12,960
Total population . .		29,392

The general appearance of the Shetland Isles, as seen from sea, is a lumpy and unvarying line of abrupt coast. The elevation of the highest parts is not remarkable: Roeness Hill, with an altitude of 1500 feet, is the highest hill in the Mainland and of Shetland. Foula is distinguished from the other islands by a cluster of five lofty hills, terminating in pointed cones, called the Noup, Liora-field, the Sneng, Comma-field, and the Kaim, the last of which is the highest, and rises to the height of nearly 1400 feet. The surface of the islands is particularly rugged and wild, and not unfrequently bears the appearance of desolation and sterility. Tracts of cultivated and fertile land, generally near the voes and the sea-coasts, with rich pastures and bright green meadows, are pleasing exceptions to this general character of the country: and the majestic cliffs and towering headlands that frown over the dark and stormy seas and *rousts* (as the turbulent surges raised by the conflicting currents and torrents that sweep round the headlands are called); the numerous detached and very singular pyramids of rock that rise to a great elevation along several parts of the coast; and the openings of innumerable lofty and dark caverns in the cliffs and precipices of the coast—some of great beauty, and others of gloomy grandeur—are, either separately or grouped together, very magnificent and highly picturesque features.

The tides, which partly occasion the rousts off the headlands, are also remarkable for their unequal flow at different parts of the islands, and in opposite or various directions at the same period of time, a phenomenon occasioned probably by the impulse which they receive from the position of the channels or *sounds* between the islands, and the projection of the headlands and angular turnings of the sea-coast Thus the tide flows about an hour earlier along the western coasts than on the eastern sides of the islands, and does not recede below high-water mark more than two-third parts of the depth of the ebb tide at the Orkney Islands. This last circumstance, and the steep inclination of the shores, which render access to seaward so difficult and circumscribed, limited the manufacture of kelp in Shetland to a very few hundred tons annually, even when that article obtained a high remunerating price in the market.

The agriculture and rural economy of the Shetland Isles have been at all times conducted in a primitive and rude manner. The culture of the soil is a secondary consideration both to landlords and tenants, who direct their attention chiefly to the prosecution of the valuable fisheries in their neighbourhood; and, consequently, the small tenants, all of whom are fishermen, have merely a small proportion of arable land, enough to enable them to raise a scanty supply of food for themselves and their families, and to allow them to devote the best part of their time to fishing. The lands are also let under condition that the landlord is to receive all the fish caught by his tenants at a certain fixed price, which enables him to derive a profit from the re-sale of it; while on the other hand the landlord is the purveyor of the tenant's fishing materials, and often of a great proportion of his food, upon which a profit also arises.

Under such a system agricultural improvements cannot be expected. The tenant also has no lease, which, if granted on reasonable terms, might stimulate him to active exertions. The delivery of perquisites to the landlord, such as fixed quantities of butter and oil and hides; and the exaction of small tithes and personal labour, in addition to the rents of their small farms, have a further effect in cramping the industry of the tenants. The climate moreover is so precarious and humid, and so ill adapted to the successful raising of corn, that, although the soil of the arable land is in several places very good, only the hardiest and most common descriptions of barley and oats are cultivated. The extent of arable land throughout all the islands, including all the detached patches, is estimated at 28,000 acres. Connected with the rural affairs of Shetland, the diminutive race of horses, cattle, and sheep peculiar to these islands require notice. The native cow is a very small animal, with long pointed horns, and is generally of more than one colour, dingy white and brown predominating. Three hundredweight may be said to be above, rather than under, the average weight of an ordinary Shetland cow, and three English quarts per day is the utmost quantity of milk that she yields. About 22,000 of these animals, young and old, are distributed through the islands. The 'Shetland pony' is now well known throughout the kingdom, being annually exported in great numbers. These diminutive horses, of which about 12,000 are supposed to be maintained in Shetland, are only from nine to eleven hands high. They are extremely hardy and vigorous, and undergo much fatigue in proportion to their size. They are invariably left to provide their food from the hill pastures, and are never placed under the shelter of a stable either by day or by night, in summer or in winter. The native sheep may almost be termed a wild animal. They are also remarkably small, and never experiencing the care or protection of a shepherd, have acquired a degree of nimbleness and vigilance which would be considered foreign to the nature of the animal by persons who are only acquainted with the tended flocks of other countries. The carcass of one of these animals weighs only about thirty pounds. The colour of their wool, from which stockings and gloves of a beautifully fine description are knit by the natives, and are eagerly sought after at high prices, is various, being white, dun, black, and brown, and all these colours often blended together in one animal. About 80,000 is the computed number of sheep in the Shetland Isles.

The fisheries of Shetland are the most important branch of industry, and the staple sources of the wealth of the inhabitants. *Sillocks*, the young of the coal-fish, literally swarm from the month of May until September, close to the rocky shores, and in the voes and bays, affording abundance of a favourite food, and considerable quantities of oil. The ling and tusk fishery, in the open sea, is the most valuable and most hazardous, and, together with the cod fishery, contributes more to the prosperity of Shetland than any other. The herring fishery is not conducted on the same scale or with the same success in Shetland as in Orkney, or on the coast of Caithness, but it is still a valuable branch of industry here; and the occasional capture of whole herds of a species of whale, here known as 'Ca'ing Whales' or 'Bottle Noses,' which approach the coast in pursuit of the herring shoals, is considered an exhilarating pastime by the natives, and supplies them annually with oil of very fine quality. The slaughter of seals in the deep caverns of the sea-coast is also engaged in, to an extent sufficient to class it among the Shetland fisheries.

Dr. Hibbert published, in 1822, 'A Minute Account of the Geology of the Shetland Isles.' The great varieties of rock, their relative position to each other, and the facilities with which they may be observed throughout the Isles of Shetland, are replete with interest. The southern part of the Mainland is composed of a ridge of clay-slate lying parallel to secondary sandstone and conglomerate on the one side, and small islands of gneiss and sienite on the other. The centre of the Mainland is a solid mass of gneiss, having bluish grey quartz on the west side, and districts of sienitic greenstone and granite to the north. The island of Yell is formed of gneiss; and Unst is chiefly formed of serpentine and diallage rock, bordering on a district of gneiss and another of micaceous slate. The island of Fetlar is similar to that of Unst; and the more remote island of Foula is formed of high hills of sandstone, with clay and mica slate, gneiss and granite on its north-eastern shores; and Fair-Isle also chiefly consists of sandstone.

There are copper-veins at Sandlodge and in Fair Isle; iron mica at Titfield-head; iron pyrites at Garthness; the chromate of iron in Unst and Fetlar; the hydrate of magnesia in the serpentine of Swinaness in Unst; and garnets, actinolite, amianthus, and cyanite in various places.

The great number and variety of sea-fowl that frequent Shetland render the ornithology of the district an interesting study. The sea-eagle, here called *Bonxie*, or *Scua-gull*, rears its young in the high hills of Foula and other elevated places. The great owl, provincially *Katogle;* the arctic or parasitic gull; the cormorant; guillemots, lyres or shearwaters, kittywakes, sheldrakes, terns, sea-hawks, and a vast variety of similar birds, are all common to the country.

With the exception of plants common in most meadows, and in ordinary and hill pastures, the botany of Shetland is very circumscribed.

This northern region is subject to severe and long continued storms; and while winter may be said to commence in the month of October, the return of spring is almost imperceptible till the end of April. The climate throughout the year is variable and humid, but to the natives it is decidedly healthy, and instances of great longevity are not uncommon.

In the high latitude of Shetland, the light of day at midsummer never totally disappears, and the smallest print can be read at midnight, when the lingering rays of the preceding day mingle with and give way to the early dawn of the morrow. During winter the nights are proportionally long and dreary; and in the month of December the sun is not above the horizon more than five hours and twenty minutes.

Lerwick is the only town in Shetland, and the capital of the country. The houses having been originally built to accommodate the natives who resorted to Bressay Sound about two centuries ago, which was at that time annually frequented by foreign busses during the fishing season, are built close to the water-edge; and the country being destitute of roads and wheeled vehicles, streets were never thought of, and consequently the town presents a singularly confused appearance, with no other thoroughfare than a tortuous ill-paved path between the houses. It is however a bustling and interesting town, with a thriving and industrious population; possesses many excellent and well-supplied shops, and has one of the best harbours in Shetland, which should ultimately render Lerwick a town of considerable commercial importance. The population of the town, in 1831, was 2750. It stands on Bressay Sound, on the east side of the Mainland of Shetland: the harbour, which is about a mile wide at the south entrance, expands opposite to the town, and again contracts; being fully protected by the shores of Bressay Island on the one side, and by those of the Mainland on the other.

The history of Shetland is an interesting one, and is blended with that of Orkney. Antiquaries have long disputed whether the antient Romans saw the Shetland Isles when they circumnavigated Britain, and much learning has been advanced to connect the *Thule* of Tacitus (*Agricola*, c. 10) with Shetland. The prevailing belief now is, that *Thule* is a corruption of, or intended for, *Foula*, one of the Shetland Isles, and the only one of them which, from the altitude of its hills and its detached position, can be seen from the seas immediately to the north of Orkney.

In the ninth century Shetland and Orkney became subject to Norway; and the early history of the two provinces is preserved by Torfaeus, and confirmed by several other more antient documents. The country was peopled by Northmen, and their laws, language, usages, and manners were soon firmly established. About the year 1380 the former line of Norwegian earls ceased to retain their authority over the islands, and a Scottish nobleman, Henry Sinclair, obtained the earldom of Orkney, which included Shetland, from the king of Denmark and Norway, and it continued in his family for about a century under the sovereignty of Norway. In the year 1469 James III. of Scotland married Margaret, the daughter of Christiern, king of Denmark, and with her he was to get a dowry or marriage portion of 60,000 florins, of which it was agreed that 10,000 florins should then be paid, and that the Orkney Islands should remain mortgaged in possession of the Scottish king, until the remaining part of the marriage portion should be paid. The Danish king however only paid 2000 florins, and for the remaining 8000 he further mortgaged the Shetland Isles, which, along with Orkney (as no part of the money was ever paid), have been attached since that time to the kingdom of Scotland.

The Norwegian laws and usages however continued in full force in Shetland until a very recent period, together with several rules and customs arising from the detached and peculiar situation of Shetland, which were also respected as laws; and thus the old laws and observances of Shetland essentially differ from those of Scotland, and are interesting as exhibiting measures resorted to by a community remote from the operation of the general laws of the kingdom, in order to preserve the well-being of its society. The free property or possession of lands was known by the term *Udal*, the proprietors being termed *Udallers*, and this property descended in the udaller's family without the evidence of any written instrument. The chief judge was called the Great Foude, or Lawman, and under him were local Foudes and certain officers named Rancelmen, and a Law-rightman to regulate weights and measures. These Rancelmen, in addition to the duties belonging to the police courts of large towns in the present day, exercised several inquisitorial functions, such as inquiring into the domestic conduct of parents, children, and servants; the preventing of domestic quarrels and scolding, fining persons who neglected to attend church on Sabbath days; examining into the sufficiency of the work of tradesmen, and the preventing of tenants from injuring their lands or houses.

Shetland for the first time enjoyed the privilege of joining in returning a member to the imperial parliament in the year 1832, in consequence of the passing of the Reform Act for Scotland. Prior to this period Shetland was totally unrepresented in parliament; but now Orkney and Shetland, as a united county, return one member. Other important changes of a public nature are yearly tending to open the resources and to increase the prosperity of this remote portion of the empire. During the last four or five years a suitable steam-vessel has plied regularly every week, from March till November, between Edinburgh and Lerwick in Shetland, calling on her way at Aberdeen and Wick.

At an early period Shetland was called Hialtland and Yealtland, which afterwards became charged into Yetland and Zetland; and from this last name the late Lord Dundas, one of the leading proprietors in Orkney and Shetland, took the title of Earl of Zetland in 1838, when elevated to that rank in the peerage.

There are several interesting remains of antiquity in Shetland,—such as Lawtings, or open courts of justice under the Norwegian laws; round Pictish towers, particularly that of Mousa, which is nearly entire; and, of more recent erection, the ruins of the large castle of Scalloway.

Edmonston's *View of Zetland;* Hibbert's *Description of the Shetland Islands;* Sheriff's *General View of the Agriculture of Shetland; Various MS. Notes and Private Information.* (*Communication from Scotland.*)

SHEW-BREAD (לֶחֶם הַפָּנִים, *ἄρτοι ἐνώπιοι, ἄρτοι τοῦ προσώπου, τῆς προϑέσεως, τῆς προσφορᾶς*) was the name given to the twelve loaves of bread, one for each of the tribes of Israel, which were constantly displayed on a golden table in the holy place of the Tabernacle and Temple. They were made of the finest wheat flour without leaven, and laid on the table in two similar heaps or rows, with frankincense and salt put over them. Every Sabbath they were renewed, and the old loaves were eaten by the priests in the holy place. The frankincense which was placed upon the shew-bread constituted it one of the 'offerings made by fire to the Lord.' The golden table on which they were placed was called the table of shew-bread. Wine was also placed upon it, and it was furnished with gold dishes, bowls, and spoons. (*Exod.*, xxv. 30; xxxv. 13; xxxix. 36; *Levit.*, xxiv. 5-9; *Numb.*, iv. 7; 1 *Sam.*, xxi. 6; 2 *Macc.*, i. 8; *Heb.*, ix. 2.) Further particulars will be found in Calmet's *Dictionary;* Lightfoot's *Prospect of the Temple;* and Winer's *Biblisches Realwörterbuch*, arts. 'Schaubrode' and 'Schaubrodtisch.'

The shew-bread is one of the most difficult parts of the Jewish Temple-service to explain. The common interpretation is, that as all the Jewish representations of divine things are strongly marked by anthropomorphism, the Temple being called the house of God, the most holy place his abode, the cover of the ark his throne, the altar his table, the burnt offerings upon it his meat (*Malachi*, i. 12), with which meat too a drink-offering was presented, so the shew-bread was, symbolically, his food. Perhaps the constant offering of the twelve loaves might be intended to signify the continual devotion of the substance of the twelve tribes to the service of God. But still the analogy of the rest of the Temple-service would lead us to conclude that some deeper typical meaning lies concealed under this rite, and, as every part of the Jewish ritual system is typical of some Christian truth or ordinance, perhaps there may have been in the shew-bread a reference to the sacrament of the Lord's Supper.

(Calmet, Lightfoot, and Winer, as above; Jahn's *Archäol. Bibl.;* Jennings's *Jewish Antiquities.*)

SHIELD was a part of the antient armour designed to ward off the strokes of the sword and all kinds of missiles. Shields were borne on the left arm, and were of different forms and sizes, and they were accordingly designated by different names. The large circular or oval shield, the invention of which was ascribed to Prœtus and Acrisius of Argos was called in Latin clipeus, and in Greek aspis or sacos (*ἀσπὶς* or *σάκος*). A smaller kind of round shield was called parma; and a smaller kind of oval shield was called pelta. Scutum was properly speaking a square or oblong shield. The antient writers however do not always accurately distinguish these different shields, but apply the name which properly denotes a particular kind of shield to shields in general. The shields in the earliest times were made of osiers twisted together (*γέῤῥα*), or of wood, and this framework was covered with the skins of oxen, of which there were mostly several layers, one over the other, whence Homer frequently calls the shield 'seven-hided' (*ἑπταβόειος*): Xenophon (*Anab.*, i., 8) describes the Egyptians, even of his time, as using wooden shields. The whole rim was surrounded with a metal edge. In the centre of the outer or convex side there was a projection called the ómphalos, *ὀμφάλος*, or umbo, in which sometimes a spike was placed, which served as a weapon of attack against an enemy who approached too near. The object of the umbo however was to make the missiles glance off from the shield. In the inner or concave side there was a band of metal or leather, which went from rim to rim as a diameter, and under which the arm of the soldier was placed, so that the shield hung on the arm. Around the inner edge there was a number of small thongs, by means of which the shield was managed with the hand. The shields of distinguished persons, even as early as the time of Homer, were covered with metal plates, and frequently adorned with embossed figures. These figures were often of the most exquisite workmanship, as may be inferred from the imaginary descriptions of the magnificent shields of Achilles, Hercules, and Æneas, in Homer, Hesiod, and Virgil. The shields of individuals, as well as of whole divisions of an army, had sometimes particular devices relating to memorable events in their history, and these are generally supposed to be the first traces of the armorial bearings of more modern times. The size of shields varied from two to four feet in length, and they were generally two or two and a half feet in breadth; so that a soldier with a large shield, by stooping a little, might conceal himself behind it, and thus be perfectly protected. The shields of horsemen were generally smaller than those of the foot soldiers. The use of shields continued from antient times throughout the middle ages, until they were made useless by the introduction of fire-arms. The numerous specimens of shields show that the knights of the middle ages were no less fond of adorning them with embossed figures, precious stones, &c. than the antients. [ARMOUR.]

There is an interesting work on the armorial bearings of the ancients, Bernd, 'Das Wappenwesen der Griechen und Römer,' Bonn, 1841.

SHIELD, WILLIAM, the popular dramatic composer, was born at Smalwell, county of Durham, in 1749. When very young, having lost his father, who was a teacher of singing, the circumstances of his mother rendered it necessary that he should adopt some business as a future means of subsistence, and having had the choice of three trades offered him, he fixed on that of a boat-builder, and was apprenticed at North Shields. His master, a kind-hearted indulgent man, rather encouraged than checked him in the pursuit of music at his leisure moments, and not unfrequently assisted him in rendering his talent as a violinist profitable, by permitting him to perform at the concerts in the town and neighbourhood. At the expiration of his apprenticeship he devoted himself wholly to his favourite art, and having attracted the notice of Avison, the author of the 'Essay on Musical Expression,' obtained from that able master instructions in the principles of composition, and shortly after exhibited the fruits of these, as well as of his own zeal and indefatigable industry, by composing an anthem for the consecration of the new church at Sunderland, which was most successfully performed by the choir of Durham cathedral. This led to his being invited to the tables of the dignitaries of the latter rich church, an introduction which, combined with his ability and excellent conduct, speedily placed him on the high road to fame and preferment.

He now undertook the management of the fashionable concerts at Scarborough, where, becoming acquainted with the charming pastoral poet John Cunningham, then an actor in the Scarborough company, he set several of his songs to music, and thus made himself very generally known as a melodist. He soon directed his views to the metropolis, and arriving in London with good recommendations, was immediately engaged by Signor Giardini as one of the band of the King's theatre, in which he soon became principal viola, an appointment which, suiting his taste, he retained nearly twenty years.

Mr. Shield first made himself known to the public as a dramatic composer in 1778, by 'The Flitch of Bacon'—written by a gentleman who had contrived to make himself very conspicuous, the Rev. H. Bate, afterwards Sir H. Bate Dudley—which was performed with the most marked success at Covent Garden. Soon after he entered into an engagement at the same theatre as composer and musical manager. In 1783 appeared 'Rosina,' written by Mrs. Brook, which is almost universally considered as Shield's *chef-d'œuvre*, and is still listened to with as much delight as when, in addition to its intrinsic merits, it had the recommendation of novelty. The same year was produced 'The Poor Soldier,' the drama by O'Keefe, which as a melodious opera is only second to 'Rosina.' 'Robin Hood' and 'Fontainebleau' followed shortly after; 'Marian,' 'Oscar and Malvina,' 'The Woodman,' and others succeeded, and ably supported the reputation which the composer had gained. In 1791, Mr. Shield, in company with his eccentric friend Joseph Ritson, went to Paris, and then extending his continental journey, visited the chief cities of Italy, including Rome, bringing home with him valuable materials for the theoretical works which he published a few years after his return. He then renewed his labours at Covent Garden, and produced 'Hartford Bridge,' 'The Farmer,' and many other operas, nearly all of which were more or less successful. In 1807 he finally retired from all theatrical concerns, and prepared his 'Introduction to Harmony,' a most valuable work in two quarto volumes, for publication. In 1809 he printed a volume of glees, ballads, &c., under the title of 'A Cento.' In 1817 appeared a second edition of his work on harmony, and also his 'Rudiments of Thorough-Bass.'

In the same year, on the death of Sir William Parsons, the Prince Regent appointed Mr. Shield to the situation of Master of the Band of Musicians in ordinary to the king, in which capacity he conducted the musical part of the ceremonial in Westminster Abbey at the coronation of George IV. He died in 1829, and his remains were honoured by interment in the cloisters of Westminster Abbey.

SHIELDS, NORTH. [TYNEMOUTH.]

SHIELDS, SOUTH, a parliamentary borough in the county of Durham, created by the Reform Act, and consisting of the previously existing townships of South Shields and Westoe in the parish of Jarrow. South Shields is on the south bank of the Tyne, at its mouth, 278½ miles from London, by Barnet, Biggleswade, Norman Cross, Stamford, Newark, Doncaster, Boroughbridge, Northallerton, Darlington, Durham, and Monk Wearmouth.

Jarrow was eminent in antient times for its Benedictine monastery, of which some remains still exist: it was destroyed in the devastating invasion of William the Conqueror; but was subsequently repaired, and united with the abbey of Wearmouth; at last it became a cell to Durham. Its revenues at the dissolution were 40*l.* 7*s.* 8*d.* gross, or 38*l.* 14*s.* 4*d.* clear. The present church of Jarrow embodies some portions of the antient conventual church; a chair is preserved in the vestry, which is said to have been the seat of the venerable Bede, who was educated in the monastery of Jarrow, and spent a great part of his life there.

South Shields (antiently written Le Sheeles) has risen into importance with the extension of the coal-trade in modern times. One inscription which has been dug up indicates that the Romans had a station here, at the termination of the military road since called the Wreken Dyke; and various Roman antiquities have been found. The present town originated with the fishermen of the Tyne, who built here along the shore sheds, locally termed 'sheels' or 'shields,' to defend themselves from the weather. Subsequently (during the fifteenth and two following centuries) the place became known for its salt-works; nearly 150 pans were at one time employed, but that branch of industry is now nearly extinct. A number of artificial hills have been formed by cinders from the salt-works, the refuse of the glass-houses and the ballast discharged by the colliers, and some of these hills have been built upon.

The town of South Shields extends into the township of Westoe: the old part consists of a long narrow and inconvenient street running parallel to the river; but the more modern parts are better built and contain many good houses. In a large square near the centre of the town is the town-hall, used also as an Exchange and news-room, and having a market-house beneath. There is a chapel of great antiquity, but so much altered that little of the antient part can be traced, with the exception of the old tower; there is a chapel-of-ease of modern erection, and there are many dissenting meeting-houses.

The two townships have an area of 1760 acres; and contained, in 1831, 3018 houses, inhabited by 4659 families, 176 houses uninhabited, and 27 building; with a population of 18,756. The principal trade of the town is in coal, of which a great quantity is brought down the river in keels, and shipped here: there are some coal-pits in the immediate vicinity. Ship-building is carried on with great activity; during the last general war several frigates were built; and there were ten years since (*Parliamentary Boundary Reports*) docks in which nineteen vessels at once could be docked and repaired: there were very extensive glass-works, a pottery, and manufactures of soda and alum, breweries, and rope-walks. The original life-boat was built at South Shields by subscription. The market is on Wednesday; and here are two fairs, but they are indifferently attended.

There are a subscription library; a literary, scientific, and mechanics' institution; and a theatre. The two townships had, in 1833, two day and Sunday 'national' schools, one with 90 boys and 50 girls, and the other with 473 children of both sexes; 54 other day-schools, with 1893 children of both sexes; and 11 Sunday-schools, with 1226 children.

The living of South Shields is a perpetual curacy, in the gift of the dean and chapter of Durham, of the clear yearly value of 330*l.* It is in the archdeaconry and diocese of Durham.

South Shields has, since the Reform Act, returned one member to parliament. The number of qualified electors on the register in 1835-6 was 625; in 1839-40, 686, all 10*l.* householders. South Shields is one of the polling-stations for the northern division of the county of Durham.

(Surtees's *History of Durham*; *Parliamentary Papers.*)

SHIFFNALL. [SHROPSHIRE.]

SHIFTING USES. [USES.]

SHIITES is the name of a sect of heretics among the Mohammedans. The word comes from *shiah*, 'a faction, party, or set of men who separate themselves from the rest of the community,' and who entertain religious opinions contrary to those of the *Sunnites*, or people who belong to any of the four orthodox sects of Mohammedanism. The name of *Shiites* is principally used to designate the sectaries or adherents of Ali Ibn Abi Tálib, who maintain him to be the lawful khalif and imám, and say that supreme authority, both in spiritual and temporal matters, belongs to his descendants.

The Shiites are divided into numerous sects, of which the principal are:—the *Imámians*, or those who believe that the office of imám, or head of the church, is not dependent on the will of the people, and that religion consists solely in knowing who is the true imám; the *Zeydians*, so called from the name of their founder, Zeyd, son of Ali, surnamed Zeynu-l-abadin (the ornament of the servants of God); the *Khattabians*, or disciples of Abú-l-Khattáb, who maintain that paradise is no other thing than the pleasures of this world, which God grants to those with whom he is pleased; hence their indulgence in wine, music, and other things forbidden by the prophet. Many of the Shiites, like the *Gholaytes*, the *Nosayrians*, the *Ishakians*, carried their veneration for Ali and his descendants so far, that they attributed divine properties to them. The Persians are Shiites, and the Turks Sunnites; hence the cause of the schism still subsisting between them, which has been maintained on both sides with ardent zeal and implacable hatred. Though the difference arose at first out of political motives, it has since so much increased, that both parties detest and anathematize the other as heretics. The chief points wherein they differ may be reduced to three:—1, The Shiites reject Abú Bekr, Omar, and Othmán, the three first khalifs, as usurpers and intruders; whereas the Sunnites respect them as rightful imáms. 2, The Shiites prefer Ali to Mohammed, or at least look upon him as his equal in every respect; whilst the Sunnites admit neither Ali nor even any of the prophets to be equal to Mohammed. 3, The Sunnites receive the *Sunna*, or body of traditions concerning the prophet, as of canonical authority; the Shiites reject it as apocryphal and unworthy of credit. (Sale's *Preliminary Discourse;* Pococke's *Spec. Hist. Arab.*, p. 267.)

SHIP. The ships of war employed at first by the maritime nations of modern Europe were galleys, moved either by wind or oars, and were similar, probably, to those of the Greeks and Romans. In the beginning of the fifteenth century vessels of a like kind, but of greater dimensions, constituted portions of the navies of France and Spain; they were called Carraques, and it is said by a French author of that age that the English ships scarcely dared to approach them. The term Galeasse was afterwards applied to a kind of war-galley which was of greater length in proportion to its breadth than those generally constructed; its rowers were covered by a narrow deck running along each side of the vessel, and on this small cannon were mounted. Such were the vessels used by the Venetians at the battle of Lepanto.

Before the reign of Henry VII. the naval force of this country consisted only of the vessels furnished at short notices by the Cinque-ports, besides such as were hired from English or foreign merchants; and, according to Du Bellay, some of the ships were a sort of long galleys called Ramberges, in the management of which the English mariners are said to have been very expert. Henry VII. caused to be constructed the 'Great Harry,' the first ship which can be ranked as one belonging to the royal navy of England; and his successor, in 1515, in emulation of Francis I., who had built a ship called the 'Caracon,' carrying 100 guns, caused one of equal burthen (about 1000 tons), and carrying 122 guns, to be constructed. This was called the 'Henry Grace de Dieu.' It appears to have been built rather for magnificence than use; not more than thirteen of the guns were nine-pounders or upwards, and its construction must have been very defective, for it is said to have steered badly and to have rolled incessantly. After having made one voyage, it was disarmed at Bristol and suffered to decay. The French ship was equally unfortunate, having been accidentally destroyed by fire at Hâvre. Henry VIII. exerted himself however to place the maritime force of the nation in a train for being improved; for which purpose he organised the Admiralty and Navy Boards, and formed dock-yards at Deptford, Woolwich, and Portsmouth.

During the reign of Edward VI. and Elizabeth the royal navy became very powerful, and at the death of the queen it consisted of forty-two ships of war. In the time of James I. was built (1610) a ship called the 'Prince,' carrying 64 guns, and of 1400 tons burthen, being the largest which had been till then constructed. And before the civil war broke out Charles I. caused to be built one called the 'Sovereign of the Seas,' which carried above 106 guns, small and great; her length was 128 feet, and her breadth 48 feet.

The ships of that age, foreign as well as English, were constructed with hulls extravagantly high, while the lower guns were frequently not more than three feet above the water; they were consequently very liable to ship seas at the lower ports during an action, when the waves ran high, or the ship heeled considerably. But the rivalry between England and the United Provinces in the seventeenth century, and the desire which Louis XIV. entertained to raise the navy of France to an equality with those of his neighbours, led to the construction of ships capable of carrying artillery of much greater calibre than had before been used at sea. The French king actually caused to be built at Toulon a ship called the 'Royal Louis,' which carried 12, 24, and 48 pounders on its upper, middle, and lower decks respectively. In the same age, and during the eighteenth century, naval architecture was zealously studied in France; and the English constructors were so sensible of their inferiority, that in most of the ships built in England at that time the proportions were copied from those of ships which had been taken in action from the rival nation. Thus the 'Leviathan' was built at Chatham nearly in conformity to the 'Courageux,' a French 74-gun ship; and several others according to the construction of the 'Invincible,' which had been taken by Lord Anson during the Seven Years' war.

During the seventeenth century the custom continued of giving to the sterns a great elevation above the surface of the water, and of loading that part, as well as the bows, with ornaments. The sterns of ships of war were, till about twenty-five years since, made, at their junctions with the sides, of an angular form, or, as they were called, square; and before 1729 they had projecting galleries or balconies extending across them, and to some distance along each after-quarter of the ship. The galleries were afterwards much diminished in breadth, but it was not till 1796 that, by the influence of lord Spencer, who was then the first lord of the admiralty, these as well as the great projecting heads were entirely omitted in the construction of ships. In 1816 Sir Robert Seppings proposed to make the sterns curvilinear like the bows, but more flat; and by the adoption of his plan there was gained considerable strength, such a form enabling the ship to resist with great effect the force of a sea in striking the stern, and that of shot when fired against it. With respect also to the means of defence at the stern and quarters of a ship, it may be observed that the curvilinear stern has greatly the advantage over those of an angular construction, there being in the latter case an interval opposite each quarter of the ship towards which none of the after-guns can be brought to bear, while such interval does not exist in the former. In a ship with a curvilinear stern, the ports may be disposed so as to allow guns to fire in any direction diverging from a centre within the ship; and at the same time the after broadside guns may be trained so as to fire obliquely towards the fore or after part of the ship. Thus there will be afforded several intervals opposite the stern and quarters, within which the lines of fire may cross each other; and consequently the defence will be as powerful about the stern as at any other part of the ship. It may be added that when the guns in a square stern are trained at their greatest degree of obliquity to the sides of the ship, their muzzles will be considerably within the timbers; and consequently, in firing, some danger may exist of blowing away part of the stern or quarter. The curvilinear form is now, with slight modifications, generally adopted for ships of war; and the only objection hitherto made to it is that the interior accommodations are thereby rather diminished.

In 1791 there was formed in London a Society for the Improvement of Naval Architecture; and its first steps consisted in offering prizes for the best papers which should be written on the subject of the resistance of fluids, on designs for vessels, on the proportions of masts, &c. The Association has already done much in throwing light on the art of constructing ships; and both the theory and practice of that art have been advanced by means of the school which was attached to the Naval College at Portsmouth, in 1811, under the superintendence of Dr. Inman. In this school young men are now instructed in those branches of science which have relation to naval affairs, and are also made to perform with their hands the mechanical operations which are required in building a ship.

In the present article it is intended to give some account of the mathematical principles only of naval architecture; the mechanical construction of ships being reserved for the article SHIPBUILDING.

The body of a ship about its middle has nearly the form of a portion of a hollow cylinder, with its axis horizontal, and its convex surface downwards. Above the surface of the water on which it floats the sides are curved, so as at the head to have, in a horizontal direction, the form of a Gothic arch more or less acute. The breadth diminishes gradually towards the stern, which above water is either a plane surface nearly perpendicular to the ship's length, or, agreeably to the construction introduced by Sir Robert Seppings, curved so as to have, in a horizontal section, nearly the form of a semi-ellipse. Below the surface of the water the body of the ship is curved in a horizontal direction towards the head and stern, so as to terminate at those places in angles which diminish from that surface downwards; and thus a vertical section, taken perpendicularly to the length of the ship, at some distance from the middle towards either extremity, presents on each side the form of a curve of contrary flexure.

The most essential conditions in the construction of a ship are, that it be capable of carrying its stores and its artillery or lading; that it be moved by wind or steam with great velocity, and that it readily obey the motion of the rudder; that it have the necessary stability, so as not to be overturned when acted upon by the wind or waves; and, finally, that its rolling or pitching be attended with as little strain as possible on the timbers. A contemplation of the qualities which a ship ought to possess, in order that it may fulfil the objects proposed by it, cannot fail to cause its construction to be considered as one of the most difficult problems in mechanical science. Those qualities are in some respects contrary to each other; and the degree of attainment for each will depend in part on the purpose, whether of war or commerce, for which the ship is built. The skill of the architect lies therefore in finding such a construction as shall allow the quality most required to be obtained in the highest degree, without being attended by too great a sacrifice of the others. The form indicated above has by experience been found to afford the means of uniting the different conditions, as far as they are consistent with each other; but that form is capable of being varied within very distant limits. The subject of the resistance of fluids against bodies immersed in them is also so imperfectly known, that the most proper proportions which the several dimensions should have to each other, in order that such resistance may be as little as possible, are yet to be determined; and in the present state of science, those proportions can only be obtained from the dimensions of ships of different classes which have been observed to possess the best sailing properties.

In merchant ships an ample capacity is frequently of more importance than a great velocity in sailing; and in this case the relations between the length, breadth, and depth depend less upon hydrodynamical principles than the corresponding relations in ships of war. With respect to the latter, it is observed by Mr. Morgan, in his papers on naval architecture, that the number and weight of the guns constitute the basis of the design; for from these the weight of the whole ship, or the volume of the water which it will displace, may be estimated. The distance between the guns on the decks must be such as by experience has been found sufficient for working them; and hence the number of decks being given, the least length which the ship should have becomes known. The breadth also must in part be determined by the artillery; for on each side of the ship, between the hatches or ladder-ways and the rear of the gun-carriages after the recoil, there must be room for a free passage; but this element must also be great enough to afford the necessary stability, that the tendency of a lateral wind to turn the ship about a longitudinal axis may be resisted. The draught of water (the depth to which the ship is immersed) may depend on the depth of water in the harbours and roadsteds; but it should also be determined from experience, so that the ship may be prevented as much as possible from making leeway; and the height of the ship above water must be such that, while the upper tiers of guns are kept as low as possible, the height of the lowest tier above the water, when the ship floats upright, may be not less than six feet, in order that the lower guns may be worked when the ship has considerable inclination. Finally, the form of the body must be that which is most favourable for velocity, by causing the least possible resistance of the water at the bows and along the sides; which allows the greatest lateral resistance, and which will permit the rudder to act with most effect in causing the ship to be turned about a vertical axis. And if, when in the design for a ship all these conditions are fulfilled, the displacement (weight of the volume of water which would fill the space occupied by the ship below the general surface of the water in which she floats) is equal to the whole weight of the ship, the several dimensions may be considered as nearly correct. Ships carrying 44 and 64 guns on two decks, and 80 guns on three decks, are now no longer constructed, because the proportions between the lengths and breadths which depend on those numbers of guns produced vessels having deficient sailing qualities.

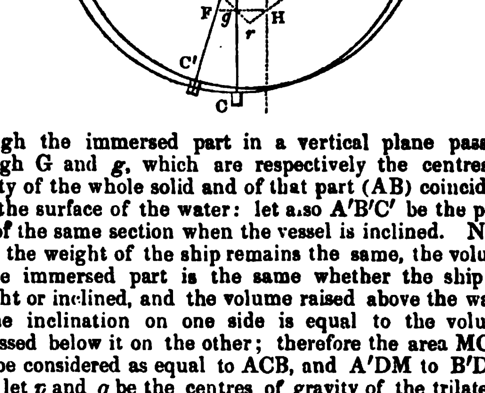
Experiments have shown, that when the quantity of sail is the same, the velocity of a ship is increased by increasing the ratio between its length and breadth, and both English and French constructors have gone on for many years augmenting that ratio; but this increase has its limit, which however has not as yet been ascertained. The advantage of diminished breadth is accompanied by an inferiority of stability, and a deficiency in this respect may produce serious evils. It may prevent the use of the lower guns on the lee-side from the fear that the ports may be under water, and the use of the guns on the weather-side from inability to give them sufficient depression; and by causing the keel to take an oblique position in the direction of its depth, the lateral resistance of the water being diminished, the leeway of the ship is increased. The power of the rudder and sails to produce rotation about a vertical axis is greater in a long than in a short ship, because the rudder and sails are at greater distances from that axis, and because the impulse of the water on the rudder is more direct: yet the resistance which the water opposes to that rotation increases in a still higher ratio; and thus the difficulty of working to windward is increased with the length of the ship. Lastly, the quantity of artillery in a ship will indirectly affect the relation between the length and breadth; for an increase of weight above water produces a diminution of stability by causing the centre of gravity of the ship to be more elevated, and this evil must be counteracted by increasing the breadth. In several English ships of war carrying from 46 to 120 guns it has been found by admeasurement that the ratio of the breadth to the length varied from $\frac{1}{3 \cdot 93}$ to $\frac{1}{3 \cdot 61}$, and that it had no dependence either upon the number of guns or upon the tonnage of the ship. The greatest length which may be given to ships of war is a point still undetermined; and the length seems to have hitherto gone on increasing in the navies of all nations. In 1786 was built the Victory, of 100 guns; this was then the greatest three-decker in the British service, and its length was 186 feet. In 1793 the Ville de Paris, of 110 guns, and 190 feet long, was built at Chatham; and in 1809 was built the Caledonia, of 120 guns, whose length was 205 feet. Some of the American line-of-battle ships with two decks are said to be about 206 feet long, and to mount 102 guns.

In the Vernon, and other ships which have been built according to the designs of Sir William Symonds, the present surveyor-general of the navy, the form of a transverse section passing vertically through the hull differs from that which had been before given to ships, in exhibiting an increase of breadth above the plane of floatation (a horizontal plane passing through the ship when she floats upright, and coinciding with the surface of the water). This construction produces, without any diminution of velocity, an increase of stability not only when the ship is afloat, but also when, on lying aground, she is subject to the force of waves against her side. It may however be said to be attended by the disadvantages of too great stability; that is, it may cause the ship to be considerably strained, and the masts to be carried away by a sudden impulse of the wind.

Archimedes showed that the stability of a body floating in a fluid depends on an equilibrium between the weight of the body and the reaction of the fluid; and Euler ('Scientia Navalis,' 1749), from considerations purely mathematical, investigated the circumstances in which floating bodies of different forms would be in equilibrio. But Bouguer ('Traité du Navire,' 1746) was the first who combined theory and practice in his investigations respecting the stability of vessels; and nearly every author who has since treated the subject, even Euler himself, in his elementary treatise on the construction and movements of vessels (1772), has adopted the principles which he had established. Don George Juan published at Madrid, in 1771, under the title 'Examen Maritimo,' a learned treatise on the construction of ships; and in 1775 M. Chapman (afterwards Admiral), a mathematician and naval architect to the king of Sweden, published on the same subject, and in the language of that country, a valuable work, which was translated into French by Vial de Clairbois, who was also the author of an 'Essai sur l'Architecture Navale' (1776), and into English, with notes, by Dr. Inman, the professor at the Royal Naval College. The work of Chapman on the construction of ships of war has also been translated by Messrs. Morgan and Bennett. To these must be added the papers on the stability of ships, in the 'Philosophical Transactions,' by Mr Attwood, M. Dupin, and Dr. Young.

The lateral action of the wind against the sails, and of the waves of the sea against the hull of a ship, are the causes that the plane passing through its masts is made to decline from the vertical position which it has when the ship is at rest; and the ship is then prevented from being overturned only by the reaction of the water against the bottom and sides. The momentum of this reaction is that which is called the stability of the ship. The axis of the rotation has been placed by different writers in different situations, but both Bouguer and Euler have proved that, if the ship has not at the same time a pitching motion, it should be considered as a horizontal line passing through the centre of gravity of the ship. In order to find approximatively the dependence of a ship's stability on its length and breadth, let it be supposed that the ship is a homogeneous solid in the form of a prism or segment of a cylinder having its axis in a horizontal position; and, the vessel being supposed to float upright, let ABC (*Fig.* 1) be a transverse section through the immersed part in a vertical plane passing through G and g, which are respectively the centres of gravity of the whole solid and of that part (AB) coinciding with the surface of the water: let also A′B′C′ be the position of the same section when the vessel is inclined. Now, while the weight of the ship remains the same, the volume of the immersed part is the same whether the ship be upright or inclined, and the volume raised above the water by the inclination on one side is equal to the volume depressed below it on the other; therefore the area MC′N may be considered as equal to ACB, and A′DM to B′DN. Next let p and q be the centres of gravity of the trilateral spaces last mentioned; then, by mechanics, the centre of gravity of MDB′C′ will be at some point, as r in pg produced, the displacement of g by the inclination being supposed to be very small; and the centre of gravity of MC′N

Fig. 1.



(the section immersed when the solid is inclined) will be at some point H in qr: also—

$$A'B'C' : A'DM :: pr : gr, \text{ and}$$
$$MC'N\ (=A'B'C') : B'DN\ (=A'DM) :: qr : rH.$$

Therefore pr and qr are cut proportionally in g and H; and gH is parallel to pq. Consequently—

$$pr : gr :: pq : gH,$$
$$\text{or } ABC : A'DM :: pq : gH;$$

and if the inclination of the ship is very small, gH may be considered as parallel to AB. Draw the vertical line HS, and GK parallel to AB; then $g\text{H}=\text{GK}$.

The area ABC may represent the volume (V) of the displacement, or of the immersed part of the ship; and the area A′DM, the volume raised above or depressed below AD in consequence of the inclination. This trilinear space being supposed to be very small, it may be considered as a triangle right-angled at M; and if the length and half-breadth of the solid be represented by l and b respectively, we have $\frac{1}{2}A'M.l.b$ for the representation of the elevated or depressed volume. But A′M varies with b; therefore such volume varies with $l.b^2$. Again, by mechanics, the distance of the centre of gravity of each of those volumes from a horizontal line passing through D, in a direction parallel to the axis of the solid, is equal to $\frac{2}{3}b$; therefore the line $pq=\frac{4}{3}b$, or pq varies with b. Then substituting, in the last proportion above, V for ABC, $l.b^2$ for A′DM, and b for pq; also putting GK for gH, we find that GK varies with $\frac{l.b^3}{\text{V}}$; or $\text{V.GK} \propto l.b^3$. Now the force of the water to prevent the ship from being overturned taking place, by hydrostatics, in the vertical line HS passing through H, and being represented by V; also the ship being supposed to turn about a longitudinal axis passing through G, we have V.GK for the momentum of the ship's stability; but the triangle GKS is similar to A′MD, all the sides of one being perpendicular to those of the other; therefore

$$A'M : DM :: GK : GS.$$

Again A′M varies with DM; therefore GK varies with GS, and $\text{V.GS} \propto l.b^3$; that is V.GS expresses also the momentum of the ship's stability. The point S is called the metacentre, and it indicates the most elevated position which the centre of gravity G can have consistently with the stability; for when G coincides with S, it is evident that the above expression vanishes.

Since the depth of the ship does not enter into the expression $l.b^3$, it may be inferred that when ships have equal lengths and breadths, they will have equal stabilities, whatever be their depths. Again, when they have equal breadths, their stabilities will vary with their lengths; and when they have equal lengths, the stabilities vary with the cubes of their breadths. It follows also that, in general, the stability of a ship is directly proportional to its length and to the cube of its breadth, whatever be its depth.

In the next place, in order to find approximatively the relations between the velocity of a ship and its dimensions, let the ship be represented by an isosceles triangular prism having the greatest rectangular surface uppermost and parallel to the surface of the water, and the triangular ends perpendicular to that surface, so that the fore and after parts are rectangular planes inclined to the same surface; then for the present purpose we may assume that the resistance experienced in moving through the water is expressed by $v.^2\ \text{A}\ \sin^3 \text{I}$. [HYDRODYNAMICS], where v is the velocity of the vessel, A the superficies of the inclined front, and I its inclination to the surface of the water. But the resistance of the water is directly proportional to the moving power, that is, to the pressure of the wind on the sails, and this last varies with the area of the sails, which may be represented by a: therefore $v^2 \propto \frac{a}{\text{A}.\ \sin.^3 \text{I}}$. Again the momentum of the ship's stability is directly proportional to the momentum of the wind on the sails, and the latter is expressed by the product of the area of the sails into the height of the centre of pressure (centre of gravity of the sails) above the axis of rotation: now this height varies with the height of the sails; that is, with the square root of their area, the sails in different ships being supposed to be similar plane figures. Therefore the momentum of stability varies with $a^{\frac{3}{2}}$, or $a \propto$ (moment. of stability)$^{\frac{2}{3}}$. Let l be the half length of the vessel, b its breadth, and d its depth; then the momentum of stability as above may be represented by $l.b^3$, A will be equal to $b(l^2+d^2)^{\frac{1}{2}}$ and $\sin^3 \text{I}$ to $\frac{d^3}{(l^2+d^2)^{\frac{3}{2}}}$. Hence $v^2 \propto \frac{l.^{\frac{2}{3}}b(l^2+d^2)}{d^3}$; and this being simplified, neglecting $l^{\frac{1}{3}}$, which may be considered as small when compared with $l^{\frac{1}{3}}$, we have $v \propto \frac{b^{\frac{1}{2}}l^{\frac{4}{3}}}{d^{\frac{3}{2}}}$.

This expression indicates that the velocity will be increased by diminishing d, which may represent the ship's draught, or the depth to which she is immersed. It is evident also that the like effect will take place if the length or the breadth, or both, are increased (the breadth of the sail being supposed to increase with that of the ship); and since, in this case, the stability will at the same time be increased, this will permit the ship to carry a greater quantity of sail; but the number of the crew being supposed to vary with the area of the sail, an increase of the latter is in general attended with a corresponding increase of expense. The factors in the value of v being different powers of b, l, and d, it thence follows that ships having the same proportions possess unequal sailing properties; it may be perceived indeed that a small ship built according to the proportions of a large one which is known to sail well will not possess the like good quality. On the other hand it may be inferred that a vessel having the same proportions as a good one of smaller dimensions will be superior to the latter. If two ships carry sails proportional to their stabilities, and if the height of the lower tier of guns above water be the same in both when the ships float upright; then, the inclinations of the planes of their masts being also supposed to be equal, the lower guns of the smaller ship will be farther from the water than those of the larger ship, and, in action, the latter might be in danger when the other would be safe. Consequently, if the greatest possible quantity of sail be given to the smaller ship, a smaller quantity relatively to its stability ought to be given to the larger.

That a ship whose hull has been constructed according to the best rules of art does not always fulfil the conditions required, may depend on several causes. The blocks, ropes, &c. may be too heavy, and the sails may be badly formed. If the burthen is placed too low, the rolling will be heavy, and the masts may be endangered; on the other hand, if the burthen is too high, there may not be sufficient stability. If the burthen is too near either of the extremities, the pitching motion will be violent, and the velocity will be consequently diminished. Lastly, through unskilfulness the sails may not be properly set with respect to the direction of the wind and of the ship's path, so that the force of the wind to propel the ship may be less than it would otherwise be, or the ship may be incapable of going about.

The discovery of the elements on which depend the stability and the sailing properties of ships will probably be made rather by studying the proportions of such as from experience have been found to possess the desired qualities, than by purely scientific researches; and as a step preparatory to this study it will be necessary to be acquainted with the methods by which, in a body like a ship, which cannot be considered as corresponding to any geometrical solid, the areas of sections, the volume of the whole or of the part immersed in the water, the position of the centre of gravity of the hull or the sails, &c., are found.

The method of equidistant ordinates is generally used for these purposes; and in finding the area of a section, some line in it being taken as an axis, an uneven number of lines as ordinates are drawn or supposed to be drawn at equal distances from one another perpendicularly to that line till they meet the surface of the ship. The lengths of these ordinates being known by actual admeasurement, or by the scale of the drawing, and also the distance between them; and the curve line in which the plane of the section meets the surface of the ship being considered, between every three consecutive ordinates, as an arc of the common parabola; by the rules of mensuration the required area will be expressed by the formula $(a+4s+2s'+b)\frac{d}{3}$; in which and b are the two extreme ordinates; s is the sum of all the even ordinates, as the second, the fourth, &c.; s' the sum of all the uneven ordinates, the third, the fifth, &c.; and d is the constant distance between every two ordinates. The following more simple and equally accurate formula for approximating to the area of any curvilineal figure has been demonstrated by mathematicians; viz. $(\frac{1}{2}(a+b)+S)d$, where a and b are the two extreme ordinates, S is the sum of all the others, and d is the constant interval between them.

By either of these rules the area of a vertical section through the middle of the ship's breadth in a longitudinal direction, or through any part of the ship's length in a transverse direction, and also the area of a horizontal section coincident with or parallel to the surface of the water, may be found. The same formulæ may be applied to determine the volume of the whole hull or of the displacement; for this purpose vertical sections may be supposed to pass through the equidistant ordinates drawn perpendicularly to the longitudinal axis of the ship, and their areas to be computed as above; then, in the first formula above, a and b must represent the areas of the sections passing through the two extreme ordinates; s the sum of the areas of all the even sections; s' that of the areas of all the uneven sections; and d the common distance of the ordinates or sections. Or the volume may be found in like manner by means of the computed areas of an uneven number of equidistant horizontal sections supposed to pass through the ship; and if the two volumes of the parts on opposite sides of a vertical plane passing through the keel, when computed by the different methods, should be found to disagree with each other, the sum of the volumes may be considered as a nearly correct value of the whole. The formulæ may also be employed to determine the momentum of any part of the ship with respect to some line about which it may be made to turn, or with respect to a plane passing through such line; and in this case the terms of the first formula will denote the momenta of the areas of the sections parallel or perpendicular to the given line of plane, and d the distance between the sections as before.

In order to find the centre of gravity of the displacement, that is, of the immersed part of the ship (considered as a homogeneous solid) when the ship floats upright; imagine that immersed part to be divided by equidistant vertical planes perpendicular to the ship's length, and also by equidistant horizontal planes; then the area of each horizontal section between every two vertical planes being multiplied by the vertical distance of that horizontal section below the surface of the water, and all the products being added together by either of the above formulæ, the sum will be the momentum of the immersed part with respect to the horizontal plane at the surface of the water. This momentum being divided by the volume of the immersed part computed as above, gives by mechanics the distance of the centre of gravity below the surface of the water. In a similar manner may be found the position of the centre of gravity with respect to a vertical plane passing perpendicularly to the length of the ship, suppose at one of its extremities; and thus its position may be completely determined. From the symmetry of the ship's figure on each side of a plane passing through its masts and keel, the centre of gravity of the whole ship will always be in that plane; and that of the immersed part will be in the same plane when the ship floats upright.

The position of a vertical line passing through the centre of gravity of the whole ship may be found by determining that of a vertical line passing through the centre of gravity of the displacement; for, by hydrostatics, when the ship floats with its masts upright, these lines are coincident. But the determination of the place of the centre of gravity in this line is a problem of considerable difficulty on account of the complexity of the subject, arising from the form of the hull, the positions of the masts, rigging, guns, lading, &c.; and it can only be found mathematically by ascertaining the place of the centre of gravity and the weight of every separate object constituting the mass of the ship and its lading. The momenta of all these objects being computed with respect to any one plane, as that of floatation (the horizontal plane at the level of the water) the difference between the sums of the momenta of the objects above and below that plane is, by the nature of the centre of gravity, equal to the product of the weight of the whole ship into the distance of the required centre of gravity from the same plane. Hence the situation of this point might be found.

The most simple mechanical method of finding the centre of gravity of a ship is probably that which was proposed by Mr. Major in the *Annals of Philosophy*, June, 1826. It consists in making the ship when afloat heel (the plane of its masts to incline) through equal angles by means of weights applied successively to a mast, and made to act horizontally at different distances above the deck; these weights being reduced to directions perpendicular to the inclining mast (by multiplying them into the cosine of the inclination) and then multiplied into their respective distances from the unknown centre of gravity of the ship, will give two products which are equal to one another; each of them being equal to the momentum of the resistance by which the water tends to prevent heeling; hence by algebra the distance of the centre of gravity from either of the points at which the weights are applied may be found.

In the expression for the momentum arising from the pressure of the wind against the sails, it is usual to consider the whole force of the wind as acting at the centre of gravity of the sails; and this point may be found by multiplying separately the area of each sail into the distance of its centre of gravity above a horizontal axis passing through the centre of gravity of the ship. The quotient arising from the sum of these momenta divided by the sum of the areas of all the sails will give the distance of the required centre of gravity above that axis; and similarly the position of the centre of gravity of the sails with respect to any vertical line as an axis may be obtained.

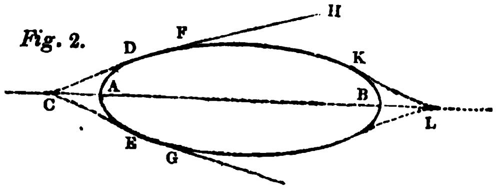
To find the centre of gravity of the displacement, or of the immersed part of the ship supposed to be homogeneous, when the plane of a ship's masts is made to incline by the lateral action of the wind, the axis of rotation being supposed to be a horizontal line passing through the centre of gravity of the whole ship, there must be first obtained by trial the position of a horizontal line in which the plane of the surface of the water will cut the body of the ship when in the upright and inclined positions respectively, so that the volume of the part raised above the water in consequence of the inclination may be equal to that of the part depressed. Let a line passing through D, *Fig.* 1, perpendicularly to the paper, be that horizontal line; then the sum of the momenta of the elevated and depressed volumes may be found by computing the areas of the trilineal figures A'DM, B'DN, in all the vertical sections taken at equal distances from one another in the direction of the ship's length, multiplying them separately by the distances of their centres of gravity from a vertical plane passing through the same horizontal line, and then adding all the products together by one of the formulæ above given. In the *Quarterly Journal of Science*, April, 1830, the area of either triangle, as A'DM, is expressed by $\frac{\gamma+\gamma''}{2}\gamma' \sin \frac{1}{2}\theta$, where γ=DM, γ''=DA', γ'= a line drawn from D to A'M, bisecting the angle A'DM, or θ (the angle of heeling). Also the momentum of the same triangle with respect to the point D is expressed approximatively, and supposing the angle of heeling to be 7° (the greatest at which a ship of war can use her windward guns), by $.0203\gamma\gamma''(\gamma+\gamma'')$.

In order to find an expression for the stability of a ship, let G be its centre of gravity, and when the ship floats upright let g be the centre of gravity of the immersed part supposed to be homogeneous. Now when the plane of the masts is inclined, g will be situated at F, and in that case let H be the place of the centre of gravity last mentioned; then by mechanics, FH will be equal to the quotient arising from the division of the sum of the momenta of the elevated and depressed volumes by the volume of the immersed part of the ship. But if θ be the angle of inclination, we shall have Fg=GF $\sin\theta$; therefore gH or GK may be found. This being multiplied by the weight of the ship and its burthen (=the force of the reaction of the water in the direction HS), gives the expression for the stability.

The plane of a ship's masts is made to decline from a vertical position not only by the action of the wind against the sails when the direction of the wind does not coincide with that plane, but also by a wave striking the ship in a direction oblique to the horizon and to the plane of the masts; and in both cases the variations in the force by which the inclination is produced and the re-action by which the water tends to bring back the plane of the masts to a vertical position cause the ship to roll about some longitudinal axis, which is supposed to pass horizontally through the centre of gravity of the whole ship. Now, if a horizontal plane coincident with the plane of floatation pass through AB when the ship floats upright, and G, the centre of gravity of the ship, be below that plane, as in the figure; in order to preserve the equality of the immersed volume when the ship is inclined, the plane which passed through AB must take such a position as A′B′. This will cause G to ascend; that is, the ship will rise on the water. On the other hand, if G had been above AB when the ship was upright, the latter would descend on the water when it is made to take an inclined position. Such rising or descending is a cause of the ship being shook or strained in rolling; and this evil can be avoided only by having the centre of gravity G coincident with the plane of floatation. It is necessary to observe, on the other hand, that by keeping that centre higher, or bringing it nearer to the metacentre S, the stability of the ship, which varies directly with the distance GS or GK, is proportionally diminished. The pitching of a ship, that is, the alternate elevation or depression of either extremity of the ship as the latter passes over a wave, is attended by a corresponding rising or descending of the whole ship; and the strain thus produced will evidently be so much the less as the centre of gravity is nearer the level of the plane of floatation and the middle of the ship's length. It should be stated here that, since a ship in tacking is supposed to turn horizontally about a vertical axis passing through its centre of gravity, the resistance then experienced, which is proportional to the square of the distances of its extremities from that axis, will be a minimum when the centre of gravity is in the middle of the ship's length; but, on the other hand, the power of the rudder depending on its distance from the same axis of rotation, that power would be increased by having the centre of gravity at some distance before the middle point.

When a vessel which is partly immersed in a fluid moves through that fluid, it always experiences a resistance in a direction contrary to that of its motion, in consequence of the inertia of the water; but it experiences also a resistance on account of the particles of water which are immediately struck by the vessel, and those immediately beyond them to a certain distance, being for a time compressed on all sides by the vessel and the surrounding fluid, and thus compelled to rise above the general level. The elevated fluid will be highest before the middle point at the bows of the vessel; and the hydrostatical pressure arising from the elevation, combined with the reaction of the neighbouring fluid, will cause the particles to flow off laterally in the direction of some curve-line whose convexity is towards the vessel, after which they will mix with the fluid on each side. Now let ADB, *Fig.* 2, be a horizontal section through the ship at the general level of the water, and let CED be the space occupied by the confined water in front of the ship; then if an artificial prow of that acute form were given to the ship, the particles of water contiguous to the sides of such prow would create very little resistance in addition to that which arises from the inertia of the water, while the latter resistance will evidently be so much the greater as the bows are more obtuse. Beyond D and E the particles flowing along the side exert forces arising from friction, adhesion, and the lateral pressure of the neighbouring water, and at certain points, as F and G, they pass off in the directions of tangents at those points. The force of friction and adhesion is very considerable, particularly if the surface is rough and unequal; and if the vessel is moving with or against a current, the pressure against its sides is equal to that which would be experienced if the water were at rest, diminished or increased on any given area by the weight of a column of the fluid whose base is that area, and whose height is that which is due to the velocity of the water. It has been found moreover by experiment, that if both vessel and fluid are in motion, with equal velocities in the same direction, the buoyancy of the vessel is the same as if both were at rest; but when the velocity of the vessel is less or greater than that of the fluid in the same direction, the vessel either sinks or rises in the fluid by a quantity equal to the height due to the difference of the velocities, and this circumstance must in some measure modify the resistance of the water against the vessel.

Fig. 2.



Besides the resistance arising from the friction of the water along the sides of the vessel, there must be noticed the diminution of pressure against the after part, in consequence of the water displaced by the motion not falling in behind with sufficient velocity to bring the surface there to the same level as in front. The particles of water diverging from the sides of the vessel in oblique directions, as FH, are by the lateral resistance of the neighbouring fluid deflected so as to describe curve lines which finally unite behind the stern in some point, as L. But the force exerted to deflect the particles from the direction FH causes a diminution of the pressure which the water would have otherwise exerted against the after part of the vessel; and consequently it is to be considered as an additional power opposing the forward movement of the vessel. The force of deflection, and consequently the retardation, will evidently be less in proportion as the tangent FH is nearer to the side of the vessel, or as the point F is more distant from the stern; and this circumstance indicates the advantage which ships of considerable length have over others. It is easy to understand however from the breaking and foaming of the water at the head and stern of a vessel when moving with considerable velocity, that the effects of the resistances will be greatly modified by the collisions of the particles of water with each other, and with the surface of the vessel, in consequence of the shocks produced by its motion, and by the effort of the water to return to a state of equilibrium.

Vessels intended for rivers, where the surface of the water is always nearly level, may have their bows made very sharp, so as to experience comparatively little resistance to their motion; but this construction has its limits for ships which are to navigate the ocean, where the waves run high. When a ship, having considerable breadth of bows, meets a sea, the resistance which she opposes to it causes her to be raised, and to be borne upon the wave; whereas, if differently constructed, she would be carried through it. The yacht called the Fire-King is made extremely sharp, and with a very gentle curvature both at the bows and stern; she therefore cuts the water with great facility, and the displaced particles seem almost immediately to fall in towards the rudder, so that the diminution of pressure abaft is small, but being, from the want of a sufficient power of resistance, prevented from rising on the waves, her decks are said to be constantly deluged with water.

In order to obtain an expression for the resistance of the water against a ship, the part of the immersed surface which is before the greatest transverse vertical section is supposed to be divided by a number of such transverse sections at equal distances from one another, measured perpendicularly between them, and by a number of sections parallel to the plane of floatation at equal distances from one another vertically. Thus the surface of the immersed part in front of the greatest transverse section is divided into trapezoidal figures; and a like division of the immersed part of the ship's surface abaft of the greatest transverse section is made. Each trapezoid, in an orthogonal projection of the fore and after part of the ship made on a plane parallel to the greatest transverse section, is then divided into two triangles by a diagonal line, and the area of each projected triangle (found by admeasurement of its sides on the scale of the drawing) is multiplied into the resolved force of the water upon it; that resolved force being expressed by the absolute force multiplied into the square of the sine of the inclination of the triangle on the ship's surface to the direction of the motion. The sum of the products is taken for the whole resistance of the water against the ship. In comparing the resistance against one ship with the resistance against another, it is evident that the absolute force of the water on each may be represented by unity.

Experiments sufficiently prove that the resistance experienced by a body in moving through a fluid is less when the greatest breadth of the body is at some distance before the middle of its length, than when it is precisely at that place, but the most advantageous situation of what is called the *midship section* (the greatest vertical section taken perpendicularly to the length of the ship) is far from having been as yet determined. In order to find its dependence upon the direct resistance of the water, M. Chapman proceeds in the following manner:—He considers the ship to be represented by a solid in the form of two isosceles wedges joined together at their heads and to move in the water with the planes which are perpendicular to their edges parallel to its surface. Now it is evident that when the solid is at rest in still water, the opposite pressures of the water against the faces in front, and against those which are behind the plane of junction, or of the greatest transverse section, will be equal to one another in directions parallel to the length of the solid. Also that, when in motion, the front faces will experience directly that resistance of the water which is due to the velocity of the solid, and that the after faces, by receding from the water in consequence of the advance of the body, will lose a portion of the pressure which they would have experienced had the body been at rest, and which would thus have indirectly contributed to force the body forward. It must moreover be observed that the water is driven forward in front of the vessel with a velocity which may be represented by v'; and that as the water in front becomes higher than that which is behind the greatest transverse section, it will flow towards the stern with a velocity which may be represented by v''. Hence if A be the sum of the areas of the two oblique surfaces in front of that greatest section, and B that of the surfaces abaft of the same section; also if θ and θ' be the inclinations of those surfaces respectively to the line of motion, and v be the velocity of the body, we shall have, supposing the resistance to vary with the square of the velocity and the cube of the sine of the inclination,

$$A\,(v-v')^2 \sin.^3\theta + B\,(v+v'')^2 \sin.^3\theta'$$

for the value of the whole resistance; or, for A sin. θ and B sin. θ' putting their equal C (the area of the transverse section) the expression for the resistance becomes

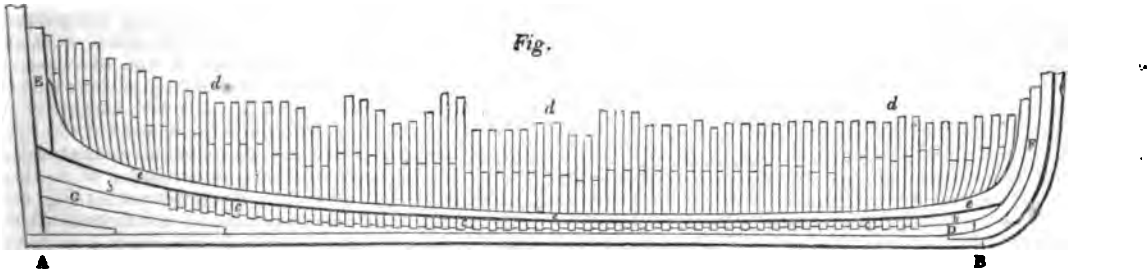
$$C\left\{(v-v')^2 \sin.^3\theta + (v+v'')^2 \sin.^3\theta'\right\}.$$

This formula indicates that such a body will always meet with less resistance when C is in front, than when it is abaft of the middle point in the length; that is, when θ is greater than θ': it indicates also that the place of the greatest breadth when the resistance is a minimum depends on the values of $v-v'$ and of $v+v''$, and that the greater v' and v'' are with respect to v, the farther should the greatest breadth be in front of the middle point.

Imagining a horizontal section through a ship at the surface of the water to present the form of four portions of parabolas, the two in front of the greatest transverse section being similar and equal on opposite sides of the longitudinal axis; and likewise the two portions abaft of that section being similar and equal to one another, but different from the former portions, Chapman finds, as approximations to the place of that greatest section, that its distance in front of the middle of the ship's length may be four, six, or eight times the horizontal distance of the centre of gravity of the whole ship from that middle point. And his observation is that the first distance might serve for sharp vessels, as frigates, and the last for merchant ships, which are much broader than the others in proportion to their lengths. Colonel Beaufoy's experiments with solids of various forms indicate that, in general, the distance of the midship section in front of the middle point in the length should be one-tenth of the length.

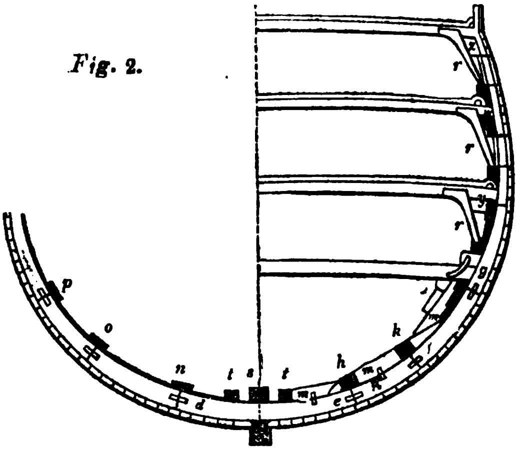
It must be understood that the assumptions on which the formulæ expressing the relations between the principal dimensions of ships, and between the dimensions and velocity, have been investigated, are far from being conformable to the circumstances of a ship when moving through the water and the same may be said of the above process for finding the place of the greatest transverse section; consequently, the formulæ afford but remote approximations to the rules which should guide the naval architect in the formation of a design. A far more perfect knowledge than we have at present of the action of the wind on the sails, of the resistance of the water, and of the conditions of stability in a ship, will be necessary before the results of analysis will be capable of being applied directly to the details of construction.

SHIP-BUILDING. When a ship is to be constructed, drawings representing the necessary elevations and sections, generally on a scale of a quarter of an inch to a foot, are prepared, and copies of these, enlarged to the full size of the objects which they represent in the intended ship, are traced with chalk on the floor of an apartment called the 'mould-loft.' The length of the loft is generally equal to half that of the greatest ship which it may be proposed to build, and of the whole height of the hull in addition; so that there may be traced upon it a horizontal plan of half the ship in the direction of its length, and beyond one extremity of the plan a representation, in the same plane, of a transverse section of the ship in a vertical plane at the place of its greatest breadth. Such plan and section being laid down, there are drawn with chalk, from their proper places in the plan, representations of the timber ribs or frames as they would appear in as many transverse sections of the ship: pieces of plank about three-quarters of an inch thick are then cut so as to correspond to the forms of the timbers; and these, which are called the moulds, become the patterns by which the timbers are to be cut from the tree or log of wood. But, as such a mould can only give the form of the timber in the direction of its length, and as the oblique positions in which the timbers stand in the ship may cause the angle which the faces of each timber make with one another to be acute or obtuse, and to vary in the same piece, certain marks on the surfaces of the boards are used to indicate the directions in which the sides of the timbers are to be cut. The operation of cutting the timbers agreeably to the forms of the mould-boards is called 'converting.'



A row of blocks of oak three feet high and about four feet asunder are placed on the building-slip (ground cut in an inclined plane descending towards the water) in the direction of the length of the intended ship, so that their upper surfaces may be in a plane making an angle of about three degrees with the horizon; and on these blocks is laid the keel AB, *Fig.* 1. This, which is the lowest timber of the ship, extends from one end to the other, and upon it is raised the whole fabric; it is of elm, and for a large ship it consists of two or more pieces scarfed together at their extremities Timbers, called the 'dead-wood,' are then placed at C and D longitudinally upon the keel from each extremity of the latter towards its middle; the upper surface of this mass is cut in a curvilinear form *b*, *b*, and with this line the bottom of the ship's body is to coincide. At A and B, the extremities of the keel, the stern-post, and stem-post are set up: the latter is curved near the bottom; and if the stern is to be what is called square, a particular frame, consisting of two transoms or horizontal timbers, and two side-pieces, is fixed above the stern-post, in order to determine the form which is to be given to this part of the ship. The sides and upper surface of the keel and dead-wood are cut to receive the floor-timbers (the lower portions, *d e*, *Fig.* 2, of those timbers which are to form the ribs of the hull): these are placed across the keel perpendicularly to its length, and the other portions (called futtocks), *e f*, *f g*, &c., of which each rib is formed, are placed successively above them, abutting end to end, or the head of a lower one against the heel of that which is immediately above it. The ends of the futtock pieces in every rib are made to fall near the middle of the length of those in the rib on each side of it; and they are united together by cylindrical coaks, or plugs of wood, which enter about two inches into those ends at the places of junction. *c*, *c*, *c*, &c., *Fig.* 1, represent sections of the ribs made by a plane passing longitudinally through the middle of the keel, and the interior surfaces of parts of the ribs appear at *d, d,* &c. The ribs were formerly placed so that their planes were perpendicular to the keel, but Dr. Inman has disposed them so as to be in vertical positions when the ship floats upright. Except near the two extremities of the ship, their planes are perpendicular to a horizontal line drawn in the plane of floatation through the whole length; but at the bows always, and at the stern if the latter is to be curvilinear, the vertical planes with which the ribs on each side coincide are oblique to the length of the ship, in order that, on a horizontal plane, the proper curvature of the extremities may be obtained. The rib-timbers above the surface of the water are nearly rectilinear, but below that plane they are made with various curvatures. About the middle of the ship they have at bottom nearly the form of a semicircle, while towards the head and stern they form curves of contrary flexure, uniting on the keel with their lower concavities towards the exterior of the ship.

Fig. 2.



It may be observed that the keel of a ship is not horizontal, or parallel to the plane of floatation when the ship is in still water, but is made lower towards the stern than it is forwards, in order to allow greater length to the rudder, and thus increase the power of the latter in giving a direction to the ship's motion.

The keelson, *e e, Fig.* 1, is placed longitudinally above the floor-timbers, and immediately over the keel, and it is united to the latter by bolts which go through both, and through the floor-timbers: its transverse section is represented at *s, Fig.* 2. In large ships two additional keelsons, *t, t, Fig.* 2, about thirty feet long, are bolted to the floor-timbers sufficiently near one another that the *step* (foot) of the mainmast may rest upon them; they serve to relieve the bottom of the ship from the pressure of that mast, and strengthen it against the upward action of the water. The timbers E and F, *Fig.* 1, called the sternson and stemson, are also attached interiorly to the stern-post and stem-post, in order to increase the strength of the fabric.

The whole assemblage of rib-timbers is covered on the outside, and either wholly or partly on the inside of the ship, with planks of oak from three to six inches thick; and in order to make the latter bend so as to lie close to the curve surface of the ribs, they are, previously to being applied, moistened by steam: the exterior planking appears in the section, *Fig.* 2. The planks are fastened to the ribs both by bolts and trenails (plugs of oak from one to two inches diameter), which pass quite through the ship's side, and are tightened by wedges driven into them at each extremity.

When the ribs do not join closely side by side, it is recommended that, before the planking is applied, the intervals both on the exterior and interior sides of the ship should be filled up with pieces of wood three inches deep, and as long as the curvature of the ribs will permit; the lines of junction with the ribs being well caulked. The spaces between the exterior and interior pieces may be filled with cement. This filling up should take place over all the bottom of the ship at least as high as the plane of floatation, since it would afford great security in the event of the bottom planks being torn off by the ship striking a rock. Sir Robert Seppings however proposes that, for ships of war, where there are intervals between the principal rib-timbers, there should be introduced in those intervals other ribs extending from the keel up to the orlop or lower deck, since by this construction the lower part of the ship will be one compact mass of timber. He observes that the filling up of the spaces between the ribs not only adds to the strength of the ship by causing its bottom to have a solid thickness of about sixteen inches, but it tends to preserve the health of the crew, since those openings become receptacles for dirt, by which the air within the ship is vitiated. Channels, or water-courses, may be cut down the ribs at their interior lines of junction, and covered by planks or battens; by these channels the water is able to descend to the limber passage along the keel, and pass to the pump-well. For merchants' ships Sir Robert Seppings would have strakes, or courses, of thick planks extend longitudinally through the ship along the interior sides of all the ribs, and cover the abuttings of the futtock-pieces in each alternate rib: such strakes appear at *n, o, p,* in *Fig.* 2. He considers that no other interior planking would be required, but he recommends that battens should be fastened over the junctions of the ribs in the vertical planes.

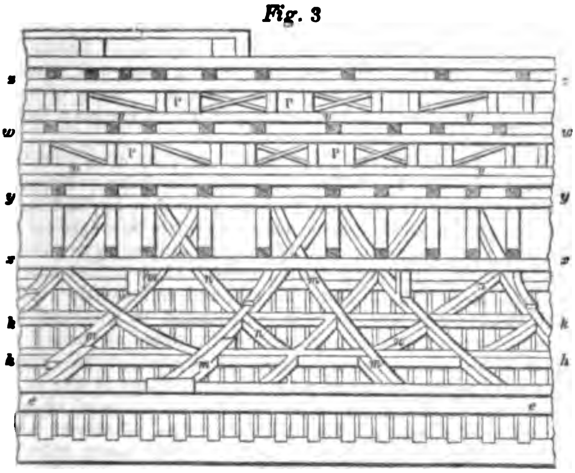
A ship being a vast fabric consisting of comparatively short pieces of timber connected together by scarfing, and the principal parts of the frame-work, the ribs, the longitudinal timbers, and the planks being nearly at right angles to one another, it must of necessity happen that when the ship is not supported in its whole length and breadth, it will bend by its own weight. This will take place not only in the event of being lifted up by a wave under some place in its length, or pressed unequally by the force of a wave acting obliquely upon one bow or quarter, but even while floating in still water, from an excess of the weight in one transverse section over that in another. In this last case it has occurred, a horizontal line having been traced from head to stern by means of a spirit-level while the ship was on the stocks, that immediately upon the ship being launched the two extremities were observed to sink as much as three or four inches; the ends of the planks separating in the upper part of the structure, while the timbers below were in a state of compression, and the whole body of the ship becoming curved in a vertical direction. M. Dupin has shown, *Phil. Trans.*, 1817, that the strain is greatest at that transverse section of the ship which divides the whole length into two parts, in each of which the weight of the displaced fluid is equal to that of the corresponding part of the ship and its loading. To counteract the tendency to arch or bend was the object of Sir Robert Seppings in the application of diagonal braces to the interior side of a ship.

Trussing ships to prevent arching was used on the Continent as early as 1759; and the Swedish architect Chapman, who describes the manner of placing the trusses, speaks of the practice as being generally followed. The method consisted in setting up three parallel rows of fir-pillars from one end of the ship to the other; the middle row rested on the keelson, and the others on parallel longitudinal timbers, fastened by bolts to the ribs of the ship, one on each side of the keel: on the heads of these pillars in each row, and under the lower deck of the ship, was placed a longitudinal timber like an architrave; and diagonal braces were placed from the head of one pillar to the foot of the next in each of the three rows. It is evident that such a disposition of braces, if well executed, would serve to prevent or diminish the arching of the ship; but it is far inferior to the method now followed, because of the interference with the loading, and the liability of the pillars to be displaced in consequence of a violent movement of the ship.

In order to understand the construction of a ship and Sir R. Seppings's application of the braces, let *Fig.* 3 represent a part, near the mainmast, of a longitudinal section through a large ship of war. In this figure *e e* is the top of the keelson; *h h* and *k k* are timbers extending through the whole length of the ship above the ribs, which are supposed to be close together, and not covered by an interior planking; *m m,* &c. are the principal timbers of the braces; *n n,* &c. are the trusses to those timbers; *x x* is a longitudinal shelf, on which rest the beams of the orlop deck, and the section shows how it is supported on the braces *m m,* &c.; *y y* is a like shelf, on which rest the beams of the lower gun-deck. The beams which support the upper decks rest likewise upon longitudinal shelf-pieces, which appear at *w w* and *z z*; and these lie upon chocks or upon pillars placed against the sides of the ship at intervals between the decks: the same shelf-pieces appear at *x, y, w, z,* in *Fig.* 2. Through these and through the ribs pass the bolts by which the iron knees *r r r*, *Fig.* 2, are attached to the body of the ship. In small vessels the beams are not always fastened by iron knees, but are merely coaked and bolted to the shelf-pieces: two or more iron knees are however usually placed under the beam near the main and fore masts. The shelves just mentioned constitute as many hoops connecting the ribs of the fabric together longitudinally; they are fastened by trenails and bolts to the ribs and to the beams of the decks. P P, &c., *Fig.* 3, are the ports, and the dispositions of the braces between them are shown at *v v*, &c.

The connection of the two sides of the ship with each other is effected by means of the beams which extend under the decks from side to side. The tops of the iron knees are fastened to these, near their extremities, by bolts passing through them; and the lower parts of the knees are joined to the ship's side by bolts passing quite through the planking, the ribs, the chock-pieces, and the knees themselves The beams of the principal decks in large ships are usually made in two pieces which abut end to end, and are connected together by having a strong middle piece scarfed and bolted to them. The planks of the gun and upper decks are recommended to be laid obliquely above the beams, and their outer extremities enter into a rebate formed near the interior side of the ship in certain longitudinal pieces which are channelled for the purpose of carrying off the water from the decks: the diagonal position is given to the deck planks, in order that they may increase the strength of the ship in a transverse direction. The exterior planking of the ship is laid on the ribs in longitudinal directions as nearly as possible parallel to the surface of the water; and at the extremities of the ship bolts pass obliquely through them and through the stem-post, the stern-post, and the adjacent rib-timbers.

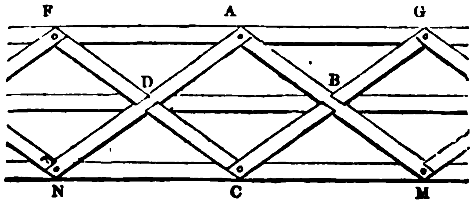
Fig. 3



The oblique timbers, or diagonal braces *m m*, &c. (*Figs.* 2 and 3), which are about six or seven feet asunder, cross the ribs at angles of about 45°, and are placed in contrary directions from the middle of each side towards each extremity of the ship. Their upper ends abut against the horizontal shelf under the lower gun-deck, and their heels or lower extremities against the keelson, or against the horizontal timber on each side of it. These braces are attached to the timbers of the ship by cylindrical coaks and bolts, and the lower ends are connected with the keelson by iron straps. The timbers *h h*, *k k*, which are of fir, are attached to the sides of the diagonal braces; and the truss-timbers *n n*, &c. are placed diagonally across the rhomboidal space formed between the principal braces and the longitudinal pieces, in order to prevent the former from becoming bent by the compression which they may suffer endways from any strain which the ship may experience. The diagonal frames, together with the oblique trussing between the ports in the upper works, not only resist the tendency of the ship to become arched, but the former resist also any pressure which may take place externally against the bottom of the ship in the event of grounding; at the same time the exterior planking, the longitudinal timbers, and the oblique planking of the decks bind the whole fabric in one firm body. A close contact of the several parts of the diagonal frames is evidently of the utmost importance, as on it depends the security of the ship against a change of figure.

The principle on which the diagonal braces act may be easily understood from the following considerations:—Let A M, A N, *Fig.* 4, be two principal braces; F D and D C, G B and B C, the struts or trusses inserted between them: then if C be the point of support, and if the parts beyond N and M be those which have a tendency to sink by the weight of the superstructure, it will follow from the elements of mechanics, that in this case the braces A M and A N, and the longitudinal timber F G, will be subject to the strain of extension in the direction of their lengths, while the trusses G B and B C, F D and D C, as well as the longitudinal timbers D B and M N, will be subject to the strain of compression. The effect of braces disposed in the positions A M, A N, in midships, and of others corresponding to them towards the head and stern, will be that the strain arising from the weight of the extremities of the ship, and by which arching is produced, is counteracted by the power of the trusses, in positions corresponding to F C and C G, to resist being compressed. A contrary effect would take place if the principal braces were disposed in the directions C F and C G, C being the point supported; for then the trusses between them, and the longitudinal pieces D B, would become disengaged, and would fall out of their places.

Fig. 4.



Sir Robert Seppings's diagonal braces were first introduced in 1810, and his paper on the application of them is contained in the *Philosophical Transactions* for 1814. They were first applied to the Tremendous; and the success was complete, for after three years' service it was found, by means of lines of sights along the ship, that the gun-deck had not arched in the least, and the upper deck only three-fourths of an inch.

In 1814, Mr. Walters, a civil architect, took out a patent for a method of counteracting the arching of a ship by braces of iron, which he proposed to apply on each side of the ship between the rib frames and the exterior planking. The braces were to extend obliquely both ways from the upper-deck beam in midships, in the direction of the line of shortest distance on the surface, towards the keel, where those which were on opposite sides of the ship were to meet under the bows and stern. By this disposition the extremities of the vessel could not sink without putting all the timbers between the trusses in a state of compression, and thus all their joints would be kept close together. No braces of such magnitude have ever yet been employed in ship-building, but diagonal braces of iron are now superseding those of timber; and for frigates and smaller vessels they are generally employed. The Goliah, now being built at Chatham for 80 guns, has, between the keel and lower gun-deck, an assemblage of iron braces let interiorly into the rib-timbers, which they cross at angles of 45°; over these, between the orlop and gun decks, comes an interior planking, which extends the whole length of the ship, and this also is crossed by braces of iron, bent, above and below the planking, so as to lie upon the ribs: to these the whole system of braces is bolted.

Vessels of iron are now very frequently constructed both for rivers and for navigation in the open seas, and they have many advantages over ships of wood. They are much lighter, or more buoyant. They are less liable to become arched, and are better able to withstand the effects of striking upon a rock. In the latter case, a ship of wood would have its bottom pierced, or it might go to pieces, while the iron one would merely become indented. They are formed with rib-frames at intervals, and with longitudinal hoops of iron; and they are covered with iron plates, which are fastened to the ribs by bolts or rivets. The lower part of the interior may be divided into compartments, which can be rendered air-tight; and thus, in the event of the bottom being perforated in any place, the water would be confined within that compartment till the damaged plate could be repaired or replaced.

The sheathing of ships at first consisted of a second covering of planks applied, on the exterior of the first, over the bottom and sides as far as they were under water; but this being found to impede the motion of the ship, a sheathing of milled lead (the invention of Sir Philip Howard) was subsequently employed. The application of plates of copper as a covering on the exterior of ships was first tried in 1760; and in 1783 all those belonging to the royal navy were ordered to be covered or sheathed with that metal. By this practice shells and sea-weeds are prevented from adhering to the sides and bottoms; the friction of the water against them is diminished, and the damage which would be caused by worms is avoided. The copper is said to remain serviceable from seven to ten years, except when a ship has been in seas which, like those on the western coast of Africa, abound with sulphuretted hydrogen; for then the copper is destroyed much sooner. The late Sir Humphry Davy proposed to protect the copper sheathing by the application of zinc, for which sulphuretted hydrogen has a stronger affinity than for copper; but though the experiment succeeded, no advantage resulted from it; for it was found that the copper, not being acted upon by the acid which prevents the adhesion of vegetable and animal matters, soon became foul.

The stability of a ship depending much on its breadth, and the lateral action of the wind on the sails being the force to which the stability is opposed, it follows that the heights of the masts or sails, and that of the common centre of gravity of the latter, ought to vary with the breadth of the ship; while the breadths of the sails must vary with its length. Now the momentum of the wind in the sails depending upon the breadth and height of the sails, and upon the place of their centre of gravity, that momentum must vary with the length of the ship and the square of its breadth; hence, in small ships, it is less proportionally to the stability than in great ships; and, on this account, the heights of the masts in the former are generally less in proportion to the breadth than in the latter.

The shrouds and back-stays are intended to enable the masts to resist the pressure of the wind when it acts in any direction aft of the beam: they are made fast to the sides of the ship at what are called the 'channels,' which are always rather aft of the mast to which they belong, in order that the action of the wind against the sails may be better resisted; and the 'dead-eyes' allow the shrouds to be relaxed or made 'tort,' as circumstances may require. The main and mizen masts are always made to rake, or incline aft; but the fore-mast is usually upright. The fore-stay and the main-topmast-stay should be in one line; so also should the main-stay and the mizen-topmast-stay. These stays serve to keep the masts steady, and resist the pressure of the wind when its direction is before the beam, as well as the strain produced by the action of the men on the braces.

The masts of ships are built of several pieces selected from the strongest parts of trees, and attached together both in the fore-and-aft and in the athwart-ship directions, the whole being bound together by hoops at intervals. Usually the central piece consists of one log of timber reduced to the form of a polygonal prism, and to the sides of this are applied other pieces, which are connected with it either by a longitudinal projection in each, which is let into a corresponding channel made in the central piece, or by blocks of hard wood which are let into both the central and attached pieces. In order that masts may more effectually resist the strain of torsion to which they are subject, it is sometimes the practice to form one of the surfaces, in each of two timbers which are to be applied together, in prismatic 'tables,' alternately elevated and depressed; so that when those surfaces are applied together, the raised parts in each may fit the depressed parts in the other.

The rudder serves to govern the ship's motion; for, on being turned so that its plane is in a position oblique to the plane of the masts and keel, the reaction of the water against it as the ship advances, being resolved in a direction perpendicular to the last-mentioned plane, becomes a force which causes the ship to turn upon a line passing through its centre of gravity. Thus by giving the rudder more or less inclination to the said plane, the ship may be made to move in any required direction, or may be made to avoid an object by which its safety might be endangered.

Ships have different designations, according to the number of their masts or the disposition of their sails. The word ship is more particularly applied to those vessels which have a fore, a main, and a mizen mast, with a top-mast and top-gallant-mast to each; and in which the yards, in sailing before the wind, are braced square, that is, in horizontal positions perpendicularly to the length of the ship: the mizen sail alone being usually in a fore-and-aft position, that is, in a vertical plane passing through the keel. A bark is a vessel with masts and sails like those of a ship, except that the mizen-mast carries no top-sail or top-gallant sail. A brig has a fore and a main mast, with top and top-gallant masts and sails, like those of a ship; but it has no mizen-mast, and the main-sail has a position corresponding to that of the mizen-sail in a ship with three masts. A snow is rigged in the same manner as a brig, except that the main-sail is attached to a small mast abaft of and very near the main-mast. A schooner has two masts, and the sails attached to them are, in their usual position, in vertical planes passing through the keel: it has small or no top-sails. Lastly, a sloop (shaloop) has only one mast, with a main-sail, whose plane is usually in a fore-and-aft position. Each of the different kinds of ships has a bowsprit which carries a fore-stay-sail and a jib-sail.

In the British Navy, ships which carry 70 or a greater number of guns are called 'line-of-battle ships.' Frigate is a term which is supposed to have been first applied to a light galley moved by sails or oars; but it is now applied to ships of war, generally with two decks, and carrying from 36 to 60 guns. These are built narrower than line-of-battle ships in proportion to their length, and sail swiftly; and such vessels were first, in 1690, constructed in England by Commissioner Pett. They accompany fleets in order to watch at a distance the movements of the enemy, and they act singly against ships of a like kind. Ships of war of a lower class than frigates have the denominations of sloops, corvettes, brigs, cutters, brigantines, ketches, schooners, and barques. The sloops of war and corvettes carry from 4 to 20 guns, and some brigs carry 16 guns: the number of guns in a vessel of either of the remaining classes does not exceed 10.

The tonnage of a ship is, properly, an expression for the interior capacity by the number of tons of sea-water which it could contain; therefore, if the interior volume were found in cubic feet, on dividing that volume by 35 (the number of cubic feet of sea-water which are equal in weight to one ton), the quotient would be the tonnage required. The tonnage however is frequently understood to express the capacity by the number of tons of sea-water which might be contained between a horizontal plane passing through the ship when she floats in still water with only her equipments and stores on board, and a horizontal plane passing through the ship when laden, that is, between what are called the *light-water* and *load-water* planes; the volume of that part of the ship expressed in cubic feet being divided by 35, as in the other case. This result evidently gives the weight of the ship's cargo merely.

As the application of the usual rules of mensuration to the determination of the tonnage in either of the above cases is very laborious, several different methods have been proposed by which an approximate value of the tonnage may be more easily found. The rule formerly employed in this country, agreeably to the acts of parliament 13 Geo. III. and 26 Geo. III., is expressed by the formula $\frac{b^2}{188}(l-\frac{3}{5}b)=$ T, where l is the length of the ship at the load-water plane, b the exterior breadth at the broadest part of the ship, and T is the tonnage required; but it may be easily shown that the rule, probably from subsequent alterations in the forms of ships, is very erroneous.

In 1791 the Society for the Improvement of Naval Architecture offered a premium for the most accurate method of determining the tonnage of ships by rules including the values of all the principal dimensions; and, in the following year, M. Chapman gave two rules, in one of which this element is expressed by $\frac{(lb)^{\frac{3}{2}}}{y}$, and in the other by $\frac{l.b.d}{x}$, where l is the extreme length on the load-water plane, b is the breadth just below the main-wale, and d is the mean vertical distance between the light and load-water planes; x and y are variable divisors depending on the fullness or sharpness of the bodies of the ships. The last of the above formulæ may be made to express the tonnage very near the truth if x be made equal to 46·67, and if the result be multiplied by the value of the fraction $\frac{3s-(n-2)h}{2(n-2)}$. Here n denotes the number of equal parts into which the length of the ship may be divided on a plane midway between the light and load-water planes; s is the sum of the half-breadths, or horizontal ordinates taken to the outside of the ship at the several points of division, and h is the greatest ordinate.

A committee appointed by the Lords Commissioners of the Admiralty to consider the measurement of tonnage, state in their Report (1834) that they conceived it to be preferable, as well for the interests of the builder and owner as for the collection of the dues, that the registered tonnage should depend on the whole interior capacity of the ship; and they gave as a rule for computing it, the formula $\frac{l.b.d}{x}=\text{T}$, in which l is the interior length of the vessel, at half the midship depth, from the after part of the stem-post to the fore part of the stern-post; d is the sum of the depths of the ship between the under side of the upper deck and the ceiling (interior surface) at the limber, taken at three points in the length, viz. one in the middle, and one at a distance from each end $=\frac{1}{5}l$. The depth at the middle point is to be doubled and added to the two other depths. b is the sum of the inside breadths of the ship taken at two points in each of the three lines of depth above mentioned, viz. at $\frac{1}{5}$ and at $\frac{4}{5}$ of the depth on the foremost and on the aftermost line of depth, and at $\frac{4}{5}$ and at $\frac{1}{5}$ of the depth on the middle line. The breadth taken at $\frac{4}{5}$ of the depth on the middle line is multiplied by 3, and that taken at $\frac{4}{5}$ of the depth on the aftermost line is multiplied by 2, before the addition is made. x is an arbitrary divisor which has been fixed at 3500, and was found from the equation $x=\frac{l.b.d}{t}$, in which the value of the second member was obtained by admeasurements of ships of different classes, and by taking a mean of the results, t being the computed value of the tonnage.

In order to find approximatively the tonnage of loaded vessels by the above formula, the committee proposed that l should represent the interior length of the ship at the upper deck, b the interior breadth on the under side of the same deck, d the depth from the upper deck measured down the pump-well, and $x=130$.

Both of these rules are empirical; but, on comparing the result obtained by the first with the interior volumes of vessels computed by the general rules of mensuration, it was found that out of fifteen cases it was in defect in nine, and in excess in three: the greatest error in defect was only 2 per cent., and in excess 6 per cent.; the rule is therefore considered to be sufficiently accurate for the objects proposed by it.

It would be convenient to have for every ship a scale of tonnage, or a table of the number of tons corresponding to different depths of the displacement, suppose at intervals of one foot; for by such scale or table the tonnage expressing any portion of the whole burthen which the ship can carry might be found by inspection from the observed depth to which the ship is immersed in the water; and the following construction has been proposed by Mr. Parsons:—Let a line on paper represent a vertical line drawn through the middle of the ship, and be divided into equal parts representing the feet in the depth. The weights of displacement in tons corresponding to different heights from the keel upwards, being computed by the rules of mensuration, may be set by a scale on horizontal lines drawn through the former line at the points which represent the depths of the displacement. Then the extremities of these lines being joined by a curve, the latter becomes a line of tonnage; and on measuring the horizontal ordinates by the above-mentioned scale, the tonnage corresponding to any height above the keel of the ship will be obtained.

SHIPS. The law of England relating to merchant ships and seamen is partly founded on principles of maritime law common to the whole civilized world, and partly on acts of parliament. The subject may conveniently be divided into four parts:—

1. That relating to the ownership of ships and its incidents.
2. To the persons employed in the navigation, &c. of merchant ships, their rights and duties, &c.
3. To the carriage of goods and passengers in merchant ships, the rights and duties, &c. of freighters and passengers, of owners and their servants.
4. To the employment and wages, &c. of merchant seamen.

1. The ownership of a ship is vested, in the first instance, in those at whose expense it has been built. It may pass into other hands by purchase, by the death, bankruptcy, &c. of the owners, or by capture from an enemy. In all these cases, the general law relating to chattels is observed, subject to certain modifications applicable to this kind of property. A sale by a party who has the mere possession of a ship can in no instance vest the property in the purchaser. Neither can the master, except when the clearest necessity exists, sell the ship which he commands. Even if he be a part owner, his sale is valid only so far as his own part is concerned; and in the case of a registered ship, even supposing him to have an authority from the owners to sell, still it is incumbent upon him to observe the forms prescribed by the registry acts. A necessity for a sale may arise when the ship is in a foreign country, where there are no correspondents of the owners, and the master is unable to proceed from want of repairs, and no money can be obtained by hypothecating her or her cargo. In case a sale under such circumstances should be litigated, the proper questions for the jury to determine are, whether such a necessity existed as would have induced the owner himself, if he had been present, to sell; and whether the actual sale has been made *bonâ fide*. No inquisition by any court having authority abroad in such matters is conclusive upon those whose property is in question. The property in a ship is now always proved by written documents; and by means of these the property in an absent ship may be conveyed. But when actual possession is possible, a delivery of it is also necessary to convey a perfect title; otherwise, in the case of the bankruptcy of a seller who is allowed to remain in possession, the property may vest in the assignees. Previous to the passing of the registry acts, 4 Geo. IV., c. 41, and 6 Geo. IV., c. 110, 3 and 4 Wm. IV., c. 55, the same consequences might have ensued from the continued possession of the original owner, in the case of ships mortgaged or conveyed to trustees for the payment of debts. But by the 42nd and 43rd sections of the last act, provisions are made for a statement of the object and nature of the transfer in the book of registry, and for indorsement on the certificate of registry, by which such consequences are prevented. Enactments to the like effect are made in the bankrupt act, 6 Geo. IV., c. 16, § 72.

In order to complete a title by capture, it is necessary that a sentence of condemnation should be obtained in a court of the nation by whom the capture has been made. This court decides according to the general law of nations. A distribution is thereupon made among the captors, for which purpose it is usual for a sale of the vessel to take place. At the time of the condemnation the ship need not be in the country where the condemnation takes place. The court at which the condemnation takes place may be in the country of a neutral power, as well as in that of the capturing power or of its allies, although this principle was admitted reluctantly, and after several decisions to the contrary in England. The property in a ship is not changed by a seizure and a sale without condemnation of a neutral state, nor upon a capture by pirates.

Where repairs have been done, or necessaries supplied to a ship, the legal owners, upon proof of their title to the ship, are *primâ facie* presumed to be liable. But this presumption may be rebutted by proof that they were done or supplied under the authority and upon the credit of another. The question to be decided, in order to determine the liability, is upon whose credit the work was done or the necessaries supplied. If a ship is let out for hire, the owners are no more liable for the work done by order of the hirers, than a landlord of a house would be for work done by order of his tenant. Analogous observations are applicable with respect to the liability of mortgagees and charterers. Where there is an actual letting of the whole ship, and the lessee has the entire control and management of her, the master and mariners being subject to his orders, the lessee becomes for the time invested with the character of owner. But where by the terms of the contract the master and mariners continue subject to the owner, and he through them retains the control and management of the ship, the contract is merely for carrying the lessee's goods.

A variety of privileges of trade are now confined to ships either of British build, or taken as prizes in war, &c.

The first statute passed with a view to effect this object was 26 Geo. III., c. 60. Other statutes, 4 Geo. IV., c. 41, 6 Geo. IV., c. 110, and 3 and 4 Wm. IV., c. 55, were subsequently passed for the same purpose. The object of the legislature has been to confine the privileges of British ships to ships duly registered and possessing a certificate of registry. No ship is to be considered a British ship unless duly registered and navigated as such. There are some exceptions from this enactment: 1, British-built vessels under 15 tons burden, and manned by British subjects, navigating the coasts and rivers of the United Kingdom or of the British possessions abroad; 2, British-built vessels owned and manned by British subjects, not more than 30 tons burden, employed in fishing or the coast-trade about Newfoundland, Canada, &c.; and, 3, Ships built at Honduras, which, under certain circumstances, are entitled to the privileges of British registered ships. It is to be observed that the registry of a ship is not compulsory; the only consequence of non-registry is, that a non-registered ship can enjoy none of the privileges of a British ship. No ships can be registered which are built elsewhere than in the United Kingdom or in some of its colonies or dependencies, or have been condemned as prize, &c., or as forfeited for breach of the laws relating to the slave-trade. They must also wholly belong to British subjects who reside within the British dominions, or are members of some British factory, or agents for some house carrying on trade in the United Kingdom. A registered ship may cease to enjoy the privileges of British ships, by sale under the decree of a court for benefit of the owners in consequence of being stranded, by capture, by repair to the amount of 20*s.* per ton in a foreign country, unless she was sea-worthy when she left the British dominions, and the repairs were necessary for her return. Every ship is considered to be divided into 64 equal parts, and no individual or partnership firm can be registered as owner or owners of less than a 64th part. Proper officers, who generally are the officers of customs on the spot in question, are appointed for the purpose of making the registry and granting certificates of registry to the owners. The registry and certificate must be made at the port to which a ship belongs, which is that port at or near which the owner resides who takes the oath required by the act. The certificate states the name, occupation, and residence of each owner, and the share or shares which he holds, the name of the master, the name of the ship and of her port, the time and place of her build or condemnation, the name of the surveying-officer, her tonnage, and contains a particular description of her in other respects. On the back of the certificate are stated the names of the owners, and the share or shares held by each. The name of the ship cannot afterwards be altered. When the property in a ship or any part of it is transferred, it must be done by a written instrument or bill of sale, which recites the contents of the certificate. The property in the ship is not conveyed until the instrument has been produced to the proper officor at the port where the ship was registered or is about to be registered afresh. The officer then makes a registry in accordance with the altered circumstances of ownership, and indorses them on the certificate; of this he must give notice to the commissioners of customs. The transfer is rendered complete by an indorsement on the bill of sale certifying the entry in the registry and the indorsement. If the master of a ship is changed, notice of it must be given to the proper authorities, and a memorandum and indorsement of the change must be made in the registry and on the certificate. If a certificate is lost, a fresh registry must be made for the purpose of granting another; and the same form is necessary in case of any alteration in the ship which creates a variance in the particulars stated in the previous registry. The only conclusive evidence of ownership of a ship is the registry and certificate; but a production of the registry alone is not even *primâ facie* evidence to render a party liable as owner of a ship. There must be some proof either that he has caused his name to be entered, or has assented to its entry; neither is it evidence to support an allegation of title by the party producing it; as, for instance, to prove interest in a plaintiff in an action on a policy of insurance.

Where a ship is the property of several part-owners, the rules of most nations have made provision for the administration of the joint property in case of a disagreement as to the management among the joint-owners. The English law contains similar provisions. The majority in value are authorised to employ the ship 'upon any probable design;' but they are only entitled to do so upon giving security to the minority in a sum equal in value to the united shares of the latter. The mode of obtaining this security is by procuring a warrant from the court of Admiralty for the arrest of the ship. After the security has been given, the minority bear no share either in the expenses or profits of the adventure. If no application of this kind is made to the court, the minority ought expressly to give notice of their dissent both to their joint-owners and all other parties engaged in the proceedings, and they will then be relieved from the necessity of contributing in case of a loss. If they take no steps of the kind, their joint-owners, as in the case of partnership of any other chattel, will not be responsible to them for any consequences short of an absolute destruction by their means of the ship. The same proceedings are proper to be taken where the joint-owners are equally divided in opinion, or the minority have obtained possession of the ship. The application for the arrest should be made at the earliest stage of the proceedings, because otherwise the applicant will be held liable to contribute to the previous expenses, although he will receive no part of the profits. One part-owner may make the others liable for repairs, &c. done at his order: the usual practice however is for the part-owners to unite in appointing one person as a general agent for them all. This person is styled the ship's husband, and his duty, when not especially defined, is to attend to all matters connected with the outfit and freighting of the ship. It is not however within the limits of his authority to effect an insurance. If he make any advances, he can sue those part-owners on whose behalf the advances are made for what is due to him. In case of disagreement among the part-owners as to the settlement of accounts concerning the expenses and earnings of a ship, the ordinary remedy is by a suit in equity.

2. *As to the persons employed in the navigation, &c. of ships, their rights and duties, &c.*—The master is the commander of the ship; he has the sole conduct and management of it. By virtue of his employment as such, he is civilly responsible for any injury done to the ship or cargo in consequence of his negligence or incompetence. Those who are employed under him are styled mariners and seamen. In every British ship he must be a British subject, and three-fourths of the crew must be British seamen. (3 & 4 Will. IV., c. 54.) In vessels employed in the coasting trade and in voyages between the United Kingdom and the Channel Islands, all the crew must be British seamen. No person is qualified to be master or deemed to be a British seaman except natural born subjects, or those who have been naturalized or made denizens, or become British subjects by conquest or cession of territory, and who have taken the oath of allegiance or fidelity, or who have served on board a ship of war during war time for three years. During war time this period may be limited by royal proclamation to two years. The natives of the British dominions in the East Indies are not British seamen, and there are certain legal provisions relative to their employment. Those ships which are not required to be wholly navigated by British seamen are deemed to be duly navigated if they have on board British seamen in the proportion of one to every 20 tons of the ship's burthen. The legal proportion of British seamen may also be diminished by royal proclamation.

The master has power to bind the owners by entering into engagements with third parties relative to the employment of the ship. Such engagements are of two kinds:—1. A contract by which the whole ship is let to hire during an entire voyage, which generally is accomplished by a sealed instrument called a charter-party. 2. A contract with distinct persons to convey the goods of each, in which case the ship is called a general ship. Such contracts made by the master, being within the lawful scope of his employment, are legally considered to be made by the owners who employ him; and in either case they or the master are liable in respect of these contracts. If the charter-party is made in the name of the master only, it will not support a direct action upon it against the owners. Still if the contract is duly made, that is, within the usual employment of the master, and under such circumstances as afford either direct proof of authority or evidence from which such authority may be inferred, the owners may be made responsible either by a special action on the case or by a suit in equity. But the master cannot be assumed to have a power to annul an express contract entered into by the owners themselves and to form a fresh contract with other parties. Besides this power which the master has to bind the owners by his contracts relative to the lading of the ship, he has also authority to render them liable for repairs done and provisions and other things furnished for her use, or for the money which he has expended for such purposes. In this case also the remedy of the creditor is against the master, unless by express contract the owners alone are rendered liable, and also against the owners. If the contract is made by the owners themselves, they alone are liable. The English law does not follow the rule of the civil law, by which a party who had repaired or furnished a ship had a claim on the ship itself in preference to all other creditors. A party who has done repairs upon a ship has a right to retain the possession of it until his demands are paid; but if he gives up possession, he is on the same footing as other creditors. When however the ship is abroad, and the necessary expenses cannot otherwise be defrayed, the master has the same power which the owners or part-owners to the extent of their shares under all circumstances have, to hypothecate the ship and freight as a security for debts contracted on behalf of the ship. The contract of hypothecation is called a contract of bottomry, by which the ship upon its arrival in port is answerable for the money advanced, with such interest as may have been agreed on. By the terms of the contract the repayment of the money is made to depend upon the accomplishment of the voyage, and, in consideration of the risk, the lender is permitted to receive a higher than the legal rate of interest. By such hypothecation the creditor acquires a claim on the ship. When the claim has been created by the master abroad, it may be enforced by suit in the Admiralty; but if the ship has been hypothecated by the owners at home, the parties can only have recourse to the common law or equity courts. The Admiralty and the equity courts will recognise the interest of the assignee of a bottomry bond, though at common law he cannot sue in his own name. In general the master has been held not to be authorised to raise money on bottomry within any part of the same country where the owners reside, on the ground that it is his duty to communicate with them before entering into such a contract. But where by reason of hostilities communication with the owners was almost impossible, and immediate necessity existed for the money, which could not be procured otherwise than upon bottomry, a master was held to have authority to raise it on those terms. When money is lent on bottomry, the owners are not personally responsible. The credit is given to the master and the ship, and the remedy is against them only. Still if a party is not content with such security, the master may also render the owners liable. The master cannot hypothecate the ship for a debt of his own, nor can he give a bottomry bond for matters not within the scope of his authority. If the sums secured by the bond are not repaid, an application must be made to the Court of Admiralty, founded on the instrument of contract and an affidavit of the facts, upon which a warrant issues to arrest the ship, and the persons interested are cited to appear before the court, which then decides what is to be done. If several bonds have been given at different times, the latest in point of time is entitled to be first satisfied, a rule derived from the civil law. (*Dig.* 20, tit. 4, s. 5, 6.) If the necessary amount of money cannot be raised by hypothecating the ship and freight, the master may also sell part of the cargo or pledge it.

The whole of the services of the master are due to his employers; and if he occupy himself on his own account, and the money earned by him is paid to his employers, they can retain it. It is his duty to give information to the owners of every matter which it may be material for them to know.

The statute which now embodies the regulations relative to mariners is 5 & 6 Wm. IV., c. 19; the object of which was, 'To amend and consolidate the laws relating to the merchant seamen of the United Kingdom, and for forming a register of all the men engaged in that service.' The statute furnishes forms for the agreements into which seamen ought to enter. These agreements must be in writing, and any agreement inconsistent with them or with a seaman's right to freight earned by ships lost before the final conclusion of a voyage is not binding. The seaman does not by signing the agreement lose his lien upon the ship, or lose any remedies which he before had for the recovery of wages, or which he was before entitled to against the ship, the master, or the owners. Any loss to the cargo or stores by embezzlement, negligence, or wilful act, may be made good out of the wages of the seamen who are guilty of such acts, and an incompetent seaman is subject to a reduction of wages. The seaman engages to serve and conduct himself in a diligent, faithful, and orderly manner, and to obey the lawful commands of the master. By the common law a seaman was liable to personal restraint, correction, and dismissal for breach of duty; but the act imposes certain other penalties, and provides for his summary punishment on application before a magistrate in any part of the British dominions

A seaman is not entitled to any additional remuneration on the occasion of danger or extra labour from the perils of the sea. If the vessel be wrecked, it is his duty to exert himself to take care as much as possible of the cargo; and if the ship arrives safely in port, the seaman is not justified in leaving her before he has assisted in completing the delivery of the cargo. But if the master propose to take the ship to some place not mentioned in the articles, the seamen are justified in leaving her; and they are not bound to continue on board if they are insufficiently provided with food and other necessaries; or if the master misconducts himself or maltreats them. By desertion a seaman forfeits his claim to wages.

If the correction or restraint by the master has been unwarranted or excessive, he is responsible to the seamen in an action at law, or by proceedings in the Court of Admiralty. In case death is caused by the punishment administered, the master is subject to criminal proceedings, which are conducted and regulated by the usual rules of law. Offences committed at sea may, under the Admiralty commission, or under a commission issued by authority of 4 & 5 Wm. IV., c. 3, be tried and punished as if committed on shore. The master may himself use force and imprisonment to repress the commission of crimes; but for the purpose of punishing crimes committed at sea, magistrates are authorised to receive informations, and commit the offenders for trial; and by 5 & 6 Wm. IV., c. 19, they may inquire into and determine complaints of assault and battery committed at sea.

As to the offence of BARRATRY, see that article.

The statute 11 & 12 Wm. III., c. 7, made perpetual by 6 Geo. I., c. 19, and 18 Geo. II., c. 30, defines various acts which shall be held to amount to piracy; and by 7 Wm. IV., and 1 Vic., c. 88, s. 3, persons convicted of the offences so held to amount to piracy, are liable to be transported for life, or not less than fifteen years, or imprisoned for three years. By 16 Car. II., c. 6, and 22 & 23 Car. II., c. 11, it is enacted that the master of any vessel of not less than 200 tons burden, carrying sixteen guns, shall not yield to pirates of any force without resistance, on pain of incapacity to command any English vessel afterwards. A ship of less burden is forbidden to yield to any Turkish pirate not having double her guns without fighting; and if any mariners or inferior officers refuse to fight when commanded, or discourage other mariners from doing so, they shall lose their wages and their goods on board, and be liable to imprisonment with hard labour for six months. If any officers or seamen are killed or wounded during the engagement, and the ship nevertheless arrives at her destined port, provisions are made by 11 & 12 Wm. III., c. 7, for levying a sum of money not exceeding two per cent. on the cargo and freight, and distributing it among the master, officers, and seamen of the ship, or the widows and children of the slain. This is done under the superintendence of the judge of the Admiralty Court or his surrogate in London, or the chief civil officers in other parts. By the 20 Geo. II., c. 38, a corporation was formed and provision made for raising a fund for building an hospital, &c. for the relief and support of wounded and disabled seamen and the widows and children of such as are killed or drowned in the merchant service. Further regulations respecting it are made by 4 & 5 Wm. IV., c. 52. All masters and owners working their own ships contribute two shillings, and other seamen one shilling a month towards this fund. This contribution is to be deducted from their wages, and for that purpose the master keeps a muster-roll of the seamen, in which all must be entered and described, and various particulars entered respecting them. A duplicate of this roll is delivered to the collectors of duties at the place in the United Kingdom where the ship discharges her cargo. By 4 & 5 Wm. IV., c. 19, a mariner falling sick or being hurt during the performance of his duty is to be cured at the expense of the ship. If seamen are cast away, &c., or in distress in foreign parts, it is enacted by 4 Geo. IV., and 1 Wm. IV., c. 20, s. 82, that the British consul there resident, or, where there is no consul, two more British merchants, shall support them and put them on board the first king's ship that touches at or near the place; or if no king's ship can be found, then on board some merchant ship. The expenses are defrayed by the commissioners of the navy. If a master in foreign parts force a seaman or any person belonging to his crew to go on shore abroad, or wilfully leave him behind when he is ready to return, he is guilty of a misdemeanor, and liable by 11 & 12 Wm. III., c. 7, and by 5 & 6 Wm. 4, c. 19, to fine and imprisonment. And in case he has afterwards been relieved while abroad in the manner before provided for, the master or owners are liable for all the expenses, which may be recovered with costs of suit in the same manner as a debt due to the crown.

3. *Of the Carriage of Goods and Passengers in Merchant Ships, the Rights and Duties, &c. of Freighters and Passengers, of Owners and their Servants.*—The contracts under which goods are conveyed in a ship are, as has been already stated, of two kinds, the contract by charter-party and the contract for their conveyance by a general ship. The former is 'a contract by which an entire ship, or some principal part thereof, is let to a merchant for the conveyance of goods on a determined voyage to one or more places.' A charter-party is a written instrument, generally, though not necessarily, under seal, which is executed by the owners or the master, or the owners and the master of the one part, and by the merchant or his agent of the other part. The word charter-party is derived from the two words *charta partita*, 'divided charter,' because the duplicates of the agreement were formerly written on one piece of paper or parchment and afterwards divided by cutting through some word or figure so as to enable each party to identify the agreement produced by the other. If the charter-party is by deed, and executed by the master, and the owners are not parties to it, they cannot bring a direct action upon the instrument; indeed the owners can never bring an action upon it unless their names appear as the parties executing it. But an action may in all cases be brought against the owners for a breach of their duties generally as ship-owners relating to matters not inconsistent with the terms of the charter-party. The charter-party states the port or ports of destination and the freight to be paid, which may be either a gross sum or so much per ton, or so much for each tub or cask of goods. If the agreement is not to pay a certain sum for the entire ship, or a certain portion of it, but to pay so much per ton, the merchant generally covenants to load a fixed amount or a full cargo. The charter-party generally also states the burden of the ship, but this statement, where there is no fraud, is not binding on the parties. The merchant may load with his own goods or those of others, or he may underlet the ship altogether. The master or owner usually covenants 'that the ship shall be tight and staunch, furnished with all necessaries for the intended voyage, ready by a day appointed to receive the cargo, and wait a certain number of days to take it on board. That after lading she shall sail with first fair wind and opportunity to the destined port (the dangers of the sea excepted), and there deliver the goods to the merchant or his assigns in the same condition they were received on board; and further that during the course of the voyage the ship shall be kept tight and staunch, and furnished with sufficient men and other necessaries to the best of the owner's endeavours.' The merchant usually covenants to load and unload the ship within a specified time.

The charter-party dates from the day on which it is delivered or signed. The terms generally used may of course be varied so as to meet the intention of the parties. They cannot be altered nor suppressed, nor others added by any verbal statements, but they may be explained by evidence of the usage of general trade, or of the usage of that particular trade in reference to which the charter-party is made. The charter-party also generally contains two covenants which seem to be wholly inoperative: one, by which the merchant binds himself and the cargo; the other, by which the owner binds the ship and freight in a penal sum for the performance of their respective covenants. In an action on the charter-party the actual damages proved will determine the amount to be recovered; and they will neither be limited nor extended by the penal sum named; and although by the general maritime law the ship and freight might be made directly available, there are no means for accomplishing that object in this country. As to the cargo, it is always subject to the general law of lien.

Under a contract of affreightment doubt often exists as to whether the goods conveyed are in the possession of the party entitled to the payment, and consequently there is doubt as to his having a lien on the goods. The question to be decided is whether the owner has parted with the possession of his ship. If he has entirely surrendered all control over the ship to the merchant who has chartered her, the merchant must be considered for the time as in possession of the ship. The goods on board therefore will be in his possession, not in the possession of the actual owner, who accordingly under such circumstances will have no lien on the goods for the payment of the freight. But it must clearly appear from the language of the charter-party taken altogether, and explained by the circumstances of the employment of the ship, that it was intended that such a complete demise of the ship should be made, one of the rules of construction being to interpret such instruments 'agreeably to the nature of the contract that a prudent shipowner would make.' The right of lien always exists where the freight is to be paid before or on the delivery at their place of destination of the goods, or even, as Lord Tenterden himself decided (2 Barn. and Ald., 603), where there is 'nothing to show that the delivery of the goods was to precede the payment of that hire.' All these difficulties may be avoided by inserting a clause in the charter-party expressly stating whether it is meant that the owner should have a lien upon the lading for his freight and expenses. The owner does not lose his right of lien by depositing the lading in a public warehouse, provided he gives notice that it is to be detained until his claim for freight is satisfied.

If either party is not ready to perform the contract contained in the charter-party by the time agreed on, he is liable to an action for non-performance of his contract, and the other party may form fresh contracts with third persons.

The charter-party generally contains a clause by virtue of which the freighter is entitled to detain the ship a certain further number of days for the purpose of loading and unloading her, on payment of a fixed sum per day. This payment and the time during which it occurs are both called demurrage. These days, when it is not otherwise provided for, are calculated from the time of the arrival of the ship at the usual place of loading or discharge, and are taken to mean working-days. If the freighter detains the ship beyond the time fixed, he is liable to an action on this breach of the agreement, even if he was not the cause of the delay and it was impossible to avoid it; unless indeed by the laws of his country the contract or the fulfilment of it was illegal. If there is nothing to show a special loss or injury on the part of the owner, the damages are measured by the scale fixed by the parties in determining the amount to be paid per day for demurrage. But if the ship be detained or the port of discharge be occupied by enemies, the freighter is not bound to pay demurrage for delays created by such causes. Demurrage payable while a ship is waiting for convoy or for cargo, ceases when the convoy is ready or the ship fully laden and cleared out. If after such time she is detained by the weather, no demurrage is payable.

When a ship or a principal part of it is not let out by charter-party, the owners contract with several merchants respectively for the conveyance of their goods. A ship so employed is called a general ship. The terms of the contract appear from the instrument called a bill of lading, two or three of which are signed by the master after the ship has been loaded. If any notice or advertisement relative to the destination of the ship has been issued, care should be taken that these are accurate, otherwise the owners may be liable for the consequences of the misstatement. The terms of the bill of lading must be made out according to the direction of the shipper, or, in case a receipt has been given on the delivery of the goods on board, of the holder of the receipt. The form of a bill of lading is stated in a former article. [Bill of Lading.]

The master ought to be provided with one bill of lading. On signing the bill of lading, he should receive the receipts which he may have given for the goods. By the statements of the bill of lading the master and his owners are bound as regards third parties, but not as regards the merchants who have shipped the goods. As between the master or owners and the shippers, the bill of lading is in the nature of a receipt, which is only evidence of the matters which it states, and is subject to be contradicted by proof of the real facts In case of an action for any breach of their implied contract as carriers, against the master or owners, the party who owns the goods mentioned in the bill of lading must be the plaintiff. This will be the consignee of the goods, unless the peculiar circumstances of the case are such as to deprive him of that character. If it is considered necessary to make any provisions relative to demurrage, they are generally inserted in the margin of the bill of lading.

A contract for the conveyance of goods may be rescinded by the act of the parties or by circumstances over which they have no control. If the contract is under seal, it ought, with a view to proceedings in the courts of common law, to be discharged by an instrument of the same nature; but if the facts show an intention in both parties to rescind the contract, a court of equity will interfere in that behalf. Where the goods have been laden and bills of lading signed, the master ought to receive back all the bills of lading or be indemnified for the consequences of having signed them, if the contract of conveyance is to be put an end to; and he has a right, in the absence of any fresh agreement to the contrary, to retain the goods till the freight which he might earn upon them has been paid. If after the contract for conveyance has been entered into, the fulfilment of it becomes unlawful in consequence of some act of the government of the country, such as a declaration of war, a suspension of commercial intercourse, or a prohibition to export, the agreement is dissolved. But nothing short of absolute unlawfulness can excuse the performance of the contract. A contract is not dissolved by the temporary restraint of an embargo, nor, as it seems, of a blockade of the port of departure. But a blockade of the port of destination dissolves the contract, because to sail to a blockaded port with the premeditated intention to break the blockade is an offence against the law of nations. If a party has absolutely contracted to furnish a lading for a ship on her arrival at a foreign port, and is prevented from doing so in consequence of any law or regulation merely municipal of the foreign country, this will not excuse the non-performance of his contract: as where the export of the articles contracted to be laden is prohibited or where intercourse is forbidden in consequence of the prevalence of an infectious disorder. In such cases and where from any other cause the correspondent of the merchant is unable to furnish a freight, and gives information of that to the master, he cannot, by afterwards remaining at the port the days prescribed, entitle the owners to demurrage.

In all matters that regard the ship, the master has within the scope of his duty an unlimited authority over the passengers as well as over the crew. A passenger may quit the ship, but while he remains on board he is bound in case of necessity to do work that is required for the service of the ship and to fight in her defence. If he thwart the master in the exercise of his authority or otherwise misconduct himself, he may lawfully be put under restraint or imprisoned. If the conduct of a passenger be unbecoming, or if he threaten the master with personal violence, he may be excluded from those parts of the ship which are frequented by the superior passengers, although he has paid such a fare as entitles him to be admitted there. If a passenger feels himself aggrieved by the manner in which he has been treated, he may bring an action against the master, and it will be for the jury, under the direction of the judge, to say whether he has any ground for complaint. In addition to this general right of action, several statutes have been passed to regulate the conveyance of passengers. Those now in force are 6 Geo. IV., c. 116, which relates to ships carrying passengers from places in the United Kingdom to places out of Europe and not within the Straits of Gibraltar. It regulates the proportion of passengers carried to the tonnage of the ship, provides security for the sea-worthiness, cleanliness, &c. and proper storing of the ship, for the presence of a surgeon and medicines, for the delivery of a list of passengers to the collector of customs at the port of departure, and attaches penalties to a violation of the regulations which it contains. Ships in the service of the crown or the post-master-general, or the East India Company, or bound to the Newfoundland fisheries or the coast of Labrador, are excepted from the operation of the act. The commissioners of the treasury have a power to exempt from its operation ships carrying passengers from Ireland to the British possessions in North America. The 5 and 6 Wm. IV., c. 53, contains further enactments of a like character. It also subjects the master to a penalty in cases of his improperly landing passengers at any place not contracted for, or wilfully delaying to sail, and provides for the maintenance of the passengers for 48 hours after their arrival at the destined port. The 4 Geo. IV., c. 88, regulates the carriage of passengers between Great Britain and Ireland. If a passenger fails to pay his fare, the master or owners have a lien on his luggage for the amount. Nothing is due for the conveyance of an infant born during the voyage. Where there is a contract for the conveyance of men or animals, in the absence of any stipulation to the contrary, freight will be due for those which die before the completion of the voyage. This may be provided against by a stipulation that the freight is to be paid for the conveyance and not for the lading of them. It is the duty of those who have contracted to convey, to do everything and be provided with everything necessary for the safe and expeditious accomplishment of the voyage; and if, through their failure to perform these duties, any damage results to the merchant, they will be answerable for it. At the commencement of the voyage the ship must be sea-worthy, tight, staunch, and sufficient, and properly equipped with all necessary tackle. The letter of the ship is not excused by his ignorance of any deficiency in these respects. The ship must also be provided with a master and crew competent to command and work her, and also with a pilot when necessary either from circumstances or from the law of the country. [PILOT.] After the goods are loaded, they must be properly guarded; if they are stolen while the ship is lying in some place within a country, the master and owners are responsible.

It is the duty of the master, unless in case of any usage which relieves him from such duty, to provide things necessary for the lading of the vessel and to stow away the goods so that they do not injure each other or suffer from the motion or leakage of the ship. The master must procure and keep all documents, papers, clearances, &c. required by the authorities in respect of the ship and cargo; and he must abstain from taking or keeping on board contraband goods or false papers. He must wait during the time appointed for loading the vessel, and, if required, also during that appointed for demurrage. He must pay the charges and duties to which the ship is subject. The statutes 3 and 4 Wm. IV., c. 52, and 1 and 2 Vic., c. 113, contain the enactments relative to what is necessary to be done in respect of the custom-house regulations by ships carrying goods from the United Kingdom beyond seas. When all things are prepared, the voyage must be commenced as soon as the weather is favourable. If the ship is to sail under convoy, she must sail first to the rendezvous assigned. Convoy means such ships of war as, in time of war, are appointed by the proper authorities to take charge of trading ships during their voyage to their respective destinations. Before sailing it is the duty of the master to obtain all the sailing orders and other necessary instructions which are issued by the commander of the convoy; and during the voyage to obey these and any others which may afterwards be issued, and to keep company with the convoy. During the time of war it is often rendered imperative upon merchant ships, by acts passed for that purpose, not to sail without the protection of convoy. After the commencement of the voyage, the master is bound, without delays, deviations, or stoppages, to sail direct to the port of destination. But stress of weather, the appearance of enemies or pirates, or the presence of any urgent necessity, will justify him in breaking through this rule; and he ought to do so for the purpose of succouring another ship which he finds in imminent peril or distress.

If the ship is lost or the goods injured during a deviation without any of these grounds of justification, the owner and master will be answerable for the loss to the merchant, even if it does not appear to have been a necessary consequence of the deviation. If the ship during the voyage is so damaged that she is unable to proceed without repairs, the master may detain the cargo, if not of a perishable character, till the repairs are made. If the cargo is of a perishable kind, he ought to tranship or sell it as may appear the most beneficial course. He may also in all cases, where the circumstances require it, exercise a discretion as to transhipping the cargo; as, for instance, when the ship is wrecked or in imminent danger.

Hypothecation of a cargo, like hypothecation of a ship, is 'a pledge without immediate change of possession.' The party to whom the goods are hypothecated immediately acquires a right to have possession of them if the money advanced is not paid at the time agreed on. This power of the master under circumstances of urgent necessity to sell or hypothecate the goods must be exercised with great circumspection; and the exercise of it can only be justified when it is consistent with what would have been the conduct of a discreet and able man under the circumstances. Where goods have been hypothecated, the merchant is entitled, on the arrival of the ship at its destination, to receive at his option either the sum for which they were hypothecated, or their market price at that place. During the voyage the master is bound to take every possible care of the cargo, and to do all things necessary for its preservation, and he and the owners will be answerable for all damage which might have been avoided by the exercise of skill, attention, and forethought. When the voyage is completed, the master must see that the ship is properly moored, and all things done relative to her which are required by the law or usages of the country. The statute 3 & 4 Wm. IV., c. 52, contains the regulations relative to customs to which it is necessary to conform in this country. Upon payment of freight and the production of bills of lading, the cargo must be without delay delivered to the parties entitled to receive it. In the case of a general ship, the usage then prevails for the master, before delivery, to take security from the merchants that they will pay their share of average after it shall have been adjusted. If the freight due on any goods is not ready to be paid, the master may detain the goods or any part of them. The goods may be detained either on board the ship or in any other safe place.

When the master is compelled, by an act of parliament, to land the goods at any particular wharf, he does not thereby part with the possession of the goods, and consequently does not lose whatever right he may have to detain them. If goods are sold by the custom-house officers before the freight is paid, the master is entitled to receive the first proceeds of the sale in discharge of the freight. In foreign countries, where any accidents have occurred to frustrate or interfere with the objects of the voyage, or any one of the parties to the contract feels himself aggrieved by the conduct of any other, it is customary to draw up a narrative of the circumstances before a public notary. This narrative is called a protest, and in foreign courts is admissible in evidence, even, as it would seem, on behalf of the parties by whom it is made. In our courts it is not admissible on their behalf, but is evidence against them.

Certain circumstances operate as an excuse to the master and owners for non-fulfilment of their contract 'The act of God' is understood to mean those accidents over which man has no control, such as 'lightning, earthquake, and tempest.' The 'perils of the sea,' interpreted strictly, apply only to the dangers caused merely by the elements, but these words have received a wider application, and in litigated cases the jury, after hearing evidence as to the usage which prevails among merchants, will determine what interpretation has been intended to be given to them. In the exercise of this discretion, juries have determined that the taking of ships by pirates is a consequence of the perils of the sea; and the verdict has been the same where the loss was caused by collision of two ships without any fault being attributable to those who navigated either of them; and also where the accident was caused wholly by the fault of those on board another ship. But all cases in which the loss happens by natural causes are not to be considered as arising from the perils of the sea. If the ship is placed in a dangerous situation by the carelessness or unskilfulness of the master, and is in consequence lost, this is not a loss from the perils of the sea, although the violence of the elements may have been the immediate cause of it. If a ship is reasonably sufficient for the purposes of the voyage, the master will not be liable for a loss arising from the perils of the sea, because a ship might have been built strong enough to resist them. By the 26 Geo. III., c. 86, owners are relieved from losses proceeding from fire, and also from the robbery, theft, or embezzlement of 'gold, silver, diamonds watches, jewels, or precious stones,' unless at the time of shipping them their quality and value are made known in writing to the master or owners. The 'restraint of princes and rulers' is understood to mean a really existing restraint, not one which is anticipated, however reasonably or honestly. By the civil law, and also by the antient common law of England, the owners, in case of their being liable for any loss to the shippers, were responsible to its full amount. By the laws however of most nations their responsibility is now limited to the value of the ship and freight. The first statute which was passed on the subject was 7 Geo. II., c. 15, which was followed by the 26 Geo. III., c. 86, and the 53 Geo. III., c. 159 supplied some deficiencies in the former statute, limiting the responsibility still further than the first statute had done. The last statute applies only to registered ships, and as to them may be considered as containing almost all the law upon the subject. By this Act the responsibility is limited to the value of the ship and freight. It contains also provisions for the distribution, by means of an application to a Court of Equity, of the recompense owing the several parties entitled, where more than one claim, and directions as to the mode of calculating the value of the ship and freight. It does not extend to vessels employed solely in inland navigation, and none of the acts apply to lighters or gabbets. In cases where ships receive injury from collision with each other, the maritime law, which is acted on in the Court of Admiralty, differs in one respect from the law of England. Where the collision has occurred without any fault on either side, as for instance, from a tempest, each party must bear the injury which he has sustained. Where it happens wholly from the fault of one ship only, her owners are liable, as far as the value of the ship and freight, to which, by 53 Geo. III., c. 159, their liability is limited, for the amount of injury caused by their own conduct. Thus far the laws are in accordance with each other. If the collision has been caused by the faults of both ships, then, according to the law of England, each party must sustain his own loss. But by the maritime law the loss occasioned is after computation divided equally, and the owners of each ship sustain half. It is impossible to lay down any rule by which to ascertain on all occasions which ship is to be considered in fault. But it may be stated generally that steamers and ships which have the wind free, are bound to take proper measures to get out of the way of a vessel which is close hauled, as they are considered to be more completely under command; and that in the case of ships meeting each other, that which is on the starboard tack should keep her course, the one on the larboard should bear up.

But the failure to observe these rules by one ship will not justify the other in the neglect of any reasonable exertion or precaution by which the collision might have been avoided. By 1 & 2 Geo. IV., c. 75, s. 52, where damage has been done by a foreign ship, a judge has power to order the ship to be arrested, until the master, owner, or consignee undertake to become defendant in any action for the damage, and give security for the damages and costs sought to be recovered.

The merchant must use the ship only for lawful purposes, and not do anything for which it may be forfeited or detained, or the owners made liable for penalties. In case of any violation of the agreement, by employment of the ship for purposes other than those contemplated, or failure to perform the terms as to lading, &c., the amount of compensation, in case of dispute, is determined, as the circumstances of the case may require, by a jury. The words primage and average, which appear in the bill of lading, mean, the first, a small sum paid to the master; the second, as there used, certain charges, varying according to the usage of different places, for towing, beaconage, &c.

When an agreement for conveyance is expressed in the general form, or when there is no actual agreement, but only, one implied by law from the circumstances of the case, there results from it a duty upon the master and owners, firstly, to deliver the goods at the place of destination, whether the ship is hired by the voyage or by the month. It is only by the entire performance of this duty that they can entitle themselves to the payment of freight. The parties may however so express the contract that the payment of all or part of the freight may be made before or during the course of the voyage. Although perhaps in such case the word freight is used in a sense which does not properly belong to it; strictly speaking it means only money accruing for the conveyance of goods in consequence of their delivery at the place of their destination. Where a provision is made by the contract for payment of freight at the place of shipment, the question has arisen whether the meaning of the parties was that the sum should be paid at all events on delivery of the goods on board, whatever might afterwards befall them; or whether it was merely to point out the place of payment in case the freight should become due by reason of the arrival of the goods at the port of destination. In all such cases the intention of the parties must be interpreted by the jury from the words and circumstances of the contract, and the usages of the place where it was made. The same observation will apply to cases where money has been advanced by the merchant, and it is disputed whether the money is to be considered as a loan or part payment of the freight. The owners will not lose their right to freight by a mere interruption or suspension of the voyage not caused by their own fault, as by capture and recapture, if the goods be ultimately delivered at the place of destination. Where the contract of conveyance is by charter-party, under which the merchant has agreed to pay a certain sum for the whole or the principal part of a ship, that sum will be payable even although he has not supplied enough for a full lading. If he has undertaken to furnish a full cargo, and to pay a certain sum per ton or per bale, he will in like manner under similar circumstances be bound to pay for as many tons or bales as the ship, or part hired, was capable of containing, even although he has not been able to put on board any lading at all; provided the ship has thereby been forced to come home without cargo, and this has not been caused by the fault of the master or owners. In case of an action against him for such a failure of his agreement, the jury will ascertain what, under all the circumstances, is a proper compensation to the owners, allowing for the profit of the conveyance of any other goods which may have been laden by other parties. If, under a contract to furnish a full cargo, the freight to be paid for per ton, &c., the merchant is ready to furnish a full cargo, and he is prevented from doing so by the master, the merchant is still liable to pay for the cargo conveyed, and his remedy for the injury which he has suffered by such prevention is by an action on the agreement against the master or owners. Where the freight is to be paid at so much a month, a calendar month is to be understood as meant. Where, from the terms of the agreement, the master has a right to refuse the delivery of the goods until the freight is paid, he is not bound to do so; and if he chooses to deliver the goods to the consignee or holder of the bill of lading, &c., and cannot afterwards get the freight from them, the merchant who chartered the ship is not released from his liability to pay the freight. If however under such circumstances the master does not insist upon payment of the freight in cash, but voluntarily and for his own convenience takes a bill of exchange in payment, the merchant-charterer is thereby discharged, and the owners will have no claim upon him in case the bill is not paid. But if he takes the bill simply because he cannot get payment in cash, the merchant-charterer still remains liable. Payment of freight by the charterer to the owners at their request is an answer to a demand by the master, unless the agreement has been made under seal between the charterer and the master; and even in that case a court of equity would interfere to relieve the charterer from a subsequent demand by the master. A purchaser of goods, by the transfer to him of a bill of lading which contains a contract for delivery of the goods to the consignees or their assigns on payment of freight, is liable for the freight. But the mere receipt of the goods alone will not bind the receiver to pay the freight, especially if there be an express agreement under seal for the payment of freight between the charterer and the master or owners. The Court of Admiralty, where a question of freight arises before it in the case of captured vessels, will make an equitable arrangement between the owners and merchant. Where two nations are at war, and goods belonging to a subject of one of them, on board a neutral ship, are captured by the enemy, the goods become lawful prize, and the captors, so representing the original owners, are bound to pay the full freight for them. The full freight is due, since it is by reason of the act of the captors that the goods have not reached their destination. On the other hand, if the goods of a neutral are captured on board a hostile ship, and the captors convey the goods to their destination, they are entitled to freight. But no freight is payable where the goods on board a neutral ship consist of warlike stores, or where the neutral ship was engaged in a traffic not open to the neutral nation in time of peace. Freight is not recoverable where the voyage from any cause is illegal. If the goods which have been laden are duly delivered, the owners will not be deprived of their right to freight simply because the goods have been damaged during the voyage; but if this damage proceeds from any improper act or omission by the master or owners, they will be liable to make recompense to the merchant. The merchant in this country seems to have no right to abandon the goods in lieu of paying freight, if, although the ship did not arrive, they have been conveyed by other means to the place of destination, and if no charge save that of freight is claimed upon them. But if the ship has been wrecked, and the goods are saved, and afterwards conveyed to the place of their destination, the merchant may abandon them, and is not bound to pay the freight if any expense of salvage has been incurred. If, in the case of a general ship, or where, though a ship is chartered, the hire for her is to be paid at so much per ton, &c., the merchant is bound to pay the freight of such goods as may be delivered, even though they form a part only of the whole cargo. Where the whole or principal part of the ship is let to the charterer without reference to the quantity of goods to be laden, and a part of the goods are afterwards lost by perils of the sea, it seems to have been held that no freight will be due for the remainder.

There is some doubt however whether this authority would be followed unless such a conclusion arose from the construction of the agreement between the parties. If the ship, without any fault in the master or owners, becomes unable to complete her voyage, and the merchant receives the goods at some other place than the place of destination, he is bound, according to the maritime law, to pay freight for the portion of the voyage which has been performed. The principle which establishes the owner's right under such circumstances to freight for a portion of the voyage has been admitted in the courts of common law in this country, but that right 'must arise out of some new contract between the master and the merchant, either expressly made or to be inferred from their conduct.' In the latter case, there being no direct means of ascertaining the intentions of the parties, they must be collected from the circumstances of the case considered with reference to the general principle which obtains in the maritime law. In doing this it is obvious that the degree of benefit derived to the merchant must be taken into calculation, as well as the amount of time, labour, and expense bestowed by the owner; and therefore when it is said that freight is to be paid according to the portion of the voyage performed, it must not be understood that time and space are the only measures for ascertaining the portion of the freight payable.

If the master unnecessarily sell the goods, and so prevent both himself from earning the whole freight, and the merchant from accepting the goods, the merchant is entitled to the entire produce of his goods without any allowance for freight. Where a portion of the voyage only has been performed, the merchant cannot be inferred to have contracted to pay freight for that portion unless he has accepted the goods at the place short of their destination. The principles upon which the Court of Admiralty, which possesses an authority over the ship and cargo, proceeds, differ from those of courts of common law. That court exercises an equitable jurisdiction; and where no contract has either been made or can be implied, applicable to the existing circumstances, 'considers itself bound to provide, as well as it can, for that relation of interests which has unexpectedly taken place, under a state of facts out of the contemplation of the contracting parties.' (Lord Stowell, in the case of the Friends *v.* Creighton, 1 Edw., *Ad. Rep.*, 246.) If the ship has actually never commenced the voyage, the owners are not entitled to any payment whatever, although they may have incurred great expences in lading her, and though her failure to commence the voyage is not attributable to any neglect or misconduct of theirs. Where the contract of hiring is for a voyage out and home, at so much to be paid monthly, &c. during the time the ship is employed, if by the terms of the contract the whole forms one entire voyage, no freight is due, unless the ship returns home, even though she may have delivered her cargo at the outport. But if the voyages out and home are distinct, freight will be earned on the delivery of the cargo at the outport.

If any part of the ship or furniture, or of the goods, is sacrificed for the sake of saving the rest, all parties interested must contribute towards the loss. This contribution is properly called 'Average.' It is sometimes called general average, in opposition to special or particular average, which is the contribution towards any kind of partial damage or loss, or gross average, in opposition to petty average, which is the contribution mentioned in the bill of lading towards the sums paid for beaconage, towage, &c.

The principle of average is recognised in the maritime law of all nations. It was introduced into the civil law from the law of Rhodes (*Dig.* 14, tit. 2, 'Lex Rhodia de Jactu;' and the Commentary of Peckius, 'In tit. *Dig. et Cod.* "Ad Rem Nauticam pertinentes" '). In order to constitute such a loss as is the subject of average, it must be incurred by design: the masts must be cut away, or the goods thrown overboard; and this must be done for the sake of saving the rest, as in the case of throwing goods overboard to keep the vessel from sinking or striking on a rock, or to lighten her that she may escape from an enemy, or of cutting away a mast or a cable to escape the perils of a storm. The necessary consequences of these acts are also the subjects of average; as where, in order to throw some goods overboard, others or some parts of the ship are damaged; or where it becomes necessary, in order to avoid the danger or repair the injuries caused by a storm or the enemy, to take goods out of the ship, and they are in consequence lost. The expenses also incurred in these operations are equally the subject of average. But the injuries incurred by a ship during an engagement with the enemy, or from the elements in consequence of measures taken to escape from an enemy, are not of such a nature as to fall within the definition. If goods are laden on deck, no average is recoverable in respect of the loss occasioned by throwing them overboard, unless by the usage of trade such goods are usually so laden. If a ship is voluntarily stranded for the purpose of saving her and the goods, and afterwards gets off safely, the expenses incurred by the stranding are the subject of general contribution; but if the ship be wrecked in consequence of the voluntary stranding, the wrecking, not being voluntary, is therefore not such a loss as calls for a general contribution. If, in consequence of such an injury done to a ship as would be the subject of average, she is compelled to go into port to repair, the necessary expenses incurred in refitting her, so as to enable her to prosecute her voyage, and the amount of wages, port dues, and provisions expended to accomplish that object, are also the subject of average; and, if the master is unable to obtain the money necessary by any other means than by the sale of a part of the cargo, the loss caused to the merchant upon such sale is also the subject of average. If, in consequence of the sacrifice made, the ship escape the danger which immediately threatens her, but is afterwards wrecked or captured, and the remaining goods, or part of them, are saved or recaptured, these are bound to contribute average towards the loss in the first instance incurred, in proportion to their net value in the hands of the merchant after all expenses of salvage, &c. have been paid.

The things upon which average is payable are, the ship, boats, furniture, &c., but not provisions or ammunition; also all merchandise, to whomsoever belonging, which is on board for the purposes of traffic, but not the covering, apparel, jewels, &c. of parties on board for their own private use. The freight due at the end of the voyage is also subject to average. The goods are to be valued at the price for which they would have sold at the place of destination. If the ship, by reason of what happened when the average was incurred, return to her port of lading, and the average is there settled, the goods are to be valued at the invoice price. The losses incurred by the ship and furniture, &c. are calculated at two-thirds of the price of the new articles rendered necessary to be purchased. The usages of other countries as to all matters connected with average differ in some respects both from those of each other and those of this country. Where the average has been adjusted according to the established law and usage of the country in which the adjustment was made, it is binding upon all the parties to it, unless there be some special contract between them which provides otherwise.

Salvage is that reasonable compensation which persons are entitled to receive who save a ship or her cargo from loss by peril of the sea, which may be called civil salvage, or recover them after capture, which may be called hostile salvage. By the law of England no fixed amount of salvage is laid down as applicable to all cases. What is reasonable can only be determined by a reference to the circumstances. Sir J. Nichol (3 Hag., *Ad. Rep.*, 117) defines the ingredients in estimating a civil salvage service to be, '1st, enterprise in the salvors in going out in tempestuous weather to assist a vessel in distress, risking their own lives to save their fellow-creatures, and to rescue the property of their fellow-subjects; 2nd, the degree of danger and distress from which the property is rescued, whether it was in imminent peril, and almost certainly lost if not at the time rescued and preserved; 3rd, the degree of labour and skill which the salvors incur and display, and the time occupied; lastly, the value.'

Unless in cases where the services have been trifling, the salvage is generally not less than a third, and not more than one-half of the property saved. If the parties cannot agree as to the amount, the salvors may retain the property until compensation is made; or they may bring an action, or commence a suit in the Admiralty Court, against the proprietors for the amount. In case the property is retained, the proprietors may, upon tender of what they think sufficient, demand it, and, if it is refused, bring an action to recover it, in which action the jury will determine as to the amount due. The costs of the action will be paid by the salvor or the proprietors according as the amount tendered is or is not determined to be sufficient. The Court of Admiralty has jurisdiction in those cases only where the salvage has been effected at sea or within high and low water mark. A passenger is not entitled to salvage for his assistance during the time he is unable to quit the ship. But, if he remain voluntarily on board, he may recover salvage for the assistance which he has given. On one occasion where a passenger under such circumstances, after the desertion of the master and part of the seamen, assumed the command with the consent of the mate and the remainder, and brought the ship safe into port, he obtained a large sum as salvage. A distinct contract for assistance will do away with any claims for salvage on behalf of the parties who render it. Though a king's ship is bound to assist a merchant ship in distress, it still has a claim for recompense. In awarding salvage, no claims are allowed which are founded on merely prerogative rights, as those of the lord-high-admiral, flag-officers, magistrates, &c.: those claims only are allowed which are made in respect of assistance rendered. The saving of human life cannot of itself be the subject of a claim for salvage, but if it is connected with the preservation of property, that is a circumstance which may affect the amount of salvage. If freight is in progress of being earned, and afterwards does become due, salvage is payable in respect of freight also. When proceedings for salvage have been commenced in the Admiralty Court, the defendants may tender by act of the court any sum which they consider sufficient, and the court will then enter upon an inquiry, and determine as they think fit. If the sum tendered has been sufficient, the court may hold the salvors liable to the expenses of the proceeding. Several statutes have been passed providing for what is to be done in case of ships in distress, and for the purpose of regulating and facilitating the adjustment of demands of salvage. The 12 Anne, c. 18, s. 2, applies to cases where the assistance has been rendered by the persons mentioned in that act. The 26 Geo. II., c. 19, provides for the case of persons voluntarily rendering assistance. The 48 Geo. III., c. 130, and 1 and 2 Geo. IV., c. 76, are applicable to cases where assistance is given at the request of persons belonging to the ship. The statutes 53 Geo. III., c. 87, and 1 and 2 Geo. IV., c. 75, contain some enactments relative to the same subject. None of these acts apply to the Cinque-Ports. Upon application by the principal officer of a ship which is stranded or in danger of being so, the sheriffs, magistrates, and officers of the customs and other persons mentioned in the acts are bound to order the constables to call together persons and go to her assistance; and if any other ship is near, the officers of the customs or constables are required to demand assistance by men and boats from her chief officer, who is liable to forfeit 100*l.* to the chief officer of the ship in distress if he does not give assistance. All the persons employed are to be subject to the command of the master or other officers or owners of the ship which is in distress, and in case of their absence, the acts name a number of persons, beginning with the officer of customs, whom, in order according as they happen to be present, all persons are to obey. The power of the county (*posse comitatus*) may, if needful, be summoned by the sheriff, or in his absence by any magistrate, to enforce the execution of the statutes, and the person in command is authorised to use force if necessary to repel persons who improperly obtrude themselves. An account of the names of the ship, master, and owners, &c., of the cargo, &c., and of the circumstances of the distress, is to be taken by the officer of the customs on oath of the parties cognizant of the circumstances before a magistrate. This account is to be forwarded to the secretary of the Admiralty, and by him published in the next London Gazette. The persons who assist are to be paid by the master, seamen, or owners, a reasonable reward within thirty days; and if this is not paid, the ship or goods remain as a security in the hands of the officer of the customs. In case of disagreement as to amount, the nearest magistrate is to call a meeting of magistrates and some other officers named, who, or any five of them, are empowered to examine witnesses on oath and to determine the amount of salvage. Provision is made for cases where no owner of the property appears. Perishable goods may be sold. No lord of a manor claiming a title to wreck can appropriate it until an account in writing, of the property, and of the place where it was found and it has been since deposited, has been sent to the vice-admiral or his agent, or, if none such reside within 50 miles, then to the Trinity-house, and a year and a day has elapsed after the delivery of the account. It is the duty of the vice-admiral or his agent to forward it to the secretary of the Trinity-house, who is bound to place it in some conspicuous situation. A variety of analogous provisions are enacted relative to goods, parts of ship's furniture, &c. which are found or recovered, whether they may have belonged to ships in distress or not. The statutes which relate to the Cinque-Ports are, 49 Geo. III., c. 122, s. 14; 1 and 2 Geo. IV., c. 75, s. 13; and 1 and 2 Geo. IV., c. 76.

In case of capture, by the antient maritime law the ship and goods became the absolute property of the captor. The old practice in this country was, when ships were in pay of the king, to divide in certain proportions, which varied at different times, the value of the capture between the king, the owners, and the captors. Where the capture was made by ships not in the king's pay, he received no share, but a small proportion was paid to the admiral. In the reign of George II. provision was for the first time made by various statutes for the restoration of the recaptured ship and cargo to the owners, and the rates of salvage were fixed, varying according to the length of time that had elapsed since the capture. In the reign of George III. these rates were done away with, and by various acts the rate of salvage was fixed at one-eighth of the value in the case of king's ships, and one-sixth for private ships; where the re-capture was effected by the joint operation of king's and private ships, the Court of Admiralty were to order such salvage as was reasonable. Convoying ships are entitled to salvage for the recapture of ships which accompanied them. A ship, which has once been used as a ship of war, is not subject to be restored if afterwards recaptured. If a ship is deserted by the enemy after capture and subsequently taken possession of, this is not a recapture, but those who take possession are entitled to recompense as in an ordinary case of salvage. If after the recapture the ship is again taken and condemned, the right of salvage is extinguished. Where the ship of a power in alliance with Great Britain is taken by the common enemy and afterwards recaptured by a British ship, the rule for restitution on payment of salvage is the same as in the case of the capture of a British ship; provided the allied power chooses to adopt that rule in reciprocal cases. If it does not, the same rule which is acted upon in the courts of the allied power is adopted in the British courts. If the ship of a neutral nation be taken as prize by an enemy of Great Britain and be retaken by British subjects, it is restored to the owners without salvage, unless there is reason to suppose that under the circumstances the ship would have been condemned in the courts of the capturing nation. Where it appears that such would have been the case, the British subjects are entitled to salvage. Ships and merchandise taken from pirates are subject, by 6 Geo. IV., c. 49, to a payment of one-eighth of the value. [Prize.]

4. *As to the Employment and Wages, &c. of Merchant-Seamen.*—Their contracts may be divided into two classes, those under which they are paid a certain sum per month, and those under which they are to receive a sum in gross for the whole voyage.

Many Acts have been passed to regulate the hiring of seamen, but they were repealed by the 5 & 6 Wm. IV., c. 19, which contains all the law on the subject. It is unlawful for any master of a British ship trading to parts beyond seas, or above the burden of eighty tons, engaged in the fisheries, coast-trade, &c., to take to sea any person (except apprentices) as one of his crew, without first entering into a written agreement with him; and the master is liable to a penalty of 10*l.* for every seaman taken to sea without entering into an agreement. The agreement must specify what wages he is to receive, the nature of his employment, and of the voyage contemplated. The voyage must be distinctly explained; where one place is mentioned, followed by the words, 'or elsewhere,' the latter words are not to be taken literally as meaning any other part of the globe, they must be confined to places having some degree of proximity or relationship to the place named. It must be dated in the month and year when it is made; the master must sign it in the first instance, and the seaman at the port where he is shipped, and before the seaman signs, it must, on pain of forfeiture of 5*l.* by the master, be read over to him distinctly in the presence of the person who is to attest the seaman's signature. The form of the agreement is prescribed by the statute. The engagement of the seaman is, to serve on board the ship; to conduct himself in an orderly, faithful, honest, careful, and sober manner; to be diligent in his duty, and obedient to the lawful commands of the master in everything relating to the ship and her materials, stores, and cargo, whether on board, in boat, or on shore. This agreement is called the ship's articles. By s. 5 of the Act no clause in the agreement whereby a seaman shall consent to forego the right, which the maritime law gives him, to wages in the case of freight earned by ships subsequently lost, or containing words to that effect, shall be binding on the seaman. If a seaman neglect or refuse to join his ship, or absent himself without leave, he may on complaint on oath by the master, mate, or owner, be apprehended and brought before a magistrate, who is authorised, if his conduct is not satisfactorily explained, to commit him to hard labour in the house of correction for thirty days; or, if he is willing to join the ship, the magistrate may, at the request of the master, order him to be conveyed on board, or delivered to the master, and award costs not exceeding forty shillings to the master, to be deducted from the wages. Persons who, with a knowledge of the fact, harbour a seaman who has so absented himself, are liable to a penalty of 10*l.* No debt incurred by a seaman after signing of the agreement, above 5*s.*, is recoverable until after the end of the voyage; and if any of the effects of the seaman are detained by a publican or lodging-house keeper for such debt, any magistrate is authorised to issue a warrant for their seizure and delivery to the seaman.

The act contains regulations relative to the preservation of the seaman's health, his protection in case of sickness or accident, and his proper treatment at home and abroad. The master and owners must deposit a copy of the agreement with the collector of the customs at the ship's port, and at the place of her destination on her arrival from abroad, on pain of forfeiting 50*l.* When a seaman is discharged, he is entitled to a certificate signed by the master of his service and discharge, specifying the period of his service and the time and place of his discharge. If without reasonable cause the master refuse such certificate, he is liable to forfeit 5*l.* to the seaman. If a ship is sold in a foreign country, except in cases of wreck and condemnation, the master is bound to pay the seamen their wages under the agreement, and to find them employment on board a British vessel homeward bound, or to send them to the port in the British dominions whence they started, or some other port which is agreed on. If he neglect to do so, and the consul or other persons named in the Act defray the necessary expenses, they may be recovered from the owner. But the master may be relieved from this necessity by the consent of the seamen, in writing, to be discharged, given in the presence of the consul, or, where there is no consul, of one or more British resident merchants.

A master is prohibited from discharging or leaving behind any of his crew at any place in the British colonies, without the sanction, in writing, of the governor or other officer appointed for that purpose, or at any place abroad without a similar sanction from the consul; or, where there is no consul, of two respectable resident merchants. Every ship is bound to have on board a sufficient stock of medicines, and the owner or master must at their own expense furnish the necessary medicines and attendance upon any of the crew who is injured in the ship's service, until the seaman is cured, or the ship return to the United Kingdom. The Act also contains provisions relative to the binding and management of apprentices.

A verbal agreement for wages is not invalid, but if a written one is in existence, no remuneration not expressed in the written agreement can be recovered.

The performance of any promise to give gratuities or extra pay in reward of extraordinary exertions made in time of distress, or by reason of the desertion or death of others of the crew, cannot be enforced.

As soon as by performance of the voyage and delivery of the cargo at the port of discharge the owner has become entitled to freight, the seaman becomes entitled to wages, and hence the meaning of the phrase that freight is the mother of wages. What is to be considered the port of discharge must be determined by a reasonable construction of the statements made in the articles. The seaman is not the less entitled to his wages although he may have been disabled by sickness or any bodily injury, provided the injury was received in the discharge of his duty. If he be prevented from fulfilling his contract by any wrongful act of the master, he will still be entitled to his wages. When a vessel is detained by an embargo, a seaman hired by the month is entitled to receive wages during the embargo. If a seaman is impressed on board a king's ship, he does not therefore lose his wages; his title to them however still remains dependent on the arrival of the ship. The 5 & 6 Geo. IV., c. 19, contains various provisions relative to the payment of wages for the portion of time during which the seaman has served. Upon being impressed, he is entitled to receive a bill from the master payable on the arrival of the ship; and where the wages cannot be computed, to a certificate of the time, &c. during which he has served, and the master receives from the officer of the king's ship a certificate of the entry of the seaman. Where a seaman dies during the period of his service, his representatives will be entitled to wages if the hiring was a monthly one; but where the hiring is for the whole voyage, and no usage exists from which a contrary agreement can be inferred, it appears that nothing is due for the partial service. By 4 & 5 Wm. IV., c. 52, the wages earned by a seaman who has died during the voyage are to be paid, within three months after the arrival of the ship, to the trustees for the port appointed under that Act, or where there are no trustees, to the president of the Corporation for the Support of Maimed Seamen, or for the use of the representatives of the deceased. There are various provisions for the payment to the widow or next of kin; in case no such persons make claim during three years, the money at the end of that period is to be applied to the institution. If after seamen are hired the owners determine not to send the ship on her voyage, the seamen are entitled to wages during the time that they have been employed, and may also recover a compensation for any special loss which they may have sustained in consequence of the ship not sailing. The 5 & 6 Wm. IV., c. 19, also regulates the payment of wages. In ships employed on the coast, wages are to be paid, if demanded, within two days after the determination of the agreement, or the seaman's discharge, whichever first happens; and in all other cases within three days after the delivery of the cargo, or ten days after the seaman's discharge. This enactment does not apply to cases where a seaman is paid, as in the whale-trade, by a share in the adventure. If a seaman is left abroad from sickness, the master is to pay the seaman there, either by money or a bill drawn on the owners, and to give an account of the wages to persons on the spot, as perscribed by the Act.

If after wreck or capture part of the cargo is saved, and the owners become entitled to freight for so much, the seaman is entitled to the same proportion of his wages. If after a vessel is stranded the seamen remain together, and by their exertions save any parts of the wreck, they are entitled upon the parts saved, as far as they will go in satisfaction of their wages. If a ship is condemned for illegal trading to which the seamen are no parties, they do not forfeit their right to wages. Where there are distinct ports of delivery during a voyage, the right to wages for so much attaches upon the delivery at each port, and the seaman will not be divested of this right by the subsequent loss of the ship; but if a ship sail to one place merely to take in cargo there, and, after taking in, is lost before arrival at the delivering port, the seaman is not entitled to wages for navigating the ship even to the place where the cargo was taken in. If a ship is recaptured, and arrives at her place of destination, the seamen are entitled to wages, subject perhaps to a proportionate deduction for salvage. A forfeiture of all wages previously earned is a consequence of desertion from the ship in all maritime codes; and the 11 & 12 Wm. III., c. 7, contains provisions to the same effect. Where the leaving of the ship does not amount to absolute desertion, it is enacted by 5 & 6 Wm. IV., c. 19, that any seaman who without leave wilfully absents himself from duty shall forfeit two days' pay for every twenty-four hours of absence, or, at the option of the master, the expenses which have been incurred by his absence; and there is the same provision as to cases where he neglects to perform his duty on board. If after arrival of the ship at the port of delivery the seaman quits her, before her cargo is delivered, without leave, he forfeits a month's wages, provided the absence or neglect is entered in the log, and substantiated, in case of dispute, by the mate or some other credible witness. In case of desertion, he forfeits not only all his wages, but also such of his effects as are left on board, provided the fact of the desertion is entered on the log, and certified by the signature of a credible witness. If by reason of the desertion it becomes necessary to employ a substitute at higher wages, the deserter is liable to pay the difference between his own wages and those of the substitute. If the seaman, after quitting the ship, is afterwards received and employed, that will amount to a waiver of the forfeiture. Wages may also be forfeited (22 & 23 Ch. II., c. 11) in case the seaman neglect or refuse to defend the ship against pirates; and if the seaman has been guilty of such acts as habitual disobedience, drunkenness, &c., which justifies his discharge, he will lose his title to wages.

The seaman may recover his wages by suit either in the common law courts or in the Admiralty courts. If in the former, his only remedy is against his debtor personally; if in the latter, he may proceed also against the ship itself. The Admiralty have only authority to 'meddle' with 'a thing done upon the sea.' (13 Ric. II., st. 2, c. 5; 15 Ric. II., c. 3.) Upon the strict construction of the words of the latter of these statutes, neither the master nor the seamen would be entitled to avail themselves of the process of the Admiralty Court, the claims of both being founded, as they usually are, upon a contract made on shore, or in a port within a county. The remedy of the master against the owners is confined to an action against them personally in the ordinary law courts; but the case of the seamen is considered to be excepted, and they have the advantage of being able to bring a suit, in which they all may join, in the Admiralty Court; and they can either arrest the ship, or proceed personally against the owners or the master. In a proceeding against the owners, the master may be a witness for the seamen. Foreign seamen may also proceed in that court for wages due under the general maritime law, but not for those the claim to which is founded on the law of some particular country. In the case of British seamen, if the contract be made by deed containing terms and conditions different from those resulting in contemplation of law from an ordinary service, the Court of Admiralty, which is considered as unfit to construe such instruments, ceases to have jurisdiction. But in order to deprive the Court of Admiralty of its jurisdiction, the defendants ought to show that the special contract is in existence. If the court does not allow the plea, and cease to entertain the case, the Court of Queen's Bench will grant a prohibition. [PROHIBITION.] Where the ship itself is proceeded against, the claims of the seamen for wages take precedence of all others. Proceedings in this court are subject to the same limitation of six years which applies to other actions. When the action is brought in an ordinary court of law, it is conducted according to the rules of those courts; but the master or owners of the ship are in all cases of proceedings for wages bound to produce the contract on which the claim is founded. Where the amount of wages claimed does not exceed 20*l*., the statute 5 & 6 Wm. IV., c. 19, gives a summary jurisdiction to magistrates residing near the port where the ship ends her voyage or delivers her cargo, to entertain the claim, and enforce the payment of it by distress and sale of the goods of the party proceeded against, or by levy upon the ship and furniture. If an action is brought in such cases, the plaintiff cannot recover costs of suit. (Abbott *On Shipping*.)

Marine Insurance.—The law of marine insurance constitutes an important part of the general law of shipping.

A maritime insurance is a contract by which one party, who is called the insurer, in consideration of a premium agreed upon, undertakes to make good to another, who is called the insured or assured, the loss or damage which may befal his ship or goods on their passage from one place to another. The instrument containing such a contract is called, in common with instruments for fire or life insurance, a policy. It is usually not under seal, unless the insurers are an incorporated company. Formerly the Royal Exchange Assurance Company and the London Assurance Company were the only companies for insuring ships, the legislature having given them a monopoly as against all except individual insurers. This monopoly has been abolished by 5 Geo. IV., c. 114. A great proportion of the business connected with the shipping insurance of this country is transacted at Lloyd's Coffee-house at London. Insurers are commonly called underwriters, from the circumstance of their writing at the foot of the policy their names and the portion they are severally willing to take of the amount for which the merchant desires to insure. The form of policy usually adopted is of antient origin, and rather quaint and obscure in its phraseology, but most of its terms have acquired a certain meaning from judicial interpretation, and it is therefore found convenient to retain them.

The ordinary form is the following:—

'In the name of God, Amen.

'A. B., as well in his own name as for and in the name and names of all and every other person or persons to whom the same doth, may, or shall appertain, in part or in all, doth make assurance, and cause himself and them, and every of them, to be insured, *lost or not lost*, at and from ———— upon any kind of goods and merchandises, and also upon the body, tackle, apparel, ordnance, munition, artillery, boat, and other furniture, of and in the good ship or vessel, called the ————, whereof is master, under God, for this present voyage, C. D., or whosoever else shall go for master in the same ship, or by whatsoever other name or names the same ship, or the master thereof, is or shall be named or called; beginning the adventure upon the said goods and merchandises from the loading thereof aboard the said ship ———— and upon the said ship ————, and so shall continue and endure during her abode there, upon the said ship, &c. And further until the said ship, with all her ordnance, tackle, apparel, &c., and goods and merchandises whatsoever, shall be arrived at ————, upon the said ship, &c., until she hath moored at anchor twenty-four hours in good safety; and upon the goods and merchandises until the same be there discharged and safely landed. And it shall be lawful for the said ship, &c. in this voyage to proceed and sail to, and touch and stay at any ports or places whatsoever, without prejudice to this insurance. The said ship and goods and merchandises, for so much as concerns the assureds and assurers in this policy, are and *shall be valued at* ————.

'Touching the adventures and perils which we the assurers are contented to bear, and do take upon us in this voyage, they are of the seas, men-of-war, fire, enemies, pirates, rovers, thieves, *jettisons*, letters of mart and countermart, surprisals, taking at sea, arrests, restraints, and detainments of all kings, princes, and people, of what nation, condition, or quality whatsoever, *barratry* of the master and mariners, and of all other perils, losses, and misfortunes that have or shall come to the hurt, detriment, or damage of the said goods and merchandises, and ship, &c., or any part thereof. And, in case of any loss or misfortune, it shall be lawful to the assureds, their factors, servants, and assigns, to sue, labour, and travail for, in, and about the defence, safeguard, and recovery of the said goods and merchandises, and ship, &c., or any part thereof, without prejudice to this insurance; to the charges whereof we the assurers will contribute each one according to the rate and quantity of his sum herein assured. And it is agreed by us the insurers that this writing or policy of insurance shall be of as much force and effect as the surest writing or policy of assurance heretofore made in Lombard-street or in the Royal Exchange, or elsewhere in London. And so we the assurers are contented and do hereby promise and bind ourselves, each one for his own part, our heirs, executors, and goods, to the assureds, their executors, administrators, and assigns, for the true performance of the premises, confessing ourselves paid the consideration due unto us for this assurance by the assured ———— at and after the rate of ————. In witness whereof, we the assurers have subscribed our names and sums assured in London.

'N.B. Corn, fish, salt, fruit, flour, and seed are warranted free from *average, unless general*, or the ship be stranded. Sugar, tobacco, hemp, flax, hides, and skins are warranted free from average under 5*l*. per cent. And all other goods, also of ship and freight, are warranted free from average under 3*l*. per cent., unless general, or the ship be stranded.'

The conditions of the policy may be varied according to the particular agreement between the parties.

The words in the policy, 'the said ship and goods and merchandises *shall be valued at*,' make this a 'valued policy;' that is, a policy which enables the merchant, in case of loss, to recover the stipulated amount without proof of the value of the things insured. A policy without words expressive of an agreement between the parties as to value, is called an open policy, and leaves the question of value open.

The subjects of marine insurance are, generally speaking whatever is put in risk, as the ship, tackle, provisions, &c., cargo, freight, profits, and money lent at bottomry or respondentia. As for the purpose of stimulating the seaman to exert himself to the utmost for the safety of the ship, a rule has been established, that he is entitled to no wages unless the adventure be completed and the ship earn freight, so an insurance which would nullify that rule is declared illegal. A seaman therefore cannot insure his wages.

The subject matter of the insurance, whether the ship only, or goods, or freight, must be accurately described, and so must the voyage, and the times and places at which the risk is to begin and end.

The words '*lost or not lost*,' in the policy have the effect of rendering the underwriter liable, though the ship be lost before the insurance is entered into, provided the loss were not then known to the assured.

Perils of the sea signify losses occasioned by winds and waves, rocks, sands, &c. If the ship is run down, this is considered a peril of the sea. *Jettison* signifies the voluntary throwing of goods or of any part of the ship overboard for *any* justifiable reason, as either to prevent their falling into the hands of an enemy, or to save the rest of the cargo or the ship. *Barratry* denotes any sort of fraud in the master or seamen by which the owners of the ship or cargo are injured. Thus barratry may be committed by running away with the ship, by defeating or delaying the voyage with a criminal intent, or by doing any act to forfeit the insurance.

The loss or damage in every case is ascribed to the proximate cause. Where the ship is checked in her rate of sailing by sea-damage, and in consequence is overtaken by an enemy and captured, this is considered a loss by capture.

The memorandum at the foot of the policy is inserted to protect the underwriter from minute liability in respect of perishable articles, as to which it would often be difficult say whether the damage was occasioned by intrinsic or extrinsic causes, the indemnity of the underwriter extending to the latter description of causes only. 'Warranted *free from average, unless general*,' protects the underwriter from making good any damage, short of a total loss, to the excepted article. A damage to any specific article itself is called a particular average. *General average*, to which the exception in the memorandum of the policy does not extend, takes place where part of the ship, as the mast, or where part of the cargo, has been thrown overboard for the common benefit, in which case the owner of the property sacrificed is entitled to contribution from all others who have property embarked in the adventure. This contribution is called general average.

The policy will be vitiated by misrepresentation or concealment on the part of the assured of any fact material to a correct estimate of the risk; and the underwriter will be discharged from liability if the ship do not proceed on the same voyage with that described, or if there be any unnecessary stopping or deviation.

(Park, *On Marine Insurance*; M'Culloch's *Commercial Dictionary*, art. 'Marine Insurance.')

SHIPWRECK. [ASPHYXIA; DROWNING; LIFE-BOAT.]

SHIRAS. [PERSIA.]

SHÎRAKOH (Lion of the Mountain), son of Shadi, and brother of Ayoob, the father of the famous Salah-ed-deen, a Kurd of the tribe of Ravendooz, commenced his career in the service of the Seljukian monarchs of Persia, and is first mentioned as holding a command in the garrison of Bagdad. Both the brothers however soon became adherents of Zenghi, the famous atabek of Syria, and continued attached to his illustrious son Noor-ed-deen, under whom they rose to high distinction. In A.D. 1159 (A.H. 554) the turbulent spirit of Shîrakoh had nearly led him into open revolt during a dangerous illness of the sultan; but he was restrained by the prudent admonitions of Ayoob, and the mention by Abul-Feda of his repairing to Mecca in the following year would appear to imply that he incurred temporary disgrace on the recovery of Noor-ed-deen. In 1163 he was however entrusted with the command of the force destined to reinstate the vizier Shawer [Shawer] in Egypt: but on that occasion, as well as in the second expedition of 1166, he was compelled to evacuate the country by the perfidy of his ally, who called in the Franks of Palestine to his aid. But his military reputation was established by the generalship and bravery displayed in these unsuccessful campaigns; and his *third* invasion (1168) established the power of Noor-ed-deen in Egypt. Amaury, king of Jerusalem, was compelled to raise the siege of Cairo: and Shîrakoh, after putting to death the perfidious Shawer, himself assumed supreme power under the title of Vizier to the Fatimite caliph Adhed, who conferred on him the title of Assad-ed-deen (Lion of the Faith). He died a few months afterwards, and was succeeded in his dignities by his nephew, the famous Salah-ed-deen.

Shîrakoh appears to have been one of the most consummate captains of his age and country; and to him was unquestionably due the foundation of the Ayoobite power, the fruits of which were reaped by his collateral relatives. His own descendants continued for four generations to occupy the petty principality of Hems or Emesa, under the suzeraintè of the sultans of Egypt and Syria, till they were deprived of it, in 1263, by the Mamluke Bibars.

SHIRE, from the Saxon *schyran*, to divide (whence also *to shear*), is the name of districts into which the whole of Great Britain is divided. The word shire is in most cases equivalent to *county*, a name often substituted for it in Great Britain, and always in Ireland. The origin of this distribution of the country cannot probably now be ascertained. It has been customary to attribute it to Alfred, upon the authority of a passage in Ingulphus, the monk of Croyland, who wrote about a century and a half after the reign of that king. Asser however, the biographer of Alfred, does not mention this most important fact; and, in truth, shires were certainly known before Alfred's time. Sir Francis Palgrave shows them to be identical, in many cases, with Saxon states; thus Kent, Sussex, Essex, Norfolk, Suffolk, Middlesex, and Surrey were antient kingdoms: Lincolnshire, under the name of Lindesse, was an independent state, and Worcestershire (*Huiccas*) was the jurisdiction of the bishop of Worcester. Another class of shires were formed out of larger divisions, either for the sake of more easy management when the population of the particular district had increased, or for the sake of giving territory to an earl. Yorkshire was part of the kingdom of Deira, and Derbyshire of Mercia. Lancashire was made a county subsequently to the Conquest. On the other hand, some shires have merged in others: Winchelcombeshire is a part of Gloucestershire; and in the recent act for abolishing the palatine jurisdiction of the bishop of Durham (6 and 7 William IV., c. 19, s. 1) no less than five shires are mentioned, viz. Craikshire, Bedlingtonshire, Norhamshire, Allertonshire, and Islandshire, which have long ceased to possess, if indeed they ever enjoyed, separate jurisdictions.

The uses of the division into shires may be learnt by an enumeration of the principal officers in each: 1, the lord lieutenant, to whom is entrusted its military array [Lord Lieutenant]; 2, the custos rotulorum, or keeper of the rolls or archives of the county, such as the county court rolls—this officer is appointed by letters-patent under the great seal, and is now always identical with the lord-lieutenant, except in counties of cities, where the high steward is usually custos rotulorum; 3, the sheriff, or, as he is often called, the high sheriff [Sheriff]; 4, the receiver-general of taxes, who is appointed by the crown, and accounts to it for the taxes levied within his district—he also receives the county rates, and disburses them as the magistrates in quarter sessions, or as any other competent authority, direct; 5, the coroner [Coroner]; 6, the justices of the peace, whose commission extends only to their own county, and who, assembled in sessions, have jurisdiction over many offences, and control over the county funds [Sessions]; 7, the under-sheriff, who is appointed by and performs nearly all the duties of sheriff; and 8, the clerk of the peace, an officer (almost always an attorney) appointed by the justices in quarter-sessions, whose duty it is to file and produce recognizances, returning them, when forfeited, to the sheriff to be levied [Recognizance]: he likewise prepares or files indictments to be tried at the sessions or assizes, and in general acts as the officer of the justices in quarter-sessions. To this list of officers may be added the knights of the shire, or representatives of the county in parliament.

County-rates are assessments made on the freeholders of the shire by the justices in quarter-sessions assembled, according to estimates laid before them. The principal objects of these rates are: the building and repair of bridges, gaols, shire-halls and courts of justice, and of late years lunatic asylums; the repair of certain roads; the payment of the salaries of the coroner, clerk of the peace, high and special constables, gaolers, &c.; the expense attending the apprehension, conveyance, and prosecution of persons accused of crime; and under this head is included the remuneration to witnesses for their loss of time and expenses; the maintenance of prisoners, and their transportation. The rates are levied by collectors, and enforced by the sheriff.

The judicial tribunals in each county are the assize court [Assizes]; the county-court, presided over by the sheriff, and, until magna charta, a court of record; the hundred courts, and courts-leet. [Courts.]

The principal subdivision in a county is the hundred, a district which in its origin bore relation rather to the population than to any uniform geographical limits. Mr. Hallam considers it to have been a district inhabited by 100 free families, and that a different system prevailed in the northern from that of the southern counties; in proof of which he contrasts Sussex, which contains 65 hundreds, and Dorsetshire, which contains 43, with Yorkshire, which contains only 26, and Lancashire, only 6. In the counties north of the Trent, and especially in Scotland, this subdivision is often called a wapentake. That the division into hundreds was known among the Germans, even in the time of the Roman invasion, is argued from two passages in Tacitus ('De Mor. Germ.,') 'ex omni juventute delectos ante aciem locant—Definitur et numerus; *centeni* ex singulis pagis sunt.' And again, 'Centeni singulis (principibus) adsunt ex plebe comites, consilium simul et auctoritas.' 'Nihil nisi armati agunt;' and hence Spelman infers the identity of the *wapentäch*, or military array (taking of weapons) and the hundred court. Sir Francis Palgrave says that the burgh was only the enclosed and fortified resort, the stockade of the inhabitants of the hundred. The subdivision of the hundred was the tithing, composed, as it is alleged, of ten free families, and having for an officer the tithing-man, a head constable.

Whether in the barbarous times to which it is attributed, so elaborate a system as we have sketched could have prevailed, is at least most doubtful; but the theory is that somewhere about the time of Edgar (A.D. 950), the county was divided into tithings, of which twelve made a hundred —for the Saxon hundred meant 120, and hence perhaps the frequent use of the number 12 in our legal processes. These hundreds were presided over by their decanus, or headborough, or hundred-man, and were represented in the shiremote; and this aggregate body, the shire, presided over by its earl and bishop or sheriff, conducted its own internal affairs.

There are three counties-palatine, the earl of which had within his shire all the fiscal and judicial powers of the crown:—Chester, created by William the Conqueror; the duchy of Lancaster, created by Edward III.—these two have been long annexed to the crown; and Durham, heretofore governed by the bishop, but annexed to the crown by statute in 1836. In the latter year, a part of the see of Ely, which had been a royal franchise, was annexed to the crown, as Hexhamshire in Northumberland had been in the reign of Elizabeth.

For an enumeration of the English and Scottish counties, see Great Britain; and for the Irish, see Ireland.

SHIRLEY. There were three brothers called *Shirley*, or *Sherley* as the name was formerly spelled, all of whom were distinguished as travellers. They were sons of Thomas Shirley, an independent gentleman, who resided in Sussex.

Thomas Shirley, the eldest son, was born in 1564. After completing his studies at Oxford, he seems to have lived with his father till the reputation acquired by his brothers induced him to travel also. He appears to have been knighted, if Watt, in the 'Bibliotheca Britannica' is correct in calling him Sir Thomas. He published his 'Travels in

Turkey, 4to. black letter. We are not acquainted with the time and place of his death.

Anthony Shirley was born in 1565. After having taken his bachelor's degree at Oxford, where he studied with his brother Thomas, he served in the English army in Holland; and in 1596 sailed to the West Indies, in a squadron fitted out for the purpose of attacking the Spanish settlements there. On his return the following year he was knighted by Queen Elizabeth, by whom he was sent to Ferrara to aid the inhabitants in a dispute which they had with the pope; but this dispute having been settled before his arrival there, he resolved to travel into Persia, and left Venice for that purpose, March 24, 1598, accompanied by his youngest brother Robert. Sir Anthony, after his arrival at Casbin, soon acquired the favour of Shah Abbas, by whom, in April, 1599, he was sent as plenipotentiary, accompanied by Hosseyn-Ali-Bey, to the various courts of Europe, for the purpose of getting them to combine with the Shah in a war against the Turks. He went first to Astrakhan, thence to Moscow, thence through Germany to Venice, and thence to Spain. The king of Spain raised him to the dignity of admiral of the Levant Seas. He died in Spain in 1630 or 1631. An account of his voyage to the West Indies is given in Hakluyt's Collection, vol. iii., edition of 1600, 'A true Relation of the Voyage undertaken by Sir Anthony Shirley, knight, in 1596, intended for the island of San Thome, but performed to San Jago, Dominica, Margarita, along the coast of Terra Firma to the Isle of Jamaica, the Bay of Honduras, thirty leagues up Rio Dolce, and homewards by Newfoundland; with the memorable exploits achieved in all this voyage.' His travels in Persia were published in a separate form, 'Relation of Sir Anthony Shirley's Travels in Persia, with his magnificent Entertainment in Persia,' Lond., 1632, 4to., black letter. His travels by Astrakhan through Russia are given in Purchas's 'Pilgrimages.'

Robert Shirley was born about 1570. When Sir Anthony Shirley left Persia on his mission, Robert remained in the service of Shah Abbas, and had a situation in the army. In 1604 the Shah granted him permission to return to England, but charged him at the same time to visit the different Christian princes of Europe, and assure them of the Shah's good will towards them, and especially to offer to the English a free commerce with his kingdom. Shirley did not reach England till 1612. Having had an audience with James I. and remained a short time in England, he returned to Persia; but in 1616 Shah Abbas sent him, as he had previously sent Sir Anthony, as ambassador to the different European powers, for the purpose of inducing them to make war on Turkey. Having, after considerable delay, reached Madrid, the king of Spain, at his suggestion, sent out four galleons to close the entrance of the Red Sea against the Turks, on condition that the Bahrein island and some other places should be given to Spain. He then passed into Holland; but his long stay in Spain had made him an object of suspicion to the Dutch states, and he was requested to leave the country. He arrived in England in 1623. His letter of credit being written in Persian, no one could be found able to read it. At length, in 1626, Nogdi-Ali-Beg arrived in England as ambassador from Persia, and at his audience with James I. affirmed that Shirley was an impostor; and the letter having been shown to him, he attempted to tear it, and struck Shirley, and in excuse for his indecent violence said that he could not restrain his anger at seeing the signature of his sovereign counterfeited. To settle the difficulty, James I. sent out Sir Dodmore Cotton as his ambassador to Shah Abbas, accompanied by Nogdi-Ali-Beg and Shirley. The Persian died on the passage. Cotton having arrived at Casbin, and obtained an audience with the Shah's first minister Mahomet-Ali-Beg, the latter refused to admit Cotton to an audience with the Shah, and requested that Shirley's letter of credit might be left with him, and promised to return it on the following day, with the Shah's answer. After waiting three days, Mahomet-Ali-Beg 'came and told the ambassador that the king had looked upon it, had denied it to be his (the Shah's), and in a great rage had burnt it.' These are the words of Herbert the traveller, who accompanied Sir Dodmore Cotton as his secretary; and he further remarks, 'We all were verily persuaded he never showed it to the king, nor had any way inquired of him concerning it: the truth is, he had been bribed, but by whom it is unnecessary to speak; it may be we did but conjecture it.' Shirley was now old, and these indignities seem to have hastened his death, which took place at Casbin, July 13, 1628, about a fortnight after his arrival at that place. He appears to have been knighted, for Herbert calls him Sir Robert Sherley.

(*Biographie Universelle*; Herbert's *Some Yeares Travels into divers parts of Asia and Afrique*, Lond., fol., 1638.)

SHIRLEY, JAMES, was born in London, about the year 1594. He was educated first at the Merchant Tailors' school, London; next at St. John's college, Oxford, which however he left without taking a degree; and lastly he removed to the university of Cambridge. Having taken holy orders, he obtained a curacy near St. Alban's, but resigned it in consequence of having adopted the Roman Catholic faith. He then opened a school at St. Alban's, but not being successful, came to London, and commenced his career as an author. The first work which he published was 'The Echo, or the Unfortunate Lovers,' a poem, London, 1618, 8vo. His first dramatic work was 'The Traitor,' a tragedy, London, 1625. He continued to write for the stage till about 1640, when, having been especially patronised by the queen Henrietta Maria, on the breaking out of the civil troubles he joined the royalists, and served under the earl of Newcastle.

In 1642 the Long Parliament enacted that the exhibition of 'public stage plays shall cease and be forborne,' for certain religious and moral reasons which are stated in the preamble; other subsequent acts and decrees, during the republic and the Protectorate, continued to enforce the first enactment; and Shirley was again obliged to try the profession of a schoolmaster: he was more successful in London than he had been at St. Alban's. In 1646 he began again to publish plays and poems. After the Restoration, the prohibition of stage performances was removed, and Shirley continued as long as he wrote to be a favourite dramatist, as indeed he was the last of the great writers who belong to the Shakspere school. He does not appear to have published anything after 1659. He is the author of about 40 plays, in some of which he was assisted by George Chapman and others. The best edition of his 'Dramatic Works' is that by Gifford, London, 6 vols. 8vo. Besides plays and poems, he wrote 'Via ad Latinam Linguam' and 'Rudiments of Grammar.'

Shirley was burnt out of his house in Fleet-street by the great fire of London, and being obliged to retire to the suburbs, died there October 29, 1666. His wife died on the same day, and both were buried in the same grave.

Shirley belongs to the poetic class of the old English school of dramatists. He has not much inventive power; his plays are consequently somewhat meagre of incident; but this defect is in some degree compensated by frequent change of scene, and there is generally much animation in the dialogue. His characters are broad and general, not discriminated by nice shades, but well defined, distinct, and consistent. He displays the passions well; with less intensity indeed than Ford, but in a similar manner, poetically rather than naturally, without any of those sudden bursts and familiar touches by which Shakspere displayed them. His language is pure idiomatic English. His versification resembles Massinger's. It has the same 'linked sweetness long drawn out,' with more melody, and more enriched with poetic ornament. His plays are no longer acted; indeed they belong to a class not well constructed for keeping possession of the stage, but they are well worth reading.

SHIRVAN. [Georgia.]

SHIRWOOD or SHIREWOOD FOREST, or, as it is more commonly written, **SHERWOOD FOREST**. This woodland district, which once extended over a considerable part of the county of Nottingham, was antiently divided into two parts, called respectively 'High Forest' and 'Thorney Wood;' the latter of which, although the smaller of the two, included nineteen towns or villages (Nottingham among them) within its limits. Sherwood Forest is not mentioned by that name till the reign of Henry II., who used to hunt in it, and in whose time, or soon after, it is regarded in popular tradition to have been the retreat of Robin Hood. [Hood, Robin.] Leland speaks of it as 'the woddy forest of Sherwood, wher ys greate game of deere.' In Camden's time it was 'much thinner,' but still bred 'an infinite number of deer or stags with lofty antlers.' The forest now extends from Nottingham to near Worksop, 25 miles, and varies in breadth from 7 to 9 miles: it was the only forest remaining under the jurisdiction of the chief justice in Eyre of the Forests north of the Trent, an office abolished by statute 57 Geo. III., c. 61, and is the only forest belonging to the crown in that part of England. It is under a lord-warden, who holds his office, during pleasure, by letters-patent from the crown; and subordinate officers, the bow-bearer and ranger appointed by him, and four verderers elected by the freeholders. It is now in a great measure cleared, and a considerable portion enclosed. Few of the antient woods have been left, but considerable plantations have been made of late years. The revenue derived from the forest by the crown in the years 1803-1832, both inclusive, was 50,926*l.* 3*s.* 3*d.*; the expenditure was 8398*l.* 18*s.* There are some noblemen's or gentlemen's parks within the limits of the forest, as Welbeck, Clumber, Clipstone, &c. The extent of the forest, according to a survey in 1609, was as follows:—

		Acres.
Antient enclosures equal to		44,839
„ woods		9,486
„ wastes		35,080
Parks.—Clipstone	1583	
Beskwood	3672	
Bulwell	326	
Nottingham	129	
		5,710
		95,115

Up to the close of the last century, the following enclosures had been made:—

	Acres.
In 1789 in Arnold Forest	2280
1792 „ Basford	1158
1794 „ Sutton in Ashfield	2608
1795 „ Kirkby in Ashfield	1941
1796 „ Lenton and Radford	261
	8248

Since then there has been an addition to the enclosures of 3087 acres in the township of Edwinstowe, by act 58 Geo. III., c. 100.

SHOEMAKER, properly the maker of the shoe, though this name is often applied to every one connected with the calling, as he who makes the boot or any other article in the trade, and also to the employing party as well as the employed. In the old statutes he is called a cordwainer, apparently a corruption of the French *cordonnier*, which means a worker of Cordova leather. [CORDOVA.] The companies of shoemakers in our antient towns were incorporated under this name; and where some of these companies still exist, they go by the same name. As a legal term cordwainer is still common.

In Rossellini's work on the 'Antiquities of Egypt,' we find various illustrations of the manufacture of the sandal; a proof of the high antiquity of the art as a peculiar occupation.

The streets of Rome, in the reign of Domitian, were at one time so filled with cobblers' stalls, that the emperor had to issue an order to clear them away. St. Anianus, a contemporary with St. Mark, Butler tells us, was a shoemaker; and Crispin and Crispinian, brothers and martyrs, have the well-known repute of belonging to the trade. They are its patrons: they have their fête-days in all Roman Catholic countries; and though there is no longer any religious observance of the day in this kingdom, the name of Crispin is still placed in the calendar against the 25th of October; and the shoemaker has still his traditions and his usages connected with the saint-day.

The law of England formerly not only took cognizance of the quality of the leather which the shoemaker wrought into his goods, but of the number of stitches that he furnished. An individual now in London has told the writer, that the man to whom he had been an apprentice in one of the small towns in the north of England, had authority in this way; so that whenever, on his inspection in the shoe-market, the standard of perfection was wanting—and the breadth of his thumb was the usual gauge as a measure for an inch,—he had power to make seizure of the articles.

The trade, as now followed in London and other principal places, is subdivided into about twenty branches. (*Guide to Trade*, 'Shoemaker,' p. 15.) The following however may be set down as the chief· the shoeman, or maker of the sole part of the shoe; the bootman, or maker of the sole part of the boot; and the boot-closer, or joiner together of the leg, vamp, &c. The labour of these is especially directed to what is called the *men's line;* whilst others make the ladies' shoe or boot. There are many women too who get a livelihood by closing the shoe; while others again follow the various sorts of binding.

The shoe, being previously cut out and closed, goes through sundry operations: the lasting or tacking of the upper-leather to the in-sole, the sewing in of the welt, the stitching to this welt of the out or top sole, the building and sewing down of the heel; and, lastly, the setting or taking off, as it is technically called: these are the principal operations, but, besides these, various less important ones are necessary. The duty of the shoeman being completed, he then, if an employed workman, returns the article to his employer, when it is rounded, that is, pared round the quarters and across the top of the vamp. The shoe is then sent to be bound; and, finally, being polished or cleaned up, becomes ready for the purchaser.

In the manufacture of the boot, the clicker or cutter having designed and cut the leather of the vamps, legs, &c. to the measure of the customer or the size wanted, the materials go to the closer. As a separate workman the boot-closer has not been known above fifty or sixty years; and as yet only in these countries. The making and closing in all other places go together. Much of the boot-closer's art, as now perfected, is of a very delicate nature, especially in the putting together or closing of all the parts of the top-boot, and the fancy-wrought and coloured Wellington of late years in fashion; the common Wellington being the easier portion of his occupation. In closing the top-boot, it usually goes twice through the hands of the workman; the first time to do what is called the tongue part, the closing of the vamp and counter to the leg; and again, after having the bottom or sole attached, to finish it, that is, to close it up behind, make and put on the top, &c. Much nice jobbing, in alterations and repairing of fractures, belongs also to the department of the boot-closer.

The office of the bootman has already been mentioned. He does for the boot what the shoeman does for the shoe; he makes or attaches the sole. The labour of this person however is much better paid than that of the shoeman; besides, it has a higher character, and considerably more time is required to complete the article. The lasting is more difficult; what is termed a rand is made to the heel of the boot, or, as latterly has been much the custom, the French seat; and this, with what is called the shank-piece, a strengthener between the inner and outer sole, which runs along the waist of the boot, are additions to the work bestowed upon the shoe, and therefore require and receive an extra pay. The best shoemen usually at the first opportunity take to be bootmen, though this is not always the case—the lighter exertion required in the shoe being to some a counterbalancing inducement.

The employing master, or the clicker who acts for him, takes measure of the customer, chooses his materials, gets his Wellington fronts to be blocked, fits up the lasts, cuts out the work for the closer, prepares and sorts the sole or bottom-stuff for the maker, sees that the workmanship is to his satisfaction, and polishes or has the boots cleaned up for sale.

Of the making of the woman's common or welted shoe, we have given no description: it resembles that of the man's; and where it differs it is unnecessary here to explain. The man's and woman's single-sole shoes or 'pumps' are also proceeded with in the same manner; but in those 'cheap' women's shoes now so abundantly manufactured there is much deception; so that *cheap* is only another word for what at last proves to be perhaps the *dearest* part of the female's expenditure for wearing-apparel. London is at present the chief place where these articles are manufactured. At Northampton a very large number of men's sale boots and shoes are produced. The business done in this branch of the trade is immense: a pair of woman's shoes or boots can be purchased at a very low rate, and men's boots and shoes at a proportionately low rate. The wealthier and more tasteful consumers still continue however to prefer bespeaking their boots and shoes, and thus a large proportion of the body of shoemakers find encouragement in the perfecting of their art.

Formerly it was the general practice for the journeyman to work in the shop with his employer; two, three, six, or more all working together. The journeymen then had sometimes, as now, so much per pair; but he was also paid by the day or week, or was even engaged as a quarterly or half-yearly servant. In every case he had his coals and candles in winter, and in all seasons his finding or grindery free, that is, his hemp, wax, paste, bristles, &c. Wages then were very low; but the work being of an inferior description, and the habits of the time very plain and simple, it is to be presumed, from every notice we have of the calling, that the shoemaker had seldom cause to complain. In London, about the year 1780, under the liberal encouragement principally bestowed by the well-known Hoby, a remarkable improvement was effected in the art; and stimulated as this was by the active rivalry of the eccentric O'Shaughnessy, a bootmaker too, like the other, for the royal and the noble, the improvement went regularly on; and the result was, that the position of the workman became almost entirely altered. The higher pay that he received gave him higher inducement, a more independent feeling, a greater desire to throw off the partially domestic character which he hitherto had borne. He gave up working in the shop of his master, or in garrets with sixes and sevens; and if married, he followed his employment in his own home; or when single, he joined himself in a sort of partnership with another workman in a like condition, and taking a furnished lodging, felt more at ease than under the former system of constraint. This still is the practice among the better-paid classes of the trade.

Dr. Thackrah, in reference to the health of the shoemaker, has these remarks:—'Shoemakers work in a bad posture, by which digestion and circulation are so much impaired that the countenance marks a shoemaker almost as well as a tailor. From the reduction of perspiration and other excretions, in this and similar employments, the blood becomes impure, and the complexion darkened. The secretion of bile is generally unhealthy, and bowel complaints are frequent. In the few shoemakers who live to old age, there is often a remarkable hollow at the base of the breast bone, occasioned by the pressure of the last.' In another place he expresses an opinion that the masters possess the power of remedying these evils. For the 'bad posture' which he speaks of, a remedy has more than once been attempted. In some of our Encyclopædias, notice is taken of a sort of standing bench which has been constructed for the shoemaker to work at, instead of his present low seat; and in the model-room of the Society of Arts, Adelphi, Strand, there are some five or six representations of these benches. As this collection is now thrown open to the public, it is to be hoped that some of the more considerate of the trade will take the pains to examine into the matter, and if they find the invention to offer any greater security for health, that they will do what they can to introduce it into general use.

In adverting to the condition of the shoe-trade, as connected with the possibility of improvement, one very gratifying feature of the present time is the getting up of what are generally called 'Pension Societies' for the relief of old, infirm, or decayed members among the particular fraternity. The journeymen printers of London have their association for this purpose, and so have the bookbinders, the tailors, and various other occupations. Among the master boot and shoe makers a similar society has been formed, and has gone on very favourably; and there is no reason why the humbler workman should not attempt something of the same kind. At present there is much loss of time, and also much money wasted by the journeyman shoemaker in far less useful objects. Much money goes for the drink demands of their meetings; much in payment of their officers; and much is being continually expended in a fruitless system of warfare from shop to shop, and from season to season, not to mention the many dishonest abstractions of their funds, of which the mere Union jobbers are so often guilty. Any more secure investment of their savings would soon effect a considerable improvement in their condition.

SHOE TRADE. None of the common handicrafts is exercised by so large a number of persons as that of the shoemaker. Tailors, who are however engaged in making clothing for scarcely one-half of the population, are rather more than one-half as numerous as shoemakers. The number of males twenty years of age and upwards returned under the census of 1831 as 'shoe and boot makers and menders' was 110,122 in England, 5819 in Wales, and 17,307 in Scotland; total 133,248. Thus in England there was one shoemaker to every 118 persons; in Wales, one to 138; and in Scotland, one to 136 There is a remarkable uniformity in all the English counties, Northamptonshire excepted, where the proportion is one to about 80; but in Scotland this is not the case: in Inverness-shire the proportion is one to 216; and in Sutherlandshire one to 250. Any calculation as to the value of this trade must be received merely as an approximative estimate; but that it is an important branch of domestic industry is sufficiently obvious. Excluding children under five years of age, we have at present in Great Britain a population of about 16,000,000, whose annual expenditure on boots and shoes, averaged at 15*s.* each, will amount to 12,000,000*l.* per annum, distributed in payment of the raw material, in rent, in profits to the masters, wages of journeymen, and cost of maintaining apprentices. The number of boot and shoe makers and menders employed in the parishes within eight miles of St. Paul's was 16,502 in 1831; at Northampton 1300 were employed; at Stafford 800; and in each of the two last-mentioned counties there were considerable numbers engaged in producing an article consumed elsewhere. In the metropolis and in the above counties women are extensively employed in the lighter parts of the business. The government contracts for the army and navy, the police, &c. are executed in London and at Northampton and Stafford; and the export market is almost entirely supplied from these quarters.

There are no documents showing the exact quantity of boots and shoes exported, as they are included under the general designation of leather 'wrought and unwrought,' exclusive however of 'saddlery.' The return under this head in the following years was as under:—

	lbs.	Declared Value.
1829 . .	1,338,937	£268,380
1887 . .	1,647,000	255,818
1839 . .	2,584,484	382,995

It is computed that about two-thirds of the above quantities consist of boots and shoes, which are exported chiefly to the East and West Indies, British North America, and the other colonies.

There is a protecting duty of 30 per cent. ad valorem on the importation of boots and shoes; notwithstanding which importation does takes place, chiefly from France. The quality of French boots is said to be excellent, they wear easily, and are of neat workmanship. A proposition has been made to reduce the duty to 20 per cent. ad valorem. The gross revenue on boots and shoes imported in 1839 was 4121*l.* In 1829 the net duty was 2202*l.*, previously to which year the duty was included under the head of 'leather' or 'silk' manufactures. The following return, showing the importations of the year 1839, is taken from the Appendix to 'Report on Import Duties,' and is the only one which has been made public. The duty is charged per dozen pairs.—

	Women's.		Girls'.	
	Pairs.	Duty.	Pairs.	Duty.
Boots and calashes .	1,364	30*s.*	1	20*s.*
Ditto, lined or trimmed	153	36*s.*	—	24*s.*
Shoes, with cork or double soles, &c. and clogs . . .	2,464	26*s.*	3	17*s.* 4*d.*
Ditto, lined or trimmed	179	29*s.*	—	19*s.* 4*d.*
Shoes of silk or other stuffs, or kid, morocco, or other leather	33,667	18*s.*	320	12*s.*
Ditto, lined or trimmed	232	24*s.*	2	16*s.*
	Men's.		Boys.	
Boots . . .	4,977	54*s.*	4	36*s.*
Shoes . . .	777	24*s.*	3	16*s.*

In a Parliamentary Paper (398, Sess. 1840), the quantity and value of boots and shoes imported from France are given; and this also is the only return of the kind which has been published:—

	Pairs.	Official Value.
1829 . .	42,399	£8,506
1830 . .	43,543	8,999
1831 . .	44,665	9,199
1832 . .	45,591	9,459
1833 . .	53,736	11,177
1834 . .	54,200	11,379
1835 . .	46,653	9,802
1836 . .	45,989	10,200
1837 . .	56,204	12,301
1838 . .	50,850	11,997
1839 . .	48,824	12,191

SHOKHNAH, IBN, is the surname of a celebrated Mohammedan writer named *Muhibbu-d-dín Abú-l-walíd Mohammed Ibn Kemáli-d-din Ibn Shokhnah,* who was Kádhi-l-Kodhát, or supreme judge of the Hanefite sect in the province of Irák or Mesopotamia. Having from his early youth given proofs of great talent, and composed several works on theology and jurisprudence, he was appointed cádi of one of the mosques of Damascus, and in course of time was raised to the highest ecclesiastical office among the Mohammedans, namely that of Sheikhu-l-Islám, or Mufti, or, as it is otherwise called, Kádhi-l-Kodhát, supreme Kádhi or judge of Irák. Ibn Shokhnah died at Damascus, in A.H. 883 (A.D. 1478). He left, among other historical works, 'Raudhatu-l-manátzir fi akhbári-l-awáyil wa-l-awákhir' (the garden of the overlooking places, or the history of antient and modern times). It is a sort of abridgment of Abú-l-fedá's large historical work, and contains a chronological history of the world from the creation to the year 1403 of our æra. It is divided into four books or sections, and contains much useful information, comprising many events which escaped that celebrated historian. Ibn Shokhnah also wrote a work on jurisprudence and canonical law, entitled 'Lisánu-l-hokhám fi maarefati-l-akhám' (verbal decisions of the judges, or a knowledge of law), which is in the Royal Library of Paris.

SHOOTER'S HILL. [KENT.]

SHO'REA, a small Indian genus of the natural family of Dipterocarpeæ, named in compliment to Sir J. Shore, afterwards Lord Teignmouth, then governor-general of Bengal. The genus is found as far south as the line; and S. robusta, the best known and most useful species, as far north as 30° North latitude, in many parts forming the forests which skirt the south-western base of the Himalayan Mountains.

The genus is characterised by having a calyx of five sepals enlarging into 5 long wings. Petals 5. Stamens 25 to 30. Fruit one-celled, three-valved, and one-seeded.

The family to which the Shorea belongs is remarkable for the number of useful products yielded by its different species, as the camphor of Sumatra, resin, wood oil, and valuable timber. Shorea robusta is remarkable on all these accounts, as it is a lofty and ornamental tree with showy inflorescence: it is well known as a timber-tree by the name of *Saul* or *Sāl,* and chiefly employed in the north-western provinces of India in all government works, house timbers, gun-carriages, &c. The wood is of a uniform light-brown colour, close-grained and strong. The tree exudes a resin which by the natives is called *ral,* and by the Europeans one of the kinds of Dammer, being used for the same purposes as many other resins, and in Bengal very frequently as a substitute for pitch in the dock-yards. It is also sometimes used by the Hindus as an incense.

SHOREHAM, a parliamentary borough and a seaport-town, is situated in a valley of the South Downs at the mouth of the river Adur, near the centre of the county of Sussex, and 57 miles south from London. The borough of Shoreham, now called New Shoreham, was part of the possessions conferred by the Conqueror upon William de Braose, lord of the rape of Bramber. The intercourse between England and Normandy at that time was considerable, and the Adur became a port of some consequence. John landed here from Normandy with a large army in 1199, and he made it a free port in 1210. In the time of Edward III. (1346) it contributed 26 ships towards the two fleets of 706 which were fitted out by the king, being one ship more than was furnished by London; Fowey, Yarmouth, and Dartmouth alone furnished a larger number. But the encroachments of the sea and the attacks of foreign enemies so reduced the town, that in the time of Camden 'the commodiousnesse of the haven, by reason of bankes and barres of sand cast up at the river's mouth, was quite gone.' In 1758 the first act was obtained for its security and improvement, but the embouchure continued to shift towards the east, and advanced a mile and a half in the course of half a century, so as to render the haven of little use. The proximity however of the rising towns of Brighton and Worthing turned public attention towards the improvement of this port, and in 1816 the cutting of an artificial channel through the shingle embankment and the erection of substantial piers, which have rendered the mouth of the harbour permanent, were effected by Mr. William Clegram. The opening is preserved by wooden piers (formed of piles) 218 feet apart, which run in a south-south-west direction across the shingle into the sea. Within this entrance a third pier has been built out from the shore nearly across the harbour, for the purpose of driving the water, on the ebb, from the eastern and western sides of the inlet, directly to the mouth. The great body of water which thus ebbs and flows through the entrance keeps the channel open; and though the width is so considerable, the stream runs between the pier-heads at the rate of five or six miles an hour. The harbour-mouth is nevertheless subject to a bar, which rises occasionally above the low-water level, and shifts its position from 60 to 160 feet from the pier-heads. The lift of the spring-tides is about 15 feet, and neaps about 9 feet. The depth of the water over the bar at high-water is from 14 to 17 feet, according to the tides and the state of the bar. The Adur was formerly crossed by a ford once belonging to the priory of Hardham. In 1782 a long narrow bridge was built over the old ford a mile above the town; the money was raised in shares by way of annuity, and the income arising from the tolls, after the death of the annuitants, fell to the duke of Norfolk. In the year 1833 the present duke built at his own expense, and under the direction of Mr. Clark, a beautiful suspension bridge nearer the mouth of the river and close to the town.

The chief trade of Shoreham consists in the export of timber, and the import of coals, corn, timber, and Irish provisions; and it is a warehousing port for all descriptions of timber, and for West Indian, Mediterranean, African, Russian, French, Dutch, and other produce. The number of vessels that annually enter the port exceeds 1000, the united tonnage of which is 90,000, giving employment to 5000 mariners. Shoreham has long been noted for its ship-building, which continues to flourish.

The borough of New Shoreham returned two members to parliament from the 23rd Edw. III. till the 11th Geo. III., c. 55, in which it was declared that a wicked and corrupt society, calling itself 'The Christian Club,' had for several years subsisted in the borough, and consisted of a great majority of persons having the right to vote; that the chief end of that society appeared to be for the purpose of selling from time to time the seats of that borough, and that John Burnett and eighty others were members of such society. It was therefore enacted that these eighty-one persons should be thenceforth disqualified from ever giving a vote at any election for members to serve in parliament; and that the right of voting should thenceforth be exercised by every 40*s.* freeholder within the rape of Bramber, as well as by the burgesses of New Shoreham.

The town is irregularly built, and the houses are for the most part old. A corn-market is held on Mondays. Shoreham is within the diocese of Chichester. The church, dedicated to St. Nicholas, is a large and elaborately finished edifice: the mixture of the round and Gothic arches fixes its date about the middle or latter end of the twelfth century. It was originally a stately and capacious edifice of a cruciform shape, with a handsome tower in the centre of the cross, but the nave has long been destroyed. The living is a vicarage, the present endowment of which consists of 20*l.* from tithe and glebe, and the interest of 200*l.* private benefaction, 800*l.* royal bounty, and 800*l.* parliamentary grant. The population of the parish, in 1831, amounted to 1503.

(Dallaway's *Western Sussex;* Horsfield's *History of Sussex,* 4to., 1835; Cooper's *Parliamentary History,* 4to., 1835; *Burrell MSS.; Parliamentary Papers,* &c.)

SHORTHAND. [STENOGRAPHY.]

SHORTSIGHTEDNESS. [SPECTACLES; VISION.]

SHOT are the balls (generally solid) of iron which are discharged from guns, howitzers, or carronades. Those which are used for the first of these kinds of artillery vary in diameter from 1·955 inches, which is that of a one-pound ball, to 7·95 inches, which is the diameter of a 68-pound ball. Shot for howitzers vary in diameter with the nature of that arm, from 4·476 inches, which is the diameter of a 12-pounder howitzer, to 9·88 inches. Carronades discharge balls weighing from 6 lbs. to 68 lbs., which are of course equal in diameter to those which belong to guns of equal calibre. For the naval service it has recently been proposed to discharge from howitzers hollow shot or unloaded shells, which, having greater diameters than solid shot with equal weights, are capable of producing more destructive effects against shipping.

SHOT AND SHOT-MAKING. [LEAD.]

Google

SHOVEL, SIR CLOUDESLEY, an English admiral, born (1650) of poor parents. He was first noticed by Sir John Narborough, with whom he went to sea as a cabin-boy, but from his great merit soon rose to the rank of an officer. In 1674, while on an expedition to Tripoli, he was sent by his patron with a message to the Dey, on which occasion he behaved with great discretion; and through some observations made by him while on shore, Sir John Narborough was enabled to enter the harbour and burn the ships of the enemy. The next year, in consequence of this service, he was appointed to the command of a ship. He continued in employ during the reign of James, who appointed him to the command of the Dover. On the accession of William he took the side of the new king, and distinguished himself so much in the battle of Bantry Bay as to obtain the honour of knighthood. In 1692 he was appointed rear-admiral of the red, and soon after was present at the battle of La Hogue, to which victory he greatly contributed. In 1694 he served under Lord Berkeley in the expedition to Camaret as vice-admiral of the red; and on the return of the latter to England, took the chief command in the expedition against Dunkirk. In the reign of Queen Anne we find him employed till 1702, when he was sent to Vigo to bring back the prizes left by Sir George Rooke. In 1704 he reinforced the fleet of this officer in the Mediterranean with a powerful squadron, and led the van in the battle of Malaga. In 1705 he held the command of the fleet sent to Spain jointly with the Earl of Peterborough, and had an active share in the capture of Barcelona. He returned to England the same year, and in 1706 sailed to Portugal with Lord Rivers to the relief of the young king of that country. He continued in command there till 1707, when he joined the Duke of Savoy in the siege of Toulon; after the raising of which he proceeded homewards with nine ships of the line, and was unfortunately wrecked off the Scilly Isles, Oct. 22, 1707. The circumstances of his death were peculiar. He is said to have been thrown on shore alive, and to have been murdered by one of the islanders for the sake of a valuable ring. Shovel is called by Bishop Burnet ('History of his own Times') 'one of the greatest seamen of the age;' and his whole career was as honourable to himself as it was creditable to the judgment of Sir John Narborough, who first drew him forth from an obscure condition. (Campbell's *Lives of English Admirals*; Cunningham's *Eminent Englishmen*.)

SHOWERS OF STONES. [AEROLITES.]

SHREWSBURY, the county town of Shropshire, in the liberty of Shrewsbury, 138 miles from St. Paul's, or the General Post-Office, London, in a direct line north-west, or 158 miles by railroad to Birmingham, and from thence by the Holyhead parliamentary road through Wednesbury, Wolverhampton, and Shiffnal: in 52° 42′ N. lat. and 2° 45′ W. long.

It is probable that the town was founded by the Britons of the kingdom of Powis, while they were yet struggling with the Saxons, or rather the Angles, for the midland counties; and it is supposed to have been established by them as a stronghold when they found Wroxeter (the Uriconium of the Romans) no longer tenable. The Welsh name was Pengwern. On the conquest of the town by the Anglo-Saxons, it received the name of Scrobbes-byrig, importing that it was a town in a scrubby or bushy spot; and of this name the modern Shrewsbury is a corruption. Ethelfleda, 'the lady of the Mercians,' daughter of Alfred the Great, founded the collegiate church of St. Alkmund, and Athelstan established a mint here, and it soon became, if it was not then, the chief town of the shire, for in the 'Saxon Chronicle,' in the account of the reign of Ethelred II., Scrobbes-byrig-scire (now corrupted into Shropshire) is mentioned.

According to Domesday-book the town had, in Edward the Confessor's time, two hundred and fifty-two houses, with a resident burgess in each house; also it had five churches. It was included in the earldom of Shrewsbury, granted by William the Conqueror to his kinsman Roger de Montgomery, who erected a castle, to clear or enlarge the site for which fifty-one houses were demolished; fifty others lay waste at the time of the Domesday Survey, and forty-three were held by Normans. The castle was erected at the entrance of the peninsula on which the town stands. There had been a castle here previously, which was besieged A.D. 1068, by the Anglo-Saxon insurgents and the Welsh, who burnt the town. The castle and town were surrendered to Henry I., by Robert de Belesme, the third earl, who had risen in arms in favour of Robert, duke of Normandie, Henry's brother. After being held for several years by the crown, the earldom was granted by Henry (A.D. 1126) to his second wife. Her castellan and sheriff Fitz-Alan, held the castle for the empress Maud against Stephen, who took it by assault (A.D. 1138), and treated the defenders with great severity. It was retaken by Henry, son of Maud, afterwards Henry II., towards the close of Stephen's reign (A.D. 1152), and the custody of the castle was restored to Fitz-Alan. The town received a charter from Henry II., but the earliest charter extant is of Richard I. In A.D. 1215 the town was taken by the Welsh under Llewelyn the Great, prince of North Wales, who had joined the insurgent barons against John, but was not long held by him. In the subsequent reign Shrewsbury was repeatedly the scene of negotiation between the English and Welsh, or the place of rendezvous in the time of war for the English forces: at other times the surrounding country was exposed to the ravage of the Welsh, and in A.D. 1234 a part of the town, or more probably a suburb, was burnt by Llewelyn of Wales and Richard earl marischal, an insurgent English baron in alliance with him.

In the war of Henry III. with his barons, Shrewsbury was taken (A.D. 1264) by Simon de Montfort, the leader of the insurgent barons, and Llewelyn, grandson of Llewelyn the Great, prince of Wales; but the battle of Evesham (A.D. 1265) restored it to the crown. In A.D. 1283 a parliament was assembled at Shrewsbury for the trial of David, the last prince of Wales, who was executed as a traitor.

In the revolution which dethroned Edward II., the earl of Arundel, who attempted to support the king's cause, attacked Shrewsbury, but was defeated and taken by the burgesses, with the aid of Sir John Charlton of Powys, and beheaded at Hereford (A.D. 1325). In the reign of Richard II. a parliament was held here (A.D. 1397-98), at which the earl of Hereford (afterwards Henry IV.) brought the charge of treason against the duke of Norfolk. In the early part of the reign of Henry IV. (A.D. 1402) that king assembled an army here to march against Owen Glendower; and the year after he fought the famous battle of Shrewsbury against the insurgent Percies and their allies.

The insurgents, under the younger Percy (Hotspur), were marching from Stafford towards Shrewsbury, which they hoped to occupy, as its command of the passage over the Severn would enable them to communicate with their ally Glendower; but the king, who came from Lichfield, reached Shrewsbury a few hours before them (July 19) Henry set fire to the suburb adjacent to the castle, and marched out to offer battle; but Hotspur, whose forces were weary with their march, drew off, and the battle was fought next day at Hateley Field, about three miles north by east of the town. Hotspur had about 14,000 men, a considerable part of them Cheshire men, who were famous for their skill as archers. Henry's force was nearly twice as great. The engagement was very fierce, but the death of Hotspur decided the battle. The insurgents were defeated with great slaughter; the earls of Douglas and Worcester and Sir Richard Venables were taken; the first was released, but the last two, with some others, were beheaded without trial.

In the war of the Roses, Shrewsbury supported the Yorkists, and Edward IV. showed much favour to the townsmen His second son Richard, the younger of the two princes murdered in the Tower, was born here. The earl of Richmond, on his march previous to the battle of Bosworth, was received into Shrewsbury with some reluctance by the magistrates, but with acclamations by the townsmen.

In the civil war of Charles I. the king came to Shrewsbury, where he received liberal contributions of money and plate from the neighbouring gentry, and largely recruited his forces. The earl of Denbigh and Colonel Mytton, the parliamentary commanders, having approached Shrewsbury (July, 1643), were repulsed by Sir Fulk Hunkes, an officer of the royalist garrison, of which Sir Francis Ottley was governor. The town was however surprised and taken by the parliamentarians (February, 1644). A plot formed by the royalists to surprise Shrewsbury (A.D. 1655) failed. Another attempt (A.D. 1659) after Oliver Cromwell's death met with no better success. The only subsequent events worthy of notice are the visit of James II. (A.D. 1685); the triumphant entry of Sacheverel, in his memorable progress (A.D. 1710), and the riotous destruction of the Presbyterian meeting-house (A.D. 1714).

The town stands chiefly on a peninsula formed by the Severn. It was formerly wholly contained within this peninsula, but has gradually extended beyond the Severn on the east and west side, forming the suburbs of Abbey-Foregate and Coleham on the east, and of Frankwell on the west; and on the north extending beyond the isthmus or neck occupied by the castle, forming the suburb of the Castle-Foregate. The streets are irregularly laid out, and for the most part inconveniently narrow, though several improvements have been made under an act of parliament obtained in 1821: the streets are indifferently paved, and lighted with gas; water is provided by a water-company, at an average charge of twenty shillings per annum for each house: the water is brought from a spring two miles distant. The only part of the antient walls which remains is a ruinous wall erected by Cromwell on the north-west side of the town, between the isthmus and the Welsh bridge; and a tower, and (unless lately demolished) part of the wall on the south side. There are some remains of the castle, especially of the keep, which has been modernised, of the walls of the inner court, the great arch of the inner gate, a lofty mound on the bank of the river, and a fort called Roushill, built by Cromwell. The houses in the town are of very varied character; modern buildings, many of them handsome, being mingled with others of greater antiquity. There are two bridges over the Severn: the English bridge (built A.D. 1774), a handsome freestone structure of seven semicircular arches, connects the Abbey-Foregate with the town; and the Welsh bridge, a neat plain structure of five arches, connects Frankwell with it. There is another bridge at Coleham over the Meol brook, which joins the Severn above the English bridge.

There are some remains of the Benedictine abbey founded by Roger de Montgomery (A.D. 1083), and which had at the dissolution a revenue of 615*l.* 4*s.* 3½*d.* gross, or 532*l.* 4*s.* 10*d.* clear. It occupied a low site of about ten acres, in the suburb of Abbey-Foregate. Part of the embattled wall which enclosed the precinct remains: it is nearly entire on the north and east sides. The enclosure is occupied by a modern mansion with its garden and fishpond; and in the garden is a beautiful stone pulpit of decorated character, covered with a profusion of ivy. The abbey church, a cruciform structure, was in great part demolished at the dissolution; but the nave, western tower, and north porch remain, though in a very dilapidated condition, and constitute the parish church of Holy Cross parish. The architecture was originally Norman; but it has undergone material alterations, especially by the insertion of a large perpendicular window in the face of the western tower. Beneath this window is a Norman doorway, the deep recess of which is adorned with various mouldings. St. Alkmond's church has been rebuilt in modern times, with the exception of the tower and spire (184 feet high), which belonged to the more antient structure. St. Chad's has also been rebuilt: it is a Grecian structure, of circular form, with a tower 150 feet high. A small part of the old church of St Chad (part of the south aisle of the chancel) now remains, and is used as a school: it is a curious structure, and contains Norman, early English, and decorated remains. St. Julian's was rebuilt about the middle of the last century; but the tower, which is of Norman architecture, belonged to the old church. St. Mary's is an antient large and fine cross church: the lower part of the tower and the south porch are of good Norman architecture, the rest of the church is principally early English, with some windows (especially those of the clerestory, which are all perpendicular) of later date: there is a very good perpendicular font. There is an antient chapel of St. Giles in the Abbey-Foregate, originally attached to the hospital of the abbey; it has been repaired within these few years. There are two modern chapels-of-ease, one to St. Mary's in the Castle-Foregate and one to St. Chad's in Frankwell; and there are several dissenting places of worship.

Among other buildings may be mentioned the town and shire hall, a spacious and handsome stone building containing two courts for the assizes, a room for county and corporation meetings, a grand-jury room with some interesting portraits, and other offices; the town and county gaol and house of correction; the military depôt, a handsome brick building near the Abbey-Foregate; the house of industry in Meol-Brace parish; the infirmary; the column in honour of Lord Hill, at the entrance of the town from London; the public subscription library, the theatre, and the assembly-rooms. On the south-west side of the town is 'the quarry,' a handsome public walk planted with lime-trees, comprising about 20 acres, and extending along the bank of the Severn.

The borough of Shrewsbury, before the alterations made by the Boundary and Municipal Reform Acts, comprised the six parishes of St. Alkmond, St. Chad, Holy Cross with St. Giles, St. Julian, St. Mary (the greater part of it), and Meol-Brace; and had an area of 14,680 acres. There were, in 1831, 4057 houses, inhabited by 4509 families, 177 houses uninhabited, and 46 houses building; with a population of 21,297. The liberties of the borough had, in addition, 435 houses, inhabited by 448 families, 7 houses uninhabited, and 2 houses building. The trade of the town is considerable, especially in Welsh cloths and flannel from the counties of Denbigh, Montgomery, and Merioneth; thread, linen-yarn, and canvas are manufactured, and there are iron-works at Coleham. The town has long been famous for brawn and 'Shrewsbury cakes.' There are markets held on Wednesday and Saturday, the latter for grain; there are market-houses for the corn and general markets. The Severn is navigable for boats of 30 or 40 tons, and there is a canal to Wombridge which opens a communication with the Staffordshire collieries.

The quarter-sessions and assizes for the county are held here; and it is the place of election and a polling-station for the northern division of the county.

Shrewsbury is a borough by prescription: the jurisdiction of the corporation extends over the borough and liberties. The boundaries of the borough, as enlarged by the Boundary Act, were adopted in the Municipal Reform Act, by which Shrewsbury was divided into five wards, and had allotted to it 10 aldermen and 30 councillors. Quarter-sessions and petty-sessions, the latter at least once a week, are held; and there are a court of record and a court-leet. The borough has sent two members to parliament from 23 Edward I.

The livings of St. Alkmond, St. Chad, and Holy Cross with St. Giles, are vicarages, of the clear yearly value of 219*l.* (with a glebe-house), 350*l.*, and 323*l.* respectively; St. Julian and St. Mary are perpetual curacies, of the clear yearly value of 159*l.* and 312*l.* respectively. All are in the archdeaconry of Salop and the diocese of Lichfield and Coventry, except St. Mary's, which is a royal peculiar or free chapel.

There were in the borough, in 1833, four dame or infant schools, with 165 boys and 149 girls: twenty-seven other day-schools of all kinds, with 939 boys and 750 girls; two of these schools, with 67 boys and 237 girls, were also Sunday-schools; and there were besides eight Sunday-schools with 444 boys, 275 girls, and 310 children of sex not specified. There was also one evening school with 35 children of sex not specified. One of the day-schools was the 'Royal Free Grammar-School,' which was endowed by King Edward VI., and was long under the care of the late Dr. Butler, afterwards Bishop of Litchfield and Coventry: it had, in 1833, 260 boys: two others were 'national' schools; another a Lancasterian school; and another, 'the Blue' or 'Bowdler's Charity-School,' was well endowed.

Among the natives of Shrewsbury were Speaker Onslow, Job Orton and Hugh Farmer, dissenting divines of note, Dr. Charles Burney, the author of the 'History of Music,' and Costard the mathematician.

(Owen and Blakeway's *History of Shrewsbury*; Rickman's *Gothic Architecture*; *Parliamentary Papers*.)

SHRIKES, the English ornithological name of the *Butcher Birds* (*Lanius*, Linn.).

Linnæus places his genus *Lanius* at the end of his first order, *Accipitres*, immediately following the owls (*Strix*). The *Picæ* form the succeeding order.

Cuvier makes the *Pies-Grièches* (*Lanius*, Linn.) the first great genus of his *Dentirostres*, his second order; the *Oiseaux de Proie* (*Accipitres*, Linn.) being his first.

Vigors observes that in the characters of the notched, depressed, and angular bill, and the strong hairs or vibrissæ that surround its base, as well as in their manners, the *Muscicapidæ* partially correspond with the *Laniadæ*, from the earlier families of which they chiefly differ in their inferior power and robustness. Entering among the *Laniadæ* by the genus *Tyrannus*, Cuv., which unites them with the preceding *Muscicapidæ*, and from which he would separate it chiefly on account of the strength of the bill, wherein the character of a *Shrike* is more conspicuous than that of a *Flycatcher*, Vigors proceeds by means of *Psaris*, Cuv., and

Artamus, Vieill., to *Dicrurus*, Vieill., the fork-tailed Shrikes of the Old World, where the base of the bill is still depressed and wide, as in the groups just quoted, but the apex gradually more compressed. Hence, he remarks, we are led by some intervening forms to the still more compressed bills of *Sparactes*, Ill., and the true *Lanius* of authors, which, by its short, compressed, and strongly dentated bill, exhibits the type of the family. 'Here,' continues the author, 'we are met by some conterminous groups, among which *Falcunculus*, Vieill., is conspicuous. And hence we descend by intermediate gradations to the more lengthened and slender-billed *Vanga*, Cuv., together with *Prionops*, *Laniarius*, and *Thamnophilus* of M. Vieillot, which bring us in contact with the *Thrushes*. The extremes of the family will be found in the *Graucalus* and *Ceblepyris* of M. Cuvier, which by their bills, in some degree depressed at the base, lead back to *Tyrannus* and the other broad-billed groups which commence the family. This last-mentioned genus *Ceblepyris* has latterly been arranged among the *Thrushes*. But I feel inclined rather to leave it in its original station among the *Shrikes*, from the peculiarity of its tail-coverts, which form themselves into a kind of puffed-out cluster on the back. This character seems to prevail among the *Laniadæ* more generally and in a greater degree than in other birds: in one species of the family the *puff-backed Shrike* of Africa, now rendered so familiar to our cabinets from our connection with the Cape, this singular protuberance is carried to so great an extent as to form an apparently artificial appendage to the back. In the genus before us this peculiarity seems even still further developed in the well-known conformation of the same tail-coverts; their shafts being elongated and projected beyond the webs in stiff and sharpened points. On looking to the general affinity which the extremes of this family bear to the *Musicapidæ*, and through them to the *Fissirostral* birds of the last preceding tribe, we may perceive the character of feeding on the wing carried on to the *Tyranni*, the fork-tailed *Dicruri*, and more particularly to the *Artami*, or the *Pie-grièches Hirondelles* of the continental writers; while the depressed bill of the same *Fissirostral* tribe is partially preserved in the groups just mentioned, together with that of *Ceblepyris*, which meets them at the opposite extreme of the circle of affinity.' [MERULIDÆ; MUSCICAPIDÆ.]

In allusion to the rapacious habits of the *Laniadæ*, Mr. Swainson observes that the comparisons which have been drawn between them and the Falcons are no less true in fact than beautiful in analogy, remarking that many of the *Falconidæ* sit on a tree for hours, watching for such little birds as come within reach of a sudden swoop, when those birds of prey pounce on the quarry, seise it in their talons, bear it to their roost, and devour it piecemeal. These, he adds, are precisely the manners of the true Shrike; yet with all this, the structure of the falcons and shrikes, and their more intimate relations, are so different, that they cannot be classed in the same order, though they illustrate that system of symbolic relationship termed analogy, which, in Mr. Swainson's opinion, pervades creation; but the two groups are, he remarks, in nowise connected, and there is consequently no affinity between them. The following, according to him, are the very decided external characters of the typical groups:—

The short and strong bill is abruptly hooked at the end, and the notch is so deep as to form a small tooth, more or less prominent, on each side: this projection, Mr. Swainson remarks, is analogous to the teeth of quadrupeds, so far as it enables the bird to take a firm grasp of its food, and is used to divide it into pieces: the claws also, as instruments of capture, are peculiarly fine and sharp in the typical group, and this character pervades more or less the whole family. The mode of darting suddenly on their prey (rather than hunting or searching for it) is most prevalent in those groups which are nearest related to the flycatchers, whose general weakness however confines their depredations to the smaller insects: larger and more powerful tribes being the food of the typical Shrikes.

Mr. Swainson arranges the *Laniadæ* in five divisions or subfamilies:—1, The *Tyranninæ*, or Tyrant Shrikes; 2, the *Ceblepyrinæ*, or Caterpillar Shrikes; 3, the *Dicrurinæ*, or Drongo Shrikes; 4, the *Thamnophilinæ*, or Bush Shrikes; and 5, the *Lanianæ*, or true Shrikes. According to Mr. Swainson's views, the first three of these subfamilies constitute the aberrant circle, or that in which the character of the Shrike is least conspicuous. The fourth is the subtypical; and in the fifth the lanine structure is most perfectly developed.

Tyranninæ.

Subfamily Character.—Bill very straight, short, depressed its whole length; the culmen not arched, but the tip abruptly hooked. Nostrils and rictus defended by bristles. Feet short, small, and slender. Lateral toes equal, or very nearly so. Claws long, slender, fully curved, and very acute.

Locality.—America only.

Genera.—*Ptilogonys*, Sw.; *Chrysolophus*, Sw.; *Saurophagus*, Sw., with its subgenus *Megastoma*, Sw.; *Tyrannus*, Vieill., with its subgenus *Milvulus*, Sw.; and *Tyrannula*, Sw.

Mr. Swainson observes that the connection between the family of shrikes and that of the flycatchers (*Muscicapidæ*) by means of the *Tyranninæ* is so perfect, that it is difficult at present to determine where one terminates and the other commences. The water-chats of Brazil pass by such imperceptible degrees into the lesser tyrant shrikes (*Tyrannula*), that, although an observer on the spot might, he remarks, draw a distinction, an ornithologist acquainted only with dried skins is at a loss to distinguish their remote ramifications. 'The water-chats, *Fluvicolinæ*,' says Mr. Swainson in continuation, 'which seem to connect the tyrant shrikes to the fly-catching family, or the *Muscicapidæ*, like very many other tribes, have their plumage black and white variously blended, but without any mixture of green. The lesser tyrants (*Tyrannula*), on the contrary, are all of an olive-coloured plumage; that colour, in short, which is most adapted for concealment among foliage, and therefore suited to their manner of life: between these however we find some curious birds, which borrow the habits of both groups. The species called by Latham White-headed Tody, for instance, is black and white: its general resort is on the sides of marshes, where it perches upon the reeds, and darts on passing insects in the same manner as a true tyrant shrike; this we have ourselves repeatedly witnessed. Azara says that it likewise chases insects upon the ground; so that we have thus in this one bird the manners of both groups exemplified. Whether this, or the *Tyrannula ambulans* of Brazil, which lives on the ground like a lark, constitutes a generic type in this division, is at present uncertain. The lesser tyrants (*Tyrannulæ*) are spread over the whole of America, where they represent the true flycatcher (*Muscicapa*) of the Old World: both have nearly the same manners; and so closely do they resemble each other, that they can only be distinguished by their feet, tail, and wings. From these we may pass to the true or greater tyrants, by a little subgeneric group (*Milvulus*, Sw.) having very long forked tails. The habits of the typical tyrants intimately resemble those of the lesser, but they feed upon larger insects more suited to their own size: some imitate the kingfishers, by diving in the water; and they will even prey upon small reptiles. The species, which are numerous, swarm in tropical America, where they are everywhere seen, perched upon naked branches, and uttering at short intervals a sharp and monotonous cry. The tyrants are bold and quarrelsome birds, particularly during the season of incubation: the male will not then suffer any birds to come near its nest, and becomes so infuriated against such unconscious intruders, that it will attack both hawks and eagles, with a determination not to be resisted, until they are fairly driven away.'

Ceblepyrinæ.

Subfamily Character.—Bill broad at the base, but destitute of long bristles. Rictus nearly smooth. Wings pointed; the three first quills graduated. Feathers on the rump very thick, and apparently spinous. Tail with the centre emarginated, and the sides rounded. Feet short; lateral toes unequal.

Locality.—Warm latitudes of the Old World.

Genera.—*Ceblepyris*, Cuv.; *Oxynotus*, Sw.; *Campephaga*, Vieill., with its subgenus *Phænicornis*, Sw.; and *Erucivora*, Sw.

Mr. Swainson is of opinion that the passage from the tyrant shrikes to the *Ceblepyrinæ* is sufficiently marked by the Mexican genus *Ptiliogonys*, which brings them very close together. The *Ceblepyrinæ* are confined to the Old World; but, according to that author, not a single species had yet been found in Europe. They live upon soft caterpillars, for which they search among the foliage of high trees, as Le Vaillant, who first called attention to the group, pointed out. Mr. Swainson remarks that nearly all the species are distinguished by the feathers on the back, which are very thick set; and when the hand is passed over them in a direction towards the head, they feel as if intermixed with little sharp spines concealed beneath the surface. This singular construction, he adds, is seen also in the Trogons, and, in a less degree, in the families of orioles and cuckoos. The genus *Phœnicornis*, in his opinion, unites this division to the tyrants.

Dicrurinæ.

Subfamily Character.—Bill compressed towards the end; the culmen gradually arched and bent over the lower mandible. Feet short. Tail lengthened, generally forked. Wings long, and more or less pointed.

Locality.—The warm latitudes of the Old World.

Genera.—*Tephrodornis*, Sw.; *Melasoma*, Sw.; *Ocypterus*, Cuv., with its subgenus *Analcipus*, Sw.; and *Dicrurus*, Vieill.

Mr. Swainson holds that we are led to the *Dicrurinæ*, or Drongo Shrikes of Le Vaillant, by those caterpillar-catchers (*Erucivora*, Sw.) which have only a few acute feathers on their back; or that the genus *Oxynotus* may possibly effect this junction. The Drongos, he states, are fly-catching birds, having their bill both compressed and depressed, and the mouth furnished with very stiff long bristles. 'These,' says Mr. Swainson, in continuation, 'are entirely unknown in America, where they seem to be represented by the fork-tailed tyrants (*Milvulus*, Sw.): like them, they have the tail, almost universally, long and forked; and they associate, as do the American birds, in flocks, something like swallows, pursuing insects upon the wing in every direction. Bees appear to be a favourite food with these birds, as they are likewise with the King Tyrant of North America (*Tyrannus intrepidus*). Some are ornamented with little recurved crests in front of the head; others have the neck-feathers pointed, and of a rich metallic hue; most have the tail remarkably developed; and nearly all are of a uniform glossy black colour: hence it becomes very difficult to distinguish the species, which, in truth, are much more numerous than has been generally imagined. In the genus *Analcipus* we first have a few bright colours. Only three species, natives of Madagascar and the Indian Islands, have yet been discovered; they lead us to the swift shrikes (*Ocypterus*, Cuv.), so named from their very long wings; but in *Tephrodornis* these members again become like those of the Drongos. This latter genus is very remarkable; for, by the bristly nature and the incurved direction of the frontal feathers, we have a clear representation of *Chætoblemma*, and all those bristle-fronted birds which are analogical to *Prionops* and *Dasycephala*.'

Mr. Swainson remarks with regard to these three groups, which form, according to him, the aberrant subfamilies of the *Laniadæ*, that the approximation of the *Dicrurinæ* to the *Tyranninæ* has been thought so strong and so decisive, that one ornithologist supposes they actually pass into each other; and he thinks that this union is not only highly probable, but what we should naturally expect; in which case the three aberrant groups would form their own circle.

Thamnophilinæ.

Subfamily Character.—Lateral toes unequal; the outer connected to the first joint of the middle toe. Claws broad, and not very acute. Bill lengthened, abruptly hooked at its tip; the tooth prominent.

Genera.—*Thamnophilus*, Vieill.; *Malaconotus*, Sw.; *Prionops*, Vieill.; *Colluricincla*, Vig.

Mr. Swainson remarks that the habits of the *Thamnophilinæ*, or Bush-Shrikes, are strikingly opposed to those of the aberrant divisions, as he terms them. The Bush-shrikes, he tells us, live among thick trees, bushes, and underwood, where they are perpetually prowling about after insects and young and sickly birds, and are great destroyers of eggs. They neither seize their prey with their claws, nor do they dart at it on the wing; the former therefore are thick and rather blunt, and the wings are so short as to indicate very feeble flight. The bill, which is the capturing instrument, is always stout, much more lengthened than in the true shrikes, and very abruptly hooked at the end, which is armed with a strong tooth.

Only one species of *Prionops* (*P. plumatus*), according to the same author, was known until lately, and that is common in Senegal, where it is said to search for terrestrial insects in humid situations beneath the surface: it has a peculiar crest of rigid feathers falling back on the head, but also reversed over the base of the bill, and completely protecting the nostrils and the sides of the mouth. Mr. Swainson looks upon this bird as forming the point of union between the bush-shrikes and the forked-tailed shrikes, or *Dicrurinæ*, the singular structure above noticed being partially developed in the genus *Tephrodornis*.

Thamnophilus, which Mr. Swainson regards as strictly typical, shows, he observes, the perfection of that particular structure which distinguishes the bush-shrikes. The bill is very powerful; and although many of the species far exceed a thrush in size, others are not much larger than a wren. The group is stated to be confined to the hotter latitudes of America, where the species are very numerous. Though the plumage is thick, the texture of the feathers is very soft and lax. The colours are sombre, but often elegantly varied with dark bands and white spots. Mr. Swainson looks upon the genus *Malaconotus* as representing these birds in Africa; and he observes that, although they were long confounded with them, their distinctions are very decisive, the African group being distinguished for the gaiety and brightness of their plumage; the brightest crimson, combined with glossy black or clear green, with orange or yellow, decorating most of the species. Others however have the sombre colours of the American group, but they are never banded; and a few so nearly approach the *Lanianæ*, that it is very difficult to distinguish them otherwise than by the great inequality of their lateral toes, the inner one being always much shorter than the outer, and the latter often so connected to the middle toe that the feet are partially syndactyle. The Australian genus *Collurisoma* (Colluricincla?), he thinks, probably represents the tenuirostral type.

Lanianæ.

Subfamily Character.—Lateral toes equal and free. Claws slender, acute. Bill generally short, with the tooth very prominent.

Genera.—*Lanius*, Linn.; *Telophonus*, Sw.; *Chætoblemma*, Sw.; *Nilaus*, Sw.; and *Falcunculus*, Vieill.

Mr. Swainson is of opinion that the precise passage between the *Thamnophilinæ* and the *Lanianæ* seems to be effected by the genus *Chætoblemma*, a remarkable form discovered in South Africa by Mr. Burchell. This, Mr. Swainson observes, is the only short-billed shrike that has the frontal feathers stiff and directed forwards upon the base of the bill: in that respect, as well as in the length of its wings, it presents, in his opinion, a curious analogy to *Prionops* among the bush-shrikes.

The same author remarks that as the genus *Lanius* is pre-eminently typical, not only of its own family, but of the whole tribe of *Dentirostres*, or toothed-billed birds, every country in the world possesses examples of it: even in New Holland the true shrikes are, he states, represented by a peculiar type, the *Falcunculus frontalis*, which however, instead of watching for its prey and devouring birds or grasshoppers, by impaling them upon thorns and feeding on them at leisure, like the true shrikes, climbs among the branches of trees and devours the hard-coated beetles which lurk beneath. Here, he observes, is a bird having the form of a shrike and the habits of a woodpecker. This New Holland shrike, as being the scansorial type of the *Lanianæ*, becomes, in Mr. Swainson's opinion, the representative of the titmice, and has the crest and nearly the same coloured plumage as the genus *Parus*. This analogy, according to his views, is further indicated by the great size of the hind toe, which is so unusually large, as at once to evince the climbing habits of the bird, as affirmed by Lewin. Nor is this, in his opinion, the only analogy indicated by the colours of this species; for in the *Bentivi Tyrant* (*Saurophagus sulphuratus*, Sw.), he sees a bird in all its most striking peculiarities of plumage coloured like the *Falcunculus cristatus*, with this difference only, that in one the back is olive-brown, and in the other olive-green. 'Now,' continues Mr. Swainson, 'it is precisely at this point where, according to our theory, the circle of the shrike family is closed; and thus these two genera will stand in juxta-position. Certain however it is that of all the tyrants, the Bentivi is that which most resembles a true shrike; not so much perhaps by its general structure, as by its living upon reptiles, and even carrion, and thus becoming, like the shrikes, both insectivorous and carnivorous.' [BENTIVI.]

Of the two other genera comprised in this subfamily, *Telophonus* and *Nilaus*, the former, according to the same

Google

author, bears such a strong resemblance to the typical genus *Lanius*, as well as to *Malaconotus*, that, without a knowledge of the true characters of these three groups, an ornithologist may be much perplexed in detecting their essential differences. 'The genus *Lanius*,' says Mr. Swainson, 'as already mentioned, is chiefly known in its outward appearance by its short and strongly toothed bill: but there is another character equally important, which all writers have hitherto overlooked—this is to be found in the equal length of the lateral toes and the acuteness of the claws. Now this structure of foot is also found, with a diminution hardly perceptible, in *Telophonus*; but then the bill is lengthened, so as to give these birds at the first glance an appearance of being *Maluconoti*. This union of characters is just what we should expect in such birds as were to *represent* the bush-shrikes in the circle of *Lanianæ*; for although the bill is moderately lengthened in *T. collaris*, and remarkably so in *T. longirostris*, still the culmen is regularly curved, and not *abruptly* hooked at the end, as in *Malaconotus*. We have no remaining doubt, in short, of the immediate union of *Telophonus* with the pre-eminently typical genus *Lanius*, this union being effected by the corvine shrikes in one division, and the *Teloph. leucogrammicus* in the other. The second type is *Nilaus*, at present composed but of one species: it has the bill much like that of a true shrike, but considerably attenuated; and the general organisation of the bird is weaker than in any other genus. This, we think, is the tenuirostral type of the circle; if so, it will consequently stand between *Chætoblemma* and *Falcunculus*. We have already shown in what respect this latter genus may be viewed as uniting the whole of the shrikes into one circular family; but as we have ventured so far as to trace out the smaller circle of the *Lanianæ*, the ornithologist may well inquire in what manner *Falcunculus* can be actually united to *Lanius*, seeing that its outward structure, no less than its scansorial habits, are so different. Now this union is effected by a singular bird of Brazil, long bandied about (to translate an expressive French phrase) in systems, from the Tanager family to the old genus *Lanius*, and then again to *Thamnophilus*: its structure was so peculiar, that some years ago we placed it as the type of a supposed genus, under the name of *Cyclaris*: a more minute analysis however of this subfamily, and more especially the recent discovery of *Chætoblemma* among the unexamined birds of our friend Mr. Burchell, has quite satisfied us that this is not one of the prominent types of the *Lanianæ*, but only an aberrant species of *Falcunculus*; we therefore cancel the name of *Cyclaris*, and propose for this bird the name of *Falcunculus Guianensis*.'

The following is Mr. Swainson's table of analogies of this family:—

Tribes of Perchers.	Analogies.	Subfamilies of Shrikes.
DENTIROSTRES .	Bill short, toothed; seize their prey with their foot . .	LANIANÆ.
CONIROSTRES . .	Bill lengthened; compressed feet strong; robust . .	THAMNOPHILINÆ.
SCANSORES . . .	Feet very short, hind toe lengthened . .	DICRURINÆ.
TENUIROSTRES .	Bill weak, mouth smooth; feed only on soft substances	CEBLEPYRINÆ.
FISSIROSTRES . .	Bill broad; feed upon the wing . .	TYRANNINÆ.

'Every one,' observes Mr. Swainson, 'must have perceived the resemblance, both in form and habits, between the true shrikes and the falcons, and that *Lanius*, which is the first division or genus, is typical of the whole family. The skulking thievish propensities of the bush-shrikes (*Thamnophilinæ*), and the jays (which belong to the *Conirostres*), in plundering the nests and destroying the eggs of other birds, is thus explained; since it is seen by the above table, that these two groups mutually represent each other. The very great development of the tail in nearly all the Drongo Shrikes (*Dicrurinæ*) is also one of the most remarkable distinctions of gallinaceous birds and of the scansorial tribe, which latter is eminently characterised by the peculiar length of the hind-toe and by the tail-feathers ending in fine points: all these characters are found in the Drongos, but in no other shrikes. The soft and tender food of the caterpillar-catchers (*Ceblepyrinæ*) evinces that even the *Tenuirostres*—a tribe living chiefly upon juices—may be represented by insectivorous shrikes; while the great depression of the bill which has caused the tyrants (*Tyranninæ*) to be confounded with the flycatchers, their constant habit of capturing their prey upon the wing, and the recorded fact that more than one species dives in the water, all remind us of the fissirostral swallows and the aquatic order of *Natatores*.'

Before dismissing his account of this family, Mr. Swainson makes the following remarks upon the genera *Vanga* and *Platylophus*,—two modern genera, he observes, that appear to enter within its limits, but whose true situation he suspects is very different. 'The name of Vanga,' says Mr. Swainson, 'was given by Buffon to a singular and very rare bird of Madagascar, as big as a jay, but with a long abruptly hooked bill like a *Thamnophilus*. It has been usual to place this genus, as well as that of *Platylophus*, in the same group: but when we find that even M. Cuvier joins them with the large bush-shrikes, and several of the African *Malaconoti*, in his genus *Vanga*, we immediately perceive that a group so composed is entirely artificial. The resemblance between *Vanga Destructor* and the smaller species of *Barita*—which latter are obviously crows—is so perfect, that a suspicion has always existed in our mind that both belonged to the corvine family. As we have seen, in the genus *Falcunculus*, a New Holland shrike assume all the manners of a woodpecker, may not *Vanga*, *Barrita* (Barita), &c., by analogy of reasoning, be true crows, disguised under the economy and much of the structure of shrikes? Again, does the *Vangæ* (Vanga) of New Holland and that of Madagascar belong to the same genus, or even to the same natural group? The only specimen of this latter bird known to exist in collections is in the Paris Museum, but in too injured a state to allow of this question being answered. On the other hand we happen to know, from unquestionable testimony, that the *Vanga Destructor* of New Holland kills and eats small birds, in the same manner as the European species; and that it is actually called a butcher-bird by the colonists. Yet this, after all, seems to us only a relation of analogy, just as in the case of *Mniotilta*, which, although it climbs like a *Certhia*, is merely a representation of those scansorial birds, and truly belongs, by affinity, to the circle of warblers. Since our last observations upon *Vanga* were published, we have been fortunate in procuring two or three species, which so connect the New Holland *Vangæ* with *Barrita* (Barita), that we no longer hesitate to place them all in the corvine family (*Corvidæ*); where also we now arrange *Platylophus*, since it certainly has a greater resemblance to *Vanga Destructor* than to any of the soft-backed shrikes or *Malaconoti*. This alteration does not however interfere with anything we have said regarding *Platylophus* being a rasorial type: as such it remains, but merely fills that station in another circle. *Platylophus*, in short, has all the outward aspect of a jay, combined with that of a shrike; while its remarkable crest indicates to which of the primary types of nature we should refer it. (*Classification of Birds*; see also *Zoological Journal*, vols. 1 and 2; and *Fauna Boreali-Americana*, vol. 2.)

The Prince of Canino, in his *Specchio Comparativo* (1827), places the genus *Lanius* between the genera *Vireo* and *Turdus*. In his *Geographical and Comparative List of the Birds of Europe and North America* (1838), the Prince arranges the *Lanidæ* between the *Muscicapidæ* (its last subfamily being *Vireoninæ*) and the *Corvidæ*. In this arrangement the family consists of the subfamily *Laninæ*, which is composed of the genera *Lanius*, Linn., and *Enneoctonus*, Boie (*Lanius*, Vig.).

Mr. G. R. Gray makes the *Laniadæ* (his fifth family of the tribe *Dentirostres*) consist of but two subfamilies—the *Lanianæ* and the *Thamnophilinæ*.

Lanianæ.

Genera.—*Keroula*, J. E. Gray; *Corvinella*, Less.; *Lanius*, Linn.; *Collurio*, Briss.; *Eurocephalus*, Smith; *Orevica*, Gould; *Falcunculus*, Vieill.; *Cyclarhis*, Sw.; *Laniellus*, Sw.; *Telophorus*, Sw.; *Niläus*, Sw.; *Napothera*, Mull.; *Prionops*, Vieill.; *Colluriocincla*, Vig. and Horsf.

Thamnophilinæ.

Genera.—*Thamnophilus*, Vieill.; *Cymnlaimus*, G. R Gray; *Pityriasis*, Less.; *Vanga*, Buff.; *Laniarius*, Vieill.; *Dryoscopus*, Boie; *Chaunotus*, G. R. Gray; *Cracticus*, Vieill.

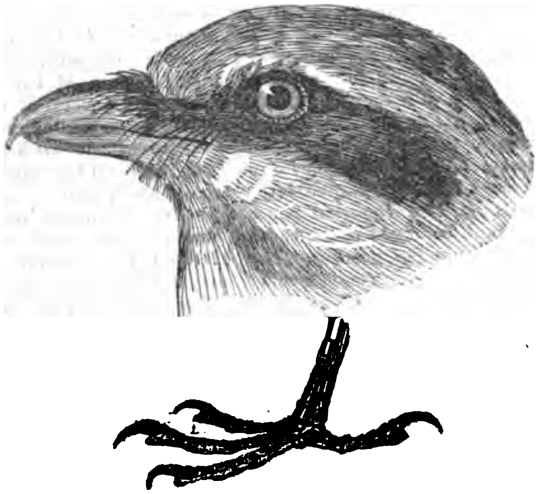
The *Dicrurinæ* are placed by Mr. G. R. Gray as the last subfamily (the 6th of the *Ampelidæ*; and the *Tyranninæ* occupy a position as the third subfamily in the family *Muscicapidæ*.

The *Laniadæ* in this author's arrangement come between the families *Ampelidæ* and *Corvidæ* (the first family of his tribe *Conirostres*). (*List of the Genera of Birds*, 1840.)

The European species of *Laniadæ* are *Lanii Excubitor*, *Meridionalis*, *Minor*, *Collurio*, and *rufus*, the two last belonging to the genus *Enneoctonus*, Boie.

We proceed to illustrate this family with the genus *Lanius*.

Generic Character.—Bill very short, strongly hooked; the tooth very prominent. Wings moderate, somewhat pointed. Tail rounded or slightly graduated. Lateral toes free and equal. Claws acute. (Sw.)



Head and foot of Lanius Excubitor.

We select as an example the *Butcher-Bird*, *Lanius Excubitor*, Linn.

Description.—Old Male.—Head, nape, and back fine bright ash; a large black band passing beneath the eyes and covering the orifices of the ears; lower part pure white; wings short, black; origin of the quills and extremity of the secondaries pure white; two external tail-feathers white; the third black towards the centre, the fourth terminated by a great white space, and the fifth by a less extensive space; the two middle ones entirely black; bill and feet deep black. Length 9 or 10 inches.

The *Young Male* resembles the female.

Female.—Upper parts less bright ash; lower parts whitish, each breast-feather terminated by a crescent of bright ash; less white at the extremity of the secondaries, and more black on the origin of the tail-feathers.

Varieties.—1. Nearly perfect white, only the black parts are lightly shadowed out by deep ash.

2. More or less variegated with white. (Temm.)

This is the *Castrica palombina* and *Averla maggiore* of the Italians; the *Pie-Grièche grise* and *Pie grisatre* of the French; *Torn-Skade* of the Danes; *Warfogel* of the Swedes; *Klavert* of the Norwegians; the *Berg-Aelster*, *Grossere Neuntoder*, and *Gemeine Würger* of the Germans; *Greater Butcher-Bird* or *Mattagess* of Willughby; *Mountain Magpie*, *Murdering Pie*, *Great Grey Shrike*, *Shreek*, and *Shrike* of the modern British; and *Cigydd Mawr* of the antient British.

Locality.—In England this species is only an occasional visitor, nor are we aware of any instance of its having bred here. 'The Grey Shrike,' says Mr. Yarrell, 'has been obtained in several southern and western counties. In Surrey, Sussex, Wiltshire, Dorsetshire, Devonshire, Worcestershire, and Cheshire; and I am informed by Mr. Thompson of Belfast, that it has occurred in one or two instances in the North of Ireland. A specimen shot near Belfast is in the collection of Dr. J. D. Marshall. North of London, it has been killed in Suffolk, Cambridgeshire, Norfolk, Yorkshire, Cumberland, Northumberland, and Durham. No Shrikes appear to have been seen either in the islands of Orkney or Shetland; but the Grey Shrike is included among the birds of Denmark, Norway, Sweden, Lapland, Russia, and Germany. In Holland it is rare; but it is rather a common bird in France, and remains there throughout the year, frequenting woods in summer and open plains in winter. It is an inhabitant also of Spain, Portugal, and Italy.' (*British Birds.*) The Prince of Canino notes it as common near Rome in winter. (*Specchio Comparativo.*)

Habits, Food, &c.—'This Bird,' writes Willughby, 'in the north of England is called *Wierangle*, a name, it seems, common to us with the Germans, who (as Gesner witnesseth), about Strasburgh, Frankfort, and elsewhere call it *Werkangel* or *Warkangel*, perchance (saith he) as it were *Wurchangel*, which literally rendered signifies a *suffocating angel*. In other parts of Germany it is called *Neghen-Doer*, that is, *Ninekiller* (*Enneactonos*), because it kills nine birds before it ceases, or every day nine. Our falconers call it the *Mattagess*, a name borrowed from the Savoyards, which is by Aldrovandus interpreted a *Murthering Pie*.' Dr. Brookes writes the northern name differently, 'called in Yorkshire and Derbyshire the *Were-Angel*.' The food of this species, which haunts bushes, the skirts of woods and plantations, consists of mice, field-mice, frogs, small birds, lizards, and beetles. 'Although,' says Willughby, 'it doth most commonly feed upon insects, yet doth it often set upon and kill not only small birds, as finches, wrens, &c., but (which Turner affirms himself to have seen) even thrushes themselves: whence it is wont by our falconers to be reclaimed and made for to fly small birds.'

Mr. Yarrell states that the grey shrike feeds upon mice, shrews, small birds, frogs, lizards, and large insects. In the *Portraits des Oyseaux* (1557), where, by the way, it is called *Falconello*, the bird is represented upon a field-mouse, with the following quatrain beneath its likeness:—

> 'Ceste Pie est la moindre de corsage:
> Au demeurant, elle vit de Souris,
> Rats et Mulots, qui sont par elle pris
> Parmy les champs, gastans bled et fourrage.'

So that it seems to have been considered a useful bird in France. It derives its name of *Butcher-Bird* from its habit of suspending its prey, after it has deprived it of life, upon thorns, and so hanging it up, as a butcher does his meat, upon its sylvan shambles. Mr. Yarrell quotes part of a letter from Mr. Doubleday of Epping, who states that an old bird of this species, taken near Norwich, in October, 1835, lived in his possession twelve months. It became very tame, and would readily take its food from its master's hands. When a bird was given to it, it invariably broke the skull, and generally ate the head first. It sometimes held the bird in its claws, and pulled it to pieces in the manner of hawks; but seemed to prefer forcing part of it through the wires, then pulling at it. It always hung what it could not eat up on the sides of the cage. It would often eat three small birds in a day. In the spring it was very noisy, one of its notes a little resembling the cry of the kestrel.

In the *Booke of Falconrie or Hawkinge* (London, 1611), we find *The Matagesse* immediately following 'the Sparrowhawke;' and at the end of 'A generall division of hawks and birdes of prey, after the opinion of one Francesco Sforzino Vyncentino, an Italian gentleman falconer,' we have the following account 'of the Matagasse:'—

'Though the matagasse bee a hawke of none account or price, neyther with us in any use; yet neverthelesse, for that in my division I made recitall of her name, according to the French author, from whence I collected sundries of these points and documents appertaining to falconrie, I think it not beside my purpose briefly to describe heere unto you, though I must needs confesse, that where the hawke is of so slender value, the definition, or rather, description of her nature and name, must be thought of no great regard;' and then the matagesse is described.

'Her feeding,' continues Turbervile, the writer of *The Booke*, 'is upon rattes, squirrells, and lisards, and sometime upon certaine birds she doth use to prey, whome she doth intrappe and deceive by flight, for this is her devise. She will stand at pearch upon some tree or poste, and there make an exceeding lamentable crye and exclamation, such as birdes are wonte to doe being wronged, or in hazarde of mischiefe, and all to make other fowles believe and thinke that she is very much distressed, and standes needefull of ayde, whereupon the credulous sellie birdes do flocke together presently at her call and voice, at what time if any happen to approach neare her, she out of hand ceazeth on them, and devoureth them (ungratefull subtill fowle!) in requital of their simplicity and pains. These hawkes are in no accompt with us, but poor simple fellows and peasants sometimes do make them to the fiste, and being reclaimed after their unskilful manner, do beare them hooded, as falconers doe their other kinde of hawkes whom they make to greater purposes. Heere I ende of this hawke, because I neither accompt her worthe the name of a hawke, in whom there resteth no valour or hardiness, ne yet deserving to have any more written of her propertie and nature, more than that she was in mine author specified as a member of my division, and there reputed in the number of long-winged hawks. For truely it is not the property of any other hawke, by such devise and cowardly will to come by their prey, but they love to winne it by main force of winges at random, as the round-winged hawkes doe, or by free stooping, as the hawkes of the tower doe most commonly use, as the falcon, gerfalcon, sacre, merlyn, and such like, which doe lie upon their wing, roving in the ayre, and ruffe the fowle, or kill it at the encounter.'

With reference to the art which the matagasse is here said to practise in order to entrap other birds, a device attributed to the butcher-bird by other authors, the communication of a writer in *The Naturalist* becomes interesting. He states that his first acquaintance with this bird was occasioned by hearing notes not entirely familiar to him, though they much resembled those of the Stonechat. Following the sound, he soon discovered the utterer; and, while listening, to his surprise, the original notes were discarded, and others adopted of a softer and more melodious character, never however prolonged to anything like a continuous song.

Sir John Sebright, in his interesting *Observations upon Hawking*, when treating of *Passage Hawks*, states that the slight falcons (*Falco gentilis*) which are brought to this country in the spring, to be used in flying herons, are caught in the preceding autumn and winter on the heaths near Falconsweard, as they pass towards the south and east. These hawks are taken, he tells us, by placing in a favourable situation a small bow net, so arranged as to be drawn over quickly by a long string that is attached to it. A pigeon of a light colour is tied on the ground as a bait; and the falconer is concealed, at a convenient distance, in a hut made of turf, to which the string reaches. A Butcher-Bird (*Lanius Excubitor*) 'that is, the Warder Butcher-Bird, from the look-out that he keeps for the falcon, is tied on the ground near the hut; and two pieces of turf are so set up as to serve him, as well for a place of shelter from the weather, as of retreat from the falcon. The falconer employs himself in some sedentary occupation, relying upon the vigilance of the butcher-bird to warn him of the approach of a hawk. This he never fails to do, by screaming loudly when he perceives his enemy at a distance, and by running under the turf when the hawk draws near. The falconer is thus prepared to pull the net the moment that the falcon has pounced upon the pigeon.'

The nest is generally built on trees, and is framed of grass-stalks, roots, and moss, with a lining of down or wool. The eggs, from four to six, or, according to Temminck, from five to seven, are bluish or greyish white, spotted on the larger end with light brown and ash.

The Butcher Bird, *Lanius Excubitor.*

In captivity, Bechstein states that, if the bird be captured when it is old, mice, birds, or living insects may be thrown to it, taking care to leave it quite alone, for as long as any one is present it will touch nothing; but as soon as it has once begun to feed freely, it will eat fresh meat, and even become accustomed to the universal paste. An ounce of meat at least is eaten at a meal, and there should be a forked branch or crossed sticks in its cage, across the angles of which it throws the mouse or any other prey, and then darting on it behind from the opposite side of the cage, devours every morsel. The same author states that it may be easily taken if a nest of young birds crying from hunger be suspended to some lime-twigs, and that in autumn and winter it will sometimes dart on birds in cages which are outside the window. Bechstein further remarks that, like the *Nutcracker*, it can imitate the different notes, but not the songs of birds. Nothing is more agreeable, according to him, than its own warbling, which much resembles the whistling of the grey parrot: its throat at the time being expanded like that of the green frog. He adds that it is a great pity that the bird only sings during the pairing season, which is from March to May, and even then often spoils the beautiful melody of its song with some harsh discordant notes.

SHRIMPS, *Salicoques* of the French, a very numerous family of Macrurous decapod crustaceans, whose body is generally compressed laterally, their abdomen very large, and their tegument simply horny.

Family Character.—As in the Astacians, the base of the external antennæ is furnished above with a lamellar appendage; but, in the shrimps, this *lamella* is much larger, nearly always entirely covered, and, generally, far surpasses the peduncle situated below. The *feet* are in general slender and very long, and the natatory false feet are encased at their base by lamellar prolongations of the dorsal segment of the corresponding wings of the abdomen, which descend very low. The caudal fin is large and well formed. The *branchiæ* are always composed of horizontal lamellæ, and are, in general, few in number. (Milne Edwards.)

M. Milne Edwards divides the family into four tribes:—

I. *Crangonians.*

Character of the Tribe.—Internal antennæ inserted on the same line as the external antennæ; first pair of feet terminated by a subcheliform hand.

This division comprises a single genus only; but the crustaceans which compose it differ too much from the other Salicoques to be comprised in the natural tribes formed by them. It corresponds to the genus *Crangon* of Fabricius, which, in the opinion of M. Milne Edwards, has been unnecessarily subdivided by Dr. Leach and M. Risso into the Crangons properly so called, Egeons, and *Pontophili*.

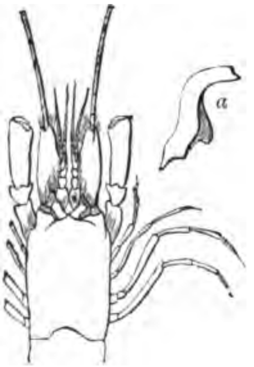
Crangon.

The genus Crangon (Fabr.) comprises those shrimps whose anterior feet are terminated by a monodactylous and subcheliform hand.

Generic Character.—Carapace much more depressed than in the other shrimps, and presenting anteriorly only the rudiment of a rostrum. *Eyes* short, large, and free. *Antennæ* inserted nearly on the same transversal line; the first pair dilated at their base, at the external side of which is a rather large scale; their peduncle is short, and they are terminated by two multi-articulate filaments. The external antennæ are inserted outwardly, and a little below the preceding, and they offer nothing remarkable. The *mandibles* are slender, and without any palp. The external *jaw-feet*, which are pediform, and of moderate length, terminate by a flattened and obtuse joint; within they carry a short palp, terminated by a small flagriform appendage directed inwards. The sternum is very wide backwards. The first pair of *feet* are strong, and terminate in a flattened band, on the anterior edge of which a moveable claw is bent back: the internal angle of this hand, which corresponds to the point of the claw, is armed with a tooth representing an immoveable rudimentary finger. The two succeeding pairs of feet are extremely slender; the second terminate, generally, in a very small didactylous claw; and the third are monodactylous, like those of the fourth and fifth pairs; but these four posterior feet are much stronger. The abdomen is very large, but presents nothing remarkable in its conformation. The branchiæ are only seven in number on each side of the thorax. (M. E.)

The genus is divided by M. Milne Edwards into the following sections:—

1. Species having the second pair of feet nearly as long as the third pair.



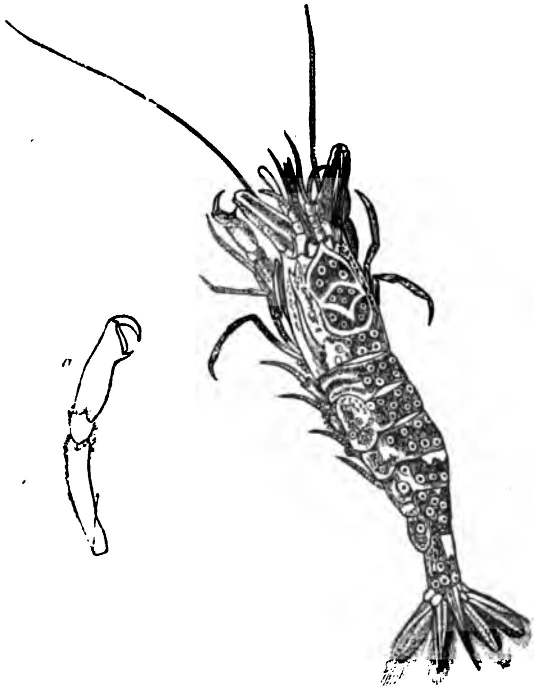
Details of Crangon. a, mandible.

In this section are comprised *C. vulgaris*, *C. fasciatus*, and *C. Boreas*. We select the first as an example.

Description of C. vulgaris.—Carapace and abdomen almost entirely smooth, with the exception of one small median spine on the stomachal region, and one lateral above each branchial region. Terminal filaments of the internal antennæ more than twice as long as their peduncle. Lamellar appendage of the external antennæ large and elongated (about twice as long as the peduncle of the internal antennæ). Last joint of the external jaw-feet long and narrow. Two last pairs of feet of moderate size. A strong spine inserted on the sternum, between the second pair of feet, and directed forwards. Abdomen smooth, and without any keel. Median blade of the caudal fin pointed, and without a furrow above. Length rather more than two inches. Colour greenish-grey, dotted with brown.

Localities.—Common on the coasts of England and France.

This is the *Crevette* of the French, and *Shrimp* of our markets, and is one of the most delicious, Pennant thinks the most delicious, of the macrurous crustaceans.



Crangon vulgaris. a, anterior foot or claw.

2. Species with the second pair of feet much longer than the third.

Example, *Crangon septemcarinatus; Sabinea septemcarinata*, Ross

Sabinea. (Ross.)

Generic Character.—*Upper antennæ* with two filaments inserted nearly on the same horizontal line; the interior longest. *Lower antennæ* shorter, a scale externally unidentate at the apex annexed to the peduncle; the first joint not prolonged to the middle of the scale.

Palps pediform, the four joints exserted; the two last equal in length.

Feet ten; the anterior pair subcompressed, subdidactylous; the second pair very short, thin, inunguiculate; third pair thin, furnished with a single claw; fourth and fifth pairs thicker than the preceding, furnished with compressed claws. (Ross.)

Example, *Sabinea septemcarinata; Crangon septemcarinatus*, Sabine.

Captain James Ross states, in the Appendix to Sir John Ross's 'Second Voyage,' that owing to the peculiar formation of the second pair of legs in this singular animal, it has become necessary to establish a new genus, which he dedicates to Major Sabine, by whom it was discovered on the coast of Davis's Straits, during Sir Edward Parry's first voyage to those regions.

The following is Major Sabine's *Description.*—Length four inches; colour varied, red and white above, white beneath. Thorax seven-carinate, the three lateral carinæ on each side serrate, the middle one with strong spines; rostrum short, curving down between the eyes, grooved in the centre; the five upper carinæ carried on in very faint rudiments along the back; the terminal setæ of the superior antennæ inserted nearly in the same horizontal line, the interior one being the longest; the first joint of the inferior antennæ scarcely produced beyond the middle of the squama; a strong spine on the abdomen directed forward between the chelate legs; the last joint of the pediform palpi subacuminate, rather longer than the preceding; second pair of legs slender, very short, bristled and uncovered, in which last essential point it differs from the *Pontophilus spinosus* of Leach, *Mal. Pod. Brit.*, t. 37, to which, in other respects, this species bears a near resemblance.

Localities.—Rarer in the Arctic Seas than *Crangon Boreas;* several taken on the west coast of Davis's Straits; a few specimens obtained near Felix Harbour; near the island Igloolik in considerable numbers.

M. Milne Edwards remarks that the genus *Messapus* of Rafinesque appears to bear some analogy to *Crangon*, but that it has been too imperfectly characterized to permit its occupation of a place in a natural method.

II. *Alpheans.*

The shrimps comprised by M. Milne Edwards under this tribe are stouter in their forms than those of the succeeding division, but they are not depressed as the Crangons are. The rostrum is very short, and has never the form of a great projecting central blade, as in the Palemonians. The *internal antennæ* are placed above the external antennæ, and are, in general, very short. One pair of feet is very stout, and generally terminated by a powerful didactylous hand. The two anterior pairs of feet are nearly always didactylous, but the third pair never are; the three last pairs are rather robust, and serve for walking as well as for swimming.

The genera included by M. Milne Edwards under this tribe are *Atya*, *Hymenocera*, *Alpheus*, *Pontonia*, *Autonomea*, *Caridina*, *Nika*, and *Athanas*.

Atya. (Leach.)

Generic Character.—See the article.

Localities.—Coasts of Mexico. (M. E.)

Hymenocera. (Latr.)

See the article.

Alpheus. (Fabr.)

Generic Character.—*Carapace* advanced above the eyes, forming above each of those organs a small vaulted buckler. *Rostrum* very small, and sometimes wanting. In other respects the carapace presents nothing particular. The *superior antennæ* are small, their first joint short, and armed externally with a lamina, which is ordinarily spiniform; the two next joints are cylindrical; and of the terminal filaments, two in number, the upper one is stouter and shorter than the lower, and presents traces of a division near the end. The *inferior antennæ* are inserted externally to and below the preceding: the lamellar palp is of moderate size, or even sometimes small and pointed, and their terminal filament presents nothing particular excepting that it is often somewhat compressed. The *mandibles* are provided with a short palpiform appendage, which is wide and flattened. The form of the *external jaw-feet* varies a little: sometimes they are slender and elongated, in other cases of moderate length, and terminated by a widened and nearly foliaceous joint. The two first pairs of *feet* are didactylous; the anterior feet strong and terminated by a large convex hand, the form and dimensions of which differ much on the opposite sides of the body. The second pair of feet are slender and filiform, their hand is rudimentary, and their carpus multi-articulate. The last three pairs are monodactylous, and of a moderate length. The *abdomen* is large, and its false feet elongated.

Geographical Distribution.—The seas of warm climates. Some species are found in the Mediterranean, but the greater part in the seas of the Antilles or in the Indian Ocean. (M. E.)

M. Milne Edwards separates the Alpheans into the following sections and subdivisions:—

1. Species with a pointed rostrum.
   A. No spine at the outside of the basilary joint of the external antennæ.

Example, *Alpheus ruber*.

Description.—Closely approximating *Alpheus brevirostris*, a species from the coasts of New Holland, but with the body very slender; the large claw with four longitudinal obtuse crests or ridges, two of which are on its superior border, and two on its external surface; its lower border obtuse; the moveable finger much shorter than the immoveable one; a spine on the superior border of the two arms, at some distance from the termination. Length 15 lines.

Locality.—The Mediterranean. (M. E.)

   B. A great spine fixed on the external border of the basilary joint of the external antennæ, and directed forwards.

Example, *Alpheus villosus*.

Description.—Body covered with a rather close down; a small median crest armed with a median spine at the base of the rostrum, which is a little inflected; a rudimentary spine on the anterior border of the orbital vaults. Second joint once and a half the length of the first. Lamellar appendage of the external antennæ very narrow, and scarcely passing beyond the peduncle of those organs; lateral spine of the basilary joint very long. External jaw-feet large, strong, wide towards the end, and furnished with large bunches of long and stiff hairs. Anterior feet convex, very unequal; the great right hand granulose and very hairy above, a little turned upon itself, hollowed by a longitudinal profound furrow on the anterior half of the external surface, and terminated by an immoveable, obtuse, and very short finger; the thumb equally obtuse and very much curved. Feet very small, but cylindrical and elongated. Length about 2 inches.

Locality.—The seas of New Holland. (M. E.)

2. Species deprived of a spiniform rostrum.

Example, *Alpheus frontalis*.

Description.—*Carapace* slightly carinated at its anterior part. *Front* very much advanced, nearly triangular; orbital vaults projecting very much; second joint of the internal antennæ slender and elongated. Lamellar appendage of the external antenuæ less long than their peduncle; no lateral spine at the base of those organs. External jaw-feet very short, but rather wide towards the end. Anterior feet smooth and very unequal; the stout hand convex, the small one more or less compressed. Length about 20 lines.

Locality.—Coasts of New Holland. (M. E.)

M. Milne Edwards records twelve species of Alpheus.

Pontonia. (Latr.)

Generic Character.—*Carapace* short and convex; the *front* with a short but robust and inflected rostrum; the *eyes* are cylindrical, projecting, and very moveable. The internal antennæ are very short, and formed very nearly like those of the Palemons or Prawns; the first joint of their pedicle is very wide and lamellar externally; the two succeeding joints are small and cylindrical. The terminal filaments, two in number, are very short, and the one between them is bifid at the extremity. The external antennæ are inserted above and external to the preceding; their lamellar appendage is large and oval. The external jaw-feet are small and very narrow throughout their length. The four first pairs of feet are didactylous; the first pair are slender and terminated by a well-formed but very small hand; the hands of the second pair are, on the contrary, very large and of very unequal size, sometimes the left is largest. The succeeding feet are moderate, monodactylous, and terminated by a nearly rudimentary tarsus. The *abdomen* is large, especially in the females, and presents a conformation very analogous to that which exists in the Palemons; it is however to be remarked that the median blade of the caudal fin bears no spines on its upper surface. The *branchiæ*, which are well developed, are only five on each side, those fixed above the appendages of the mouth being rudimentary, and the first rings of the thorax supporting only one pair. (M. E.)

M. Milne Edwards divides the *Pontoniæ* into the following sections:—

1. Species with the rostrum very large and depressed, and the external antennæ inserted nearly on the same line as the superior antennæ.

Example, *Pontonia macrophthalma*.

Description.—Carapace nearly as wide as it is long. Rostrum triangular; eyes very large and remarkably projecting; a small spine on the outside of the basilary joint of the external antennæ. External jaw-feet very short. Second pair of feet very large, differing but little; hand nearly as large as the claviform body, and terminated by a claw, the immoveable finger of which is pointed and armed with a large tubercle, and the moveable finger stout and nearly semilunar. Abdomen narrow. Length about ten lines.

Locality.—Asiatic seas, where it was found by M. Dussumier. (M. E.)

2. Species with the narrow rostrum very much compressed laterally, and inflected towards the point; the external antennæ inserted entirely below the superior antennæ.

Example, *Pontonia armata*.

Description.—Carapace armed with a small spine near the base of the external antennæ, and depressed near the insertion of the eyes; rostrum not advanced beyond the half of the length of the scale of the external antennæ. Abdomen very stout. Second pair of feet moderate, and but slightly convex. Length nearly two inches.

Locality.—New Ireland, where it was found by MM. Quoy and Gaimard. (M. E.)

Autonomea. (Risso.)

Generic Character.—*Antennæ* intermediate or superior, terminated by two filaments, one of which is much longer and thicker than the other; external or inferior antennæ longer than the body, and setaceous. Peduncles of the first inarticulate, having their lower portion convex and armed with a spur, the intermediate long and cylindrical, and the last short and bent. Those of the second bi-articulate, without scales, their second portion being hairy at its extremity. External *jaw-feet* not foliaceous. First pair of *feet* only didactylous, very large, thick, unequal; the others very short, very delicate, and terminating in simple hooks. *Body* elongated, smooth. *Carapace* slightly convex, terminated anteriorly by a sharp point at the *rostrum*, which hardly advances beyond the eyes, which are globular and supported on very small peduncles. The three intermediate natatory plates of the extremity of the *abdomen* truncated at the summit with a small point on each side, the two lateral plates rounded and ciliated. (Desm.)

Example, *Autonomea Olivii*.

Description.—Length 15 lines; general form that of *Nika* and *Alpheus*. Carapace smooth, demi-transparent, yellowish, slightly varied with reddish tints; first pair of feet fine red above, and bright yellow below; external antennæ whitish.

Locality.—The Adriatic Sea, and, rather rarely, at the environs of Nice, where it lives solitary in the sea-weed and muddy places; the female carries her reddish eggs about the middle of the summer. (Desm.)

Caridina. (M. E.)

Generic Character.—*Carapace* presenting nothing particular, and terminating by a lamellar rostrum varying in length. *Eyes* projecting. *Internal antennæ* very long, and terminated by two large multi-articulate filaments, one of which is convex at its base; external antennæ formed like those of the Palemons. External jaw-feet long, slender, and pediform. Two first pair of feet didactylous; the anterior very short and presenting a remarkable disposition. The carpus is nearly triangular, and terminates anteriorly by a concave border, which receives the base of the hand fixed at its lower angle; the hand is short and terminated by two lamellar fingers deeply hollowed into a spoon-shape. The second pair of feet are longer and more slender; the carpus is of the ordinary form, but the hand is formed like that of the preceding member. The three last pairs of feet are slender and nearly of the same length. *Abdomen* formed as in the Palemons. (M. E.)

Example, *Caridina Typus*.

Description.—Rostrum sharp, straight, moderate, not attaining the extremity of the second joint of the internal antennæ, and armed below with three small teeth. Anterior feet shorter than the external jaw-feet. Extremity of the claws furnished with much hair. Length about 10 lines. (M. E.)

M. Milne Edwards is of opinion that this tribe establishes the passage between *Pontonia* and *Atya*, and seems to bear some analogy to *Hymenocera*.

Nika. (Risso.)

Generic Character.—M. Milne Edwards observes that this genus is remarkable for the defect of symmetry in the conformation of the two first pairs of feet. In their general form, he remarks, they resemble the Palemons, or rather, the genus *Athanas*, for their *rostrum* is very small. Their internal *antennæ* are slender, and terminated, as in these last, by two rather long filaments. The external *jaw-feet* are pediform, long, and stout; the joint which terminates them is pointed at the end. The anterior *feet* are stronger than those which succeed, but of moderate length; the anterior right limb has a well-formed didactylous hand, whilst that opposed to it is monodactylous and formed after the manner of ambulatory feet. The second pair of feet are filiform, and terminated by a small pincer, which is nearly rudimentary; their carpus is multi-articulate, and their length very different; the left is nearly twice the length of the anterior feet, and the right is nearly twice the length of its opposite. The succeeding feet are monodactylous, and terminated by a styliform tarsus, which is not spiny; the fourth pair are longer than the third. The *abdomen* has the same form as in the *Palemonians*.

Example, *Nika edulis*.

Description.—Rostrum slightly inflected, and nearly of the length of the eyes. A small tooth on each side, on the anterior border of the carapace, below the insertion of the eyes. Anterior jaw-feet very large, their antepenultimate joint passing beyond the lamina of the external antennæ. The monodactylous foot of the first pair less than the didactylous foot. Median lamina of the caudal fin hollowed into a longitudinal furrow, and furnished above with two pairs of small spines. Length about two inches.

Localities.—The Mediterranean and the English Channel. (M. E.)

Athanas. (Leach.)

Generic Character.—*Carapace* not elevating itself into a carina at the base of the *rostrum*, as in the *Palemonians*; the rostrum itself not toothed on its edges. *Eyes* projecting but little, but not covered by the carapace, as in *Alpheus*. *Internal antennæ* rather large, and terminating by three multi-articulate filaments, disposed as in *Palemon*, as are the *external antennæ* also. *Mandibles* robust, with a palpiform, short, but very large appendage composed of two joints. *External jaw-feet* slender and short. First pair of *feet* long and very strong, unequal, and terminating by a large didactylous hand, the pincers of which are short and robust. Second pair of feet filiform, and ordinarily bent (reployées en deux); their carpus is much elongated and multi-articulate, and they terminate in a very small and very weak didactylous hand. The three succeeding pairs of feet are monodactylous, and present nothing remarkable. *Abdomen* not gibbous; each of the *false feet* supporting two large lanceolate laminæ. External laminæ of the *caudal fin* with a transverse articulation as in the *Astacians*. (M. E.)

Example, *Athanas nitescens*.

Description.—Rostrum sharp, shorter than the peduncle of the internal antennæ; a spine on each side of its base, on the anterior border of the carapace. Hands unequal, convex, and with short and obtuse fingers. Carpus of the second pair of feet divided into five or six joints. Median lamina of the caudal fin carrying on its upper surface four spines; posterior border of the four lateral pieces dentilated. Length about an inch.

Localities.—Coasts of France and England. (M. E.)

III. *Palemonians*.

Character of the Tribe.—*Body* laterally compressed, but the *abdomen* never sharp as in the *Peneans*. *Thorax* large. *Carapace* armed in front with a great sabre-like *rostrum*, nearly always dentated above. *Antennæ* placed as in the preceding tribe, but longer, and the first pair often with three terminal filaments. All the *feet* are slender, and the two first pairs are, generally, didactylous, whilst the three last pairs are never didactylous. The *abdomen* is of great size, but far less than that of the *Peneans*. (M. E.)

Genera.—*Gnathophyllum*; *Hippolyte*; *Rhynchocinetes*; *Pandalus*; *Lysmata*; and *Palemon*.

Gnathophyllum (Latreille. *Drimo*, Risso).

Generic Character.—*Rostrum* short but compressed, lamellar, and dentilated on its superior edge. Upper *antennæ* terminated by very short filaments, and blade of the lower antennæ rather large and oval. The *external jaw-feet* are foliaceous and formed nearly like those of *Calianassa*, and their second and third joints are enlarged so as to form a great operculum which covers the whole of the mouth, and carries in front a small slender stem formed of the two last joints. Two first pairs of *feet* moderate and terminated by a didactylous hand; the three last pairs monodactylous, of moderate length, and terminated by a small dentated tarsus. *Abdomen* presenting nothing remarkable. (M. E.)

Example, *Gnathophyllum elegans*.

Description.—Carapace convex, rostrum oblique, and armed above with from six to seven teeth; second pair of feet rather longer and stouter than the first pair; terminal blades of the abdomen oval. Length about 20 lines.

Locality.—Nice.

Hippolyte. (Leach.)

Generic Character.—General form of the body resembling that of *Palemon*, but their *abdomen* is incapable of being completely straightened, and appears, in some degree, to be humped; *rostrum* very large, compressed, and nearly always strongly dentated; *internal antennæ* small, and terminated only by two multi-articulate filaments nearly of equal length, one of which is very large and strongly ciliated; *external antennæ* inserted under the preceding, and presenting nothing remarkable; *external jaw-feet* slender and elongated; *feet* formed nearly in the same manner as those of *Lysmata*, only that they offer no appendage at their base; the first pair are short, but rather stout; the second are filiform, terminated by an extremely small didactylous hand, and have a multi-articulate carpus; the three last pairs of feet are rather long, and in general very spiny at the end; the terminal plates of the natatory *false-feet* are lanceolate, dentilated on their edges, and ciliated all round; *branchiæ* seven on each side. (M. E.)

The species, which are rather numerous, and all small in size, are divided by M. Milne Edwards into the following sections:—

1. Species whose rostrum springs from the front and is not continued backwards, with an elevated crest occupying the median line of the carapace.

Example, *Hippolyte varians*.

Description.—Rostrum passing beyond the peduncle of the internal antennæ, straight, slender, and armed with two teeth above—one situated at its base, and the other near its extremity—and two below, situated a little behind the last superior tooth; a small spine on each side of the base of the rostrum, above the insertion of the eyes; first joint of the internal antennæ armed externally with a spine of moderate size; lamellar appendages of the external antennæ large, passing a little beyond the rostrum, and oval, or rather truncated obliquely from within outwards, and from before backwards at their extremity; external jaw-feet short, passing only slightly beyond the peduncle of the antennæ, and terminated by a short flattened joint, which is truncated and spiny inwards; anterior feet very short, hardly reaching beyond the basilary joint of the external antennæ; second pair moderate, shorter than the third, and having the carpus divided into three or four indistinct segments; median blade of the caudal fin with two pairs of small spines on its upper surface. Length four or five lines.

Localities.—The British Channel and the coasts of La Vendée. (M. E.)

2. Species whose rostrum forms an elevated crest on the anterior part of the stomachal region, but is not prolonged on the posterior part of the carapace.

Example, *Hippolyte crassicornis*.

Description.—Carapace rounded above; rostrum very small, rather elevated at its base, but taking its origin close to the insertion of the eyes, and not reaching to the extremity of those organs, inflected at first, then straight, bifid at the end, and armed above with two or three dentilations; eyes very large; internal antennæ remarkably stout, their basilary joint dilated and lamellar below; the two succeeding joints spiny, and the upper terminal filament extremely stout and furnished all round with long thick hairs; lamellar appendage of the external antennæ short and oval; external jaw-feet long (reaching beyond the lamellar appendage of the external antennæ), and having the last joint slender and cylindrical; anterior feet not reaching beyond the peduncle of the external antennæ; the second pair of the same length as the third, and having the carpus divided into many segments; four pairs of spines on the upper surface of the median blade of the caudal fin. Length four lines.

Locality.—St. Malo. (M. E.)

3. Species the base of whose rostrum is elevated into a crest and prolonged to the posterior edge of the carapace.

Example.—*Hippolyte gibberosa.*

Description.—Rostrum taking its origin from the posterior third of the carapace, very much bent and armed with four or five teeth at its base, then curving strongly upwards, and only presenting one small spine towards the level of the extremity of the eyes, and two or three dentilations at its point; its lower border descending very low at its base and armed with six or seven teeth, the posterior of which are very strong; lateral spine of the internal antennæ very large; lamellar appendage of the external antennæ nearly triangular; external jaw-feet short and truncated at the end; anterior feet very small and scarcely reaching beyond the peduncle of the external antennæ, the second pair longer than the third and having the lower part of the carpus divided into a great number of joints. Length about eighteen lines.

Locality.—The coasts of New Holland. (M. E.)

Rhynchocinetes. (Edwards.)

Generic Character.—M. Milne Edwards observes that this genus is closely approximated to *Hippolyte*, but that it is distinguished from all the other macrurous crustaceans by the singular conformation of the *rostrum*, which, instead of being a simple prolongation from the front, is a distinct lamina of the carapace, and articulated with the front so as to be very moveable, and to possess the power of lowering itself above the antennæ, or of elevating itself vertically; in other respects it much resembles the rostrum of *Hippolyte*. It is very large, sabre-shaped, and dentilated on both edges. *Eyes* projecting, and, when bent forward, lodged in an excavation of the peduncle of the superior antennæ, the basilary joint of which is large and armed externally with a spiniform lamina; terminal filaments two in number and formed as in *Hippolyte;* the lamellar appendage of the external antennæ large and triangular; *external jaw-feet* pediform and elongated—the last joint slender, cylindrical, and spiny at the end; *feet* like those of *Hippolyte*, except that at the external side of the base of each there is a small, palpiform, rudimentary appendage, and that the tarsi of the second pair is not multi-articulate; *abdomen* presenting nothing remarkable; *branchiæ* seven on each side. (M. E.)

Example, *Rhynchocinetes Typus.*

Description.—Front armed with three spines, of which the median, placed above the base of the rostrum, is followed by another median spine; rostrum very large, longer than the lamina of the external antennæ, armed above with two spines situated near the base, and with seven or eight dentilations situated at its extremity; its inferior border furnished with a score of very large teeth; external jaw-feet of the same length as the rostrum; anterior feet larger than the others and reaching a little beyond the peduncle of the external antennæ; pincers short and hollowed into a spoon-shape; moveable finger dentilated; second pair of feet as long as the first pair, but much shorter than the third; three pairs of small spines on the upper surface of the median blade of the caudal fin. Length about two and a half inches.

Locality.—The Indian Ocean. (M. E.)

Pandalus. (Leach.)

Generic Character.—Closely resembling *Palemon* in the general form of the body, but distinguished from that genus by the conformation of the *feet*, of which the two anterior are monodactylous. *Carapace* armed in front with a very long compressed rostrum, which is elevated towards the end, and dentilated both above and below. *Eyes* large, short, and free. Upper *antennæ* formed nearly like those of *Palemon*, excepting that they possess only two terminal filaments. External *jaw-feet* slender and pediform. *Feet* slender, the first pair shortest, and terminated by a styliform joint; the second pair filiform, and terminated by a very small didactylous hand; their carpus multi-articulate. Succeeding feet presenting nothing remarkable. Disposition of the *abdomen* the same as in *Palemon.* Number of *branchiæ* 12 on each side of the body. (M. E.)

Example, *Pandalus annulicornis.*

Description.—Rostrum of the length of the carapace, armed above with some ten teeth, which occupy the stomachal region and the posterior half of its fore part; a small tooth near the point of the rostrum, separated from the preceding by a rather long smooth space; interior border of the rostrum armed with from seven to eight very large teeth towards its base, and the last of which are placed towards the extremity. Feet rather strong, and of moderate length; first pair not attaining to the extremity of the lamellar appendage of the external antennæ; three last pairs of feet armed with spines. Length of the body about two inches.

Localities.—Coasts of England and Iceland. (M. E.)

Lysmata. (Risso.)

Generic Character.—Resembling very much the Palemons, and establishing the passage between them and *Hippolyte;* they have their general form, and their carapace is equally armed with a long, compressed, and dentilated rostrum. *Internal antennæ* terminating also in three multi-articulate filaments, two of which are long, and one very short. The *external antennæ* are inserted under the first, and present nothing remarkable. The *mandibles* are deprived of a palpiform appendage. The two first pairs of *jaw-feet* have at their base a membranous vesicle formed by the flabelliform appendage modified. The external jaw-feet are slender, and present nothing remarkable. The *feet*, as well as the jaw-feet, carry a small horny blade fixed to their basilary joint, and represent the flagrum, which in the crawfishes is situated in like manner, but acquires very considerable dimensions. First pair of feet of moderate length, rather robust, and terminating in a small didactylous hand, but they are filiform and very long. Their hand is rudimentary; and their extremely long carpus is divided into a multitude of small joints. The three succeeding pairs monodactylous, and formed in the ordinary manner, excepting that at their base is found the vestige of a flagrum. Disposition of the *abdomen* the same as in the Palemons. The *branchiæ* seven on each side, the five last rather large, and fixed to the thorax above the five thoracic feet; but the two anterior are placed one upon the other above the external jaw-feet, and are rudimentary. A tubercle situated at the base of the second and third pairs of jaw-feet may also be the vestige of a branchia. (M. E.)

Example, *Lysmata seticordata.*

Description.—Rostrum taking its origin towards the middle of the carapace, a little inflected towards the end, not attaining the extremity of the peduncle of the internal antennæ, and armed with six teeth above and two below. Two of the filaments of the superior antennæ as long as the body. External jaw-feet reaching beyond the lamellar appendage of the external antennæ, and nearly of the length of the anterior feet, the hand of which is small. Second pair of feet twice as long as the preceding, and habitually bent double; their carpus extremely long. Length about two inches. Colour red-brown, striped longitudinally with white.

Locality.—The Mediterranean. (M. E.)

Palemon. (Fabr.)

Generic Character.—*Body* compressed but little, and generally rounded above. *Carapace* moderate in size, and presenting towards its anterior third a median crest, which is the origin of the *rostrum;* this last advances above the base of the eyes and antennæ, and presents nearly always a considerable length; it is very much curved upwards towards the end, and strongly dentilated on its upper and lower borders. *Eyes* large and projecting. *Internal antennæ* inserted above the external ones; the first joint of their peduncle very large, depressed, excavated upon its upper surface for the lodgement of the eyes, and armed externally with a strong spine, which occupies its anterior angle. The two succeeding peduncular joints stout and cylindrical. The multi-articulate filaments which terminate these organs are three, two of which are in general extremely long, and one very short and joined by its base to one of the preceding. The *external antennæ* are inserted below, and rather external to the internal antennæ; the lamellar palp which covers their base is very large, oval, rounded, and ciliated at the end, and armed with a spine at its external border. The *mandibles* carry a small, cylindrical, palpiform appendage, and the external *jaw-feet* are of moderate length, slender, sometimes unguiculated at the end, and sometimes terminated by a small multi-articulate appendage. *Frst pair of feet* slender, terminated by a small didactylous hand, and presenting near their base on the internal side a small dilatation, which covers the mouth, and acts after the manner of jaw-feet. *Second pair of feet* much longer and stronger, terminated also by a well-formed didactylous hand, and with the carpus entire and formed in the ordinary manner. Three succeeding pairs slender and monodactylous, their length diminishing progressively, and without any vestige at their base of flagrum or palp. *Abdomen* very large, and narrowing gradually towards the end; its upper surface regularly arched, but capable of becoming nearly completely straight, without any hump as in *Hippolyte*. The seventh segment, which forms the median piece of the caudal fin, is triangular and shorter than the lateral blades; it is generally armed with some spines at its extremity, and there are on the upper surface five small spines, the anterior of which is situated on the median line, and the others laterally. The lateral blades of the caudal fin are very large, oval, and nearly of equal size. The abdominal false feet are very large; the first pair carry a large ciliated blade, and a second smaller one; the others are provided with two ciliated blades, nearly of the same size, of which the internal one carries towards its base a small cylindrical appendage. (M. E.)

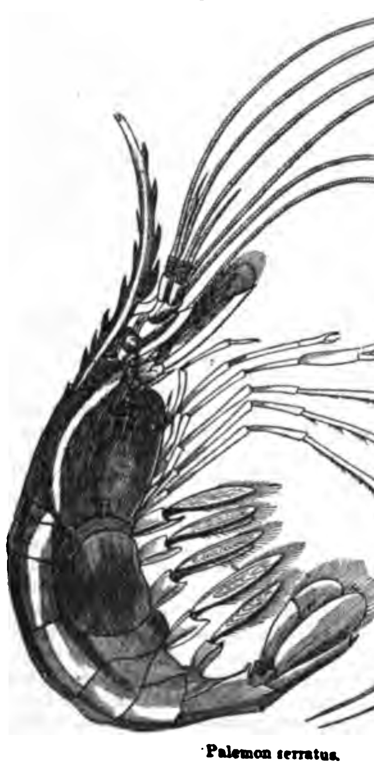
M. Milne Edwards remarks that the nervous system of the Palemons presents a much greater concentration than that of the crawfishes (Ecrevisses); for all the thoracic ganglions are approximated so that they nearly touch each other. The branchiæ, he observes, are eight in number on each side of the body.

The species of this useful and delicious genus are numerous. M. Milne Edwards records 17, besides the Indian *Palemon brevimanus* and *Palemon Coromandelinus* of Fabricius. Those of our own coasts are well known to the epicure; and some of the species which are found in warm climates attain to a considerable size; such are the *Palemon Carcinus* of the Indian seas and the Ganges, which attains to nearly a foot in length, and the *Palemon Jamaicensis* of the Antilles, which is from 10 to 12 inches long.

The prawns generally inhabit sandy bottoms near the coasts, but some are found at the mouths of rivers, and far up. They mostly boil red.

M. Milne Edwards subdivides the species into the following sections:—

1. Species having the anterior border of the carapace armed on each side with two spines, situated one above and the other below the insertion of the external antennæ.


Palemon serratus.

Example, *Palemon serratus.*

Description.—Rostrum reaching much beyond the lamellar appendage of the external antennæ; very much elevated towards the end, and bifid at its extremity; its superior border smooth for nearly its anterior half, and armed on the rest of its extent with from seven to eight teeth; the crest which occupies its inferior border very wide at its posterior extremity, and armed with five or six teeth. The small terminal filament of the superior antennæ very short, not attaining the extremity of the rostrum when it is directed forwards, nor the anterior border of the carapace when it is directed backwards. External jaw-feet only a little passing beyond the peduncle of the external antennæ; their palp very short. Anterior feet not attaining the lamellar appendage of the external antennæ, the second pair reaching but little beyond that *lamella;* and the third pair, when they are bent forward, not reaching it at all. Hands of the second feet hardly convex; their pincers nearly of the length of the carpus. Length from 3 to 4 inches. Colour greyish with small red and brown spots.

Locality.—The coasts of France and England.

This is the *Astacus serratus* of Pennant; *Cancer Squilla* of Herbst; *The Prawn* of the shops.

N.B. There are two other *Prawns* which inhabit our coasts: one, the *Palemon Squilla* and *Astacus Squilla* of Fabricius, with a much shorter rostrum, not reaching beyond the lamellar appendage of the external antennæ, nearly straight, and dentated to the top, and about 20 lines long altogether; the other, *Palemon varians*, with a very short rostrum armed with from four to six teeth above, and only two or three below, and about one half the size of the last.

For the parasite (*Bopyrus*) which infests prawns, see ISOPODA, vol. xiii., p. 51.

2. Species having the anterior border of the carapace armed on each side with a single spine.

A. A second spine situated behind the preceding, nearly on the same horizontal line.

A**. Prehensile borders of the pincers nearly straight, and touching each other throughout their length.

Example, *Palemon Carcinus.*

Description.—Rostrum very long, passing much beyond the lamellar appendages of the external antennæ, strongly curved upwards on its anterior half, and armed with twelve or fourteen teeth on its lower border; one very strong tooth at the anterior border of the carapace, near the insertion of the external antennæ, followed by a second tooth not so large, situated a little below its base. External jaw-feet very short, hardly advancing beyond the peduncular portion of the external antennæ. First pair of feet attaining the extremity of the rostrum; second pair cylindrical, covered, in the male with small short spines—in the adult male they are longer than the body, and their third joint passes beyond the lamellar appendage of the external. antennæ; carpus nearly of the length of the palmar portion of the hand; pincers cylindrical, a little hooked at the end; the immoveable finger furnished with a small corneous crest, which is received in a furrow of the moveable finger, which is stouter than the first, and covered with a very close brownish down. Three succeeding feet rather rugose above; their tarsus short and triangular. Last segment of the abdomen terminated by a sharp point, at the base of which on each side is a rudimentary spine. Length sometimes nearly a foot.

Localities.—The Indian seas and the Ganges.

A**. Prehensile borders of the pincers concave, so as to leave a space between them.

Example, *Palemon spinimanus.*

Description.—Rostrum nearly straight, shorter than the peduncle of the internal antennæ, and armed with thirteen or fourteen small teeth above, and three or four below. Second pair of feet unequal, and very spinous; a row of very large curved and closely approximated spines on the upper border of the hand, and a great number of long flexible hairs on its internal surface; pincers short, stout, and arched, so as to leave a great space furnished with hairs between them. Length about four inches.

Localities.—The Antilles and the coast of Brazil.

AA. No second spine situated at the base or behind that with which the anterior border of the carapace is armed on each side.

Example, *Palemon Gaudichaudi.*

Description.—Body stout and thick. Rostrum extremely short, not reaching beyond the first basilary joint of the internal antennæ, incurved, and armed with from seven to eight very small teeth above, and two or three below, all near its extremity. A single tooth on each side of the carapace. Lamellar appendage of the external antennæ very short. Second pair of feet convex, very unequal and rough, with short points in small individuals, but becoming long as the animal advances in age; pincers stout, and as long as the palmar portion of the hand. Succeeding feet very short. Last segment of the abdomen very short, rounded at the end, and without any spines worthy of remark. Length from four to five inches.

Locality.—Chili.

IV. *Peneans.*

In this tribe M. Milne Edwards comprises those shrimps whose abdomen is in general extremely elongated, and whose feet often carry at their base a palpiform appendage more or less developed. The rostrum is short, or nearly null, and the lower antennæ, if not both pairs, are nearly always very long. The conformation of the feet varies much; but generally these organs become for the most part so slender and long, that they cannot serve except for swimming, and sometimes the last pairs become rudimentary or disappear.

Genera.—*Stenopus; Sicyonia; Penæus; Euphema; Ephyra; Oplophorus; Pasiphæa; Sergestes; Acetes.*

Stenopus. (Latr.)

Generic Character.—*Body* not compressed laterally, and teguments comparatively soft. *Carapace* terminated anteriorly by a small rostrum. *Eyes* short, and disposed in the ordinary manner. Peduncle of the superior *antennæ* slender, and not carrying any lamellar appendage, as in the *Penæi;* terminal filaments of those organs long and cylindrical, and two in number. Lower antennæ presenting nothing remarkable. *Mandibles* strong, and furnished with a palp which is but little enlarged, and resembling that of the Palemons rather than that of the *Penæi.* External *jaw-feet* slender, elongated, and provided with a palp which is nearly rudimentary. Three first pairs of feet didactylous, and progressively increasing in length; third pair much stouter than the others, and very spiny. Two last pairs of feet very long also, but filiform, and with their two last joints divided into a multitude of small rings: a disposition which is not seen either in the *Penæi* or the *Sicyoniæ,* and which recals the structure observable in the second pair of feet of the species of *Hippolyte,* &c. The feet bear no lamellar appendage as in the *Penæi.* The *abdomen* is of moderate size, and presents nothing remarkable. (M. E.)

Example, *Stenopus hispidus; Palemon hispidus,* Oliv.

Description.—Carapace and abdomen covered with small prickles and some hairs; rostrum pointed, slender, raised, and not reaching beyond the basilary joint of the superior antennæ. Filaments of the antennæ very long. First pair of feet shorter than the second pair, but reaching much beyond the lamellar appendage of the inferior antennæ, and smooth like the second pair. Third pair longer than the whole body, furnished with many longitudinal rows of pointed teeth. Tarsus of the two last pairs of feet bifid. Median blade of the caudal fin furrowed in the middle, and furnished above with two rows of spines. Length about two inches and a half.

Locality.—The Indian Ocean.

Sicyonia. (Edwards.)

Generic Character.—*Tegument* harder than in the greater part of the shrimps. *Body* slightly compressed. *Carapace* surmounted with a median crest, which is continued forward into a rather large *rostrum.* On each side of the carapace, about its anterior third, a spine directed forwards. *Eyes* large, cylindrical, and exposed. Upper antennæ very short, their peduncle very stout, and not presenting, as in the *Penæi,* a lamellar appendage recurved above the eyes; their terminal filaments, two in number, extremely short. External antennæ inserted below the preceding, and offering nothing particular. Two first pairs of *jaw-feet* formed nearly the same as in the *Penæi,* excepting that they are deprived of palps. Three first pairs of feet terminated by a small didactylous hand, and elongated from before backwards, as in the preceding genus; the two last pairs monodactylous, and the last much longer than the penultimate pair. None of these organs are multi-articulate, as in the *Stenopi,* nor provided with a flabelliform appendage, or a palp, as in the *Penæi. Abdomen* carinated above, and presenting several furrows, which make it appear as if it were sculptured; it carries below five pairs of false feet, each of which is only provided with a single natatory blade; the median blade of the caudal fin is pointed and furrowed above. *Branchiæ* eleven on each side.

Example, *Sicyonia sculpta; Cancer carinatus,* Oliv.

Description.—Rostrum of the length of the peduncle of the superior antennæ; six large teeth situated both on its superior border and the dorsal crest of the carapace; a single dentilation below, near the point of the rostrum; terminal filament of the lower antennæ slender and cylindrical; external jaw-feet moderate. Length about two inches.

Locality.—The Mediterranean.

Penæus. (Latr.)

Generic Character.—*Carapace* furnished above with a more or less long median crest, which is continued forwards into a nearly straight, lamellar, and dentilated rostrum; on each side, near the insertion of the superior antennæ, a stout tooth, and a curved longitudinal furrow, which circumscribes laterally the stomachal region; a spine nearly always exists at the point of junction of the stomachal furrow and that of the branchial region, and sometimes a small crest is seen between the first of these furrows and the basilary crest of the rostrum. Eyes stout and rounded. First joint of the *superior antennæ* very large, and excavated above so as to form a cavity in which the eyes are lodged; its external border armed with a tooth, and its internal border with a small lamellar and ciliated appendage, which curves back upwards and outwards. The two last joints of the peduncle cylindrical and very short; and the terminal filaments of varying length. The *external antennæ* present nothing remarkable. *Mandibles* provided with a very large lamellar palp. Two last pairs of jaw-feet carrying a very long and multi-articulate foliaceous palp, and provided also with a flabelliform appendage which ascends among the branchiæ; external jaw-feet long, slender, and pediform. Four first pairs of the thoracic feet provided with a flagrum which ascends into the branchial cavity as in the crawfishes, and at the base of all the feet a small lamellar appendage analagous to the palp of the jaw-feet, a mode of conformation which reminds the observer of that of the *Stomapods.* The three first pairs of feet terminated by a small didactylous hand, and augmenting progressively in length from before backwards. Two last pairs of feet monodactylous and of moderate length. *Abdomen* extremely large and very much compressed; its posterior moiety surmounted with a median crest more or less marked. False feet not encased by the lateral laminæ of the abdomen, and terminating by two ciliated laminæ of unequal size. Caudal fin large; its median blade triangular, and hollowed below by a median furrow. *Branchiæ* disposed in bundles as in the lobster, eighteen on each side, and between each bundle the flabelliform appendage of the foot situated below. (M. E.)

M. Milne Edwards subdivides the genus into the following sections:—

1. Species having the antennæ terminated by very short filaments.

* A median furrow extending from the base of the rostrum to the posterior border of the carapace.

Example, *Penæus Caramote; Cancer Kerathurus,* Forsk.; *Palemon sulcatus,* Oliv.

Description.—Rostrum shorter than the peduncle of the superior antennæ, a little recurved upwards, armed above with a dozen of rather strong teeth, and below with a single one situated a little in front of the eyes, furnished on each side with a crest which is continued backwards to the posterior border of the carapace, thus forming a very deep longitudinal furrow on each side of the median crest; a third crest, less wide, but more elevated, separates these two furrows at the posterior half of the carapace, and forms a sequence to the base of the rostrum. There is a very strong tooth on the anterior border of the carapace above the insertion of the antennæ, a second much smaller between that and the rostrum, and a third behind the lateral furrow situate at the base of the first. Eyes extremely large and very short. Terminal filaments of the superior antennæ extremely small, shorter than the two last joints of the peduncle. Base of the three first pairs of feet armed with strong spines. Median blade of the caudal fin armed at its extremity with three spines, of which the median is the strongest. Length about seven inches.

Locality.—The Mediterranean.

** No median furrow between the base of the rostrum and the posterior border of the carapace.

Example, *Penæus setiferus; Palemon setiferus*, Oliv.; *Astacus fluviatilis Americanus*, Seba.

Description.—Rostrum of the same length as the blade of the external antennæ, straight, styliform at the end, armed with two spines below, and from nine to ten teeth above, continuing backwards with a delicate crest, which occupies the posterior half of the carapace, and furnished on its sides with a small crest, which is not prolonged beyond the stomachal region. No small tooth above the base of the eyes, which are very large, and carried on rather long peduncles. Lameallr filaments of the superior antennæ about half the length of the peduncle which carries them. Multi-articulate filament of the external antennæ excessively long. No spines at the extremity of the median blade of the caudal fin. Length about seven inches.

Locality.—Very abundant at the mouths of the rivers of Florida.

2. Species having the superior antennæ terminated by filaments longer than the carapace.

Example, *Penæus membranaceus.*

Description.—Carapace slightly carinated throughout its length; rostrum a little elevated, lamellar, very short (not reaching beyond the eyes), armed above with five or six rather large teeth, and ciliated below. Eyes large and short. Terminal filaments of the superior antennæ much longer than the carapace; one slender and cylindrical, the other stout, flattened, and ciliated within. External antennæ moderate. Feet short; the third pair hardly reaching beyond the peduncle of the superior antennæ. Median blade of the caudal fin elongated, and armed with a pair of lateral spines near its point. Length about three inches.

Locality.—The Mediterranean.

M. Milne Edwards remarks that the genus *Melicertus* of Rafinesque seems to differ but little from *Penæus.*

Euphema. (Edwards.)

Generic Character.—General form of the body approaching closely to that of *Hippolyte. Carapace* terminating anteriorly by a very long rostrum; abdomen bent towards the middle, its second ring prolonged posteriorly into a long spine, which is directed horizontally backwards, as is the rostrum forwards. *Eyes* large and short. Disposition of the *antennæ* presenting nothing remarkable; the first pair have, as usual, their first joint excavated above for the lodgment of the eyes, and terminate by two multi-articulate filaments. The second pair of antennæ are inserted below the preceding. *Mandibles* short, stout, but slightly dentilated, and provided with a palpiform, short, wide, and bi-articulate stem. The valvular appendage of the jaws of the second pair is oval, and only a little prolonged backwards. The two last pairs of jaw-feet are moderate, pediform, and provided with a lamellar palp nearly as long as the internal stem; they also carry at their base an appendage which represents the flagrum, but which is membranous and vesicular, nearly as in the *Amphipods.* The three first pairs of thoracic *feet* are terminated by a small imperfectly didactylous hand; and the two last pairs are monodactylous and strongly ciliated, so as to be rather natatory than ambulatory; all carry at their base a small very short flagrum, as well as a lamellar palp. The appendages of the five first rings of the abdomen are composed of a cylindrical peduncle and of two terminal joints, as in the ordinary Salicoques, only the blades are not ciliated. The caudal fin presents nothing remarkable. *Branchiæ* lamellar, and fixed in many rows on each side of the thorax. (M. E.)

Example, *Euphema armata;* the only known species.

Description.—Rostrum of the length of the carapace, horizontal, armed with a tooth at its base, and slightly denticulated along its superior border; a small spine on each side on the anterior border of the carapace. Internal antennæ shorter than the rostrum. First pair of feet the shortest. Dorsal spine of the second abdominal ring long and sharp, passing beyond the succeeding ring; a very small spine on the middle of the posterior border of each of the succeeding segments Median blade of the caudal fin narrow, pointed, and terminated by two small spines; lateral blades narrow and ciliated. Length about eight lines.

Locality.—The Southern Atlantic.

Ephyra. (Roux.)

Generic Character.—Body laterally compressed; *carapace* smooth; *abdomen* carinated, and rostrum dentated; *jaw-feet* very much elongated, and the thoracic feet carrying at their base a palpiform appendage, but not appearing to have a point as in the next genus. Two first pairs of feet small, shorter than the succeeding ones, and didactylous *carpi* simple. (Roux.)

Example, *Ephyra pelagica.*

Description.—Body arched, compressed, of a lively red-coral colour, the corselet elongated, ornamented on its sides with a curved suture, with four points and a carinated rostrum, quinquedentate above, bidentated and ciliated below. Eyes large, blackish blue; interior antennæ long, placed on a tri-articulated pedicle, the lateral pieces striated, with a spur; the jaw-feet triangular; the two first pairs of feet short, delicate, the others rather larger; the abdomen with six compressed segments, terminated by caudal, oval, oblong, ciliated scales; middle plate short, solid, convex, and pointed.

Locality.—The Mediterranean, at great depths.

Oplophorus. (Edwards.)

Generic Character.—Body not compressed. *Carapace* terminated by a styliform rostrum, which is very long and dentilated on its two borders. Peduncle of the *superior antennæ* very short, and one of the terminal filaments very stout and pyriform at its base, but soon becoming slender and cylindrical like the other. The lamellar appendage of the *external antennæ* differs much from that of all the other shrimps; it is large, narrows gradually from its base, terminates in a very sharp point, and presents a series of spines on its external edge. External *jaw-feet* short, and carrying externally an extremely large lamellar palp. Two first pairs of feet very short, terminated by a very small hand, and provided at their base with a very large and ciliated lamellar appendage. Three succeeding pairs of feet moderate and monodactylous; the appendix fixed at their base small; and the tarsus of the third and fourth pairs styliform and very large, whilst that of the posterior feet is rounded and extremely short. There is also at the base of each foot a small flabelliform appendage which ascends among the branchiæ, and the number of these last organs is nine. *Abdomen* differing but little from that of *Hippolyte.*

Example, *Oplophorus Typus.*

Description.—Rostrum of the length of the lamellar appendage of the external antennæ, slender, elevated, and furnished with seven or eight small teeth on each of its borders. A median crest extending from the base of the rostrum to the posterior border of the carapace, and two small crests on the stomachal region; two spines on each side on the anterior border of the carapace, and one at its posterior angle. A very strong pointed tooth directed backwards, springing from the upper surface of the three abdominal rings which precede the penultimate one. Median blade of the caudal fin pointed and much longer than the lateral blades. Length about 20 lines.

Locality.—New Guinea.

Pasiphæa (Savign. *Alpheus*, Risso).

Generic Character.—Body remarkably flat laterally. *Rostrum* very short or even rudimentary, and the *carapace* much narrower forward than behind. *Eyes* moderate and directed forward. Peduncle of the internal *antennæ* slender, and terminated by two multi-articulate filaments, one of which is rather long; external antennæ inserted below the preceding, and offering nothing remarkable. Mandibles strongly dentated, and deprived of a palpiform stem. External *jaw-feet* very long, slender, and pediform; at their base a lamellar and ciliated palp as in the *Penæi.* The thoracic *feet* carry also, suspended at the external side of their basilary joint, a rather long lamellar appendage of the same form, but membranous and but little or not at all ciliated. Two first pairs of feet rather stout, nearly of the same length, armed with spines on their third joint, and terminated by a didactylous hand, the pincers of which are slender and furnished with a series of sharp spines on the prehensile border. The three next pairs of feet are very slender, monodactylous, and more or less natatory; in general, if not always, the penultimate pair are much the shortest. *Abdomen* very long and very much compressed. False feet of the first ring terminating by a single blade, but those of the four next feet carrying each two short natatory and but little ciliated blades. The sixth abdominal ring very long, and the seventh short and triangular. External blades of the caudal fin large and narrowed towards the end.

Example, *Pasiphæa Sivado.*

Description.—Distinguished from the other species by a caudal fin whose blades are equal, and the conformation of the rostrum, which is sharp, slightly curved, and inflected towards the point.

Locality.—The coasts of Nice.

Sergestes. (Edwards.)

Generic Character.—*Body* slender and a little flattened; *carapace* presenting anteriorly a small spine in lieu of a rostrum. *Eyes* very much projecting, and the ophthalmic ring on which their peduncles are inserted not completely covered by the carapace. *Upper antennæ* extremely long, and carrying, besides the principal terminal filament, two rudimentary filaments. *External antennæ* inserted below the preceding, and also very long. *Second pair of jaw-feet* nearly pediform and without either palp or flabelliform appendage, long, slender, bent back on themselves, and applied upon the mouth. Appendages which correspond to the *external jaw-feet* offering nothing which can distinguish them from the ordinary thoracic feet; they are delicate, very long, ciliated, and terminated by a very slender styliform joint. Four next pairs of feet with the same general form, slender, filiform, furnished with much hair, and presenting at their base neither flabelliform appendage nor vestige of palp; second and third pairs provided at their extremity with a rudimentary joint, which is nevertheless moveable and disposed so as to constitute a microscopic claw. Penultimate pair of feet very short and a little distant from each other; the last pair nearly rudimentary. *Abdomen* presenting nothing remarkable, except that its lateral laminæ do not descend so as to encase the base of the false feet as in the ordinary *Salicoques.* The first pair of these false feet terminates by a single natatory foliaceous blade, and presents in the male a corneous prolongation of an odd form, which is fixed to the peduncle of those appendages, and goes to articulate itself on the median line with that of the opposite side. The four next false feet have two narrow natatory blades, which are ciliated and of unequal size. The median blade of the caudal fin is small and pointed, and the lateral blades are narrow, very nearly oval, and terminated in a point. *Branchiæ* disposed on a single line, seven on each side of the thorax.

Example, *Sergestes Atlanticus*, the only known species.

Description.—Third joint of the peduncle of the upper antennæ at least as long as the preceding. Anterior feet much shorter than the external jaw-feet, which are nearly of the same length as the second and third pairs of feet. Length about an inch.

Locality.—The Atlantic Ocean, at some distance from the Azores.

Acetes. (Edwards.)

Generic Character.—Analogous to *Sergestes* in its conformation, but placed at a distance from all the animals of the same order by the absence of the two last pairs of feet. Thoracic feet, consequently, only three pairs; but, as in the Sergestes, the external jaw-feet acquire an excessive length, and perform the same functions as the ordinary feet. *Carapace* smooth, and presenting at its anterior extremity a longitudinal series of three small teeth, but there is no true rostrum. *Eyes* spherical and carried on rather long peduncles; the superior antennæ, placed above the external ones, have a long peduncle; but its last joint is shorter than the first, and only carries two bristles, one of which is about twice the length of the body. The lower or external antennæ present a terminal filament not less elongated, and their base is covered, as in ordinary, by a great corneous plate. The mandibles, or jaws, properly so called, and the two pairs of jaw-feet, do not differ remarkably from those of *Sergestes;* and the same may be said of the ambulatory feet, which are filiform and terminated by a very elongated joint, but the two posterior feet are wanting, as has been observed. Nevertheless a thoracic segment may still be distinguished behind, carrying branchiæ like the preceding, but without locomotive appendages. The abdomen presents nothing remarkable; the natatory false feet all terminate by two narrow and pointed blades, which are at first nearly of the same length, but the internal one of which becomes shorter on the last segments. The peduncle of these appendages presents very opposite modifications; for upon the first rings of the abdomen it is long and narrow, whilst upon the last it is stout and short. The caudal fin resembles that of *Sergestes.*

Example, *Acetes Indicus.*

Description.—Body compressed laterally; rostral crest armed with three or four dentilations. Posterior feet longer than those of the two preceding pairs, but a little shorter than the external jaw-feet. Lower antennæ about four times as long as the body. Length about one inch.

Such is a mere outline of this very numerous and extensive family, which is spread more widely over the globe than perhaps any other of the crustaceous forms. The part assigned to the *Salicoques* in the sea, and there is hardly any sea without some species of the race, seems to be that analogous to some of the insects on land, whose task it is to clear away the remains of dead animal matter after the beasts and birds of prey have been satiated. If a dead small bird or frog be placed where ants can have access to it, those insects will speedily reduce the body to a closely-cleaned skeleton. The shrimp family, acting in hosts, as speedily remove all traces of fish or flesh from the bones of any dead animal exposed to their ravages. They are in short the principal scavengers of the ocean; and, notwithstanding their office, they are deservedly and highly prized as nutritious and delicious food.

The *Opossum Shrimps* will be treated of under the article Stomapodes.

Fossil Shrimps.

Crangon.

M. Milne Edwards observes that the *Crangon Magnevilii* of M. Delonchamps is a fossil crustacean which, as yet, is only imperfectly known; but which, from the conformation of its feet, would seem to belong to the genus *Crangon*, or at least to differ but little from it. This fossil was found at Vaucelles, in the Jurassic limestone of Caen, and is remarkable for the size of the second pair of feet, which are longer than all the succeeding ones.

Another fossil, found in the coral limestone of Ranville, and considered by M. Delonchamps to belong to the same species as the preceding, seems to M. Milne Edwards to be worthy of being distinguished from it by reason of the subcheliform hand and some other important characters.

Alpheus?

M. Milne Edwards is inclined to believe that the fossil crustacean figured by Schlotheim under the name of *Macrourites modestiformis*, is a shrimp belonging to the tribe of Alpheans, or at least intermediate between them and the Crangonians. It seems to approach the last by its rude and unequal carapace, and by the conformation of the abdomen; but, as in the Alpheans, the first or second pair of feet are very large, of unequal size, and terminated by a well-formed didactylous claw.

Palemon?

The fossil crustacean figured by M. Desmarest under the name of *Palemon Spinipes*, appears to M. Milne Edwards to constitute the type of a particular genus intermediate between *Palemon, Pandalus*, and *Sergestes;* the body of this shrimp is compressed laterally, and the abdomen seems to be slightly carinated as in the *Penæi;* the carapace terminates forward by a large, straight, compressed, and cultriform rostrum. The superior antennæ are provided with very long multi-articulate filaments, as in Palemon. The second or third last pairs of feet are slender and monodactylous, whilst the two first pairs are stout and appear to be didactylous. The members which M. Milne Edwards thinks are the external jaw-feet present very considerable dimensions, and are converted into organs of locomotion as in *Sergestes;* and the four anterior feet are furnished on their interior border with long spiniform hairs and are terminated by a flattened joint.

Locality.—Lithographic slate of Solenhofen and Pappenheim.

The same zoologist remarks that the *Macrourites tipularius* of Schlotheim is a shrimp which closely approaches the preceding, but is, still, very distinct from it. It appears to M. Milne Edwards that it ought to be arranged in the same genus, and it presents in a still more marked degree the character so remarkable in the preceding fossil, consisting of the presence of a pair of very large and monodactylous ambulatory feet before the didactylous feet, which last are of moderate length and consist of two pairs. M. Milne

Edwards observes that in the figure given by Schlotheim they only appear to be succeeded by two pairs of monodactylous feet; but in a specimen belonging to the Paris Museum one may see that there are three pairs· these six posterior feet are very slender and long. The general form of the body is nearly the same as in the preceding species, but the rostrum is much shorter, and a lamellar appendage situated above the base of the external antennæ may be clearly distinguished; the internal antennæ do not appear to be terminated by more than two filaments. The anterior limbs, which M. Milne Edwards considers as analogous to the external jaw-feet of *Sergestes*, are so large that their antepenultimate joint reaches far beyond the extremity of the rostrum, as well as the peduncle of the antennæ.

Sicyonia?

The fossil crustacean figured by Schlotheim under the name of *Macrourites fusiformis* appears to M. Milne Edwards to be intermediate between *Sicyonia*, *Palemon*, and *Hippolyte*, but he thinks that its place ought to be in the tribe of *Peneans*. The carapace is very short, and surmounted by a median dentilated crest which occupies its whole length, and terminates anteriorly by a small rostrum which is inflected and dentilated above. The abdomen seems to be equally carinated above, and the three first pairs of feet are didactylous; but the first and third pairs are slender, whilst the second pair are very stout, although they are of moderate length. M. Milne Edwards thinks that it ought to form the type of a distinct genus.

We have seen [article HOMARUS] that M. Milne Edwards is of opinion that the genus *Coleia* of Broderip (*Geol. Trans.*, 2nd series, vol. v., pl. 12) is intermediate between the *Astacians* and *Salicoques* or Shrimps. In the same paper Mr. Broderip has described and figured the remains of other macrourous decapods found with *Coleia* at Lyme Regis, but of smaller size. Their chelæ and legs had been washed away, and the carapace was very obscure. In two of the specimens however may be seen the breathing organs after an inhumation of thousands of years. The tips of the four larger branchiæ and of the four smaller ones below may be observed pointing towards the situation of the heart, and these branchiæ show that the last-named crustaceans did not belong to the *Amphipoda*, but to the highest division of the *Macroura*. The spines, he remarks, are like those of *Crangon salebrosus*; and he states that the general organization, so far as it is presented to view, reminds the observer of the Arctic forms of the Macrourous crustaceans; adding that there is enough to satisfy himself and to convince his friend Professor Owen, whose attention to this branch of natural history makes his opinion of great value, that these last-mentioned fossils belong to the *Salicoques*, or Shrimp-family.

SHROPSHIRE, a county on the west side of England, lying between 52° 20′ and 53° 4′ N. lat. and 2° 17′ and 3° 14′ W. long. It derives its name from the Saxon *Scrobscire*, a contraction of Scrobbes-burh-scyre, or the shire of *Scrobbes-burh*, the Saxon name for Shrewsbury. The term Salop, in Latin Salopia, appears to owe its orign to *Sloppesburie*, a Norman corruption of the Saxon name. [SHREWSBURY.]

It is bounded on the north by Cheshire and a detached part of Flintshire; on the east by Staffordshire; on the south-east, south, and south-west by the counties of Worcester, Hereford, and Radnor; and on the west and north-west by Montgomeryshire and Denbighshire. The general figure of the county is a parallelogram, but its boundary-line is extremely irregular. Its greatest length from north to south is 46 miles, and its greatest breadth 37 miles, and the circumference is upwards of two hundred miles. The Hales-Owen division of the hundred of Brimstrey is a detached portion of the county, of considerable extent, and situated within the counties of Stafford and Worcester. The area of the county is 1343 square miles, or 859,520 acres, but according to the Population Returns made in 1831, the number of acres assigned to the several parishes amounts to 864,360. The gross population in 1831 was 222,938, and the average number of inhabitants to each square mile 165. In size Shropshire is exceeded by fourteen English counties; it is however the largest but one of the inland counties; Wiltshire having a surface of 1367 square miles. In regard to absolute population, it is exceeded by twenty-two English counties. Its relative amount of population to neighbouring counties may be seen from the following estimate. The average number of persons, in 1831, to a square mile in Staffordshire was 346, Cheshire 318, Worcestershire 292, Shropshire 165, Denbighshire 132, Herefordshire 122, Montgomeryshire 79, and Radnor 58. Shrewsbury, the county town, is distant 154 miles N.W. from London.

Surface, Hydrography, and Communications.—Shropshire contains every variety of surface, from the rugged mountain to the fertile and cultivated valley. The river Severn separates the county into two nearly equal divisions, and forms a boundary between the more elevated districts of the west and south, and an extensive level on the north and north-east, which extends into Cheshire and Staffordshire. On the west, various chains of Welsh mountains extend into Shropshire. The Berwyn range, which traverses Montgomeryshire, terminates within the boundaries of Shropshire, between Oswestry and Chirk, with Selattyn Hill, which is 1300 feet above the level of the sea. The Breidden Hills, remarkable for their picturesque forms, are situated on the southern bank of the Severn, near where that river enters Shropshire. The greater portion and highest parts of these hills lie in Montgomeryshire, but their north-eastern extremities extend four miles into this county, forming the hills of Middleton, Cefn-y-castel, Builthey, and Bauseley. A long series of elevations, commencing in Radnorshire, extend into Shropshire on the south-west, and form the district of mountainous land called Clun Forest, portions of which attain an elevation of 1200 feet and upwards. Connected with this range by intermediate hills is an elevated tract situated north of Bishop's Castle and surrounding the village of Shelve, the central ridge of which runs from south-west to north-east, and is about seven miles long. The highest point of it is Corndon Mountain, 1700 feet. On the west this tract is separated by a valley from the Long Mountain in Montgomeryshire, and on the east it is flanked by a very singular mass of rocks called the Stiperstones. Proceeding to the south-east, another range of hills is approached, the most considerable portion of which is called the Longmynd. This range is connected on the south with that mountainous district lying east of Clun Forest, which occupies the tracts between the valleys of the Teme, the Clun, and the Onny. North of the Onny, the Longmynd comprises the Warren Hill, 1200 feet; Medlicot, 1680 feet; Stillhill, 900 feet, &c. On the east lies the valley of Church Stretton, which is bounded on the opposite side by the Caradoc Hills, comprising the heights of Ragleath (1000 feet), Hope Bowdler, Caradoc (1200 feet), the Lawley (900 feet), Frodesley, and Acton Burnel. This range, like those just described, runs from south-west to north-east. It extends across the Severn in tracts of inferior elevation, and terminates near Wellington, in the remarkable and well-known hill called the Wrekin. This hill rises 1320 feet above the sea, and being considerably higher than and nearly detached from all neighbouring hills, it forms a conspicuous object. The long narrow valley of Ape-dale lies to the east of the Caradoc Hills, and this is succeeded by a singular elevated ridge, known by the name of Wenlock Edge. This ridge extends from the valley of the Onny to the Severn at Coalbrook-dale, a distance of about 20 miles. It rises at a slight angle from the east and south-east, to the height of from 500 to 600 feet, and presents a steep escarpment on the west. This ridge may be traced south of the Onny into Herefordshire near Leintwardine, forming the hills called Yeo-edge and Shelderton, which are respectively 850 and 900 feet high. Wenlock-edge is flanked on the east by a number of detached rounded hills, extending from the Onny to the town of Wenlock, all of which are under 1000 feet in height, and, as well as the greater portion of Wenlock-edge, are under cultivation or planted to their summits. Between the hills last described and the town of Ludlow there lies a rich tract of low land called Corvedale. This valley extends north to within a short distance of Wenlock, and on the south opens to the valley of the Teme. It is shut in on the east by a range of hills rising four or five hundred feet above the valley, and extending from Ludlow northwards on the west side of the Brown Clee Hills, which attain the greatest elevation in the county, and consist of two hills called Abdon Barf and Clee Barf, the former of which is 1806 feet above the sea, and the latter 1600 feet. A few miles south of the Brown Clee hills, and connected with them by a tract of sandstone of some (although considerably inferior) elevation, lie the Titterstone Clee Hills, the summit of which also attains the height of 1730 feet, and presents an extremely picturesque appearance in the scenery of this and adjoining counties. The part of Shropshire lying east and south-east of the Titterstone Clee Hills consists of elevations from 400 to 800 feet high, and intersected by numerous valleys. North and north-west of the Clee Hills an open and fertile country extends as far as the Severn.

The part of Shropshire lying on the left bank of that river, as was before stated, does not present such a varied surface as that just described, and a greater proportion of it is under cultivation. The tract which lies on the northern boundary of the county, and which divides it from Cheshire, is not more than 300 feet above the sea. This is the watershed or limit of the drainage of the Severn, the waters on the north falling towards the rivers Dee and Weaver.

Although Shropshire may be considered a well-cultivated county, yet there are extensive tracts of waste land, many portions of which might be enclosed with advantage. Some of the elevated districts which have been mentioned, such as the Corndon, Stiperstones, Caradoc Hills, the Brown and Titterstone Clee Hills, &c., are however too barren or rugged to admit of cultivation, but they afford herbage for sheep. Clun Forest is not, as its name would imply, a wooded tract, but consists of smooth rounded hills, which were used until lately as sheepwalks, and comprise upwards of 12,000 acres; the greater portion of it is now divided and allotted by act of parliament. The Morf, situated on the left bank of the Severn below Bridgnorth, is a tract of waste land, five miles in length and from two to three in breadth. This, as well as portions of the Longmynd and various other commons, might, it is said, be profitably enclosed, or at least planted. The cultivation of mountain land is however on the increase. In the parish of Selattyn, in the neighbourhood of Oswestry, the population has increased considerably within the last few years, and it is attributed to this cause. There are numerous wastes between Shrewsbury and Drayton, and the county also contains several extensive mosses or bogs, such as Bagley Moors between Shrewsbury and Ellesmere, which, previously to any attempt at cultivation, would require an efficient system of draining, the expense of which, where practicable, would be more than compensated for by the improved quality of the soil.

The forest of Wyre lies on the right bank of the Severn, between the towns of Bewdley and Cleobury Mortimer. It is a large tract, principally of underwood, which is cut down when young for the purpose of burning into charcoal to supply the iron-works in the vicinity. Shropshire contains a greater quantity of oak timber than almost any county in England.

The principal river of Shropshire is the Severn. The other rivers and streams are the Teme, Clun, Onny, Tern, Roden, Perry, Meole, Cound, Warf, Rea, and Corve.

The Severn enters the county on the west from Montgomeryshire, a short distance below its junction with the Vyrnwy, a Montgomeryshire stream. Its general direction as far as Shrewsbury is easterly, but previously to reaching that town it makes a considerable bend to the north. From Shrewsbury it pursues a winding course, but having a main inclination to the south-east as far as Coalbrook-dale. Its subsequent course is more decidedly south, passing by Bridgnorth, and quitting Shropshire and entering Worcestershire a short distance above Bewdley. Its entire course through the county is near seventy miles, in no part of which does it serve as a boundary-line, but, as before mentioned, flows through the middle of the county. It is navigable to within a short distance of Welshpool in Montgomeryshire, and consequently is of considerable importance as one of the chief means of transporting the productions and manufactures of the county. [SEVERN.]

The Teme has neither its rise, termination, nor the principal part of its course within Shropshire, yet, being the river next in size to the Severn, and connected with the drainage of the southern portion of the county, it claims notice immediately after the Severn. It rises in Radnorshire, and soon forms the boundary between that county and Shropshire. A short distance below the town of Knighton, in the former county, it becomes the boundary between the counties of Hereford and Salop, and subsequently enters the latter a short distance above the town of Ludlow, running under the walls of that castle: it then alternately divides this county from those of Worcester and Hereford, and finally quits it and enters Worcestershire below the town of Tenbury, and falls into the Severn near Worcester. Throughout its whole course it flows through rich and picturesque scenery. Its direction is nearly east, deflecting below Ludlow to the south-east.

The Clun is a tributary of the last-mentioned river, and rises within the county in the wild uncultivated district called Clun Forest, and flows east. At Clun it is joined by a brook from the left bank, and at Clunbury by another stream from the same side. Its course is then to the south, and it falls into the Teme at the village of Leintwardine in Herefordshire.

The Onny is also a tributary of the Teme. It rises among the Corndon Hills, and takes a south-easterly direction. It is joined from the north by Eaton brook, which flows through Ape-dale, and by several small streams, and unites with the Teme about two miles above Ludlow. Its whole course is within the limits of the county, and it falls about 300 feet.

The Tern rises in a small pool on the borders of Staffordshire, in the north-eastern district of Shropshire, and flows south-west by Market-Drayton. It then takes a more directly southerly course, and is joined on the left bank by the river Mees, which runs near the town of Newport. It is also joined by other streams from the same side, and again running westward is joined by the river Roden on the right, and falls into the Severn between Atcham and Wroxeter. Its whole course is about 30 miles, and it is the longest of the Shropshire streams.

The Roden rises between Ellesmere and Whitchurch, and takes a south-easterly direction by Wem, and, as before stated, falls into the Tern.

The Perry is a tributary of the Severn, and rises among the Selattyn Hills north of Oswestry. Its course is south-west, and it falls into the Severn on the north bank of that river, a short distance below Montford bridge, and about eight miles above Shrewsbury.

The Meole brook rises from the eastern flank of the Longmynd, and flows east-north-east. It is joined from the right by the Rea brook, which rises in Marton Pool, and passing by the village of Meole brace joins the Severn at Shrewsbury.

The Cound is also a tributary of the Severn from the south side. It rises in the neighbourhood of Smethcote, and flowing north by Longnor and Condover, unites with the Severn about two miles below Wroxeter.

The Warf is another tributary of the Severn. It rises in the neighbourhood of Shiffnal, and pursuing a southerly direction enters the Severn near Bridgnorth.

There are two or three streams in the county bearing the name of Rea, but the principal of the mtakes its rise in the parish of Ditton Priors, in the liberties of Wenlock, and running south by Cleobury Mortimer, unites with the Teme at Newnham below Tenbury in Worcestershire. The Corve also takes its rise within the liberties of Wenlock, and flows south-west through the fertile valley known as Corve-dale. It joins the Teme at Ludlow.

It will be seen that the prevailing tendency of the rivers is to the south and south-east; the only streams among those we have mentioned which deviate from that course being the Meole and the Cound. To these two must be added the drainage of the extreme northern portion of the county, whose waters flow north to the river Dee at Weaver. The Severn is the only navigable river.

The fish that frequent that part of the Severn which is in Shropshire are salmon, trout, grayling, pike, perch, shad, chub, gudgeon, roach, dace, carp, flounders, eels, and a few lampreys. The fish of the other rivers and streams are principally trout and grayling.

The lakes, or natural pools of water, are not numerous or extensive. The largest is Ellesmere, near the town of that name. It covers about 116 acres. The smaller are Whitemere, Colemere, Avesmere, and Mereton pools.

Canals.—The first canal formed in this county appears to have been a short line commencing at Donnington Wood, in the parish of Lilleshall, and terminating at Pave Lane near Newport, a distance of about seven miles, with a short branch to lime-works at Lilleshall. This canal was formed by the Marquis of Stafford, for the purpose of conveying coal from Donnington to the lime-works at Lilleshall, and for public sale at the wharf at Pave Lane.

In 1788 the Shropshire canal was projected from the termination of the last-mentioned canal at Donnington Wood to the Severn, at Coalport below Coalbrook-dale, and was completed in 1792. The length of it is about seven and a half miles, with a rise of 120 feet and a fall of 333 feet. This canal is of the greatest importance in conveying the produce of the coal, iron, and other works to the Severn. There is a branch from this canal at Southall-bank to Brierly-hill near Coalbrook-dale, a distance of 2¾ miles, for the same purposes, as well as for bringing up limestone for the use of the iron-works. This canal is supplied with water by means of engines which drain the mines in the neighbourhood, and also by reservoirs. A short canal from the Oaken-gates to the iron-works at Ketley had been previously constructed by Mr. William Reynolds of Ketley.

The Shrewsbury canal was commenced in 1793, under the superintendence of the late Mr. Telford. It begins at the Severn at Shrewsbury, and after running on the left bank of that river for some distance, turns north-east and joins the Donnington and Shropshire canals at Wrockwardine-wood. It was upon the line of this canal that Mr. Telford constructed the first aqueduct of cast-iron. It crosses the valley of the Teme at Long Mill, and is 186 feet in length. It was proposed in consequence of the great floods which happened in 1795, and was completed in March, 1796. The length of the Shrewsbury canal is 17 miles; it has a rise of 154 feet and a fall of 22 feet. There is a peculiarity in the construction of the Shrewsbury as well as in the Ketley and Shropshire canals, which consists in the application of inclined planes instead of locks for the ascent and descent of boats. The inclined plane was first introduced by Mr. William Reynolds on the Ketley canal; the ground over which this canal was formed, being high, rugged, and separated from the adjoining country, rendered it impossible to procure a sufficient quantity of water for the construction of locks. The boats are placed on frames which slide up and down the inclined plane on iron rails, and as one boat descends another ascends. The inclined plane in the Ketley canal has a fall of 73 feet. On the Shropshire canal there are three inclined planes: the first 320 yards in length, and with a rise of 120 feet; the second is 600 yards long, with a fall of 126 feet; and the third 350 yards, with a fall of 207 feet. There is an inclined plane on the Shrewsbury canal, 223 yards in length, with 75 feet rise.

The Birmingham and Liverpool Junction Canal, commenced in 1826, passes through the north-eastern part of the county, and a communication between this canal and the Shrewsbury has been effected by means of a canal which branches off from the Shrewsbury line near Eyton, and passing by Newport unites with the Birmingham and Liverpool canal about four miles from that town.

The Chester and Ellesmere canal traverses the northern part of the county. The branch of it known as the Montgomeryshire canal also passes through a portion of the county. It was intended to form another line from Hordley on the Montgomeryshire canal to Shrewsbury, but it has not been carried farther than Weston wharf.

The canals of Shropshire are confined to that portion of the county which lies north of the Severn. The southern part is wholly devoid of water communication.

Roads.—The roads of this county, both turnpike and private, were described at the end of the last century as generally bad. 'The private ones, particularly in the clay part of the county, being almost impassable to any but the inhabitants, notwithstanding many acts of parliament had been passed with a view to make them perfectly good.' In common with those of all other counties, a great improvement has taken place since that time in the roads of Shropshire. The average number of miles of paved streets and turnpike roads in the years 1812-13-14 was 713; and of other highways 2252; and in 1839 the number of miles of turnpike roads was 754, and of other highways 1876.

The principal mail and coach road in the county is the London and Holyhead road, which enters Shropshire between Wolverhampton and Shiffnal, passes through Shrewsbury, and enters Denbighshire near Chirk. The improvements on this road were commenced in 1815, by Mr. Telford, under a government commission. The whole line of this road is now vested in the commissioners of woods and works, and other commissioners; and parliament has from time to time granted large sums of money for improvements. In 1836 the sum of 4000*l.* was granted for improving the portion of this road lying between Shrewsbury and Oswestry, by lowering Mountford Hill between Shrewsbury and the ten-mile stone on the road to Oswestry. The ordinary width of this road, exclusive of foot-paths, is 30 feet. It was the chief line of communication between London and Dublin, but the opening of railroads from the British metropolis to Liverpool has interfered considerably with the traffic on the Holyhead road. The Bristol, Shrewsbury, and Chester road enters Shropshire at Ludlow, passes through Church Stretton to Shrewsbury, and thence northwards. It is traversed daily by the Bristol and Chester mails. There is a branch from this road leading from Ludlow to Bishop's Castle and Montgomery. There are mail-coach and other roads from Bridgnorth to Shrewsbury, Ludlow to Birmingham over the Clee Hills, Ludlow to Wenlock and Coalbrook-dale, and the road from Ludlow to Bridgnorth has been recently altered and improved. There are also various roads communicating with Coalbrook-dale, Wellington, Drayton, Newport, &c. No railroad for steam-carriages has yet been formed in the county.

Geology and Mineralogy.—In noticing the physical appearance of Shropshire, it was mentioned that the part of the county lying north and east of the Severn differed materially in its general character from the western and southern districts, the former being more even and less elevated than the latter; and it will now be seen that this marked difference is intimately connected with the geological phenomena of the county; for the river Severn nearly forms the division between the new red system on the north, and the older formations on the south; and where any exceptions to this boundary occur, there also a difference of outline and elevation may be observed.

In noticing the different strata of this county in a descending order, an outlier of lias situated between Whitchurch and Market-Drayton first claims attention. It was discovered by Mr. Murchison in 1834. It lies in an elliptical basin, the new red-sandstone rising from beneath, and forming around the lias on the south the hills of Hawkstone, and appearing on the east and south-east at Belton and Market-Drayton, on the north-east in the rising ground extending towards Nantwich, and to the north-west in the undulating country near Whitchurch. The western boundary is not well defined, owing to the low form of the ground, and the superficial accumulations of gravel, sand, and peat; but the lias must have at least a length of ten miles, and a breadth of three or four miles. The greater part of this basin consists of lower lias shale, finely laminated; but the overlying subdivision of the marlstone is also apparent at Prees. The strata contain the characteristic fossils of the lias, and have been bored through in various places for coal, but there is no probability of that fuel being obtained, the experimentalists having mistaken the black lias shale for coal shale. This outlier is distant sixty miles from the nearest point of the great lias formation in Worcestershire and Warwickshire; but Mr. Murchison, from observations he has made, thinks it probable that these formations were originally connected.

The new red system, which rises from beneath and surrounds the bed of lias, occupies the whole northern portion of the county, extending north and east into Cheshire and Staffordshire, and on the west passing into the coal-formation of Chirk and Oswestry. On the south-west it wraps round the edges of the Silurian rocks of Montgomeryshire, and extends for some miles south of the Severn to the coal-formations about Westbury and Pontesbury, where the southern edge of the new red-sandstone overlies that coal-field which extends north-east to near Shrewsbury; but the sandstone again penetrates south to a narrow point near the Caradoc Hills, and is succeeded on the west by the coal-field of Le Botwood. The edges of the rocks of the Silurian system extending north across the Severn, as well as the trap-rocks of the Wrekin, again deflect the sandstone, the boundary-line of which is extended still farther to the north-east from Wellington to near Newport, by the coal-formation of Coalbrook-dale, on the western edge of which field the sandstone again appears, and occupies the remainder of the county lying east of the Severn, and extends a few miles west of that river in the neighbourhood of Bridgnorth, Chelmarsh, &c., and bounded by the old red-sandstone and an elongated portion of the Forest of Wyre coal-formation.

The new red system in this part of England consists of—1, *Saliferous marls*, &c.; 2, *Red-sandstone* and *quartzose conglomerate;* 3, *Calcareous conglomerate;* and, 4, *Lower red-sandstone;* the first and second being respectively the equivalents of the *keuper* and *bunter sandstein* of foreign geologists. The third division is of the same age as the dolomitic conglomerate of the south-west and of the magnesian limestone of the north-east of England; and the fourth is the equivalent of the sandstones of the north-east of England, occupying the same place as the German *rothe-todte-liegende*.

In addition to these beds, there are in some places calcareous flags lying between the red-sandstone and saliferous marls, which appear to be the representatives of the *muschelkalk*, although none of the fossils peculiar to that formation have yet been discovered in them. In the neighbourhood of the outlier of lias just mentioned the upper beds of the new red system appear, and are especially well developed at Broughton, seven miles north of Shrewsbury, where the saliferous marls pass beneath the lias, and overlie the calcareous flags or muschelkalk which rest upon the sandstones of the Hawkstone Hills. These standstones (No. 2) occupy the greater part of the new red system in Shropshire, and may be seen at Ashley Heath, in the north-east of the county, at an elevation of 803 feet; and on the south-west they occupy Harmer Hill, Pimhill, and the rocks at Ness Cliff, on the road between Shrewsbury and Oswestry. This division of the system also forms the northern and north-eastern portions of the great plain of Shrewsbury; but can only be seen at intervals, the surface being covered with gravel, clay, &c. It also extends over the country lying between the coal-fields of Coalbrook-dale and Staffordshire, and the district east of Bridgnorth. The calcareous conglomerate (No. 3) is well displayed between Cardeston and Alberbury, west of Shrewsbury and south of the Severn. It there constitutes a low ridge two miles in length, presenting its escarpment to the carboniferous tracts of Wolliston and Westbury. This formation also occurs east of the Coalbrook-dale coal-fields, running from the Severn at Coalport to near Lilleshall. It is also met with at Apley Terrace and other spots on the left bank of the Severn, in the neighbourhood of Bridgnorth, and at Chelmarsh, a few miles lower down on the opposite side of the river. The extensive denudation of the new red system between Newport and Shrewsbury appears to have obliterated all traces of these conglomerates; but they may be observed on the banks of the Meole brook, south of Shrewsbury. To ascertain the position and localities occupied by the lower red-sandstone (No. 4) in Shropshire, it is only necessary to mention, that as the new red system occurs there in the form of a basin, it follows that the lower members will appear towards the edges of that system; and accordingly the lower red-sandstone will be met with along the line previously pointed out as the boundary of the system. The town of Bridgnorth is built upon these lower beds, and a good natural section of them, passing into the coal-measures, occurs on the western slope of Chelmarsh Common. Bands of impure, concretionary, and mottled limestone occur in these beds, and bear a close resemblance to the cornstone of the old red-sandstone.

Proceeding in a descending order, the carboniferous system of Shropshire next claims attention, and the coal-field of Coalbrook-dale, being the most extensive and productive in the county, deserves the first notice. It extends from near Wenlock, on the right bank of the Severn, across that river to Wellington on the north-west, and is prolongated in a north-easterly direction to Lilleshall, while a thin tortuous zone extends south to Tasley, within a short distance of Bridgnorth. The most productive portion of this field includes Broseley on the south, and stretches north of the Severn in a large triangular-shaped mass, having Lilleshall for its apex. On the north-west and east, being more than two thirds of its circumference, this coal-field is bounded and overlaid by the lower new red-sandstone, but the passage from one formation into the other is rendered difficult of observation or obscure by faults and accumulations of drifted matter. On the west it is flanked by a thin zone of the lower Silurian rocks, and by the trap rocks of the Wrekin and Ercall hills, and on the south by the old red-sandstone and upper Silurian rocks. In the upper measures of this coal-field there is a remarkable band of freshwater limestone, which was quite a new feature in coal-fields, until Mr. Murchison discovered it in the coal-field of Shrewsbury. He subsequently recognised it, in 1832, in the southern edge of this coal-field, and some years afterwards it was noticed in the coal-measures of Ardwick near Manchester. At Tasley, in the Coalbrook-dale field, this limestone has a thickness of three feet; but, like the associated strata, it is not of great persistency, and thins out and reappears at intervals. Its western termination is near the Breidden Hills where it is associated with coal, and passes upwards into the lower new red-sandstone. It has been recently discovered four yards in thickness near Broseley. Its geological position, wherever it has been observed, is immediately under the youngest members of the carboniferous series, the strata below the freshwater limestone being the great productive mining portion of the district. The characteristic fossils of this limestone in the Coalbrook-dale field are a Cypris, and a very minute univalve, which has been named *Microconchus carbonarius*. The coal and iron measures below it are generally more abundant in the northern than in the southern part of the field, and they are more persistent than the upper measures; but nevertheless great changes occur within a short distance, beds of sandstone passing into clay, and clay into sandstone, while the coal-seams wedge out, or taper away and disappear amid the shales and sandstones. In a shaft near Madeley, 230 yards in depth, twenty-one carbonaceous beds occur, of which ten are pure coal, and are reached at a depth of about 200 yards, and have a total thickness of 15 ft. 11 in.

The following table will show the variations in the number and thickness of the seams in different parts of the coal field:—

Pits.	Thickness of Coal.			No. of Beds of Coal.
	yds.	ft.	in.	
Hadley . . .	15	0	0	16
Sneds Hill . .	14	2	2	12
Malinslee . .	11	0	10	13
Langley . .	11	2	6	11
Dawley . .	14	0	0	16
Lightmoor . .	13	2	0	17
Madeley . .	10	2	10	24
Broseley . . .	7	0	9	13

The coal-measures on the east side of the field are not less than 1000 feet thick. The ironstone of this field is both concretionary and flat-bedded, and the various courses of it are known under local names, such as *New Mine*, *Crawstone*, *Pennystone*, &c. The ores of iron are peroxides in sandstone, argillaceous carbonates in shale, and sulphurets in the coal. The sulphuret of iron is the most abundant mineral; and next to it the sulphuret of zinc, or blende. Titanium has been detected in the refuse slags of iron-ore. Petroleum occurs in great abundance in both the upper and lower measures, and some of the beds of shale of the latter afford excellent fire-clay, which is used in the manufacture of pipes and pottery.

The true millstone-grit appears to be absent in this formation; but the grits, conglomerates, and sandstones forming the lower portion of the coal-field may perhaps be considered as its representatives. The carboniferous limestone does not occur in any extensive range, and the coal-field throughout the greater part of its extent reposes upon older rocks, chiefly of the Silurian system, and, in the southern district, upon the old red-sandstone. The carboniferous limestone however is met with at Lilleshall, Little Wenlock, and Steeraway, and traces of it occur at intermediate spots.

The coal-field has been disturbed, especially its western side, by the protrusion of trap, differing in age and mineral character, but appearing on contiguous lines of fissure parallel to that of which the Wrekin is composed, and producing the various dislocations with which the field abounds. The main lines of fault run nearly from south-west to north-east, but are traversed by cross faults. Mr. Prestwich observes that there is probably no coal-field of equal size in the kingdom which has been so much shattered. The most powerful dislocation within the field is called the Lightmoor Fault, and is an upcast of more than two hundred yards at the point of its greatest amount. The trap rock juts out in bosses of irregular shape in the vicinity of Little Wenlock.

The organic remains of the coal-measures of this field are numerous. Those noticed comprise between forty and fifty species of terrestrial plants, three genera of fishes, three species of trilobites, with other crustacea, and forty species of conchifera and mollusca.

The Shrewsbury coal-field, already mentioned in describing the southern boundary of the new red system, extends from the Severn at the Breidden Hills on the west, to Shrewsbury on the east, and occupies a semicircular bay, of which Pontesbury is the southern point. The south-west and south-east sides of this field rest unconformably upon older rocks of various ages; and on the opposite side the coal-measures graduate upwards into the lower new red-sandstone; and at Wellbatch, Asterley, and Coedway the sandstone may be seen graduating into the coal-measures. The strata of the coal-field have generally a slight inclination towards a common centre. The principal places where the coal is worked are Nobold, Wellbatch, Aston, Pontesbury, Minsterly, Westbury, Braggington, and Coedway; and where the formation is best developed the coal is found in three seams, consisting, in descending order, of half-yard, yard, and two-foot coals. The last is generally the best. These coal-beds are separated from each other by red, green, and black shale, and clod. Owing to the unequal thickness of the overlying strata and numerous dislocations, the coal-seams are reached at various levels. The deepest pits are those farthest from the edge of the field, and are about ninety-five yards; while near the hilly sides of the older rocks coal is met with at from ten to twenty yards. The strata of this coal-field belong to the upper or youngest series of coal-measures, and the freshwater limestone described in the Coalbrook-dale field is found between the seams of coal, and was indeed first noticed by Mr. Murchison in this locality. It varies in thickness from three to eight feet; and at Pontesford it is divided into two beds.

There are several small irregular carbonaceous troughs lying between the Shrewsbury and Coalbrook-dale fields, but similar in character to the former, and containing the freshwater limestone. The largest of these is that of Le Botwood. Others occur at Uffington (three miles north-east of Shrewsbury), Longnor, Longden, Pitchford, Cound, Dryton, &c.; in some of which coal is worked.

The coal-field of Oswestry is situated on the western verge of the county, and is quite distinct from those already noticed. The productive portion of it is very limited, occupying a small area between the town of Oswestry and the hills of Llanvorda, Trefonen, Treflach, and Sweeny. It contains only two seams of coal worthy of extraction, the upper being four feet thick; the lower, which is six feet, is a very inferior coal. Near their outcrop these seams are separated from each other by about twelve yards of strata composed of shale and clod, with thin courses of sandstone. In these situations the coal has long since been exhausted, and it is now raised from spots towards the centre of the basin, and by shafts sunk through the new red-sandstone, under which the coal passes on the east side of the field. The millstone-grit and sandstone are developed to a large extent, rising west of the coal into broad ledges towards the higher hills of limestone; and on the other hand dipping generally at very slight angles beneath the coal.

The carboniferous limestone is better developed here than in any other part of the county. It separates the millstone-grit from the older Silurian rocks, and has a maximum thickness of at least four or five hundred feet. This coal-field is affected by numerous faults, the two principal of which run north by east and south by west, which is nearly the line of elevation of the adjacent mountains on which the coal-field reposes.

The roof of the coal abounds in impressions of plants, and the mountain limestone contains a vast profusion of characteristic corals and crinoidea, with numbers of the *Productus hemisphæricus*, *P. Martini*, &c.

The coal-fields of Shropshire remaining to be noticed are situated on the south side of the county. That of the Titterstone Clee Hill lies between the towns of Ludlow and Cleobury-Mortimer. This carboniferous tract lies at a very considerable height, and is of an extremely irregular outline. It is flanked on the south and north-east by zones of carboniferous limestone rising from beneath the millstone-grit, which is on the other sides bounded by the old red-sandstone, which wraps entirely around the tract, separating it on the north from the coal-field of the Brown Clee Hill, on the west from the Ludlow Rocks, and on the east from the coal-fields of the Forest of Wyre.

The portion of the field known by the name of Cornbrook forms an elevated trough, capped by a plateau of basalt, which covers the strata here. South-west of the Cornbrook rocks, and at a considerably lower level, is a small basin of elliptical form, called the Knowlbury field, which is distinctly broken off from the great field of Cornbrook. This basin is completely exempt from basalt, except that its surface is partially encumbered with fragments of that rock. At Cornbrook and Knowlbury there are four principal beds of coal, which vary in thickness in different parts, and beneath the uppermost bed the shale contains concretions of ironstone of excellent quality, which also occur beneath the next seam. In the Cornbrook tracts the coal is worked by shafts sunk through the overlying basalt, which varies in thickness from twenty to sixty-four yards. In the Knowlbury basin the lower beds of coal and sandstone crop out on the west at angles of about 30°, resting on the old red-sandstone. In the centre of the basin the shafts are sunk to a great depth, the new pit being 220 yards deep. This coal-field is traversed by two principal and several minor faults, the prevailing direction of which is from north-east to south-west. The millstone-grit rises at many points from beneath the productive coal-field. It is most expanded to the north, where it is separated from the old red-sandstone by the carboniferous limestone at Oreton; but in other parts, where the latter formation is wanting, it rests immediately upon the sandstone. It has a thickness of several hundred feet, and is inclined at high angles near its exterior margin, the inclination decreasing as it passes beneath the coal-seams. The mountain limestone, as before mentioned, occurs near the northern and southern extremities of the tract, where it lies between the millstone-grit and the old red-sandstone. The thickness of the strata never exceeds sixty feet. Titterstone, the highest point of these hills, is composed of a pure basalt, and has an elevation of 1730 feet above the sea. 'The iron-ores, and the limestone with which they are associated in these hills, are,' says Mr. Murchison, 'very superior in quality to those of the great Staffordshire field, and at first sight it appears surprising that these valuable products should not be turned to better account. They are however excluded from fair competition by the want of means of transport; and it is painful to record, that with all the spirit and enterprise which can be bestowed on such works, the manufacture of iron in the Clee Hills is attended with little profit. Vast heaps of the finest ore have lain unheeded for many years on the high grounds of the Brown Clee; and it is only by the actual juxta-position of the coal, iron-ore, and lime, at Knowlbury, in a lower and more favourable position, that Mr. Lewis (the proprietor) is enabled to sell, though at a very small profit, a manufactured article of the very first quality. The construction of canals or rail roads would soon render the Clee Hills the centre of wealth and industry.'

The coal-field of the Brown Clee Hills lies a few miles north of the formation just described, and, like that, is surrounded on all sides by the old red-sandstone, which here separates the coal-measures into two distinct elevations, known as the Clee Barf and the Abdon Barf. These two carboniferous tracts are the loftiest in Great Britain. The sandstone rises to a considerable height upon the flanks of the hills, and dips inwards, upon which repose the strata containing seams of bad coal of slight value, the summits being composed, as at Cornbrook, of basalt. In some parts there are thin beds of coal, having a total thickness of seven or eight feet. In the lower part of the series, ironstone nodules occur. The lowest coal rests upon a sandstone, the equivalent of the millstone-grit which reposes on the old red-sandstone, without any traces of carboniferous limestone. The pits on the Abdon Barf are shallow. Those of the Clee Barf vary from 14 to 80 yards, and are all worked by the common windlass. Nearly all the best coal has been extracted. The coal-measures are intersected by a vast number of faults, trending from north to south and east to west.

In this coal-field, as at the Titterstone Clee Hill, there is abundant evidence of the tract having been heaved up into its present position by powerful forces acting from beneath, which have thrown the carbonaceous masses into separate troughs or basins.

The coal-field of Wyre or Bewdley Forest lies east of those just described, occupies the south-eastern corner of the county, and extends into Worcestershire, the greater part of it lying within that county. It has a length from north to south of about 20 miles, and a breadth in the Forest of Wyre of five or six miles. That portion of it lying in Shropshire and extending southward in a narrow zone from near Bridgnorth, is bounded on the west by the old red-sandstone of Chelmarsh. This band contains at least three seams of coal, of which only one is worked, and that, like the rest of this field, is of an inferior sulphureous quality. At Kinlet, where the coal-measures occupy a greater width, a greenstone trap occupies some of the highest ground.

An examination of these coal-fields of Shropshire has enabled Mr. Murchison to lay down the following data in respect to them, independently of the phenomena resulting from igneous action and disturbance:—

1. The proof of a younger zone of coal passing upwards and conformably into the lower members of the new red-sandstone, and containing within it a peculiar freshwater limestone, always occupying in a long course the same position.

2. The Coalbrook-dale field has been shown to contain not only this upper carbonaceous zone, but further, a full development of the older coal strata, charged with a mixture of freshwater, terrestrial, and marine remains, indicating an æstuary origin. These beds however pass down in two localities into bands of true mountain limestone, containing exclusively fossils of marine origin.

3. The Clee Hill coal-fields consist of only the lower carbonaceous masses, reposing upon millstone-grit and carboniferous limestone. These therefore were probably accumulated in a bed of the sea.

4. In the northern extremity of the Forest of Wyre, where the passage upwards into the new red-sandstone is clearly marked, no volcanic eruptions having there burst forth to obscure the succession of the stratified deposits, a large portion of carbonaceous masses is thus proved to belong to the younger zone of coal-measures: but the order of succession beneath them is not complete; for the carboniferous limestone being absent, the coal reposes directly upon the old red-sandstone or Silurian rocks.

5. The fields of Shrewsbury and Coalbrook-dale were originally deposited upon rocks of all ages, from the slates of the Cambrian system to the carboniferous limestone included, the latter case being the exception, and not the rule, as in other parts of England.

The old red system, which Mr. Murchison has divided into three formations—which in a descending order are: 1, quartz on conglomerate and sandstone; 2, cornstone and marl; and 3, tilestone—occupies a considerable part of the southern division of the county. It is here the northern prolongation of that great tract of sandstone which occupies such large portions of the counties of Monmouth, Brecknock, and Hereford, and part of Worcester, and enters this county from the south. Its northern extremity terminates in the coal-field of Coalbrook-dale, and on the east in that of the Forest of Wyre, with the exception of the space lying between those two coal-fields where the old and new red systems meet. On the west it is bounded in Corve-dale by the upper Ludlow rock of the Silurian system. The three subdivisions above mentioned are met with in this county, but the middle, or cornstone, is the most prevalent, and affords lime of an inferior quality. Organic remains of various kinds are abundant in the tilestone group, while those of the upper division are confined to a few land-plants. At Hayton's Bent, north of Ludlow, veins of copper-ore occur, which were formerly worked, but have been abandoned for upwards of one hundred years. A large outlier of old red-sandstone, the principal part of which forms Clun Forest, occurs on the south-west of the county, and is separated from the great mass by wide intervening tracts of Silurian rocks. This outlier is nearly one hundred square miles in superficial extent. Its western extremity reaches into Radnorshire.

The portion of the county now left undescribed, and comprising about one-fourth of its surface, is composed of the stratified rocks of the Silurian and Cambrian systems. These occupy the southern division of the county lying west of a line drawn from Ludlow to the Severn at Coalbrook-dale.

The Ludlow rocks rise from the old red-sandstone of Corve-dale into eminences of 1000 or 1100 feet above the sea, exhibiting the subdivisions of the formation, viz. the upper Ludlow rock, Aymestry limestone, and lower Ludlow rock. West of these, and separated by Hope-dale, is that unbroken escarpment extending from the valley of the Onny to Coalbrook-dale, called Wenlock Edge, and composed of Wenlock limestone. This is succeeded by Wenlock shale, composing the valley east of the Caradoc or Church-Stretton Hills, which consist chiefly of different varieties of unbedded or amorphous trap, flanked on the east and west sides by Caradoc sandstone. On the north-eastern extremities of these Silurian rocks, west of Church Stretton and north of the Onny, is an elevated and extensive tract of rocks of the Cambrian system, composing the Longmynd and other mountains, with outbreaks of trap, and these are again succeeded by Caradoc sandstone, the altered and irregular ridge of the Stiperstone, and the trap rocks of Shelve and Corndon. A vast expanse of Ludlow rocks then succeeds, and extends into Montgomeryshire, and this formation occupies nearly the whole of Shropshire lying south and west of the Onny, the outlier of old red-sandstone above described forming an exception The Silurian and Cambrian rocks above described, between the old red-sandstone of Corve-dale and Montgomeryshire, have a general direction from south-west to north-east, and we have seen that the coal-fields of Coalbrook-dale and Shrewsbury wrap round their northern edges. Many interesting geological phenomena occur in the Silurian rocks and the varieties of trap associated with them. Among the trap and sandstones of Shelve and Corndon occur several metalliferous veins, containing ores of lead, &c., of considerable value.

The trap-rocks of the Wrekin, &c., as in the other volcanic districts, have disturbed and altered the adjacent strata, and from observing these phenomena, and the dislocations of Coalbrook-dale and the Clee Hills, 'it may,' says Mr. Murchison, 'be affirmed that this district in Shropshire furnishes proofs of the alternate play and repose of volcanic action during very long periods. These evidences demonstrate, 1, that volcanic grits were formed during the deposition of the lower Silurian strata; 2, that the Upper Silurian rocks and old red-sandstone were accumulated tranquilly without a trace of contemporaneous eruptions; 3, that after their consolidation, the last-mentioned deposits were dismembered and set upon their edges by vast outbursts of intrusive trap; 4, that the carboniferous system was deposited after the older strata had been upheaved; 5, that subsequent dislocations, including some of the most violent with which we are acquainted, took place after the accumulation of the coal-measures and lower new red-sandstone.'

The superficial deposit or drift of the part of Shropshire lying south of the Severn is principally derived from the Silurian rocks on the west and north-west; that of the north of Shropshire consists of masses of sand and gravel derived from the underlying new red-sandstone, and in the neighbourhood of the coal-fields this is often mixed up with detritus derived from the coal-measures, &c.

On the surface of these local accumulations in Northern Shropshire there occurs in some places a foreign detritus composed of granitic bowlders, derived from Cumberland or Scotland, and marine shells of existing species are often found mixed up with them. The bowlders occur both isolated and in groups, being numerous on the northern face of Haughmond Hill and the north-western slopes of the Wrekin, and isolated in the district lying a few miles south of Shrewsbury. Further observations and deductions respecting the occurrence of this foreign drift will be found in the article SEVERN.

Mineral Springs.—There are numerous saline springs issuing from the new red-sandstone of North Shropshire. They occur at Smeithmore, Kingleywick, Admaston, Moreton Say, &c. These springs are not however confined to the new red system, for they are met with in the coal-measures at Broseley, and at Sutton near Shrewsbury. At the latter place, in addition to the saline ingredients, there is a considerable proportion of chloride of lime. A saline spring, called *Saltmoor*, occurs also at Ashford, on the banks of the Terne below Ludlow, from which, at the period of the Norman conquest, it appears salt was manufactured, as is said to have been formerly the case with the springs at Broseley. The Saltmoor well issues from the old red-sandstone, and its geological relations and phenomena seem to correspond with the valuable wells lately discovered at Tenbury in Worcestershire, close to the Shropshire border. The medicinal virtues of the latter are however of far greater interest and importance, as, in addition to the saline matter, chloride of lime, and iodine and bromine, are found in unusually large proportions. The connection between these springs at Tenbury, Saltmoor, &c., and the intrusive basaltic rocks at the Clee Hills, affords an interesting subject for geological inquiry.

On Prolley Moor, on the western side of the Longmynd, there is a spring of which chloride of lime appears to be the principal ingredient. Chalybeate springs occur near Sherlot Common, in the neighbourhood of Wenlock, at Moreton Say, and other places.

Soil and Agriculture.—The soil of the county on the right bank of the Severn is chiefly a red clay and gravel, derived from and overlying the new red-sandstone formation; it is favourable for many kinds of agricultural produce. The hundred of Bradford North consists of this clay and gravel with sand, and a considerable quantity of peat, with some good meadow land in the lower portions. In Bradford South and Brimstry hundreds, a red sand prevails throughout, with the exception of the district in the neighbourhood of Coalbrook-dale. Pimhill hundred consists of this and some boggy land, with however a large proportion of good wheat land. Farther west, towards Oswestry and the borders of Denbighshire, there is a coarse gravel mixed with the prevailing red clay, and some boggy and peaty land, which has however been diminished by draining. This red clay does not extend in any considerable degree south or west of the Severn, although a red clay of a somewhat different character prevails over the greater portions of the franchise of Wenlock, and the hundreds of Stottesden, Overs, and Munslow. This clay lies over the old red-sandstone, which contains beds of impure limestone, and which is burnt and used as a manure to a considerable extent. It forms some of the best land in the county. In the three last-named hundreds lie the coal-fields of Bewdley, and the Titterstone and Brown Clee Hills. The hundreds of Condover, Ford, and Chirbury have a prevailing deep light-coloured loam, with sand and gravelly clay. The south-west portion of the county is the least productive, comprising the hundreds of Purslow and Clun. The ground is too steep and elevated, and the soil too light to admit of general cultivation. The valleys consist of loam, resting on gravel, and forming good meadow and pasture land.

The relative quantities of pasture and arable land, and the proportions in which grain and the various kinds of agricultural produce are cultivated, vary of course with the situation of the farms and the nature of the soil. The farms are for the most part arable, but some are for grasing, for hay, for the dairy, and for rearing and feeding. The crops in general cultivation are, wheat, barley, oats, peas, vetches, and turnips, to which may now be added potatoes (though these last are chiefly consumed by the farmer as food for his stock), and, in a few places, beans.

The following are the various rotations of the crops:—1, Wheat, barley, clover; 2, Peas, wheat, barley, clover; 3, Wheat, turnips, barley, clover or peas; 4, Wheat, barley, turnips, barley, clover; 5, Peas or vetches, wheat, oats, clover; 6, Fallow, wheat, oats, clover; 7, Pasture, oats, fallow, wheat, oats, clover; and in some places where the soil is not adapted for turnips the rotation is as follows:—1, Fallow, wheat, clover, oats or peas, fallow; 2, Fallow, wheat, oats or barley, clover, peas or vetches, fallow; 3, Fallow, barley, clover, wheat, fallow.

In the neighbourhood of Shrewsbury, upon a pebbly loam of some depth, resting upon gravel, the following plan has been pursued with success:—The clover leys were ploughed and sown with wheat in October, or early in November, and covered with a light dressing of lime and soil prepared for the purpose. When the wheat was cleared off, the stubble was ploughed in, and sown with turnips, which were eaten by sheep in December. Early peas were sown in the beginning of February, and carried off by the middle of July, when the land was immediately manured and sown with turnips; the largest of which were removed off the ground in December, and the rest eaten by cows, sheep, &c. In the following spring barley and clover were sown, and mown or eaten in summer. By this plan it is said the lands were kept free from weeds, and never required to be fallowed. The produce was about twenty-six bushels of wheat per acre, and as many of peas.

The following course of crops was formerly not unusual: fallow, wheat, oats for two years; the second year's crop was sown with clover, which was suffered to remain two or three years, while fresh land or a clover ley of three years' growth was broken up for oats or a fallow. If barley was introduced, it was after the wheat, and before the oats.

The introduction of turnips in the place of fallows is a main feature in the improvements effected in the cultivation of the farms. Where however the land is too heavy and strong for turnips, the fallows are commenced at various periods, but the greater part of them are not sufficiently worked or cleaned. Many farmers however begin their fallows in January, and by repeated ploughings, harrowings, and rollings, bring them into very good order for wheat. In other cases the first ploughing is not performed until May or June; the next in August; and in September the land is again ploughed and harrowed, and sown in the end of October. By this means it is evident that land cannot be well cleaned, unless great labour and diligence be used. In general however, after a stubble, the land is ploughed before Christmas, and has at least three more ploughings in the course of the summer. After clover it is grazed in the spring with sheep, and not ploughed until June, or sometimes the clover is mown and a tolerably good fallow made previous to October.

Wheat is sown in October, and on good land not until the middle of November. From two to three bushels per acre is the quantity sown, according to the proportion and quality of the manure employed. The wheat is first steeped in salt and water, and subsequently sprinkled with lime. Where wheat succeeds a clover ley, dung is spread upon the latter, and ploughed under; but sometimes the manure is carted, and spread after the seed is harrowed in. If lime is the manure employed, it is either spread upon the clover in July or harrowed in with the soil during the summer. Summer fallows for wheat are manured with dung or lime; but if turnips are to succeed wheat, no manure is used for the latter. Wheat, as well as other grain, has heretofore been sown broad-cast, but drilling is now becoming general in many parts of the county, and dibbling has been recommended. It is sometimes eaten a little in the spring with sheep, and harrowed once or twice in May or June. The crop varies from ten to twenty-five bushels per acre. Buckwheat is sown on light soils from the middle to the end of May, which allows time for the ground to be well cleaned. Wheat is generally reaped with broad hooks or saw sickles, but some is mown.

Barley is sown from the latter end of March to the beginning of May. Two and a half bushels an acre is about the average quantity of seed sown. Upon strong soils, when barley succeeds wheat, the latter stubble is ploughed under about Christmas. Upon such soils the land is rendered fit by the frost for working with the harrows at seed-time. If barley however succeeds wheat, on sandy, gravelly, or pebbly loams, three ploughings are often given; and after turnips, either one or two ploughings. The produce is from twenty to forty bushels per acre.

Oats are commonly sown after wheat, and often, upon stiff soils, with only one ploughing, and succeed well. They are also sown upon the turf with one ploughing. Barley as well as oat crops are mowed.

Peas are perhaps more grown in Shropshire upon sound soils than in most other counties, but are regarded as a very uncertain crop. They are sown in March, from two to three bushels per acre. They are frequently sown upon old pastures or clover leys, with one ploughing. The produce varies from ten to twenty-four bushels per acre. They are used as food for horses, and for fattening pigs. Vetches are cut green for horses in the stable. If left for seed, they are succeeded by a crop of wheat.

Turnips were formerly chiefly cultivated on the east side of the county, but their growth has lately been much extended and encouraged by the principal farmers and the landed proprietors, who have given premiums for that purpose, so that now they form a regular crop wherever the soil will admit of their profitable cultivation. They are sown from the middle of June to the beginning of July. The land is previously well manured and cleaned by frequent ploughings, commencing before Christmas. The quantity of seed used is one pound to an acre. The plants are twice hoed, and the produce varies from ten to twenty tons per acre. Where the soil is sandy and dry, the turnips are not removed from the field, but are eaten by sheep or young cattle. For this purpose they are sometimes removed to an adjoining stubble or ley. In other cases they are drawn home and stacked for winter use.

The cultivation of the potato has also been on the increase of late years. In the neighbourhood of towns, where manure can be procured, and the potatoes easily conveyed to market, this vegetable should be made a staple article of cultivation. It is also found to be an excellent food for cows, producing in winter, with a very small quantity of good hay, a plentiful supply of good milk. In some cases this crop is immediately preceded by wheat. The exhaustion of the soil by the potato has been proposed to be remedied, or rather avoided, by the following plan:—A wheat fallow to be ploughed in two, three, or four bout ridges, dung to be put in the furrow, and on the dung the potato sets to be placed, and a bout ploughed on them. A ridge is thus formed, giving the manure and a double portion of earth for the plant to root and grow in. The remaining part of the land would form alleys in which, during the summer, the operation of the plough would make the fallow; and thus crop and fallow be obtained without injuring the land, for the fallow would be amended by whatever extra care was bestowed upon the potato crop beyond the tillage usually given to the summer fallow. Thus two most important articles of food (wheat and potatoes) might be had with the same tillage, and from land that would otherwise be unproductive.

Beans are not much cultivated, which has latterly been the case also with rye, although that was formerly considerably cultivated on the sandy loams, where wheat has since taken its place, owing perhaps to a change in the soil, arising from the quantity of lime used on it.

Some hemp and flax are cultivated in the county.

Hops are scarcely known, except on the southern edge of the county adjoining Herefordshire; but to show that their extended cultivation is not impracticable, it may be mentioned that a hop-yard was formed in the parish of Ditton-Priors, west of the Brown Clee Hills, and kept up six years, beginning in the year 1830: it produced on an average about 4 cwt. per acre; two years were total failures, which was the case throughout England. It answered on the whole tolerably well. A good orchard has risen up on the ground formerly occupied by the hop-yard.

The grass-land is the portion which receives the least attention at the hands of the farmer. He is apt to think all or nearly all his manure is most called for on the arable land, and consequently bestows little or none on the pastures and meadows. Irrigation is however extensively practised, and with the greatest advantage.

The meadows adjoining the Severn, and other rivers and streams, are rich, and are often overflowed; and the water lies on them, especially near the Severn, for a considerable time. The fertilizing effects of these floods are very great, and of value to the farmer, when occurring, as they generally do before the grass is in a forward state, or after it has been mown and removed. Sometimes however a flood occurs near the period of hay harvest, when the effects are most disastrous, the crops in that case being often wholly destroyed. To prevent this, recourse has been had, in the upper portion of the Severn, to embankments, and as the total exclusion of the flood water would perhaps be a worse consequence than the evil prevented, where attention is paid to this point care is taken to place flood-gates, which are shut or opened according to the period of the year. Of so much importance is irrigation esteemed, that an act of parliament was passed about fifty years since, to compel the landholders on the banks of a stream called the Rea, near Shrewsbury, to adopt a uniform system, by which the benefit of the waters might be obtained, as well as its evil consequences more effectually prevented.

When manure is bestowed on the grass-land, it is generally carried out in the winter, during hard frosts, when the land is hard and the teams are not wanting for other purposes. The time however when the manure is most efficacious is immediately after the hay is removed. The meadows are shut up for a crop about Candlemas, and generally mown in July. The most common grasses are *anthoxanthum odoratum, phleum pratense, alopecurus pratensis*, &c.

This county is not remarkable for its dairy produce, although a ready sale is obtained for cheese and butter at the market-towns, where they are purchased by dealers and carried to the manufacturing districts of Wolverhampton, Dudley, and Birmingham, and large dairies are therefore to be found on some of the farms situated within reach of the markets. The cheese is, generally speaking, of an inferior kind, but that made on the northern part of the county, on the borders of Cheshire, must be deemed an exception, where more attention is paid to this department and the dairies are larger. The cattle are reared from the improved breeds of Lancashire, Cheshire, Leicestershire, and Staffordshire. In the neighbourhood of Bishop's Castle there is a good breed of cattle, the colour a dark red; in the south the Herefordshire breed is becoming more common. On some large farms and gentlemen's estates the Devonshire, Alderney, and other breeds are introduced and bred for the purposes of the dairy. On the north-east side of the Severn the breed of cattle is an inferior sort of the Lancashire long-horn, and principally for the dairies, and most farmers throughout the county rear a few calves every year for the same purpose, and in some cases the breeds are improved by the purchase of bulls from Leicestershire and Lancashire. The Leicestershire breeds, so termed, are very quick feeders, but appear less adapted to work than those of Herefordshire and Devonshire. When the intention of the farmer is to rear calves, it is deemed advantageous that the cows should bring them in February or earlier, but when intended to fatten for consumption, a month or two later is considered the most desirable time. The manner of feeding the calves varies: some give oatmeal, wheat-flour, or oil-cake with milk, while others give them hay and oats, or turn them out to grass at an early period. The calves intended for the market are generally suckled until sold. Where the land is of an inferior kind, it is considered good management to rear as many calves as are requisite to keep up the stock of cows. The cows are generally housed and tied up during the winter. There are some horses bred in Shropshire, as well for the road as the plough, but of no particular breed. The waggon horses are generally of a strong black sort. In some parts of the county the farmers keep cart stallions, and breeding mares constitute a portion of almost every team, by which means the stock is continued on the farms, and several useful horses brought to market. Some saddle horses are also reared. On Clun Forest and the Longmynd a small hardy race is reared approaching to the character of the Welsh pony. At Walcott, the seat of the earl of Powis, a variety of breeds were introduced about 50 years ago by Lord Clive. On the east side of the county a great portion of the horses are supplied from Derbyshire and Leicestershire. Oxen are used for the plough to a considerable extent, although not so much as formerly. They are preferred for ploughing in the stiff land, but horses for all road-work. Five oxen are generally used in the plough, in single gearing, or four oxen with a horse to lead. In a few cases they have been used in waggons.

The sheep of Shropshire are various, according to the fancy of the farmer. Most of the sorts in England may be found in one portion or another of the county. The old Shropshire sheep are horned, with black or mottled faces and legs. Their size is nearly that of the South-Down; but the neck is longer, and the carcass not so compact. They are nimble and very hardy, and are not supplied with much dry food except during long snows. This sort abounds on the Longmynd. They weigh near 10 lbs. per quarter when fattened. Their fleeces weigh from 2 to 3 lbs. The small Welsh breed, of 5 or 6 lbs. per quarter, exists here, as well as the Leicestershire, of six times the weight. Upon the hills towards Wales the sheep are without horns, with white faces and with shorter legs, and heavier but coarser fleeces than the Shropshire sort. They weigh about the same. The farmers in the neighbourhood of the hills and commons prefer the cross of the South-Down with the Longmynd, the produce being as hardy and biting as close as the latter, while the wool is improved and the weight of the sheep increased. The expense of procuring winter-food for the hill flocks takes off much of the profit. The sheep are not generally folded. Pigs and hogs are fattened and reared to a great extent. The original hog of the county, a high-backed long-eared animal, has been crossed by various breeds, and is now rarely to be met with unmixed. The Chinese breed has diminished as the Berkshire and Leicestershire have been introduced.

There is not much cider or perry made in the county. The orchards are chiefly confined to the south and south-east borders.

The size of estates and farms in Shropshire, as in other counties, varies considerably. There are estates of from 10,000 to 30,000 acres, and numbers of all inferior sizes. The farms generally vary from 100 to 1000 acres, and on the west, on the borders of Wales, there are many little farms not exceeding 20 acres. It may be stated however that the farms are larger and more consolidated than formerly, two or three being often put into one.

Mining Industry and Manufactures.—The rich coal-formations of this county and the iron-stone associated with them give employment to several thousand persons. The number of labourers employed in labour not agricultural or connected with manufactures other than that of iron was, in 1831, 11,585. The greater portion of these are engaged in raising coal, ironstone, and lime, and in the manufacture of iron, and a few in the lead-mines on the western side of the county. Coal is raised in various parts of ten hundreds. The district in which the greatest number of hands is employed is in the coal and ironstone formation in the hundreds of Bradford South and Brimstrey, extending from Lilleshall to Coalbrook-dale and Willey. Its connection with the coal and materials employed in smelting, and the vicinity of the Severn, render it now the most productive iron-district in the kingdom. In 1740 there were six furnaces in Shropshire, producing 2000 tons annually. It is to be observed that at that period the iron-trade was languishing in consequence of the want of wood-charcoal, cutting down timber for the use of the iron-works having been prohibited by special enactments in consequence of the great destruction of timber which had previously taken place. At length patents were granted for using *pit coal*, which, after great difficulty, was effected by enlarging the height of the blast furnaces so as to prolong the descent and contact of the ore and coke, and more especially by the eventual application of the steam-engine, which rendered the working of the blowing-machinery at once regular and powerful.

In 1788 there were three charcoal-furnaces in the county, producing 600 tons each annually, and two coke blast furnaces, producing 1100 tons each; total 23,100: the total number of tons produced by coke blast-furnaces at the same period in England and Wales was 48,200; so that Shropshire produced nearly one-half.

In 1796 the number of furnaces was 23; the excise return of iron made being 68,129 tons, and the actual return 32,969 tons. At the same period the total number of furnaces in England and Wales was 104, the excise returns for which amounted to 167,321½ tons; the actual return being 108,793 tons.

It is in this county and Staffordshire that the manufacture of iron is seen in its greatest perfection. The beauty and finish of their small rolling-machinery, which is run at an immense speed, enables them to secure almost the whole of the very small and extra sizes of iron, which they throw off at little more cost than the Welsh manufacturers do their common bars. It is in South Wales that the furnaces and manufactories produce the greatest quantity; in Shropshire and Staffordshire that the highest excellence in rolling has been attained. In 1827 Salop was computed to produce 78,800 tons annually, from 31 furnaces. The total quantity produced at the same time in England and Wales was 690,500 tons. Every part of the process, from digging the ore to the completion of the manufacture, including the conversion of the coal into coke, is performed on the spot.

A considerable quantity of lead is procured from the Snail-beach, Hope, and other mines in the district of Shelve and Corndon.

The quantity of coal raised annually is calculated at about 300,000 tons, a great portion of which is consumed in the furnaces.

In the parish of Wellington upwards of 1000 men are employed in coal-pits and limestone-quarries. In the parish of Great Dawley 1379 men were, in 1831, employed in collieries. The population of this parish, between the years 1821 and 1831, increased 1730 persons, which is attributable to the establishment of blast-furnaces, forges, and mills for the manufacture of bar-iron, and also to collieries. In the parish of Madeley, which includes Coalbrook-dale and Ironbridge, 350 men were, in 1831, employed in mines and coal-pits, and in the chapelry of Prior's-lee, in the parish of Shiffnal, 332 men were similarly employed. In the parish of Much Wenlock between 100 and 200 men are employed in lime-rock and iron-stone works, and 100 in Little Wenlock parish. In the parish of Broseley 126 persons were, in 1831, employed in mines; the population however between 1821 and 1831 decreased upwards of 500 persons. This was ascribed to the cessation of five iron blast-furnaces. [BROSELEY.] In Coalbrook-dale and other places the iron is manufactured on the spot into various articles, and distributed by means of the Severn and canals. Coalbrook-dale can claim the merit of having first introduced on a large scale the use of coke as a substitute for charcoal in the manufacture of iron. Nails are made in great quantities at Wellington. In the Hales-Owen division of the hundred of Brimstrey, which is, as stated before, an outlier of the county, and comprising the southern part of the great Dudley coal-field, about 500 males twenty years of age and upwards are employed in the manufacture of iron At Shrewsbury and in its vicinity 74 men were, in 1831, employed in iron-castings at forges, and in preparing the weighty apparatus of powerful machinery.

Coal is raised in great quantities on the Titterstone Clee Hills in the hundreds of Munslow and Overs. They supply a great part of Worcestershire, Herefordshire, and Radnorshire, as well as Shropshire, with fuel. Iron-stone and lime are also raised there, and there are forges for smelting the former. There are coal-pits also on the Brown Clee Hills situated to the north of those just mentioned. Coal is also raised in other parts of the county, in the neighbourhood of Oswestry, Le Botwood, about nine miles south of Shrewsbury, and in other places.

Near Coalport china of every description and of exquisite workmanship is made; and at Caughley, in the neighbourhood of Broseley, there is another china-manufactory, which is chiefly confined to the blue and white, and blue, white, and gold sorts. The manufacture of china gives employment to about 200 men. At Coalport there is a manufactory of earthenware, similar to the Etrurian or Wedgwood ware; and at Broseley the coarser kinds of ware, such as garden-pots, are made. Glass is made at Wrockwardine.

There are flannel-manufactories at Shrewsbury, Oswestry, Church Stretton, and Worthen; and at the latter town there is a manufactory of coarse linens and linen thread. Carpets are made at Bridgnorth, and give employment to 90 men. Gloves are made at Ludlow, but not in such quantities as formerly. There are mills for dyeing woollen cloth at Le Botwood, &c., and there are paper-mills at Ludlow, Bridgnorth, Cleobury Mortimer, Drayton, &c. According to the Population Returns of 1831, the total number of persons employed in manufacture or in making manufacturing machinery was 1353; but this must of course be taken as exclusive of those employed in iron-furnaces and in forges.

Divisions, Towns, &c.—Shropshire is divided into sixteen hundreds, boroughs, and liberties, as follows:—

Hundreds.	Situation.	Acres.	Population. 1831.
Bradford, North, comprising Drayton and Whitchurch divisions	N.E.	112,410	26,867
Bradford, South, comprising Newport and Wellington divisions	Central and E.	85,400	37,982
Bimstrey or Brimstree, comprising Hales-Owen and Shiffnall divisions . .	E.	60,690	21,065
Chirbury . .	W.	26,890	4,212
Condover . .	Central	42,110	5,910
Ford . . .	W.	39,000	6,898
Munslow . .	S.	84,500	10,367
Oswestry . .	N.W.	62,580	19,025
Overs . . .	S.	19,110	2,767
Pimhill . .	N.	64,460	12,315
Purslow . .	S.W.	105,930	12,133
Stottesden . .	S.E.	87,290	11,919
Bridgnorth, Borough	E.	3,500	5,298
Ludlow, Borough .	S.	280	5,253
Shrewsbury, borough and liberties .	Central	24,620	23,492
Wenlock, borough and liberties . .	Central and E.	45,590	17,435

Shropshire contains the parliamentary boroughs and market-towns of Bridgnorth, Ludlow, Shrewsbury, and Wenlock; and the market-towns of Bishop's Castle, Broseley, Cleobury-Mortimer, Clun, Drayton in Hales, or Market-Drayton, Ellesmere, Hales-Owen, Newport, Oswestry, Shiffnall, Church-Stretton, Wellington, Wem, and Whitchurch. Of these, BISHOP'S CASTLE (population, in 1831, 2007), BRIDGNORTH (pop. in 1831, 6171), BROSELEY (pop. in 1831, 4299), LUDLOW (pop. in 1831, 5253), OSWESTRY (pop. in 1831, 4478), and SHREWSBURY (pop. in 1831, 21,297), are described under their respective heads. The other towns we shall proceed to notice here.

Cleobury-Mortimer is situated in the hundred of Stottesden, on the little river Rea, and about 30 miles south-east from Shrewsbury. The population of this parish, in 1831, was 1716, of which a very small portion is employed in agriculture. The town consists principally of one long street. The market is held on Thursday, and there are three yearly fairs. The only manufacture is a small one of paper. Twenty-one men, in 1831, were employed in coal-pits. The living is a vicarage, of the yearly value of 448*l*. There is one infant-school, containing 32 children of both sexes. This school is supported partly by rent of land attached to it, by a private donation, and by 5*l*. allowed by the trustees of the free-school. There is one daily free-school with 80 boys and 60 girls. It is supported by the income arising from two estates in the parish, with which the school is endowed.

The town owes its name to having formerly belonged to the family of Mortimer. A castle formerly stood here, erected by Hugh de Montgomery, which was destroyed in the reign of Henry II. The remains of a camp supposed to be of Danish origin are a little to the east of the school.

Robert Langeland, otherwise John Malverne, the author of the 'Visions of Pierce Plowman,' a satire upon the clergy of the fourteenth century, is supposed to have been born here.

Clun is in the hundred of Purslow, on the western side of the county. The population of the parish, in 1831, was 1996. The parish, which is very extensive, contains the townships of Clun, Edeclift, Hobendrid, and Newcastle. It derives its name from that of the river which waters it, the Colun or Clun. The district in which Clun is situated was formerly considered part of Wales; and the borough was of sufficient importance, in the age immediately succeeding the Norman conquest, to confer a title on the celebrated family of Fitz-Alan of Clun. William Fitz-Alan, in the reign of Henry II., obtained a charter for a fair here. Leland describes this place as a pretty market-town, but as having at that time declined in importance. The ruins of the castle are situated on the banks of the stream. It was built by William Fitz-Alan, in the reign of Henry III., and continued in his family, the earls of Arundel, down to the reign of Elizabeth, when the last earl died. By the marriage of Henry Fitz-Alan with one of the Howards of Norfolk, the castle became vested in that family; from them it passed to the Walcots, and afterwards to Lord Clive, whose descendants now possess it; but the dukes of Norfolk still retain the title of Baron of Clun.

The size and appearance of Clun are so insignificant as only to rank it as a town by virtue of its being a borough and possessing a good weekly market. The borough is precisely co-extensive with the township. There is a tradition of the existence of a charter granted by some of the earls of Arundel, lords marchers of Wales, but its possession cannot now be traced. There are two bailiffs, a recorder, and two serjeants-at-mace. The burgesses are 24 in number. The bailiffs are elected by the burgesses at large, and the practice has been to appoint them by rotation. The recorder has always in practice been appointed by the lord of the manor. Freedom is obtained by birth and by election. The only privilege is exemption from tolls at the fairs. The only court now held is the Civil Court of Record for the trial of causes to an unlimited amount; but the business is very trifling, and no instance is known of a cause proceeding to trial. The court is held before the bailiffs, assisted by the recorder, every third Wednesday.

There are three fairs, two of which are chartered, and the weekly market is now well attended.

The living is a vicarage, of the annual value of 680*l*. The patron is the Earl of Powis, who is the impropriator of the rectorial tithes. The Wesleyan and Primitive Methodists have places of worship here. An hospital for the support of 13 old men was founded (1607) by the Earl of Northampton, who endowed it with land, and subsequently, by will, with the fee-farm rents of the rectories of Clun and Bishop's Castle, and with the rectories of Knighton and Church Stoke. The present income of the hospital, arising from these and other sources, is upwards of 1500*l*. a-year. The hospital consists of a warden and 14 poor men, two having been added about the year 1786. The warden has a salary of 80*l*. per annum, and each of the hospitallers has two or three rooms, a small garden, and 10*s*. per week. The nominators are the steward of the lordship of Clun, the parson of Hopesay, vicar, bailiffs, and churchwardens of Clun and of Bishop's Castle, and the warden of the hospital. The hospital is a neat quadrangular building with a large garden in front. There are two daily and Sunday schools here. In one, commenced in 1831, are about 80 children of both sexes daily, and 120 on Sundays; it is connected with the Wesleyan Methodists. The other school contains about 110 children daily, and 150 on Sundays, and is supported by subscriptions from the vicar and the parish generally.

The various claims and disputes respecting the right of common on the adjoining hills known as Clun Forest, caused an act of parliament to be passed in 1837 for enclosing this tract, which Leland describes as being in his time 'a great forest of red deere and roes, longing to the lords of Arundel.'

Drayton-in-Hales, or Market-Drayton, is in the north-eastern extremity of the county, near the borders of Staffordshire, and in that portion of the hundred of North Bradford known as the Drayton Division. The population of the entire parish (which is partly in Staffordshire) was, in 1831, 4619. There seems to be little known of the history of this place. The parish church was built in the reign of Stephen. The town is watered by the river Teme, and is supposed to have been formerly much larger, as many old foundations have been traced in the vicinity. The market held here was, formerly one of the largest in the district. There are eight fairs in the course of the year. There are manufactories of paper and of hair-seats for chairs, &c.; but the number of labourers employed in manufactures in this parish were returned in 1831 as only 8. The living is a vicarage, of the net annual value of 173*l*. The church was formerly a Gothic structure, but its character was destroyed by repairs effected in 1787.

There are seventeen daily-schools, only one of which has a small endowment, and by the aid of which, assisted by payments from the parents, 16 boys are taught. In all the other schools the children are taught at the expense of the parents. One is a national school, containing about 50 boys and 20 girls. The number of children in the remaining fifteen schools is about 350. In addition to these are four Sunday-schools, one in connection with the Established Church, and the remainder with Methodists and Calvinists.

Ellesmere is in the northern district of the county, in the hundred of Pimhill. A part of the parish is in Flintshire. The population of the portion in Shropshire, which includes the whole of the town, was, in 1831, 6540; the population of the whole parish being 7057.

The town owes its name to the mere or lake close to which it stands. In 'Domesday' Earl Roger is stated to have held Ellesmere, and it was subsequently granted to various personages; among the rest by King John to Llewellyn, prince of North Wales, who married Joan, the king's daughter; but it seems only to have been held at the will of the king, who probably was not disposed to give up a town and castle of such importance situated in the marches of Wales. In the reign of Henry III., David, the son of Llewellyn, surrendered Ellesmere to the crown, and it was then granted to the family of Lord de Strange, who had previously held it, and it was continued in that family and their connections by marriage with the Kynastons and earls of Derby, by one of whom, in the reign of Elizabeth, the manor of Ellesmere was alienated by licence to Richard Spence, Esq., and Edward Savage, who, the following year, alienated it to Thomas Egerton, afterwards lord chancellor, and created Baron of Ellesmere. Sir Edward Kynaston, in the reign of Elizabeth, obtained a weekly market on Tuesday for this place, as well as a yearly fair. There are no remains of the castle, but the eminence on which it stood is ascertained. The town is neat and clean, and its appearance is much enlivened by the beautiful lake close to which it stands. The church is large, but irregularly built. The tower is in the centre. The tracery of the eastern window is very beautiful. The market is well attended, and flax and stockings form principal articles of sale. The chief trade of the town consists in malting and tanning. Six fairs are held here in the course of the year. The living is a vicarage, the annual value of which is returned at 386*l*. In 1833 there were sixteen day-schools here, one of which is wholly supported by endowment, and contains 12 boys and 12 girls. Seven of the other schools are partly supported by subscription, and partly by payments from the parents, and contain between 300 and 400 children of both sexes. In the remaining schools, about 250 children are taught wholly at the expense of the parents. There are also two day and boarding schools, and two Sunday-schools, one in connection with the Established Church, and the other supported by dissenters. A lending library is attached to the latter.

Hales-Owen is situated in that insulated part of the hundred of Brimstrey which is surrounded by Worcestershire and Staffordshire, and is about twelve miles from the nearest part of Shropshire. The population of the whole parish, in 1831, was 11,839, of which 9765 were comprised in the Shropshire portion. The town was formerly remarkable for its great abbey of Præmonstratensian canons, which was built in the reign of John. The remains of the building are now trifling; but from the foundations that can be traced, it must have been of considerable extent. St. Kenelm's Chapel in this parish is an antient building consisting of a single aisle and tower. There is a legend in connection with this building, that Kenelm, the only son of Kenulf, king of the Mercians, was murdered on this spot in the ninth century by his guardian, through the artifice of his sister, who subsequently took possession of the kingdom, and that the whole of this transaction was miraculously revealed to the pope at Rome, and the chapel of St. Kenelm erected on the spot where the murder was perpetrated. A portion of the chapel bears traces of great antiquity, and the tower is an elegant specimen of Gothic architecture.

The town is pleasantly situated in a valley, and contains many good houses. The church is a fine building, with a beautiful spire supported by four arches. About five hundred persons are employed in manufactures, which principally consist of nails and various sorts of hardware. There are two fairs held here in the year, and one at St. Kenelm. The living of Hales-Owen is a vicarage, the annual value of which is about 700*l.* The perpetual curacy of Oldbury is in the gift of the vicar for the time being of the parish, and is worth 150*l.* per annum. In the vicinity of Hales-Owen is the Leasowes, the birth-place and residence of the poet Shenstone. The grounds were laid out under his superintendence with excellent taste, but after his death they were much neglected. The poet was buried in the churchyard of Hales-Owen, and within the church is a monument to his memory. There are four day-schools, one of which is a free grammar-school for forty boys. Another is endowed for the education of twenty-two poor children. There are one boarding-school and seven Sunday-schools, two in connection with the Established Church, two with Baptists, two with Methodists, and the other with Independents. These Sunday-schools are supported by subscription, and contain altogether about eight hundred children.

Although Madeley, or Madeley-Market, was at one time remarkable for its excellent market, it can no longer be called a market-town, the market having been removed to Coalbrook-dale, about two miles from Madeley; but as it is still held within the parish, and as under this head it is intended to make some mention of the celebrated district of Coalbrook-dale, Madeley may be properly noticed among the principal places within the county.

The population of the parish of Madeley, in 1831, was 5822. It is situated within that extensive district known as the borough of Wenlock. It lies on the north side of the Severn, about sixteen miles from Shrewsbury.

Madeley does not appear to be a place of great antiquity, and it owes its rise and population to the extensive coal and iron works in the vicinity.

Coalbrook-dale is situated about two miles from Madeley, and lies in the valley of the Severn. The iron-works here are the most extensive in England. Coal is also raised in considerable quantities. In 1831, 350 men were employed in mines and coal-pits in the parish, but the number employed in the furnaces has not been ascertained. It may however be estimated that from 8000 to 10,000 persons are so employed in the iron-works of the district, which are not confined to the parish of Madeley, but extend to Lilleshall, &c. By means of the Severn and the various canals previously described, the products of this vast manufacturing district are exported and distributed. This valley contains the first iron bridge erected in the country. It is over the river Severn, and consists of one arch, with a span of 100 feet 6 inches. It is composed of five ribs, each rib formed of three concentric arcs, connected by radiating pieces, each piece weighing 5 tons 15 cwt. The width of the roadway is 25 feet, and the height from the base-line to the centre of the bridge is 40 feet. The total weight of iron employed in the structure is 378 tons 10 cwt. It was erected in 1779, in a space of little more than three months. The success attending this experiment induced, in 1796, the erection of a similar bridge, from a plan of Telford's, over the Severn at Buildwas, about two miles above Coalbrook-dale. The span of this arch is 130 feet. In the neighbourhood of Madeley there is a manufacture of coal-tar carried on. The spring of petroleum, or fossil-tar, at Broseley, is noticed under the article BROSELEY. The manufacture of china and other ware at Coalport has been noticed in treating of the manufactures of the county. There are three annual fairs at Madeley. The living is a vicarage, of the average net income of 241*l.*

There were two infant-schools and eighteen day-schools in this parish in 1835. To one of the latter, containing about 100 children of both sexes, a lending-library is attached, to which children and any other persons may have access on payment of 1*d.* per month. In the remaining seventeen schools there are about 500 children, and in all of them the education is at the expense of the parents. There are six Sunday-schools, three in connection with the Established Church, the remainder with Wesleyan Methodists. Small libraries are attached to two of the former, and in all of them the instruction is gratuitous. A house of industry was built on some charity lands here, and leased to the churchwardens and overseers for the use of the poor at a rent of 18*l.*, which is applied in clothing for the poor.

Newport is a small market-town and borough on the borders of Staffordshire, and in the Newport division of the hundred of South Bradford. The population of the borough, which is co-extensive with the parish, in 1831, was 2745. This place formerly belonged to the Audleys, and subsequently to a family of the name of Newport, to whom it gave the title of baron. The abbot and convent of St. Peter and St. Paul, at Shrewsbury, were patrons of the church of Newport, and from them it was purchased in the reign of Henry VI. by Thomas Draper, a citizen of London, who made it collegiate, placing in it a custos, who was the parish priest, and four fellows. The establishment falling into the hands of the crown on the dissolution of religious houses, the college property was afterwards granted by queen Elizabeth to private individuals. A portion of the present church appears to be of the fifteenth century, and the interior bears traces of great beauty; but the side-aisles having been rebuilt with brick, the building presents a most incongruous appearance. Newport sustained great damage in 1665 by a fire which consumed 160 houses.

The only manufacture carried on here appears to be that of stockings.

The existence of the corporation can be traced as far back as the reign of Henry III. There are no courts, criminal or civil. The only gaol consists of a lockup-house, in which prisoners are confined previously to commitment to the county gaol. The income of the corporation is from 30*l.* to 40*l.*, arising from land, and is applied to charitable purposes, and to keeping in order cisterns and conduits which supply the town with water, and to improvements in the town. In 1446 the burgesses caused an almshouse to be erected and endowed for the support of four old women. The present annual income is about 70*l.* There are six fairs held here annually. The living is a perpetual curacy, endowed with the rectorial tithes, and is of the net annual value of 275*l.*

There is a free grammar-school, mainly supported by the endowment of William Adams, who, in 1756, conveyed lands to the governors of the school for that purpose, and also for erecting and endowing an almshouse. The annual income of the whole charity is upwards of 1300*l.* There are 30 boys in the school on the foundation, and the master receives a salary of 175*l.* per annum. A library is attached to the school, which is a handsome brick building. A scholarship at Christ Church, Oxford, of 80*l.* a year, payable for seven years, and four smaller scholarships, unrestricted as to college or university, are attached to this school. There are eleven other day-schools, in all of which, with the exception of one, which is partly supported by endowment, the instruction is at the expense of the parents. There are two Sunday-schools; one, connected with Independents, has a small lending-library attached.

Shiffnal, sometimes called Idsall, is also near the border of Staffordshire, and is in the Shiffnal division of the hundred of Brimstrey. In 1831 the parish, comprising the townships of Hatton and Woodside, and chapelry of Prior's Lee, contained 4779 persons. There are three fairs here in the year. The town is situated on the London and Holyhead road: it contains but little to interest the traveller. The parish church is a large and interesting cruciform building, and contains a fine altar and some monuments. In the chapelry of Prior's Lee, between 300 and 400 men are employed in mines and coal-pits. The living of Shiffnal is a vicarage, of the net annual value of 450*l.* Prior's Lee is a perpetual curacy, in the gift of the vicar of Shiffnal, with an income of 139*l.* per annum.

There is one infant-school; eight day-schools, one of them partially endowed, another a national school, and in the remainder the instruction is at the expense of the parents; and two Sunday-schools, with a small lending-library at the church.

Shiffnal is the birth-place of Dr. Beddoes.

Stretton, commonly called Church Stretton, is supposed to derive its name from Street-town, so called because it is situated close to Watling Street. It is in the hundred of Munslow. The town is small; the population of the entire parish, in 1831, was only 1302. The town lies in a narrow valley, bounded on one side by a picturesque range of hills known as the Caradoc Hills, and on the other by the Longmynd. Caer Caradoc, one of the Caradoc Hills, has entrenchments on its summit, and was one of the military stations of Caractacus. It was at one time supposed to be the place where that chief fought his last battle; but that supposition was subsequently abandoned, as the situation does not correspond with the description of Tacitus. Another of these hills also has deep entrenchments, called Brocard's Castle. The town contained a picturesque market-place and town-house of the Elizabethan age, which has however been recently removed. Five fairs are held here annually. The turnpike-road from Ludlow to Shrewsbury passes through this place. The living is a rectory, with an income of the annual value of 542*l.* There are two infant-schools and three day-schools here: one of them, called the free-school, is partly supported by funds accruing from bequests. There is also one Sunday-school.

Wellington is situated in the hundred of South Bradford, near the base of the Wrekin, and in the populous district of the iron-mines and coal-pits. The number of persons in this parish in 1831 was 9671. Here Charles I., in 1642, on his route from Nottingham to Shrewsbury, collected his troops, and in order to prevent the growing disaffection amongst them, declared that he would support the reformed religion, govern by law, uphold the privileges of parliament, and preserve the liberty of the subject.

The town is neat in its appearance, and has an excellent market on Thursday and a fair every month. The church is a handsome modern structure.

In 1831, 1011 men were employed in coal and lime pits in this parish.

The living is a vicarage with the rectory of Eyton united, with a net income of 842*l.* There are thirteen day-schools, in eleven of which the instruction is at the expense of the parents, the other two are supported by subscription and a small endowment; nine Sunday-schools, two connected with the Established Church, three with Methodists, two with Baptists, and two with Independents, and all supported by voluntary contributions.

Wem lies on the road between Shrewsbury and Whitchurch, about 10 miles north of the former town. The parish, which in 1831 contained 3973 persons, is partly in the hundred of North Bradford and partly in Pimhill hundred. The manor of Wem falling to the crown in consequence of the attainder of Philip Howard, earl of Arundel, James II. conferred it on the notorious chancellor Jefferies, who was created Baron Wem. The title became extinct with his son.

The town is pleasantly situated near the source of the river Roden. It consists principally of one large open street. In addition to the weekly markets, six fairs are held here annually. The church is a handsome structure with a lofty steeple and a fine chancel. The living is a rectory, to which is annexed the chapelry of Edstaston, with a net annual income of 1767*l.* There are one infant and seven day schools. One of the latter is a free grammar-school, founded and endowed by Sir Thomas Adams. It contains 30 boys. A scholarship of 80*l.* per annum at Christ Church, Oxford, is attached to this school. One national school contains about 200 children. In 1835 there were four Sunday-schools, all connected with dissenters: a lending library is attached to one of them.

Sir Thomas Adams, mentioned as the founder of a grammar-school, was born here in 1586. He was brought up as a draper in London, but received his education at the University of Cambridge. He was elected lord mayor of London in 1645. Being a warm partizan of Charles I., he was sent to the Tower, where he was confined some time. He is said to have subsequently sent large sums of money to Charles II. while abroad, and he was deputed, previous to the Restoration, to accompany General Monk to Holland to attend Charles on his return to England. He was soon afterwards created a baronet, and died in 1667. He founded a professorship of Arabic in Cambridge, which was for some time held by Abraham Wheelock, at whose suggestion Sir Thomas Adams went to the expense of printing and diffusing the Persian Gospels.

Wenlock, sometimes called Great or Much Wenlock, to distinguish it from Little Wenlock, is situated in the borough of Wenlock, and about 13 miles south-east from Shrewsbury. The population of the parish in 1831 was 2424. Wenlock abbey is the object of greatest interest in this neighbourhood. It was founded about the year 680 by Milburga, of the family of one of the kings of Mercia, and she presided over it as abbess. It was subsequently destroyed by the Danes, and restored by Leofric, earl of Chester, in the reign of Edward the Confessor. It was again destroyed by the Danes, and was forsaken, but in 1080 Roger de Montgomery, earl of Arundel, according to William of Malmsbury, rebuilt and endowed it. The last refounder placed in it a prior and congregation of monks from Seez in Normandy, who were regarded as a cell of the house of De Caritate in France, and it suffered the fate of other alien priories by confiscations and exactions until the reign of Richard II., when it was naturalised. In the reign of Henry VIII. it was granted to Augustino de Augustino. Isabel de Say, lady of Clun, had endowed it with the church of St. George at Clun, and seven dependent chapels, which grant was confirmed by Edward III.

The ruins of this abbey are situated in a valley on the south side of the town, adjoining the churchyard. The remains are considerable, and prove the building to have been of the early Gothic of the thirteenth century. The whole length from east to west was 401 feet, and the breadth of the nave and aisles 66 feet, and the edifice and precincts must have included 30 acres.

The borough of Wenlock comprises seventeen parishes, which are scattered over a considerable extent of country. The borough was first incorporated by Edward IV. This charter conferred on the burgesses the privilege of returning one member to parliament, and is said to be the first instance of that privilege being conferred by charter. A subsequent charter was granted by Charles I. Under the Municipal Corporation Act the borough consists of three wards, with six aldermen and eighteen councillors. The boundary of the borough has not been altered for any purpose. It now returns two members, whose return, until the passing of the Reform Act, was vested exclusively in the burgesses. The number of the constituency in 1839-40 was 949, of which 142 were burgesses. The population of the whole borough in 1831 was 17,435. The corporate magistrates hold a petty sessions at Wenlock, which is the seat of the municipal government, every alternate week, and a general sessions twice a year. Capital offences were formerly tried before this court; about a century ago three persons were sentenced to death at the sessions, and executed in the town. There is a gaol within the borough, which however is only used for the detention of prisoners previous to commitment, the magistrates always availing themselves of the power of committing to the county prison.

The police of the borough is efficient, and consists of a high constable appointed by the corporation, and of others appointed by the inhabitants. The revenues of the corporation are very trifling, the only source of income arising from the tolls of fairs and markets in the town of Much Wenlock.

The town of Much Wenlock consists of only two streets. Between 100 and 200 men in this parish are employed in lime-rock and iron-stone works. In the reign of Richard II. this place is said to have been famous for copper-mines. There are four fairs here in the year. The living is a vicarage, of the net annual value of 180*l.* There are four day-schools; one of them is wholly supported by Lady Wenlock, and another is partly endowed.

Whitchurch is in the hundred of North Bradford, and on the borders of Cheshire, into which county a portion of the parish extends. The population of the entire parish, which comprises twelve townships, in 1831, was 5819. The town is situated on an acclivity, at the top of which stands the church, a handsome structure, erected in 1722. It appears that part of the wall of Whitchurch castle was standing in 1760. The road from Shrewsbury to Chester passes through this place. A weekly market and four annual fairs are held here. The living is a rectory, united with the rectory of Marbury in Cheshire, of the net annual value of 1458*l*. There is one infant-school; seventeen day-schools, one of them a free grammar-school endowed by John Talbot in the reign of Edward VI., and subsequently augmented; one a national school supported by subscription, two others partly supported by subscription, and two day and boarding schools; three day and Sunday schools, one supported by endowment, and to which a lending library is attached, and another partly supported by subscription, and both appertaining to Unitarians. The third is a Lancasterian school. Besides these there are six Sunday-schools supported by contributions. There is an almshouse for six poor persons endowed by the wills of Mr. Samuel Higginson and Jane his widow. Nicholas Barnard, chaplain to Archbishop Usher, and afterwards dean of Ardagh, and the author of several works, was born and buried here. Abraham Whelock, professor of Arabic at Cambridge, and distinguished as a linguist, was also born here

The principal villages of Shropshire are: Chirbury, Dawley, Donnington, Edgmond, Ercall, Hodnet, Lilleshall, Pontesbury, Prees, Tonge, Westbury, Whittington, Worthen, Wrockwardine, Wroxeter, &c.

Divisions for Ecclesiastical and Legal Purposes.—Shropshire is in the several dioceses of Hereford, Lichfield, and St. Asaph; and the detached portion of the county, comprising the Hales-Owen division of the hundred of Brimstrey, is situated within the diocese of Worcester. The ecclesiastical commissioners however have recommended that the whole of the county which is not comprised within the diocese of Hereford be added to the diocese of Chester. The whole of the county is in the province of Canterbury. The archdeaconry of Salop, in the diocese of Hereford, comprehends the whole (with the exception of one parish, which is in the archdeaconry of Hereford) of that part of Shropshire which is in the diocese of Hereford, forming about one-half of the county. It also includes portions of several adjoining counties. The archdeaconry of Salop, in the diocese of Lichfield, is principally confined within the limits of this county, and includes nearly the whole of that portion of this diocese, the exception being three parishes and a chapelry lying in the archdeaconry of Stafford. The part of the county in the diocese of St. Asaph is included in the archdeaconry of the same name. The deaneries are as follows:—Burford, Clun, Ludlow, Pontesbury, Stottesden, and Wenlock, in the archdeaconry of Salop in the diocese of Hereford; Newport and Salop in the archdeaconry of Salop in the diocese of Lichfield; Lapley and Treizull in the archdeaconry of Stafford, and Marchia in that of St. Asaph. The deanery of Bridgnorth is a peculiar, which the ecclesiastical commissioners have recommended to be added to the diocese of Hereford.

Shropshire contains 220 parishes, of which 9 are in the diocese of St. Asaph, 106 in Hereford, 104 in Lichfield, and 1 in Worcester. The total number of churches and chapels in the county is 224.

Shropshire is included in the Oxford circuit. The assizes and quarter-sessions are held at Shrewsbury, where the county gaol stands. The peculiar jurisdiction of the franchise of Wenlock is noticed elsewhere.

Shropshire returns twelve members to parliament, of which four are for the county, viz. two for the northern division and two for the southern. This division was directed by the Reform Act, and effected by the subsequent Act 2 & 3 Wm. IV., c. 64. The northern division includes the hundreds of Oswestry, Pimhill, North Bradford and South Bradford, and the liberty of Shrewsbury. The southern division includes the hundreds of Brimstrey, Chirbury, Condover, Ford, Munslow, Overs, Purslow (including Clun and Stottesden), and the franchise of Wenlock. The election for the northern division is held at Shrewsbury, and for the southern division at Church Stretton. The polling-places for the northern division are, Shrewsbury, Oswestry, Whitchurch, and Wellington, to which were subsequently added Ellesmere, Newport, Market-Drayton, and Wem. Those for the southern division are, Church Stretton, Bridgnorth, Ludlow, Bishop's Castle, and Wenlock, to which have also been added Cleobury-Mortimer, Clun, Pontesbury, and Shiffnal. The insulated portion of Shropshire at Hales Owen is, for all election purposes, annexed to the eastern division of the county of Worcester. The parliamentary boroughs within the county are Shrewsbury, Bridgnorth, Ludlow, and Wenlock, each of which returns two members to parliament.

The alterations effected by the Reform Act were the addition of two members for the county, and the disfranchisement of the borough of Bishop's Castle, which previously returned two members,—so that the total number of members for the county and boroughs remains the same, viz. twelve.

History, Antiquities, &c.—Previous to the Roman invasion, the district of which this county is now a part was inhabited by the Cornavii and the Ordovices, their territory being divided by the Severn. The boundaries between these tribes and the Silures is uncertain, and it is probable that the southern portion of Shropshire was possessed by the latter; but, as is observed by a modern writer, the only definite memorials of the earlier Britons are their graves.

The Ordovices joined with the Silures under Caractacus in defending their country against the Romans, and were for a time successful. After the subjugation of Britain this county formed part of the Roman province of Flavia Cæsariensis.

The western side of the county bears numerous traces of this remote period. There are remains of various British camps. The name of Caractacus is associated with one situated near Church Stretton, and called Caer Caradoc. The Gaer ditches near Clun, which bear traces of an antient fortification, have been assigned by Camden and others as the spot where the British chief encountered Ostorius Scapula, and was vanquished. This spot corresponds in many particulars with the description given by Tacitus. Coxwall Knoll, on the banks of the river Teme, on the borders of Herefordshire, but within the boundaries of Shropshire, has also been claimed by some antiquarians as the scene of this action, while others urge the claims of the Breidden Hills, near the Severn, to this distinction. As however the description given by Tacitus is the only guide in assisting tradition, the fact cannot be determined with certainty.

On a hill called Tongley, near Walcot, the seat of the earl of Powis, there are vestiges of a British encampment called Bury Ditches. The area is circular and of great extent, defended by three deep trenches. Other British remains may be traced at Brocard's Castle, near Church Stretton; at Old Port (a corruption of Old Fort), near Oswestry; and on the Wrekin and Clee Hills.

Of Roman stations, one of the principal was Uriconium or Viriconium, now Wroxeter, situated on the banks of the Severn, about six miles south-east from Shrewsbury, and although now only a village, there is little doubt that it was a principal city of the Cornavii, and subsequently possessed and fortified by the Romans. A rampart and ditch, with remains of walls, three miles in circumference, mark the antient boundaries of the city. It has long been remarkable for the numerous British and Roman antiquities discovered in the town and neighbourhood. Numerous Roman silver and copper coins have been found here. In 1752 three sepulchral stones bearing inscriptions were found, and numerous urns, as well as entire human skeletons, moulds for forging Roman money, &c. have been from time to time dug up. At the bottom of the Severn at low-water foundations of stone may be seen. Another Roman station was Mediolanum, supposed by some to have been near Market-Drayton, but placed by others at Meivod; and a third was Rutunium, at Rowton, although Horseley supposes the site to be at Wem. There were also Bravinium at Rushbury; Sariconium at Bury Hill; and Uricona at Sheriff-Hales. Near the village of Chesterton, in the neighbourhood of Bridgnorth, there are the remains of a Roman camp called the Walls: the form is nearly square, and comprises upwards of twenty acres: it had four entrances to it.

The Roman road known as Watling Street traversed this county from east to south-west, as far as Church Stretton, whence it took a more southerly course, and crossed the Onny at Stretford bridge, and entered Herefordshire at the village of Leintwardine.

As the Roman empire declined, and the Saxons took their place, this country was naturally the scene of numerous battles and contests between the British and Roman inhabitants and the new invaders. The Saxons destroyed the Roman towns; and Uriconium among the rest. The Saxons however soon built another city in its place, to which they gave the name of Scrobbes-burg, the 'town of shrubs' (from the wooded appearance of the neighbourhood), now softened to Shrewsbury. These contests lasted for nearly a century and a half, when the Saxons ultimately succeeded in subduing the inland Britons.

The district thus occupied by the Saxon chiefs extended as far as the base of the Welsh mountains, and became one extensive Saxon state, known by the name of Myrcnaland, or Myrcna-rice, 'the land or kingdom of the borderers,' Latinized into Mercia, and subsequently corrupted into the Marches of Wales. The portion of this district now comprising the counties of Salop and Hereford was possessed at first by a tribe of Saxons named Hecanas; but in the year 626 Penda obtained the supreme power over the whole of Mercia, and during the seventh and eighth centuries the Saxons held firm possession of the county, and were sometimes assisted by the independent Welsh in the contests with other Saxon kings. The Welsh princes however began to make inroads on the Saxons, and many battles took place between them.

In consequence of these attacks Offa, king of Mercia, formed that dyke or rampart which still bears his name, extending from Flintshire on the north to the Bristol Channel on the south, and which seems to have been intended as a defence as well as a boundary between the Saxons and the Britons. It entered Shropshire between Chirk and Oswestry, crossed part of Montgomeryshire, and again entered Shropshire between Newtown and Bishop's Castle, finally quitting it and entering Radnorshire at Knighton, on the banks of the Teme. It may be still plainly traced on the high ground where cultivation and the ploughshare have not levelled it. This work did not answer the purposes for which it was intended; for the Welsh penetrated far east of it, and committed great ravages, carrying away immense spoil in their retreats.

This part of the kingdom of Mercia, in common with the rest of England, was affected by the incursions of the Danes in the latter part of the ninth century. In 849 they penetrated as far as the Severn, and in the following year reached Wales. In 896 they established themselves at Cwatbricge (Quatford) on the Severn, south of Bridgnorth, where they built a fortress and passed the winter. At Cleobury-Mortimer are the remains of what is supposed to have been a Danish camp.

When Alfred succeeded in subduing the Danes, and uniting the seven Saxon kingdoms into one, Scrobbesburg was one of his principal cities, and he gave the same name to the shire of which it is the capital. His daughter Ethelfleda, in 912, built a fortress at Bridgnorth, and another in 915 at Cyricbyrig, or Chirbury, as defences against the Danes, who, towards the end of that century, again became formidable; and while they ravaged the south, Ethelred was living in indolence on one of his manors in Shropshire. The Welsh however still continued to dispute the boundaries, and Griffydd, prince of North Wales, carried his incursions so far as to induce Harold to march against him. Harold succeeded in discomfiting the mountaineers, who sent him the head of their prince as a peace-offering; and there is a tradition that the heaps of rock called by the Britons *Carneddau tewion*, on the summit of the Stiperstones, on the western side of this county, are monuments of the triumph of Harold.

The Norman conquest produced a greater change in the state of this county and the Welsh borders than perhaps any of the previous transitions of empire: for William the Conqueror, as soon as he was established on the throne, granted nearly the whole of this district, as well as other lands, to his relative Roger de Montgomery, who had assisted him in subduing Edric Sylvaticus, earl of Shrewsbury. The king also granted to many of his followers all the lands they might conquer from the Welsh; and as this was naturally an incentive to aggressions of greater force than any sense of duty or allegiance to their monarch, it may be readily imagined that a bitter and exterminating warfare was carried on against the antient possessors of the soil. The Welsh did not tamely submit to their encroachments; and in 1068 or 1069, under Owen Gwinnedd, their prince, and Edric the Forrester, the dispossessed Earl of Shrewsbury, they assaulted the city of Shrewsbury with such vigour and in such numbers as to require the whole Norman army and William at its head, who had lately returned from Normandy, to drive them back. Edric, although the last to yield, obtained forgiveness, and was afterwards raised to trust and favour. The allegiance of the Welsh was also attempted to be gained by promising a confirmation of all their privileges upon paying a small sum or other token in acknowledgment of the right of the English crown, and by threatening them in case of refusal. In these grants of the Conqueror to his Norman barons may probably be traced the origin of the Lords Marchers, who for a long period held as arbitrary and despotic sway over the inhabitants of the border country as the monarch himself in other parts. They were however bound to assist the king in his wars, and to maintain their castles well armed and garrisoned for the defence of his as well as their own territories. Their jurisdiction within their respective seignories may be said to have been unbounded. They established a court of their own to settle disputes among themselves. They built towns and erected castles, and to them may be attributed the greater portion of the numerous castles in this county, a number exceeding, says an old writer, that of any other district.

On the death of the Conqueror, Roger de Montgomery and the border barons espoused the cause of Duke Robert, and with their dependants and Welsh auxiliaries ravaged Worcestershire and Shropshire, but the insurrection was soon repressed by William II., the early years of whose reign were marked by constant hostilities between the Welsh and the border barons, and the former, encouraged by the death of Roger de Montgomery in 1094, invaded Shropshire and Herefordshire in that and the following years, destroying castles and carrying away plunder. The king proceeded with a large army to stop their depredations, and although unable to bring the Welsh to a regular engagement, he eventually succeeded in subduing them.

Upon the death of William II., Robert de Belesme, to whom the earldom of Shrewsbury had descended, espoused the claims of Robert, duke of Normandy, in opposition to those of Prince Henry; and in 1102, when the latter was established on the throne, he broke out into open rebellion, and fortified his castles of Shrewsbury and Bridgnorth in this county. The king declared him a traitor, and marched against him with a considerable force. Bridgnorth surrendered to Henry after a siege of thirty days, the king having in the mean time been joined by three thousand of the knights and landholders of Shropshire, who were weary of the tyranny of their feudal lord; and upon the latter presenting himself before the gates of Shrewsbury, the inhabitants sent him the key of the town, and the earl, forced to surrender, was banished to Normandy. He subsequently took arms a second time against Henry, and being taken, remained a prisoner for the rest of his life. In the wars between Stephen and the empress Maude, William Fitz-Alan, governor of Shrewsbury, and sheriff of the county, in common with several noblemen, espoused the cause of the empress. Stephen besieged the castles of Shrewsbury and Ludlow, and upon taking the former, hanged several of the garrison. Fitz-Alan fled; but upon the accession of Henry II. he was restored to his estates. Henry destroyed an immense number of castles, and among the rest that of Bridgnorth. In the reign of John, Gwynwynwyn, Prince of Powys, came to Shrewsbury to meet the English council assembled there to decide upon the measures necessary to be adopted to counteract and oppose the depredations of the Welsh on the borders. The English council however, by a gross breach of confidence and generosity, refused to listen to his proposals, and detained him as a prisoner.

In 1215 Llewellyn, Prince of Wales, marched to Shrewsbury with a large force, upon which the town and castle were delivered to him without resistance. In a short time after Henry III. came to the throne, Shrewsbury was again in the hands of the English, and an amicable understanding subsisted for some time between Henry and the Welsh. In 1233 however new feuds broke out. The Earl of Pembroke and his associates fled into Wales and joined Llewellyn, and with their united forces they laid waste the marches, sacked Shrewsbury, and put the inhabitants to the sword. The king adopted a mild policy, and effected a treaty with the insurgents; but the Earl of Pembroke being treacherously stabbed, this treaty was not of long duration. Repeated conflicts ensued between Henry and Llewellyn, and his brother David ap Llewellyn, during which Shrewsbury was for a short time in the hands of the English. In 1277, in consequence of these repeated disturbances of the Welsh, Edward I. removed the courts of King's Bench and Exchequer to Shrewsbury, where they were held for some time; and in 1283 the parliament was assembled there, and at Acton Burnell, for the express purpose of adopting measures against David ap Llewellyn, who was taken prisoner, tried by the parliament, and hanged and quartered. With this prince and his brother Llewellyn, who had been previously killed in battle, ended the race of the brave native princes of Wales.

Edward now formed Wales into a principality for his son; and by a parliament held at Rhudlin Castle laws were enacted for the government of the country, In 1397 Richard II. adjourned his parliament from Westminster to Shrewsbury, where it was held with great splendour. The revolt of Owen Glendwr, in the subsequent reign of Henry IV., is so well known, and forms so material a feature in the history of England, as to render anything more than the bare mention of it superfluous. [GLENDWR.] For the same reason it is sufficient merely to allude to the memorable conflict between Henry and the Percies, known as the battle of Shrewsbury, which took place on the 22nd of July, 1403, at Berwick, near Shrewsbury, and established Henry on the throne.

In the contests between the houses of York and Lancaster, Shrewsbury, Ludlow, and the border country in general espoused the cause of the former; and it was perhaps in gratitude for these services that Edward IV. re-established the court of the resident and council of the marches of North Wales, which was held at Ludlow; and this court, although altered and affected by subsequent acts, continued until the reign of William III., when it was abolished by act of parliament, at the request of the inhabitants of the principality. It seems difficult to determine whether the marches comprehended in Shropshire were under the jurisdiction of this court; for subsequently, by the 27th of Henry VIII., some marches were annexed to Wales and others to England; and by the statute which established the court of the marches, this, with other counties, was excluded from its jurisdiction. After the usurpation of the throne by Richard III., the duke of Buckingham, his former ally, endeavoured to raise an insurrection in this district against the tyrant; but meeting with disasters which dispersed his army, he fled to Shrewsbury, where he was betrayed and executed without trial. The Duke of Richmond, afterwards Henry VII., having assembled his army on the Long Mountain on the borders of this county, marched to Shrewsbury, where, after some hesitation on the part of the bailiff, he was enthusiastically received by the inhabitants, and was joined by the tenants of the earl of Shrewsbury, who accompanied him to Bosworth Field.

The marches of Wales annexed to Shropshire by the 27th of Henry VIII. were 'the lordships, towns, parishes, commotes, hundreds, and cantredes of Oswestrie, Whetington, Masbroke, Knocking, Ellesmere, Down, and Cherbury hundred.' Of these, Oswestry, Whittington, Masbrook, and Knocking were formed into the hundred of Oswestry. Ellesmere, *cum membris*, was united to the hundred of Chirbury; and by a subsequent statute, passed in the same reign, the town and hundred of Aberton, until then included in Merionethshire, was added to this county.

In the great civil war between Charles I. and the Parliament, the towns of Shrewsbury, Ludlow, and Bridgnorth espoused the royal cause. In 1642 Charles came to Shrewsbury from Nottingham at the head of his army. He was joined here by Prince Rupert, Prince Charles, the Duke of York, and many noblemen and gentlemen of the adjoining counties, and his army considerably reinforced. He left the town on the 12th of October, and marched towards London. The battle of Edge-hill took place on the 23rd of the same month. In 1644 the town was stormed by the parliamentary forces, and soon taken, the guards having deserted their posts. Bridgnorth was besieged by the parliamentary forces, and the castle, after standing out for a month, was taken.

The great number of castles built in the western side of the county has been already remarked. The most important of these existing in the beginning of the reign of Henry III. appear to have been Bruges (Bridgnorth), Salopesbury (Shrewsbury), Ludelaue (Ludlow), Ellesmere, Caus, and Blancmuster (or Oswestry). Of these, Bridgnorth and Shrewsbury were originally Saxon fortresses.

Among those whose ruins still remain, Ludlow was one of the most extensive, and its ruins are perhaps the most perfect, on the whole Welsh border. It is generally supposed to have been founded by Roger de Montgomery, who has been already mentioned, and held by his descendant Robert de Belesme, from whom it was taken by Henry I., and granted to his favourite Joce de Dinan, who completed the building. In the next reign it was besieged by Stephen, the castle having been previously seized by Gervase Paganel, who joined the empress Matilda; but as it was manfully defended, the king was obliged to raise the siege. It however subsequently fell into the king's hands, and Henry II. gave the castle and the valley called Corve-dale to Fulke Fitzwarine, surnamed De Dinan, who was succeeded by Joccas de Dinan, who seized and confined Hugh de Mortimer, lord of Wigmore, in one of the towers of the castle, which still bears his name. In the reign of Richard I. the castle was seized by Hubert, archbishop of Canterbury, on behalf of the crown. King John presented it to Philip d'Aubigney, from whom it eventually passed to the Mortimers, and from them hereditarily to the crown. In the reign of Henry VI. it was possessed by Richard, duke of York, who had raised forces in the Welsh marches. On the advance of the king's army however, in 1459, the duke and his sons abandoned the castle and town, which were given up to plunder. It is said that the duchess of York, with her sons, and the duchess of Buckingham, were confined as prisoners here a considerable time.

In the progress of the civil war the castle came into the possession of Edward, duke of York, who, on his accession to the throne as Edward IV., repaired the castle, and made it the court of his son the prince of Wales. The latter, on the death of his father, was here proclaimed king, and shortly afterwards removed to London by his uncle the duke of Gloucester. In the reign of Henry VII. this castle again became a royal residence; and Arthur, the king's eldest son, held a court here to celebrate his marriage with Katharine of Aragon. The prince died here the following year. The most splendid æra of Ludlow Castle was subsequent to this period. During the reigns of Henry VIII. and Elizabeth, the lords-presidents of the marches held their courts here. Sir Henry Sidney, who held the office of president, made this castle his favourite residence, aud put it into repair. In 1616 it was visited by Prince Charles, afterwards Charles I. The masque of 'Comus' was performed here in 1634, during the presidency of the earl of Bridgewater. During the civil wars in the reign of Charles I. this castle was for some time kept as a garrison for the king; but in June, 1646, it was delivered up to the parliamentary forces. After the Restoration, Butler, who was secretary to the earl of Carbery, the president of the marches, wrote a part of his 'Hudibras' in the castle. After the dissolution of the court of the lords-marchers, in the reign of William III., the castle was suffered to fall into decay, and it is now a magnificent ruin.

The ruins of Shrewsbury Castle are slight, and are noticed under that article. [SHREWSBURY.]

Of Bridgnorth Castle (which is also noticed under BRIDGNORTH), only one tower remains. The castle is said to have been founded as far back as the year 912.

The castle of Oswestry has also been noticed in describing the town. [OSWESTRY.]

Acton Burnell Castle, near Longnor, was founded or restored by Robert Burnell, bishop of Bath and Wells, treasurer and afterwards chancellor of England. This castle is remarkable as being the place where a parliament was held in 1284, in the reign of Edward I. The lords sat in the castle, and the commons in a large barn belonging to the abbot of the monastery of St. Peter and St. Paul at Shrewsbury. The act entitled Statutum de Mercatoribus was passed here. The remains of the castle consist of a square building, with a tower at each corner.

Cause Castle, near the village of Westbury, in the hundred of Ford, is supposed to have been erected by Roger Corbett, who held a considerable tract of land in this district under Roger de Montgomery. It subsequently passed into the hands of Henry I., who gave it to Paris Fitz-John. It more than once fell into the power of the Welsh, with the lands in the neighbourhood. On the execution of the duke of Buckingham, the last earl of Stafford, in whose hands it had been for some time, it was forfeited to the crown, but was restored to the son of that nobleman. In the reign of Elizabeth it was alienated to Robert Harcourt. It is now a mere confused heap of ruins, a great portion of the stone having been removed. The site of the castle is one of the most lofty and commanding in the western border of this county.

Clun Castle has been described in another part of this article.

Of the early history of Hepton Castle, situated in the south-western side of the county, little appears to be known. It was granted by Henry II. to Walter de Clifford. In the civil wars in the reign of Charles I., it was defended on behalf of the parliament, and the siege lasted upwards of a fortnight. The castle was soon afterwards nearly destroyed, and is now in complete ruin. The castles of Knocking, Ruyton, and Middle, in the hundred of Oswestry, were built by the family of L'Estrange about the twelfth century. The castle of Knockin was destroyed in the civil wars in the reign of King John, but afterwards repaired by John L'Estrange in the reign of Henry III. Scarcely a vestige of the castle now remains, the stone having been carried away and some of it broken up to mend the roads. There are no remains of Ruyton Castle, and those of Middle consist of little else than one tower. Red Castle, near Hawkstone, although stated by Dugdale and others to have had its origin in the reign of Henry III., appears, from an antient manuscript in the Audley family, to have been in existence in the reign of William the Conqueror; and that the lands in its vicinity were given by Maud, the wife of that sovereign, to John de Audley for certain services rendered to the state. The position of the castle is remarkably strong, being the summit of a rocky hill.

Whittington Castle, near Oswestry, was formerly a place of considerable importance, and held after the Conquest by Roger de Montgomery, but being forfeited by his son Robert, it was bestowed on William Peverel, who offered the castle and his fair daughter Melette to that one of the lady's suitors who should prove victorious in a tournament appointed to take place at Peverel's castle in the Peak of Derbyshire. The prize was won by Guarine de Metz, of the house of Lorraine, lord of Alderbury and sheriff of Shropshire, in whose family the castle remained for nearly four centuries; but in 1419, the race becoming extinct, the castle and manor passed through various hands. The adventures of Fulke Fitz-Warine or Guarine, the grandson of Guarine de Metz, are recorded in the Anglo-Norman metrical 'Romance of the Fitz-Warines,' of which a prose version of the fourteenth century is preserved in the British Museum. The ruins are extremely picturesque, and include eight massive towers. The east walls of the castle are washed by a lake.

In addition to the above, there are remains of castles at Alderbury, Sibdon, and Wattlesborough. Bishop's Castle (as the name imports), Chirbury, Ellesmere, Holdgate, and Whitchurch were also seats of castles, but of these no portions now exist.

The ecclesiastical and religious establishments in the county amounted to near fifty. From a manuscript of the earlier part of the reign of Henry III., preserved in the Cotton MSS. in the British Museum, and recently (1841) brought to light by Mr. Thomas Wright, the following appear to have been the most important monastic houses in the county at that period:—

Abbatia Salopesbury (Shrewsbury), S. Petri et S. Melburgæ, Monachi nigri.

Abbatia Beldewas (Buildas), S. Mar., Monachi nigri.

Abbatia Lilleshelle (Lilleshall), Canonici nigri.

Abbatia Hageman (Haughmond), S. Mar., Canonici albi.

Prioratus Wenelok (Wenlock), S. Melburgæ, Monachi nigri de Cluniaco.

Prioratus Brumfield (Bromfield), Monachi nigri.

The remains of some of the abbeys are very beautiful. Buildas Abbey is situated at the village of Buildas, on the south bank of the Severn, about eleven miles below Shrewsbury. It was founded in the year 1135, by Roger, bishop of Chester, for monks of the order of Savigny, which was afterwards united to the Cistercians. The foundation was confirmed by Stephen in 1139, and it was subsequently enriched by many munificent benefactions and donations confirmed by royal charter. Henry II. subjected the abbey of St. Mary's, Dublin, to the abbots of this place. The site and all the lands belonging to the establishment in Shropshire, Staffordshire, and Derbyshire were granted by Henry VIII. in 1538, to Edward, lord Powis. At the time of its dissolution it contained twelve monks. The abbey was dedicated to St. Mary and St. Chad. The walls are nearly entire. The shape of the building is cruciform, with a massive tower in the middle. The chapter-house is tolerably perfect. It is a parallelogram 43 feet by 33, on the east side of the building. The side aisles, transept, and chapels of the choir are in total ruin. The lower story of the tower remains, resting on four arches springing from brackets in the walls. The ruins present some curious specimens of the architecture of the period when the round arch was giving way to the pointed.

Haughmond or Haghmond Abbey is situated on a rising ground four miles east of Shrewsbury. It was founded in 1100 by William Fitz-Alan, who conferred on it the land on which it stood with all appurtenances. Leland says there was a hermitage and a chapel on this spot before the abbey was built. The establishment consisted of canons of St. Augustine, and all grants made to them were confirmed by charter of the 13th Edw. II. Henry II., at the request of the abbot, granted to William Fitz-Alan and his heirs the keeping of the abbey and its possessions in times of vacation occasioned by the death of any abbot, to the exclusion of the king and his successors. Pope Alexander, in 1172, granted many valuable privileges to the abbots and monks of this monastery, which were confirmed by subsequent possessors of the see. The yearly revenues at the dissolution amounted, according to Dugdale, to 259*l.* 13*s.* 7½*d.* The extent of the whole foundation is not distinctly traceable, but the chapter-house is entire. It is oblong, the upper end forming two sides of an hexagon. The roof is of oak, on which rested another story. A beautiful Norman arch in the south door of the nave is all that remains of the abbey church. South of the chapter-house are remains of the refectory, halls, &c.

Lilleshall or Lilleshull Abbey, near the village of the same name, in the neighbourhood of Newport, is an extremely beautiful ruin. It was founded in the reign of Stephen, and endowed with the estates of a college of St. Alkmond, said to have been founded by Ethelfleda, 'the lady of the Mercians.' The church, which was cruciform, was 228 feet in length, and the breadth of the nave 36 feet. It appears to have had two towers, one in the centre and the other at the west end, and the fine round Norman arch at that end appears to have been the lower portion of the latter. The south door communicating with the cloister is one of the richest early Norman arches in the kingdom. The east window is large, with a beautiful pointed arch of the fourteenth century. The abbeys of Shrewsbury and Wenlock are noticed elsewhere. There are also remains of an abbey near Alderbury, called New or White Abbey, founded by Fulke Fitz-Warine, in the early part of the thirteenth century.

At Bromfield, near Ludlow, are the remains of a priory or cell of Benedictines, originally a college of prebends or secular canons, founded in 1105. In 1155 the prior and canons, wishing to become monks, placed themselves under the government of the abbey of St. Peter's of Gloucester, and from that time Bromfield was considered as only a cell to that great monastic foundation. The ruins are slight, but are well situated on the river Teme.

At Chirbury, on the borders of Montgomeryshire, there are also traces of a priory of Austin canons. It was founded in the reign of King John; its nave forms the present parish church. The choir and the transept are totally destroyed.

White Ladies' priory is near Boscobel, on the borders of Staffordshire. It is a picturesque ruin, situated in a sequestered spot. The date of its foundation is uncertain, but its architecture indicates Saxon origin. It was inhabited by White or Cistercian nuns as early as the reign of Richard I. or John.

At the village of Tonge there is an antient collegiate church, formerly belonging to the abbey of Shrewsbury, purchased by Isabel, widow of Sir Fulke Pembridge, in the early part of the fifteenth century, who rebuilt it, and made it collegiate for a warden, four fellows, two clerks, and choristers; to which was added an hospital for thirteen poor persons.

The Heath chapel, situate at the north foot of the Brown Clee Hills, is a curious specimen of Anglo-Norman architecture in its simplest form.

Stoke Castle, near the village of Onibury, in the hundred of Munslow, is a relic of the castellated mansion of past ages, rather than of a post of strength.

Boscobel House, situate near the village of Tonge, on the borders of Staffordshire, was a place of concealment for Charles II. after his defeat at Worcester. The battle was fought on the 3rd of September, 1651, and at the close of the engagement Charles fled, accompanied by the duke of Buckingham, the earl of Derby, Lord Wilmot, and other adherents, under the guidance of Charles Gifford, Esq., a Staffordshire gentleman, and Francis Yates, one of his servants. The party arrived on the morning of the 4th of September at White Ladies', about three-quarters of a mile from Boscobel, and inhabited by John Penderell and his brothers. Here the king put on the dress of a woodman, and spent the day in the adjoining woods, his followers having left him and joined the disordered royalist troops, with the exception of Lord Wilmot, who went in another direction. That night the king, accompanied by Richard Penderell, proceeded on foot to Madeley, to the house of Mr. Francis Wolfe, intending to proceed into Wales, but finding the country was overrun with the militia and soldiers of the parliamentary forces, they lay concealed in a barn of Mr. Wolfe's the whole of that day. As soon as it was dark, the king determined to retrace his steps, and, accompanied by Richard Penderell, they forded the Severn, and walked all night to Boscobel, which was inhabited by William Penderell and his wife. Here he met with Major Careless. The following day was spent in an oak-tree near Boscobel, and that and the night succeeding Charles appears to have slept at Boscobel. On Monday, the 8th of September, near midnight, he set off on horseback again, accompanied by Richard Penderell, to Broseley, the residence of Mr. Whitgrave, where he met Lord Wilmot. From Mr. Whitgrave's the king went the next night to Col. Lane's, at Bentley, with whose sister, Mrs. Lane, he subsequently made his escape on horseback into the south.

(Archdeacon Plymley's *Survey of Shropshire; Beauties of England and Wales;* Dugdale's *Monasticon;* Gough's *Camden;* Wright's *History of the Welsh Border;* Murchison's *Silurian System;* together with various Parliamentary Reports and Returns, &c.)

STATISTICS.

Population.—Shropshire ranks the nineteenth on the list of agricultural counties. In 1811, the proportion of the agricultural population was 42 per cent.; in 1821, 44 per cent.; and in 1831, 36·8 per cent. In 1831, of 56,754 males twenty years of age and upwards, 23,267 were employed in agriculture, comprising 17,296 labourers, 3832 occupiers of land employing labourers, and 2139 small occupiers not employing hired labour. The number of males aged twenty employed in manufactures, or in making manufacturing machinery, was 1353 in 1831. 'The preparation of iron for the forge is the principal manufacture in the county of Salop; at Hales-Owen nearly 500 men are so employed, and at Madeley 250. At Dawley and other places in its vicinity many men are employed in the blast furnaces, but the number is not mentioned. At and near Shrewsbury 74 men are employed in iron castings and at forges, and in preparing the weighty apparatus of powerful machinery; nails are made at Wellington. The finer kinds of earthenware employ about 200 men at Madeley and Broseley; carpeting employs 90 men at Bridgnorth; glass is made at Wrockwardine; flannels are made at Oswestry, Church-Stretton, and Worthen; and a small manufacture of hair-seating exists at (Market Drayton) Drayton-in-Hales.'—(*Census of* 1831.)

The population of Shropshire, at each of the four following periods was,—

	Males.	Females.	Total.	Increase per cent.
1801	82,563	85,076	167,639	..
1811	95,842	98,456	194,298	15·8
1821	102,056	104,097	206,153	6·1
1831	111,017	111,921	222,938	8·1

showing an increase of 55,299 in thirty years, or 32·9 per cent.; being about 3½ per cent. below the whole rate of increase throughout England.

The following table exhibits a summary of the population of every hundred, &c. as taken in 1831:—

HUNDREDS, BOROUGHS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of persons.	Males twenty years of age.
Bradford, North (Hundred)	5,131	5,438	21	126	2,751	1,636	1,051	13,149	13,718	26,867	6,599
Bradford, South „	7,301	8,028	26	201	1,819	4,575	1,634	19,208	18,774	37,982	9,635
Brimstrey „	4,087	4,734	44	187	1,520	1,861	1,353	10,544	10,521	21,065	4,856
Chirbury „	749	850	7	17	444	148	258	2,218	1,994	4,212	1,041
Condover „	1,061	1,153	2	29	743	239	171	3,051	2,859	5,910	1,628
Ford „	1,291	1,412	1	50	664	282	466	3,517	3,381	6,898	1,792
Munslow „	1,949	2,075	15	31	1,395	426	254	5,277	5,090	10,367	2,721
Oswestry „	3,610	3,868	14	103	1,890	1,132	846	9,351	9,674	19,025	4,808
Overs „	533	560	2	16	327	99	134	1,407	1,360	2,767	708
Pimhill „	2,209	2,325	8	19	1,215	638	472	6,207	6,108	12,315	3,359
Purslow „	2,266	2,428	10	55	1,520	535	373	6,181	5,952	12,133	3,121
Stottesden „	2,290	2,420	6	111	1,352	522	546	6,059	5,860	11,919	3,229
Bridgnorth (Borough)	1,113	1,262	8	44	56	100	1,106	2,555	2,743	5,298	1,313
Ludlow „	909	1,119	10	56	—	490	629	2,428	2,825	5,253	1,346
Shrewsbury (Borough and Liberty)	4,492	4,957	48	184	721	1,944	2,292	11,107	12,385	23,492	6,004
Wenlock (Town and Liberties)	3,642	3,793	31	186	679	1,583	1,536	8,758	8,677	17,435	4,314
Total .	42,633	46,427	253	1,415	17,096	16,210	13,121	111,017	111,921	222,938	56,474

County Expenses, Crime, &c.—Sums expended for the relief of the poor:—1748-49-50 (annual average), 7925*l.*; 1776, 22,316*l.*; 1783-84-85 (average), 33,937*l.* The sums expended at the four dates of—

	£.		s.	d.	
1801 were	66,747,	being	7	11	for each inhabitant.
1811 . .	106,318	„	10	11	„
1821 . .	92,907	„	9	0	„
1831 . .	87,111	„	7	9	„

The expenditure in each of the following years was as under:—

1835.	1836.	1837.	1838.	1839.	1840.
£73,039	£64,003	£56,351	£51,506	£54,778	£55,022

Assuming that the population had increased from 1831 to 1840 at the rate of one per cent. per annum, the expenditure in the latter year would average 4*s.* 6½*d.* for each inhabitant, which is lower than for the whole of England and Wales. The saving effected between the years 1834 and 1840 amounted to 34,406*l.*, or 37 per cent., namely, under the head of relief and maintenance, 27,471*l.*, or 33 per cent.; in suits of law, &c., 2889*l.*, or 71 per cent.; and in miscellaneous expenses, 4046*l.*, or 56 per cent.

In 1835-6 the number of bastard children chargeable to the poor-rate in the county was 2037, or 1 in 109 of the population according to the census of 1831, the proportion for England being 1 in 215. In 1830 the number of illegitimate births was 495, or 1 in 13, the proportion for England being 1 in 20. The number of lunatics and idiots chargeable on the poor's-rate in 1836 was 261, or 1 in 854, the proportion for England being 1 in 1033. The number of paupers relieved during the quarter ending Lady-day, 1840, was 10,396 (1924 in-door, and 8472 out-door), being 6 per cent. of the total population, which, with the exception of Derbyshire and Staffordshire, was lower than in any county in England or Wales. The number of poor-law unions in the county is 13, comprising a population of 174,899, according to the census of 1831. There are 22 parishes, containing a population of 48,039, in which the administration of relief to the poor is managed under local acts.

The annual value of real property in the county assessed to the property tax in 1815 was 1,037,988*l*. The sum raised for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 106,285*l*., and was levied upon the various descriptions of property as follows:—

On land . .	£86,035	13*s*.
Dwelling-houses .	14,202	8
Mills, factories, &c. .	1,900	11
Manorial profits, navigation, &c.	4,146	17
Total	£106,285	9

The amount expended was—

For the relief of the poor . . .	£86,077	3*s*.
In suits of law, removal of paupers, &c.	3,803	11
For other purposes . .	19,405	19
Total money expended	£109,286	13

The county expenditure in 1834, exclusive of that for the relief of the poor, was 9880*l*. 10*s*. 11*d*., disbursed as follows:—

	£.	*s*.	*d*.
Bridges, building, repairs .	1,241	15	11
Gaols, houses of correction, and maintaining prisoners, &c. .	3,426	2	8
Shire-halls and courts of justice, building, repairs, &c.	427	2	9
Lunatic asylums . . .	34	15	0
Prosecutions . . .	1,865	9	1
Clerk of the peace . . .	999	15	9
Conveyance of prisoners before trial	377	16	9
Conveyance of transports	137	18	10
Vagrants, apprehending and conveying	6	18	4
Constables, high and special .	18	16	9
Coroner . . .	286	1	6
Debt, payment of interest and principal	101	5	6
Miscellaneous . . .	956	12	1
Total	£9,880	10	11

The county-rate raised at different periods during the last half century, and the principal disbursements, are shown in the following table:—

	1792. £	1801. £	1811. £	1821. £	1831. £	1838. £
Income .	4,453	8,322	8,616	10,945	10,126	14,979
Expenditure:—						
Bridges .	1,254	1,363	3,203	950	2,617	1,682
Gaols .	26	142	501	1,051	556	1,498
Prisoners' maintenance	848	2,430	1,917	2,911	3,788	2,190
Prosecutions	102	786	368	1,736	2,169	2,626
Constables & vagrants	393	550	167	528	237	313

According to official returns (made pursuant to act 2 & 3 Vict., c. 40), the length of streets and highways in the county, and the expenditure thereon, in 1839, was as under:—

		Miles.
Streets and roads repaired under local acts		49
Turnpike-roads		640
All other highways		2,245
		2,935
Amount of rates levied		£15,534
Expended in repairs of highways	£14,872	
Law and other expenses . .	101	
Total expenditure .		£14,973

In 1839 there were 39 turnpike trusts in the county: the number of miles of road under their charge was 988. In 1839 the income arising from tolls was 25,992*l*.; parish composition in lieu of statute duty, 219*l*.; estimated value of statute duty performed, 352*l*.; total income, 27,548*l*.; and the total expenditure in the same year was 30,143*l*. The assets, including arrears of income, amounted to 7836*l*.; the debts to 129,183*l*. The debts, in 1836, were equal to 3·41 years of the annual income; the proportion of unpaid interest to the total debt was only 3 per cent., the average for England being 12 per cent.

In 1839 the sum of 9446*l*. was collected to defray expenses connected with the Established Church, of which sum 7537*l*. was derived from church-rates, and 1909*l*. from various other sources, including 440*l*. from estates and rent-charges. The expenditure amounted to 8595*l*., and included 3385*l*. for repairs of churches.

Crime.—Number of persons charged with criminal offences in the four septennial periods ending 1819, 1826, 1833, 1840:—

	1815-19.	1820-26.	1827-33.	1834-40.
Total of each septennial period . .	986	1013	1509	1917
Annual average .	141	144	215	274

The numbers committed, convicted, and acquitted in each year from 1834 to 1840 were as under:—

	1834.	1835.	1836.	1837.	1838.	1839.	1840.
Committed	263	206	228	252	271	310	387
Convicted	204	130	147	180	195	217	259
Acquitted	59	76	81	72	76	93	128

In 1834 the proportion of persons committed to the total population of the county was 1 in 848; in 1837, 1 in 884; and in 1840 (allowing 1 per cent. per annum for the increase of population), 1 in about 620.

Of 387 criminal offenders tried at the assizes and sessions in Salop in 1840, 18 were charged with offences against the person; 22 with offences against property committed with violence; 308 (including 244 cases of simple larceny) with offences against property committed without violence; only 1 was charged with malicious offences; 4 for forging and uttering base coin; and 34 for various misdemeanours. Of the whole number committed, 259 were convicted, 128 were acquitted, 3 were not prosecuted, no bill was found against 45, and 80 were found not guilty on trial. Of those convicted there was not one case in which sentence of death was passed. Of 12 convicted of offences against the person, 7 were sentenced to various terms of imprisonment (5 to periods of six months and under), and 5 were either whipped, fined, or discharged on sureties. In 20 convictions for offences against property committed with violence, 2 were transported for life; 2 for terms above 10 and not exceeding 15 years; 7 for terms exceeding 7 and under 10 years; 8 were imprisoned for terms above 6 months and not exceeding 1 year. In 191 convictions for offences against property committed without violence, 2 were transported, 13 for periods exceeding 7 years, and 17 for 7 years; 3 were sentenced to imprisonment for 1 year and upwards; 22 for 1 year and not under 6 months; and 134 for periods under 6 months. In the single case of malicious injury to property, the offender was sentenced to transportation for 10 years. In 3 convictions for uttering base coin, the offenders were sentenced to short periods of imprisonment not exceeding 6 months. In 32 convictions for misdemeanours, 14 were sentenced to various terms of imprisonment (only 1 for above 12 months), and 18 were discharged on fines or sureties. The number sentenced to transportation was 43 males and 1 female. Of the whole number of offenders tried, 315 were males and 72 females; 138 males and 38 females could neither read nor write; 144 males and 30 females could either read or read and write imperfectly; 12 males could read and write well; 2 males had superior instruction; and the degree of instruction of the remaining 19 males and 4 females could not be ascertained. The proportion of uninstructed criminals on an average of several years was 94·7 per cent., and of those instructed 5·3 per cent., the average of the former for England and Wales being 89·3 per cent.

Savings' Banks.—There are 13 savings' banks in the county, in which the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1835.	1836.	1837.	1838.
No. of depositors	9,952	10,276	11,535	12,200	12,664	13,880
Am. of depots.	£374,878	£382,034	£412,035	£435,665	£450,171	£473,637

The various sums placed in the savings' banks in 1830, 1834, and 1839, were distributed as under:—

		1830.		1834.		1839.	
		Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding	£20	4,434	£22,368	5,183	£38,603	6,753	£51,786
,,	50	2,504	77,632	2,981	92,218	4,000	123,563
,,	100	1,824	90,568	1,899	96,864	1,829	126,093
,,	150	578	67,963	562	67,835	678	80,855
,,	200	252	42,875	292	49,438	466	77,595
Above . .	200	148	36,340	127	32,168	116	28,158
		9,234	347,796	10,544	377,126	13,836	487,550

Exclusive of the above, the deposits of 132 friendly societies amounted, in 1839, to 30,553*l.*; and 14,078*l.* were invested by 165 charitable institutions.

The number of registered parliamentary electors in the county, in 1835, was,—northern division, 5016; southern, 3566: total, 8682. In 1840 there was an increase of 23 in the northern division, and of 210 in the southern division; the total number in the county being 8816, classed as follows:—

	N. div.	S. div.	Total.
Freeholders of every class . .	3,309	2,227	5,536
Copyhold and customary tenants	115	87	202
Leaseholders for life or period of years	23	50	73
50*l.* tenants at will . . .	1,462	1,313	2,775
Trustees and mortgagees in actual receipt . . .	14	4	18
Qualified by offices . . .	72	87	159
Joint and duplicate qualifications	44	8	52
	5,039	3,776	8,280

Education.—The following summary is taken from the Parliamentary Returns made in 1833:—

	Schools.	Scholars.	Total.
Infant schools . . .	28		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		305	
Females . .		362	
Sex not specified .		286	
			953
Daily schools . . .	542		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		7,954	
Females . .		6,333	
Sex not specified .		3,939	
			18,226
Schools . .	570		
Total of children under daily instruction			19,179
Sunday schools . . .	240		
Number of children at such schools; ages from 4 to 15 years:—			
Males . .		7,185	
Females . .		7,158	
Sex not specified .		4,338	
			18,681

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 years then found as residing in Shropshire in 1833, was about 75,000. Six Sunday-schools are returned from places where no other schools exist; and the children, 152 in number, who are instructed therein cannot be supposed to attend any other schools; at all other places children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Fifty-two schools, containing 3595 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is known to be thus far created. Making allowance therefore for this cause, which prevents accuracy, we may perhaps fairly estimate that less than one-half of the children between the ages of 2 and 15 years are under instruction in this county. Thirty-seven boarding-schools are included in the number of daily schools given above. No school in the county is reported as being confined to the children of parents of the Established Church, or of any other religious denomination; such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists and Roman Catholics.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	2	78	2	67	20	550	4	250
Daily Schools	78	2569	53	2,715	356	9,077	55	3865
Sunday Schools	11	833	191	14,616	1	14	37	3218
Total...	91	3480	246	17,398	377	9,641	96	7333

The schools established by Dissenters, included in the above statement, are—

		Scholars.
Daily-schools . . .	15, containing	580
Sunday-schools . . .	82 .	7,812

The schools established since 1818 are—

Infant and other daily schools .	190, containing	6,872
Sunday-schools . .	144 .	12,459

Lending-libraries are attached to 33 schools.

SHROUDS. [SHIP.]

SHROVE-TIDE, or **SHROVE-TUESDAY** (from the Anglo-Saxon *scrifan*, to confess), signifies the time of confessing sins; for which purpose this day was antiently set apart by the church of Rome as a preparation for the austerities of Lent. This season was likewise called *Fasting-tide*, *Fastens*, and *Fast-mass*, by all of which titles it is yet designated in different parts of the North.

In the Reformed Church the antient practice of shriving or confessing at Shrove-tide is discontinued.

After the people had made the confession required at this season by the discipline of the antient Church, they were permitted to indulge in festive amusements, although not allowed to partake of anything beyond the usual substitutes for flesh; and hence arose the custom yet preserved of eating pancakes and fritters at Shrovetide, which has given this day the vulgar appellation of Pancake Tuesday. The Monday preceding was, by the vulgar, called Collop Monday, a name which it even yet retains in some places, from the primitive custom of eating eggs on collops or slices of bread, which the less scrupulous and more luxurious moderns have extended to collops of meat.

On these days of authorised indulgence all kinds of recreations were tolerated, provided a due regard was paid to the abstinence commanded by the Church; and from this origin sprang the Carnival. [CARNIVAL.]

To the pastimes of this early age are also to be traced the nearly exploded diversions of cock-fighting and cock-throwing, as well as the discontinued customs of whipping-tops, roasting of herrings, Jack of Lent, &c., which three last-named sports were evidently meant as types of the rigour of church discipline. The cock-fightings and cock-throwings in England, which have gone into disuse, were once general throughout the kingdom at this season.

(Brady's *Clavis Calendaria*, vol. i., pp. 199, 200; Brand's *Popular Antiq.*, vol. i., p. 56, &c.)

SHRUB (*frutex*). All plants are divided into herbs, shrubs, and trees. A shrub is a plant with a woody stem, which approaches the tree in its duration and consistence, but never attains the height of a tree, and is generally taller than the herb. It varies in height from about four to twelve feet. Linnæus attempted to distinguish trees from shrubs by the former having buds and the latter having none. But this distinction is of no avail, as plants like the willow, generally called shrubs, possess buds, whilst most trees in hot countries are without them.

In horticulture shrubs are too well known to need a definition. For practical purposes they are divided into the deciduous and evergreen kinds, and each of these kinds may be further divided, according to their hardy or tender habits, their form, size, mode of growth, colour, &c. The most ornamental flowering shrubs are those belonging to the genera Rosa, Rhododendron, Azalea, Kalmia, Andromeda, Vaccinium, &c. Among the evergreen shrubs are the holly, the ivy, the jasmine, the box, various heaths, &c.

Shrubs are often planted together, forming what are called shrubberies, and when the kinds are judiciously selected and arranged, these collections add greatly to the beauty of the gardens and pleasure-grounds where they are introduced.

Shrubs in general thrive in ordinary garden soils, and better in light than heavy lands. Previous to planting them it is always desirable to trench the soil to its full depth. They seldom require manure, except in very poor soils. Evergreens thrive best in loams of a middling texture. Kalmias, Ericas, &c. require peat or heath soil. Deciduous shrubs in general thrive in light loams or sandy soils.

SHUCKBURGH EVELYN, SIR GEORGE, Bart., a gentleman distinguished as a classical scholar as well as for his attainments in mathematical and philosophical learning, was born in 1750, and represented the county of Warwick in three successive parliaments. In 1774 he was elected a fellow of the Royal Society, and in the volume of its 'Transactions' for 1798 will be found the communications which he made to that body concerning the measurement of the heights of mountains by the barometer, and the adoption of a general standard of weights and measures. Together with General Roy he made numerous experiments in order to find the effect of variations of temperature on the volumes of air and mercury; and from the labours of these experimenters there has resulted a rule for obtaining the relative heights of stations, which possesses perhaps all the accuracy of which the barometrical method is susceptible, or which can be required for the purposes of geography. According to Sir George Shuckburgh, the formula expressing the required height in fathoms is

$$(10000\,l \mp 0{\cdot}44\,d)\,\{1 + {\cdot}0023\,(f - 32^\circ)\};$$

where l is the difference between the logarithms of the heights of the barometer at the two stations; $\mp d$ is the difference between the attached thermometers (Fahrenheit's scale), the negative sign being used when the mercury is coldest at the upper station, and the positive sign in the contrary case, and f is the mean of the temperatures expressed by a detached thermometer at the stations. When the air is tranquil, and the observations are carefully made, this formula will give the required height within two or three feet in four thousand.

It has always been considered advantageous that the units of linear measure and of weight should have a relation to some invariable standard existing in nature, in order that in the event of the values of those units being lost, they may be recovered with accuracy. This was the object proposed by the government of France in 1793, when it was decided that the metre should be a certain portion of the circumference of a meridian of the earth; and to Sir George Shuckburgh belongs the merit of having determined the relation between the yard (the unit of measure in England) and the length of a pendulum which should make a certain number of vibrations in a given time. The subject had already, at intervals, during many years been recommended to the attention of the government, but the inquiry from various circumstances being deferred, it was reserved for private individuals, to whom, for the sake of obtaining accuracy and uniformity in their scientific pursuits, it was of importance to have a precise standard of length, to procure one by their own exertions. By numerous experiments Sir George found that the difference between two pendulums, one vibrating 42 times and the other 84 times in a minute (mean time) in the latitude of London, at 113 feet above the level of the sea, when the mercury in the barometer is at 30 inches, and the temperature is at 60° (Fahr.), is equal to 59·89358 inches according to the parliamentary standard; and it is evident that by repeating such experiments with all due care, the length of a rod containing the same number of inches might be obtained. From the more recent experiments of Captain Kater and Colonel Sabine, the length of a pendulum vibrating one second in London is 39·13929 inches; which gives for the difference between two such pendulums as those above mentioned, 59·90103 inches, a result agreeing with that which had been found by Sir George Shuckburgh within ·00745 inch. This philosopher also ascertained from numerous experiments that a cubic inch of distilled water, when the mercury in the barometer is at 29·5 inches, and the temperature is 60°, weighs in air 252·506 grains, and in vacuo 252·806 grains; hence the exact weight of a grain, and consequently of all other weights, may at any time be obtained. (*Phil. Trans.*, 1798.)

In order that a precise standard of length might be preserved in the country, Sir George Shuckburgh employed Mr. Troughton to make for him a brass-bar, and to lay down on it with great accuracy the length of 5 feet, divided into feet, inches, and tenths of an inch; the bar was 67¼ inches long, $1\frac{4}{10}$ inch wide, and 0·4 inch thick; and besides the scale just mentioned, there were laid upon it various other measures of acknowledged or reputed authority. This scale is now in the possession of the Royal Society; and in the *Phil. Trans.* for 1798 is a paper by Sir George, in which the scale is described, and the length of 3 feet on it is compared with the length of the old standard yard which was kept at the Exchequer (where it is supposed to have been placed in the reign of Elizabeth) and with that of another standard yard belonging to the Royal Society. The difference between the last-mentioned standards, which was considerable, had been observed by Mr. Graham in 1742.

In 1833 the Royal Astronomical Society caused a new standard measure to be made with all possible accuracy; this is a brass tube, or rather, it consists of three brass tubes drawn within one another, and the scale, which is 5 feet long, divided into inches and tenths, is formed on the upper part of the exterior surface between two lines drawn parallel to the axis of the tube. By careful comparison it has been found that 3 feet on this scale exceeds 3 feet on the Shuckburgh scale by ·000079 inch; and it may be observed here that 3 feet on the latter scale exceed the imperial yard which is at present in use by ·00058 inch. (*Mem. Royal Astr. Soc.*, vol. ix.)

It is said of Sir George Shuckburgh that in matters of science no man was more cautious of making hasty inferences or of forming general conclusions from partial or inaccurate observations. He had travelled on the Continent; and being a diligent cultivator of astronomy, he fitted up an observatory with instruments which he caused to be constructed by Mr. Ramsden. He died at his seat in Warwickshire, September, 1804, in the 54th year of his age, leaving the character of a man of great integrity, and, as a senator, of independent conduct.

SHUMLA, *Schumna*, or *Ciumna*, in 43° 12′ N. lat. and 26° 53′ E. long., is a considerable town in the eyalet (province) of Rumelia and the sandjak (district) of Silistria. It is situated on the northern declivity of the Balkan, in Bulgaria, on the way from Constantinople to Bukharest, at nine days' journey from Constantinople. It is surrounded by walls and defended by a citadel, and although upon the whole it is not well built, there are so many mosques and baths, that the appearance of the town is agreeable. The celebrated mausoleum of Djezaïr-il-Hassan Pasha is one of the greatest attractions and very much improves the dull features of Shumla. There is however much more life than could be expected; the commerce is flourishing, owing to the many roads from the northern provinces which lead through it to the capital; the silk and cloth manufactures are kept in activity by a continual demand; the cotton manufactories, of which there are a great number in this place, supply almost all Bulgaria, and even Wallachia, with the produce of their industry; and the extensive copper trade, which the inhabitants have almost monopolised in the north, enriches the town considerably. The number of inhabitants is between 20,000 and 30,000, and consists of Turks, Bulgarians, Greeks, Armenians, and Jews. The situation of Shumla is on a considerable elevation, but it has not a good climate. Being situated at the spot where the roads from the chief fortresses of the Danube meet, the possession of Shumla is the key of the Balkan. Indeed Shumla was always the point of attack in every attempt to cross over into Turkey. It came into the possession of the Ottoman Porte in the reign of Murad II., when the castle was occupied by Ali Pasha, the son of this sovereign's grand-visir, in 1472. It was besieged in 1774 by Rumianzow, but without success. In 1810 Kaminskoi was obliged to retreat with a considerable loss, the Russians having again attempted to get possession of the key to Constantinople. But this fortress was not so fortunate in 1828, when General Wittgenstein took it; his conquest however did not compensate for the loss which he suffered of the greater part of his army, partly from the fury of the Turks, and partly from the plague and dysentery which raged in the camp. General Diebitsch had in the meantime crossed the Balkan without coming to Shumla.

There is an interesting account of this town in the 'Description de Shumla,' by Barbié du Bocage, Paris, 1828.

There is in the neighbourhood of Shumla a village called Madara, which well deserves the attention of travellers; it is inhabited solely by women, the number of whom amounts to about 2000. This female community has laws of its own; they are exempt from all taxes, and are noted for their hospitality.

SHUS. [Persia; Sus.]

SHUSTER. [Persia.]

SI, in Music, the name given by the English, Italians, and French, to the seventh of the syllables used in solmisation; and, by the two last, also to the note, or sound, called B by the Germans and English. [Solmisation.]

SIAK. [Sumatra.]

SIALAGOGUES (from *σίαλον*, 'saliva,' and *ἀγωγός*, 'that which leads or brings'), agents which increase the flow of saliva and other fluids from the parotid and other glands in the vicinity of the mouth. They operate in different ways, and are distinguished into local or remote. Of the local, some are gaseous, others are solid; these last are also termed *masticatories*. Of the gaseous, the most familiar is the odour of savoury food, which produces an immediate secretion from the salivary glands, being the primary step in the process of digestion, for the perfect performance of which thorough insalivation of the food is requisite. By the motion of the jaw in the act of mastication a further flow of saliva is occasioned, and this result occurs however insipid or insoluble the substance may be which is moved about in the mouth. Hence even a pebble or mastiche will cause it. But if the substance possess an agreeable aroma, or a considerable degree of pungency or acrimony, a greatly augmented secretion is the consequence. In hot climates piquant articles are extensively used to stimulate the languid action of the digestive organs. [Aromatics; Food.] In local affections of the mouth, nose, or even head, relief is often obtained by exciting the salivary glands to increased secretion, and this is effected by chewing pellitory root and other pungent articles, or holding in the mouth an infusion or tincture of these. Remote sialagogues are first received into the system by the stomach or other channels, and then exert a peculiar influence on the salivary glands. Of these the most familiar is mercury. This often proves highly remedial, especially in the fevers of tropical countries, in which the occurrence of salivation is always regarded as a forerunner of recovery. In persons whose systems cannot sustain mercury, or to whom it is objectionable, a deficiency of saliva, a frequent accompaniment of indigestion, is removed by the Virginian snake-root, alone, or in combination with preparations of copper.

The excessive salivation which results from even a small dose of mercury should cause the utmost caution to be observed in its use; especially as it is extremely difficult to remove it when once established, or even to mitigate its effects. [Mercury.]

SIALIA. [Blue Bird.]

SIAM. Including the countries tributary to or dependent on it, Siam extends from 4° to 22° N. lat., and from 98° to 105° 20′ E. long. It comprehends a vast extent of country in the peninsula beyond the Ganges, and the larger part of the Malay peninsula. The greater part of the boundary by which it is separated from the adjacent countries is imperfectly known, except where it borders on the British possessions, where also it has lately been discovered that the frontier-line differs materially from that which is laid down in the best maps. [Tenasserim.] On the east of Siam lie the countries constituting the kingdom of Cochin-China or Annam; on the north is China (the province of Yunnan) and that part of Laos which is subject to the Birmans; on the west is the Birman empire, from which it is separated by the river Saluen, the British province of Tenasserim, and the Gulf of Bengal; and on the south are the independent states of the Malay peninsula, Perak and Pahang. That portion of the Indian Ocean which is called the Gulf of Siam, and extends from south-east to north-west above 500 miles, with an average width of about 250, is almost entirely surrounded by the countries subject to Siam. According to the calculation of Berghaus, the boundary-line between Siam and Cochin-China is 1357 miles long; that towards China, 115 miles; between Birma and Siam, 331 miles; and that by which it is separated from the British possessions, 664 miles. The boundary-line which separates it from Perak and Pahang is 230 miles long. The Gulf of Bengal forms a coast-line of 529 miles; and the Indian Ocean, with the Gulf of Siam, one of 1467 miles.

Siam is the largest of the three empires contained in the peninsula beyond the Ganges. Crawfurd estimates the area at 190,000 square miles; but according to the calculation of Berghaus, it is nearly 290,000 square miles. Taking the former estimate, it is about 60,000 square miles larger than the Birman empire, and 7600 square miles larger than Cochin-China.

Surface and Soil.—A considerable portion of Siam is covered with mountains and hills. The mountainous and hilly part appears to be connected with two chains of mountains, running south and north, and terminating at their northern extremity in the snow-covered mountain-ranges which surround the elevated table-land that forms the centre of the Chinese province of Yunnan. North of 22°, and without the boundaries of Siam, both ranges seem to approach so near to one another as to constitute one extensive mountain-region furrowed from north to south by the narrow valley of the river Menam, but after entering Siam the mountains gradually recede, and contain the wide valley of that river.

The western of the two great chains, called by geographers the Mountains of Siam, separates the basins of the rivers Saluen and Menam, and occupies also the northern portion of the Malay peninsula, as far south as 11° N. lat. It extends therefore from north to south about 750 miles. We do not know the width of this range, except towards its southern extremity, where (between 15° and 12° N. lat.) it is probably not more than 70 miles across, but is divided into two ridges, which enclose the narrow valley in which the Tenasserim river runs southward. The greater part of this range has been seen by travellers. The whole of it appears to be covered with jungle or high trees. Some of the summits rise, according to a vague estimate, to between 5000 and 6000 feet. We are no better acquainted with the elevation of the range which runs through the British province of Tenasserim parallel to the shores of the Gulf of Bengal, but it does not in general exceed about 2000 feet. The ridge which extends along the eastern banks of the Tenasserim river is called by the Siamese Sam-ra-yot, or the 'Three Hundred Peaks.' It consists of lofty mountains, extremely rugged on their flanks as well as summits, and rising in innumerable bold conical peaks. This ridge, which lowers considerably as it approaches Kwi Point (12° N. lat.), does not come near the Gulf of Siam, but leaves between it and the shores a level country, apparently alluvial, on which rise some insulated peaks. The mountains of Siam terminate near 11° N. lat., on the isthmus of Kraw. Three passes are known to lead over these Mountains between Tenasserim and Siam, but only one of them seems adapted to facilitate the intercourse between the two countries, and it is probable that, in spite of the jealous policy of the Siamese court, a regular communication will soon be established along this road. It leads from Molmein, near the confluence of the river Ataran with the Saluen, along the banks of the first-named river to its source, where the range is passed at a place called Prasong-tshu, or the 'Three Pagodas.' Thence it passes into Siam, and traverses the rich and fertile valley of the river Mekhlong to the town of the same name, which is built where the river falls into the western branch of the Menam river, not far from its mouth.

The high ground which traverses the isthmus of Kraw from north to south, which extends from 12° to 9° N. lat., can hardly be called hilly. It is also separated from both the mountain-ranges which lie north and south of it, the mountains of Siam and those of the Malay peninsula, by deep and wide depressions. The northern of these depressions occurs near 11° S. lat., where the ground that separates the Pakchan river, which falls into the Gulf of Bengal, and the Choomphon river, which enters the Gulf of Siam, is so low, that, according to the statement of the natives, the two rivers often unite their waters during the spring-tides. As both rivers are navigable for boats, it is probable that they might be so connected as to constitute a short and direct water-communication across the isthmus between the Bay of Bengal and the Gulf of Siam. The southern depression occurs at the southern extremity of the isthmus of Kraw, and crosses the peninsula obliquely, beginning on the shores of the Bay of Bengal, east of Phunga or Ponga (8° 15 N. lat.), and running north-east to the town of Pennom, east of which it expands to a great width, comprehending the low country on both sides of the river Thakham between the towns of Phoon-phin and Chai-ya.

The mountains of the Malay peninsula have been noticed under that head [vol. xiv., 326]. The undulating country which separates the Malay mountains and the mountains of Siam from the Bay of Bengal, and extends a few miles inland, terminates on the shores with a coast of moderate elevation. It is stated to be of slight fertility, and in some parts even barren. But the province of Wellesley, before it was occupied by the British, was also considered as a sterile tract, and yet it has been found to possess a considerable degree of fertility. It is probable that other tracts of similar fertility will be found within the territories of Siam, when they are well cultivated. It is however certain that this portion of the empire is thinly inhabited. At a distance of from 10 to 20 miles, this coast is lined with a series of islands. The long channel between them and the mainland has depth enough for the largest vessels, except near the continent, where it has generally only from four to five fathoms; whilst near the islands there are generally from twenty to thirty fathoms. Many vessels sail through it during the south-western moonsoon, as the heavy sea is greatly broken by the islands, and the gales are not so strong. The islands themselves are rocky, and most of them high: some rise to more than 3000 feet. The channels between them are very deep, and usually free from danger. Most of these islands are only from two to six miles long. The largest, from north to south, are the following: St. Matthew's Island (10° N. lat), also called Elephant Island, is about twelve miles long and six wide, and has at the north part an excellent harbour, which is four miles in length and three in width, and is called Elephant's Harbour. The highest part, situated in the middle of the island, is nearly 3000 feet above the sea-level. Salanga, or Junk Seylon (8° N. lat.), is about sixteen miles long and six wide. It is separated from the continent by the Strait of Papra, in which there are only from two to three and a half fathoms water. On the east side of Salanga are some tolerably good harbours. Provisions are abundant, and tin was formerly exported. Towards its southern extremity is a high mountain. Farther south, between 6° 49′ and 6° 8′, is the group of the Lancava Islands, which, in addition to several smaller ones, contains the islands of Trotto, Lancawi, and the two Laddas. They are also very elevated, and have some good harbours; but though the islands are partly cleared and well cultivated by Malays and some Chinese settlers, the harbours are little frequented.

The eastern coast of that portion of the Malay peninsula which belongs to Siam is much lower and wider, the mountains being frequently fifteen and twenty miles distant. In fertility it is also superior to the western coast: several extensive tracts yield rich crops of rice; and others, though uncultivated and covered with jungle, exhibit a vigorous vegetation. The islands along this coast are not numerous, nor elevated, except Tantalem, the largest, which however is not very high.

To the east of the Mountains of Siam is the large valley of the river Menam. According to Crawfurd, it extends from the most northern recess of the Gulf of Siam to Pech-ai (between 19° and 20° N. lat.) 360 miles; and its breadth at its southern extremity does not exceed 60 miles. Hence he calculates that if its average breadth equals that of its southern extremity, the whole area is 21,600 square miles. In this estimate he seems only to have included that portion of the valley which is subject to annual inundations, and whose soil is therefore alluvial. But it is now known that this alluvial tract towards its southern extremity, at least on the west, is enclosed by a more elevated country of equal width and of considerable fertility. This will greatly enlarge the area of this region. We are however acquainted only with the southern part of it, no European having given any account of the country north of the antient capital, Ayuthia, or Yuthia, which is only 20 miles from the mouth of the Menam in a straight line. In this tract the fertility of the soil is not inferior to that of most countries between the tropics which are subject to the inundations of a large river. The banks of the river, being more elevated than the country at a distance, are studded with villages and towns, and the lower grounds are covered with extensive rice-fields.

The mountain-range which divides the valley of the Menam from that of the river Maekhaun or Cambodja is almost entirely unknown. According to information collected by Sir Francis Hamilton, it would seem that between 19° and 20° N. lat. a great interruption in the mountain-chain occurs, as it was stated to him by a native of Laos, that in these parts an arm of the river Maekhaun branches off and runs to the Menam, so as to constitute, at least during some part of the year, a natural water-communication. This is probable from the circumstance that the Siamese have been able to keep their footing in Southern Laos, or Lanjang, which hardly would have been the case if both countries were separated by a high continuous range, as its southern boundary seems to lie open to Cambodja, a portion of the Cochin-Chinese empire. This mountain-range, which is called the Mountains of Cambodja, in consequence of its dividing the last-mentioned country from Siam, has only been seen by Europeans where it approaches the Gulf of Siam between the river Bang-pa-kung (14° 40 N. lat.) and Chan-ti-bon (12° 20′ N. lat.), and again between Tung-yai (12° N. lat.) and Kong (11° N. lat.). In these parts it presents itself as an extensive range of moderate elevation, covered to its summits with high trees and vegetation.

Between the towns of Chan-ti-bon and Tung yai lies a plain, which extends from the shores of the Gulf of Siam far inland, the mountains in these parts receding so far from the shores as not to be visible from the sea. This tract, which constitutes the province of Chan-ti-bon, is one of the most fertile and populous districts in the Siamese empire. The population is stated by some at a million, and by others at half that amount. It is in general well cultivated, and from three to four hundred vessels are employed in taking the produce to Bang-kok, whence a great portion of it goes to China.

That portion of the Siamese empire which lies east of the Mountains of Cambodja belongs to the basin of the river Maekhaun, or river of Cambodja. It is almost entirely unknown, not having been visited by Europeans, except early in the sixteenth century by a Dutchman. It seems to extend in wide plains, which terminate south of 15° N. lat. on the river Maekhaun, which here divides Siam from Cochin-China, but north of 15° the plains reach so far east as to come up to the mountain-range of Cochin-China, whose western declivity is in these parts included within the territories of Siam. This extensive country is supposed to be very fertile, but thinly peopled.

Rivers and Lakes.—The river Saluen, which forms the boundary between Siam and the Birman empire for 150 miles, is noticed under Birma [vol. iv., p. 438]. Several of the small rivers which drain the eastern side of the Malay peninsula are navigable for a few miles, as the Thawang, which passes near Ligor (between 8° and 9° N. lat.). But the most important of the rivers of Siam is the Menam, a name which signifies, in the Siamese language, 'mother of waters.' This river rises in the south-western districts of the Chinese province of Yunnan, with two branches. The western and longer one, called Nanting-ho, has its origin near 24° N. lat., and has a general southward course until it joins (south of 22° N. lat.) the other branch, called Maepraen, which is considered by the Siamese to be the principal branch, though its course does not appear to be so long. The united river preserves the name of Maepraen, and traverses Lower Laos, or Yunshan, where it becomes navigable for boats at the town of Chang-mai, or Zamaë, the capital of that country. Farther down the navigation is much impeded by rapids, cataracts, and whirlpools, so that in several places, according to Kämpfer, goods must be taken out of the boats and transported to some distance by land. From the place where an arm of the Maekhaun is said to join the Menam, it appears that the river is called Menam, or Meinam, and, so far as we know, no impediments to navigation occur farther down. Our more exact knowledge of the river begins at Ayuthia, the antient capital, which was visited by Kämpfer in 1690. This intelligent traveller gives a map of the river's course hence to the sea, which, in 1826, the British agent Burney found to be very correct, a rather curious circumstance, as the river flows through an extensive alluvial tract. Kämpfer observes that the river above Ayuthia divides several times, and contains some very large and several smaller islands. On one of the latter Ayuthia is built. The last division of the waters occurs below Bang-kok, the present capital. Kämpfer describes the Menam as a large, deep, and rather rapid river in the lower part of its course, which is navigated by vessels of considerable burden. In his time the middle embouchure was the deepest, and by it large vessels entered the river, but at present both this and the western branch have only from eight to twelve feet of water on the bar. The western branch is called Mekhlong, and the middle one Tachin. The eastern arm, which at present is the only one navigable for large vessels, varies below Bang-kok from three-quarters of a mile to one mile and a half in width, and the depth, even close to the low banks, is from six to ten fathoms, whilst its rapidity during the low tide is about three miles an hour. It might therefore be navigated by larger vessels, were it not for an extensive bank which lies opposite its mouth, and extends about ten miles into the sea. The outer edge of this bank, which is only about two hundred yards wide, consists of sand and harder materials, but the rest of the flat is so soft, that when a ship grounds during the ebb, she often sinks five feet in the mud and clay, without however sustaining any damage. The highest water on this bar from February to September is about thirteen feet and a half, and in the remaining four months, in which the country is inundated, somewhat more than fourteen feet. On account of the obstacles arising from this extensive bar, Crawfurd thinks that the navigation of this river ought to be confined to vessels not exceeding 200 or 250 tons burden. The Menam, like all large rivers which have their source or course between the tropics, inundates the flat country contiguous to its banks. In the lower part of the river the water begins to overflow in the month of September, and continues to rise to the beginning or middle of November, when it decreases; and at the end of December the waters re-enter the bed. But it seems that farther to the north the increase takes place sooner, as, according to Crawfurd, the flat boats and rafts of timber and bamboo, loaded with goods of various descriptions, leave Chang-mai in the month of August, and in two months reach Bang-kok, where the river is crowded with them in November and December. The inundations contribute greatly to the fertility of the alluvial tract by the mud which they deposit. The whole course of the Menam does not exceed 800 miles, and this river is therefore greatly inferior to the Irawaddi and Maekhaun.

It is not known if any of the several tributaries of the Menam, which join it in the upper course, are navigable; but this is the case with the two rivers which fall into it from the west near its mouth. The most western, the Mekhlong, which has also given its name to the western embouchure of the Menam, is now known to run through a country in which hills and plains of some extent alternate, and to be navigable for boats to the distance of 200 miles from its mouth, as far as the fortress of Lumtshhang, a place of some commerce. The eastern of these two rivers, which reaches the sea by the central embouchure of the Menam, to which it gives its name, Tachin, is probably navigable for at least the same distance, but this circumstance has not been ascertained. The plains along its banks are inhabited by many Chinese, who cultivate the sugar-cane.

About 30 miles east from the eastern mouth of the Menam is that of the river Bang-pa-kung, which is of considerable size, and probably runs more than 300 miles, as it is supposed to originate in the mountains of Cambodja, between 15° and 16° N. lat. It runs west-south-west. It is said to be not much inferior in size to the Menam itself, and to have the same depth of water on its bar. Within the bar there are from two and a half to three fathoms water. It drains a country highly productive in rice and not inferior in fertility to the alluvial tract that surrounds Bang-kok and Ayuthia.

A large lake is said to exist in the parallel of Ayuthia, but a considerable distance from it to the west. Its name is Lachado, and a river called Talan carries off its waters to the Menam.

Climate.—Considerable variety of climate must exist in a country which extends from the fourth to the twenty-second degree of latitude, and which also presents a great diversity in its surface, on which elevated mountains and extensive plains occur. At Bang-kok, and this is the only place of which we have any detailed information, the year is divided between the dry and the wet seasons, as in other tropical countries. The dry season lasts from October to April, and during this time the weather is temperate, the thermometer sinking in December and January to 72°, but in April and the beginning of May, before the rains set in, it is daily from 95° to 96° in the shade. The periodical rains commence early in May; they are at first light, but about the middle of that month they fall in torrents, and go on increasing, so that in June and July they are extremely heavy. In August the rains are usually light, and they cease in September. The river has then risen so as to inundate the country, and it continues to rise to the end of November. The waters are lowest in the three months preceding the rains. The greatest rise of the river at Bang-kok is 18 feet. During the rains, hard gales from the south and south-west are frequent, and with the rain they moderate the heat.

The prevailing winds are connected with the monsoons. In March, April, and May they generally blow from the south, and are sometimes tempestuous shortly before the rains set in. In June the wind turns to the south-west, and gradually to the west, where it settles during the two following months. In September, when the wind turns to the north-west, the rain ceases, and blows from the north during the remainder of the year. In January it proceeds to the north-east, and in February to the south-west. Thus the prevailing winds blow regularly during the year from all points of the compass. If the change takes place gradually, the equilibrium of the air is not sensibly disturbed; but whenever the change occurs within the short period of a day, it is attended with a hurricane.

Productions.—Siam is rich in natural productions. Rice is most extensively cultivated. On the alluvial soil of the Menam it generally yields forty fold; and when only thirty fold, it is considered an indifferent crop. The rice of Siam is not inferior to that of any country, and it is exported to a large amount. With the exception of Bengal, Siam unquestionably exports more rice than any country in Asia. It goes chiefly to China. Maize is also extensively cultivated, particularly in the mountain districts; but it is not exported, on account of its little value and great weight in comparison with rice. It does not appear that wheat or any of the grains which are cultivated in Hindustan are grown in Siam. Of leguminous plants, the Phaseolus radiatus, the Phaseolus maximus, and the Arachis hypogaea are most commonly cultivated, and the first is exported to China and the Malay islands. The roots cultivated in other tropical countries are common, especially the sweet potato. The cocoa and areca palms are cultivated extensively in the lower tracts, and the oil obtained from the first is an important article of export.

Siam is noted for a great variety and abundance of fruit-trees, and their produce surpasses that of all other parts of India in flavour. The neighbourhood of Bang-kok is one forest of fruit-trees; and as the Siamese consume a great quantity of fruit, the destruction of these plantations in 1831, by an inundation, in which the river in October rose three or four feet above its common level, was a serious calamity. The most exquisite fruits are the mango, the mangustan, the orange, the durian, the lichi, and the pine-apple, with many others of inferior value. The mangustan and the durian do not bear fruit in all the British possessions in Hindustan, but yield abundantly in Siam as far north as Korat, between 16° and 17° N. lat. The lichi (*Scytalia litchi*) has been introduced from China.

Several other plants are cultivated as articles of foreign trade. The most important is the sugar-cane, which indeed has been grown in Siam from time immemorial, but only for internal consumption. About 1812 however some Chinese began to grow it on an extensive scale, and the cultivation increased so rapidly, that in 1822 more than 60,000 pekuls, or 8,000,000 pounds, were sent to China, the western parts of Hindustan, Persia, Arabia, and Europe. This new branch of industry however did not then extend farther than the lower parts of the rivers Bang-pa-kung, Menam, Tachin, and Mekhlong. The cultivators of the cane are always Siamese, but the manufacturers of sugar are invariably Chinese. Black pepper of a superior quality is cultivated in the country east of the Gulf of Siam to the amount of 60,000 pekuls, or 8,000,000 pounds, nearly the whole of which is exported to China. Tobacco, which formerly was imported, is now grown so generally, that considerable quantities are exported to Cochin-China and to several of the Malay countries; the best is grown in the countries east of the Gulf of Siam. Cotton does not succeed in the low countries, and is only cultivated in the more elevated tracts on the Malay peninsula, and in those which divide the alluvial region of the Menam from the Mountains of Siam. It is of good quality, and annually sent to the Chinese island of Hainan to the amount of 20,000 pekuls.

The forests, which cover nearly all the mountain-ranges of this country, yield several articles of trade. Cardamums are collected in the forests on the Mountains of Cambodja, and go to China, where they fetch a very high price. In the mountainous and woody districts of Laos a gum is collected which resembles benzoin, with which it has long been confounded. But the real benzoin is an object of cultivation in Sumatra, and the kam-nyan, as the Siamese call that which is collected in their country, is the produce of a tree that grows spontaneously in the forests of some districts of Laos. It is comparatively cheap and abundant. Gamboge, a well-known pigment, is collected in the mountains of Cambodja, within the boundaries of Siam, and Crawfurd thinks that this is the only part of the world in which it is produced. Aquila-wood is procured in the countries east of the Gulf of Siam, as far north as 13° 30′ N. lat., and considerable quantities of it go to China, where it is used as a perfume in the temples. Sapan-wood is got from the forests, with which the mountains of Siam are clothed between 10° and 15° N. lat. In point of quantity, if not of value, it is the most considerable of all the exports of Siam. It is principally sent to China, but recently a very considerable quantity has been exported to Bengal and Europe.

The forests of Siam contain many valuable timber-trees; one of them yields a considerable article of export, though, as Crawfurd supposes, it has not yet found a place in any botanical system. It is called by the Siamese *Wai-deng*, or red wood, and by the Portuguese *Pao Rosa*, or rose-wood, but it does not resemble the rose-wood used in Europe, though it is used in China, to which large quantities are exported, for cabinet-work. This tree is only found on the mountains of Cambodja which surround the upper course of the river Bang-pa-kung, and it grows to a large size. The teak-forests are very extensive, but all of them are in Laos, or north of 16° N. lat. Great numbers of trees are floated down the Menam, when the river is swollen, to Bang-kok: the consumption of teak timber in the lower districts is very considerable.

In Siam the elephant exists in the greatest perfection. The finest are found in the forest of Suphan, between 14° and 15° N. lat., west of Bang-kok, but they inhabit every part of the kingdom. In Bang-kok their use is prohibited, except to a few persons of very high rank. In all other parts of the country they are freely employed, both for riding and as beasts of burden, especially in Southern Laos, whose capital, Lanjang, takes its name from this circumstance, signifying 'the place of ten millions of elephants.' The number of wild elephants is very great, and they are regularly hunted on account of the government. The ivory, hides, and bones are largely exported to China. The buffalo is numerous in the alluvial tracts, where it is preferred to the ox for agricultural labour, on account of its superior strength and its habits, which are more suitable to a marshy soil. Black cattle are more numerous in the more elevated districts, and are only kept for agricultural purposes, their milk being too trifling in quantity to be useful, and the slaughter of them is forbidden even to strangers. But the numerous wild cattle which are found in many parts of the country are shot by professed huntsmen, for their hides, horns, bones, and flesh; the flesh, after being converted into jerked beef, forms an article of trade with China. The horses of Siam are of a small kind, resembling our ponies. A small kind of goat is kept about the temples, which produces very little milk. Hogs are very numerous, both in a domestic and in a wild state. The lard, prepared with great care, is exported to the European settlements in the neighbouring countries. Fowls in their wild state exist in the forests of Siam, and the common fowl is reared in the lower countries.

The double-horned rhinoceros is more frequently met with in Siam than in any other country: it is hunted for its hide and horn, both of which are exported to China. A rhinoceros hide brings, weight for weight, nearly double the price of any other hide. It is said that a thousand rhinoceros horns are annually sent to China, where they are much valued for supposed medicinal virtues. The tiger is extremely common, though not equal in size to that of Bengal: his bones and skin constitute a considerable article of commerce with China; the bones are used by the Chinese as a medicine. The black tiger is by no means rare. The skins of leopards, which are also very common, go to China. The true civet (*viverra civetta*) is reared by the Siamese for its musk. The scaly skin of the pangolin (*manis pentadactyla*) is sent to China, where it also appears to be used for its supposed medicinal virtues. There is also the orang-utan. There are seven different kinds of deer, among which the common stag (*Cervus Elephas*), the muntjac, and the chevrotin (*Moschus pygmæus* and *Javanicus*) are most common.

Common ducks are reared in great numbers by the Chinese, but geese are almost unknown. The peacock is common in the forests, and the feathers are exported to China. There are several species of pheasants and pigeons, and also of wading birds. The feathers of the king-fisher, the blue jay, the pelican, and several birds of the crane and stork families, are sent to China. There are tortoises and crocodiles in the Menam, but they are not so common as in the Ganges. The green turtle (*Testudo Midas*) abounds on the islands along the eastern shores of the Gulf of Siam, and the eggs are sent to Bang-kok, where they are used for food. Lizards and serpents are numerous, but few of the latter are poisonous.

Fish is abundant, but of very inferior quality; several kinds however are dried and exported. Shrimps dried and prepared are an article of export under the name of *balachang*. The *coccus lacca* produces the dye or gum called lac in commerce. It is found in the forests of the northern provinces of Siam Proper, in Laos, and in the mountains of the Malay peninsula. The lac of Siam is of very superior quality, containing a larger portion of colouring-matter than that of Bengal and of the Birman empire. It is exported to China and the European settlements.

Several kinds of animals in Siam contain individuals of a white colour, which is never the case in other countries. Besides white elephants, which are kept in the stables of the king, and treated with a kind of veneration, Finlayson found white monkeys, white buffaloes, and white deer, and he observed even a white porpoise in the Gulf of Siam. He thinks that this anomaly in the colour of the animals is connected with the peculiarities of the climate.

Gold is found in the mountains of the Malay peninsula, and at the southern extremity of those of Siam, and is worked in some places; but the quantity produced is not sufficient for the consumption of the country, owing to the quantity used in gilding temples and images. This metal is accordingly imported from the Malay countries. Tin exists in many places in the mountains where gold is found, but especially in those of the Malay peninsula, where it is worked, and also on the island of Salanga. It constitutes a considerable article of export. Iron is very abundant in both ranges which form the boundary of the valley of the Menam, and is worked on a very extensive scale. Copper and lead are found in some places, and worked to some extent, especially the latter. Zinc is said to abound, but is not worked. Antimony is worked on a small scale. The only precious stones which are known to exist in Siam are the sapphire, the Oriental ruby, and the Oriental topaz, which are obtained by digging the alluvial soil at the bottom of the hills that surround the plain of Chan-ti-bon; but the sapphire and the ruby are inferior to those of Birma. Salt is made in the low wooded and uninhabited country which extends between the mouths of the Menam along the sea, as in the Sunderbunds of Bengal.

Inhabitants.—The population of Siam is composed of different nations, part of whom are aborigines, and part emigrants from other countries. The first class of inhabitants consists of Siamese, Laos, Cambodjans, and Malays, who have attained a certain, though different degree of civilization, and of Kariang, Lawa, Kha, Chong, and Samang, who occupy some mountain-regions, and seem to be backward in civilization. The immigrant nations are Chinese, Mohammedans, Hindus, Peguans, and Portuguese.

The Siamese, Laos, Cambodjans, and Malays seem to belong to the same race with the Birmans and inhabitants of Cochin-China. They are all members of the great Mongol family, and they are all shorter than the nations of the Caucasian race. The average height of the Siamese is five feet three inches. The skin is of a lighter colour than that of the Asiatics to the west of the Ganges, a colour which, in the high ranks, where a yellow cosmetic is generally used, approaches that of gold. The texture of the skin is remarkably smooth, soft, and shining. They have a strong tendency to obesity. The form of the head is most remarkable. The most characteristic features are the cheek bones, which are large and prominent, and give to the whole face the form of a lozenge, instead of the oval figure which constitutes beauty among the nations of Western Asia and Europe. The forehead, though less promonent towards the sides, is broad, and covered with the hairy scalp in greater proportion than in any other people. In some it descends to within an inch, or even less, of the eyebrows, covers the whole of the temples, and stretches forward ot within nearly the same distance of the outer angle of the eye. The diameter of the head from the front backwards is very short, and hence the general form is somewhat cylindrical; and, in a great number of instances, from the crown to the nape of the neck is nearly a straight line. The top of the head is often unusually flat. The hair is black, thick, coarse, and long. The face differs greatly from that of the European or Hindu, the features never being bold, prominent, or well defined. The nose is small, round at the point, but not flattened as in the negro; and the nostrils, instead of being parallel, diverge greatly. The mouth is wide, but not projecting; the lips are rather thick. The eyes are small, and the outer angles are more turned up than in the western races, though not so much as in the Chinese. The eye-brows are neither prominent nor well marked. The beard consists only of a few straggling hairs.

The Siamese call themselves Thay, but are called by the Malays, and some other neighbouring nations, Zëam, or Zam, from which word the term Siam is derived. They speak a peculiar language, of which however that which is spoken in Laos is only a dialect. It consists of monosyllabic words; but these are mixed with a considerable number of words taken from the Pali language, and others from the Chinese. The alphabet is mixed up with characters taken from the Pali and Devanagari. It is used in common life, and some poetry and novels, as well as historical compositions, are written in it. But the sacred literature is only written in the Pali language, which, together with the worship of Buddha, was introduced into Siam and the adjacent countries in the fourth century of our æra. The temples of Buddha are the only edifices which display any architectural character. [BANG-KOK, vol. iii., p. 372.]

The Siamese have made considerable progress in the cultivation of the soil, and they have very extensive orchards; but their houses and the dress of the common people indicate that in other respects they have not advanced far in the arts of civilization. The Chinese, who during the last century settled in large numbers in Siam, have introduced several branches of industry, but it does not appear that any of them have been adopted by the Siamese.

The inhabitants of Laos [LAOS] and those of Cambodja are about equal in civilization to the Siamese.

The two migratory tribes of the Kariang and Lowa occupy some mountain-tracts in that portion of Laos which is subject to Siam. The last-mentioned tribe has made some progress in civilization, as they work the lead-mines, which are abundant in their country. The Kha tribe inhabits the mountains of Cambodja between 15° and 17° N. lat., and the Chong occupy their southern extremity between 11° and 14° N. lat. The Samang tribe exists only in that part of Siam which is situated on the Malay peninsula south of the isthmus of Kraw It belongs to the race of the Austral negroes, or Papuas, who are found in the interior of almost all the larger islands of the Indian Archipelago east of the Andaman Islands.

Among the foreign colonists the Chinese are the most numerous, though Crawfurd says that, according to some statements, their number does not exceed 440,000; he adds, that it was stated by some to be as high as 750,000. More recent travellers have found that their number at Bang-kok alone exceeds 300,000, and it seems that they are dispersed all over the country, working the mines, manufacturing sugar, occupied in several trades, and many of them as merchants. Some few of them emigrate from Yunnan to Laos, but the larger number come from the provinces of Canton and Fukian. Those from the island of Hainan and the provinces of Chekiang and Kiangnan are less numerous. They soon assimilate with the Siamese, intermarry with them, and adopt the religion of Buddha as practised in Siam; but they invariably dress in the costume of their own country.

There are a few Hindus, and a greater number of Mohammedans, who have immigrated from the peninsula of Hindustan. They preserve their religion and dress. The Mohammedans have nine mosques at Bang-kok, but they are all very poor buildings.

A few Cochin-Chinese have also settled in the country; and a number of Peguans, expelled from their country by the Birmans, have taken refuge in Siam.

Population.—Crawfurd estimates the population, according to the nations inhabiting Siam as follows —

Siamese . . .	1,260,000
Laos	840,000
Peguans . . .	25,000
Cambodjans . . .	25,000
Malays	195,000
Chinese . . .	440,000
Natives of Hindustan . .	3,500
Portuguese . . .	2,000
	2,790,500

Recent travellers who have visited Siam think that the population is considerably underrated; and though they do not state in what particulars Crawfurd's statements are erroneous, they make the whole population amount to between 5,000,000 and 6,000,000. This assertion is supported by the travels of Leal, who went from Molmein to Bang-kok through the valley of the river Mekhlong, and found several towns there whose population he estimated at between 5000 and 13,000 each.

Divisions and Towns.—Siam is composed of countries which constitute the kingdom of Siam, and are immediately subject to the sovereign, and also of tributary countries, governed by their own princes, who are dependent on the king of Siam. The former consist of the kingdom of Siam, called by the natives Iudara Thay-nu, and of a portion of the kingdom of Cambodja, called by the Siamese Iudara Shan. The tributary princes inhabit the countries north and south of the kingdom. On the north are the countries of the princes of Laos; and on the south the princes who govern a portion of the eastern coast of the Malay peninsula.

1. Iudara Thay-nu, or Siam Proper, comprehends the countries along the eastern coast of the Gulf of Siam, as far inland as the mountains of Cambodja, and those in the basin of the river Menam as far north as 19° N. lat., together with the isthmus of Kraw, and the Malay peninsula as far south as 7° N. lat. According to the most recent information, the small Malay kingdom of Queda has been incorporated into Siam Proper, and at present constitutes a part of the province of Ligor. By this accession the southern boundary of Siam Proper has been extended to 5° N. lat., and it surrounds the British colony of Wellesley Province. [PENANG.] It comprehends all the coast-line of Siam, except that of the tributary Malay states which lie south of it, and all that has been stated respecting the climate and productions refers especially to this part of Siam. It is divided into eighteen provinces, which have been laid down in Berghaus's map according to the statements of the French traveller De la Loubère, who was there towards the end of the sixteenth century.

On the banks of the Menam river are Bang-kok, the new capital [BANG-KOK], and Ayuthia, the antient capital. The last-mentioned place was taken in 1767 by the Birmans, and from that time ceased to be the capital. Modern travellers have not been permitted to visit it, but Kämpfer, who was there in 1690, describes it as a large place, about nine miles in circumference, but adds, that a part of the enclosed space was laid out in extensive gardens, though other parts were closely occupied by houses and temples. Crawfurd was informed that in population it was equal to Bang-kok in 1818. It is built on an island formed by two arms of the river Menam, and is also called Duarawadi, and sometimes Iudara, or by the Europeans Siam. The country which extends from this town southward to Bang-kok and the mouth of the river is well cultivated and covered with villages, except near the sea, where the low shores, inundated by the high tides at full and change, are covered with trees, and only inhabited by persons who make salt.

Bang-pa-söe is near the mouth of the river Bang-pa-kung, which has a mud-bar with only twelve feet of water on it, but within the river it deepens to from two and a half to three fathoms. Around it is a large tract of low alluvial ground of great fertility and very productive in rice and sugar-cane. The town is a considerable place, and carries on an active commerce with Bang-kok. Farther up on the banks of the same river is the town of Patriyu, which contains a considerable population, and is fortified.

Chan-ti-bun is the capital of a province of the same name, which, according to some statements, contains a population of a million, and according to others only half that number. The town has 30,000 inhabitants, and exports the produce of the province, consisting of rice, pepper, gamboge, cardamums, and aquila-wood; the pepper amounts to 40,000 pekuls. It is built on a small hill, at the foot of a mountain, near the banks of a river, which at its mouth forms a harbour that affords anchorage in five or six fathoms water, but the river is only navigated up to the town by boats of from 300 to 1000 pekuls burden, which carry goods from this place to Bang-kok. The number of such vessels employed in this trade is stated to be between 300 and 400.

South of Chan-ti-bun is the town of Tung-hay, near the mouth of a small river which falls into a broad arm of the sea. It exports pepper, aquila-wood, and pepper; of the last, about 15,000 pekuls to Bang-kok.

Pi-sa-luk is a considerable town, which Crawfurd states to be on the banks of the Menam, but in Berghaus's map it is placed on one of its tributaries, near 18° 30′ N. lat.

Leal in passing from Martaban through the valley of the Mekhlong river found some commercial towns there. At the mouth of the river is the town of Mekhlong, with 13,000 inhabitants, which has a harbour for small vessels, and carries on a considerable trade. Rat-phri has 10,000, Pak-prek 8000, and Bant-chiom 5000 inhabitants, and these places have a considerable trade with the adjacent countries. Much sapan-wood is cut in the forests on the neighbouring mountains. At Lamtchang, which is a small place, but has some commerce, the river becomes navigable. South of Mekhlong, on the shores of the Gulf of Siam, is the town Pri-pri, which has a considerable population, and exports rice and palm-sugar. The harbour is only accessible to vessels of small burden. From Puchpuri, which lies a little more to the south, a road formerly led to Mergui, at the mouth of the river Tenasserim, by which some commerce was carried on between the Gulf of Bengal and that of Siam. But this road is no longer used, and we have no account of the town of Puchpuri.

On the isthmus of Kraw, along the coast of the Gulf of Siam, are the towns of Choomphon, Chai-ya, Bandon, Phum-phin, and Phosuga. Choomphon contains about 8000 inhabitants but has little trade. A road leads from this place to Pakchan in Tenasserim, but it is little used. Near 9° 40′ is an extensive flat, intersected by several branches of the sea or rivers, on which three small towns are situated, Chai-ya, Bandon, and Phum-phin, which have some trade in rice, and timber, which grows in the neighbourhood, and also in tin. The tin is brought from Salanga by means of a road which traverses the isthmus, passing through Pennon, and terminates on the Gulf of Bengal at Poonga, a town with 4000 inhabitants, situated at the northern extremity of the bay formed by the island of Salanga.

In the part of Proper Siam which lies south of the isthmus of Kraw, on the Malay peninsula, are several towns. Ligor has about 5000 inhabitants, and some trade with China, to which country cotton, black pepper, tin, and rattans are exported. The harbour can only be entered by small vessels. Talung lies farther to the south, on a river which falls into the channel between the mainland and the island of Tantalem. From this place a road crosses the peninsula, which leads to Trang, a small harbour and town on the Gulf of Bengal; it is not much used. Still farther south, and near the boundary of the Malay kingdom of Patani, is the town of Sungora or Sungkla, which is built partly on the continent and partly on the southern extremity of the island of Tantalem. The harbour is frequented yearly by two or three Chinese junks, which export tin, pepper, rice, and sapan-wood. A road leads from Sungora across the peninsula to Queda.

Samui, an island in the Gulf of Siam, is also called Carnam on our maps. It is near 10° N. lat., and several miles from the eastern coast of the isthmus of Kraw. It is not large, but fertile and a place of trade, being visited annually by some Chinese junks, which export cotton and birds' nests. The group of the Sichang Islands lies within the more narrow portion of the Gulf of Siam, not far from the eastern coast. They are eight in number, and the largest, properly called Sichang, is five miles in length, and about a mile and a quarter in its broadest part. Between this island and Koh-kam, the next in magnitude, is an excellent harbour, which may become the station of large vessels trading with Bang-kok, as such vessels cannot pass the mud-bank which lies before the mouth of the Menam.

II. That portion of the kingdom of Siam which formerly belonged to the kingdom of Cambodja lies on the west of the great river Maekhaun, and is called Bangtang. It has not been visited by Europeans. It is stated to consist of extensive level flats, which stretch from the river many miles westward to the mountains of Cambodja, but the population is said to be small.

III. and IV. The tributary states of Laos, and those on the Malay peninsula are noticed under LAOS and MALAY PENINSULA.

Manufactures.—The Siamese do not distinguish themselves in any of the useful arts, and are much behind the Hindus and Chinese. Even their vessels and trinkets of gold and silver are imported from China. But certain gold and silver vases are fabricated in the palace of the king, and presented to the chiefs as insignia of title and office. They are of handsome form and neat workmanship. The manufacturing of silk and cotton stuffs is wholly in the hands of women; the fabrics are of a very coarse and homely texture, and greatly inferior to those made in Java and Celebes. A common description of coarse pottery is made in the country, but all the ordinary and better descriptions are imported from China, and in large quantities. The Chinese, who settled in Siam during the last century, have introduced some branches of industry. Besides the fabrication of sugar, which they have greatly extended, and the working of the neglected mines of iron, they carry on the trades of blacksmith, tin-smith, and currier on a large scale. Considerable quantities of wrought-iron are produced by them; and at Bang-kok there are several extensive manufactures of cast-iron wholly conducted by Chinese. As the articles made in them are remarkably cheap, they find a ready sale among the Malay tribes on the peninsula, and in the Indian Archipelago. The manufacture of tin vessels is very considerable, and the utensils, being polished bright, and often of very handsome forms, give an air of extreme neatness to the shops in Bang-kok in which they are sold. The preparation of leather is carried on to a great extent, not for the purpose of making shoes, which are scarcely used, but for covering mattresses and pillows, and for exportation to China. After being tanned, the leather is dyed red with the bark of a species of mimosa. The hides are principally those of the deer, but also of black cattle and the buffalo. Tigers' and leopards' skins, &c. are preserved with the fur on, and exported to China. From six to eight junks of the largest description are annually built at Bang-kok.

Commerce.—Siam in a commercial point of view is considered the most important of the three empires which divide among them the countries between the Gulf of Bengal and China. As all the provinces of the empire produce some articles which are in demand in foreign countries, and nearly all the foreign commerce is at present concentrated in the town of Bang-kok, the inland and coasting trade is very considerable. The most important branch of inland commerce is that with the northern provinces of Siam Proper and with Laos, and the number of boats which come down the Menam must be very great, as in November and December the river at Bang-kok is crowded with them. The goods brought down consist of grain, cotton, sapan-wood, oil, timber, stick-lac, benzoin, some raw silk, ivory, and bees'-wax, with horns and hides; and the returns are salt, salt fish, and Chinese, Indian, and European manufactures, and also those of Bang-kok. The produce of the province of Bangtang, and also of Lanjang or Southern Laos, reaches Bang-kok by the river Bang-pa-kung, which in the rainy season has a depth of from 11 to 12 feet in the greatest part of its course, and in the dry season from three to four, and is therefore navigable during the former for boats of considerable burthen, and at all times for small boats. By this route are brought down gamboge, cardamums, stick-lac, varnish, raw hides, horns, and ivory. From the countries west of Bang-kok, especially those on the banks of the rivers Mekhlong and Tachin, great quantities of sugar, cotton, and sapan-wood are brought to Bang-kok. Goods are in general directly exported to China from the other ports; this does not appear to be the case with those of the rich province of Chan-ti-bun, probably on account of the shallowness of the ports, and hence, as already stated, from 300 to 400 small vessels are employed in the coasting trade between that province and the capital.

The most important branch of the foreign trade of Siam is that with China. It is partly carried on by Chinese vessels, but mostly in vessels built in Siam and navigated by Chinese. The ports of China which trade with Siam are Canton, Kiang-mui, and Chang-lim in the province of Quantong or Kuantong, Amoy in Fokien, Ningpo in Chekiang, and Shanghae and Soocheu in Kiangnan, besides several ports of the great island of Hainan. They arrive at Bang-kok with the north-east monsoon, from January to the beginning of April, and sail from the Menam in June and July, when the south-west monsoon is strongest. The following is a list of the principal commodities imported from China: coarse earthenware and porcelain, spelter, quicksilver, tea, vermicelli, dried fruits, raw silk, crapes, satins and other silk fabrics, nankeens, shoes, fans, umbrellas, writing-paper, sacrificial paper, incense rods, and many minor articles. A considerable number of passengers come annually to settle in Siam. The following commodities are exported to China: black pepper, sugar, tin, cardamums, aquila-wood, sapan-wood, red mangrove bark, rosewood for furniture and cabinet-work, cotton, ivory, stick-lac, rice, areca nuts, salt fish, the hides and skins of oxen, buffaloes, elephants, rhinoceroses, deer, tigers, leopards, civet-cats, the pangolin; the belly-shell of a species of land tortoise; the horns of the ox, deer, buffalo, and rhinoceros; the bones of the ox, buffalo, elephant, rhinoceros, and tiger; dried deers' sinews, and the feathers of the pelican, of several species of stork and crane, of the peacock and kingfisher, and also edible birds'-nests. Crawfurd, from whom these notices of the commerce are taken, has formed an estimate of the number and tonnage of the vessels employed in it, which shows that at that time (1818) the trade had attained great importance. Canton is visited by three large junks of from 10,000 to 15,000 pekuls and fifty of from 2000 to 5000 pekuls, Chang-lim by two of 7000 pekuls, Amoy by two of 6000 pekuls, Ningpo by eight of from 6000 to 8000 pekuls, Soocheu by one of 5000 pekuls, and the great commercial town of Shang-hae is visited annually by fifteen of from 5000 to 8000 pekuls. These vessels are built in Siam, and their tonnage may be assumed at 393,000 pekuls, or 24,562 tons. Chinese vessels come from Kiang-mui, about five in number, having a tonnage of from 3000 to 5000 pekuls; from Chang-lim one of 3000 pekuls; and from Amoy two of 3000 pekuls each. Canton, Ningpo, and Shang-hae have no trade with Siam under the Chinese flag; but all the junks that carry on the trade with the island of Hainan belong to China. They are small vessels from 2000 to 3500 pekuls, and seldom less than fifty come yearly. These Chinese vessels probably employ 168,500 pekuls, or 10,531 tons, of shipping, and the whole trade not less than 561,500 pekuls, or 35,093 tons. Though this estimate may appear an exaggeration to persons not acquainted with the great natural wealth of Siam, it seems that Crawfurd has not taken into acceount the junks that visit the smaller harbours of Tung-hay, Mekhlong, Phri-phri, Chai-ya, Phun-phin, Ligor, and Sangora. He observes that the crews of all these vessels are entirely composed of Chinese, except those which go to Canton; and he concludes that the Siamese, like the Europeans, are excluded from all other parts of China. Besides the trade with China, which is carried on by sea, there is an overland trade between Laos and the province of Yun-nan, but as the roads traverse high mountain-ranges, the commerce is not very active. The imports consist of coarse Chinese woollens, some English broad-cloths, pins, needles, and other descriptions of hardware, with some gold, copper, and lead. The returns are principally ivory, stick-lac, rhinoceros horns, and some minor articles.

It does not appear that any commercial intercourse exists between Siam and the Birman empire. It is probably prevented by the petty warfare which is continually going on in the thinly inhabited districts along the banks of the Saluen river, and which has for its object the making of prisoners, who are sold as slaves. Such a warfare does not seem to exist on the boundary-line between Siam and Cochin-China; and it is probable that a portion of the produce of Southern Laos, or Lanjang, and of the province of Bantabang, finds its way hither to Saigan or to Kang-kao. With Cochin-China the Siamese have also a considerable commerce by sea. From 60 to 80 junks annually visit the ports of that part of Cambodja which is subject to Cochin-China, especially Pongsom, Kang-kao, Tec-sia, and Kamao, and that of the great commercial town of Saigun, and a small number go to Fai-fo and Hue, in Cochin-China Proper. The exports of Siam consist of unwrought iron, iron pans, tobacco, opium, and some Chinese, Indian, and European manufactures. The returns are wrought and unwrought silks, mats for bags and sails, gamboge, cardamums, ivory, hides and horns, with dried deer's flesh and salt fish, chiefly for the Chinese market. Within the last few years a commercial intercourse has been established between Molmein in Tenasserim and the northern districts of Siam The British colony is supplied with live stock, and the trade seems gradually extending to many other articles.

The most important trade, next to that with China, is with the European establishments on the Malay peninsula, and the Sunda Islands, especially with the British colonies of Singapore, Malacca, and Pulo Penang, and with the Dutch establishments of Batavia, Cheribon, and Samarang in Java, Pontianac in Borneo, and Rhio in Bintang. The staple exports of Siam to these colonies are sugar, salt, oil, and rice, to which may be added the minor articles of stick-lac, iron pans, coarse earthenware, and hog's lard. The returns are British and Indian piece-goods, some British woollens, opium, glass, with the produce of the adjacent countries which are suited for the Chinese market, such as pepper, tin, dragon's blood, rattans, tripang, birds' nests, and camphor. In 1824 the number of Siamese junks which entered the ports in the Straits of Malacca, and all of which finally cleared from Singapore, amounted to 44, and ten years ago to between 60 and 70. If those which do not touch at Singapore are added, the number probably exceeds 200. Their ordinary tonnage is from 1000 to 3000 pekuls, though there may be a few as large as 6000 or 7000. Taking the average of each junk at 2250 pekuls, the whole trade amounts to 450,000 pekuls, or 28,125 tons. The crews of these vessels are almost exclusively Chinese, but the vessels are built at Bang-kok.

Crawfurd is of opinion that the trade of Bang-kok far exceeds that of any other Asiatic port in which Europeans have not settled, with the exception of Canton. But the trade of Shang-hae is certainly much more extensive than that of either Canton or Bang-kok. [SHANG-HAE.]

Formerly the commodities of Hindustan and Europe reached the capital of Siam by being transported across the isthmus of Kraw and the Malay peninsula, by the roads which connect Poonga with Chai-ya, Phun-phin, and Bandon, Trang with Ligor, and Queda with Sungora. The goods were carried overland by elephants, the only animal of burden used in these parts, and the journey took from five to seven days. The goods were shipped on the shores of the Gulf of Siam for the capital. By these roads the tin, ivory, and birds' nests of Salang are still brought to Siam; but not the manufactures of Europe and Hindustan, as Singapore is a better emporium for procuring the goods, and the conveyance by this route is less expensive.

History.—The early history of Siam is entirely unknown. In 1511 the Portuguese, after the conquest of Malacca by Albuquerque, established an intercourse with Siam. In the sixteenth century, Siam was for many years subject to the Birmans, but recovered its independence towards the close of that century. In 1612 the first English vessel went to Ayuthia. Towards the end of the seventeenth century, a European adventurer, a native of the island of Cephalonia, called Phaulcon, was raised to the rank of *phraklang*, or foreign minister of Siam. Previously to his arrival in Siam, he had served as a common sailor, mostly in English vessels. By his talents he gained the esteem of the king, and was by degrees promoted to one of the most important offices of government. He persuaded the king to encourage the civilisation of his subjects by inviting European settlers, and for that purpose to send an embassy to Louis XIV. of France. This embassy appeared in Europe in 1684, and the king of France sent two embassies to Siam in 1685 and 1687, and also a corps of 500 French soldiers. Phaulcon put the French in possession of the fortress of Bang-kok, which, though then a small place, had the command of the shipping in the river. It appears that relying on these European troops and his influence, Phaulcon intended to bring about a revolution, and to put a person on the throne who, though related to the king, had no claims to the crown But the conspiracy was discovered, and in 1690 a revolution took place, through which the reigning family lost the throne, the minister Phaulcon his life, and the French were expelled from the country. In the early part of the eighteenth century a civil war desolated the country, and in this state of things the Birman sovereign Alompra meditated the conquest of Siam. He was prevented from the execution of this design by his death (1760), but one of his successors prosecuted his plan, and after laying waste the country, the Birmans took the then capital, Ayuthia. The king of Siam had been killed in the assault, and his family was carried away to Ava as prisoners. Soon afterwards the Birman army left the country, and a chief of Chinese descent seized upon the throne and proclaimed himself king. His name was Phia-tak. He put down the insurrections in the kingdom, established his residence at Bang-kok, and successfully resisted the attacks of the Birmans. But in 1782 he was deprived of his throne and life by an insurrection which placed the reigning family on the throne. Some further attempts of the Birmans to conquer at least a part of Siam entirely failed, and a truce was at last concluded between both parties in 1793. Since that time no remarkable event has taken place in the history of Siam.

Government.—The government of Siam is despotic, not even limited by antient customs, by the established tenets of religion, or by the authority of hereditary chiefs. In Siam Proper there are no persons who by birth have any privileges, though in Laos and on the Malay peninsula there exist hereditary princes. To conceive an idea of the awe in which the king is held by the people, it need only be mentioned that his subjects cannot venture even to utter his name. It is certainly never mentioned in writing, and is said to be known only by a very few among his principal courtiers. Crawfurd thinks it doubtful whether the king of Siam has in reality any other name than the formidable epithets under which he is usually mentioned, as 'the Sacred Head of Heads,' 'the Sacred Head of Lives,' 'the Owner of All,' &c. His health must not be inquired after, because, however ill he may be, it must be taken for granted that he is free from bodily infirmities. No heir to the throne is appointed during the life-time of the king; for to imagine his death is considered high treason. Consequently, at the demise of a king the throne is generally disputed by any persons who think themselves entitled to it, and on such an occasion civil wars can rarely be avoided.

(Kämpfer's *History of Japan, together with a Description of the Kingdom of Siam;* Crawfurd's *Journal of an Embassy to the Courts of Siam and Cochin-China;* Finayson's *Mission to Siam and Hué*, by Raffles; Moor's *Notices on the Indian Archipelago;* Leal, in Berghaus's *Memoir zur Karte von Hinterindien;* and Ritter's *Erdkunde von Asien*, vol. iii.)

SI'AMANG. [APE, ii., 148; HYLOBATES, xii., 408.]

SIASI. [SULO ARCHIPELAGO.]

SIBERIA is the name of that part of the Russian empire which is in Asia, and extends from the Ural Mountains, which divide Europe from Asia, eastward to the seas of Okhotzk and Kamtchatka, both of which are parts of the Pacific Ocean. It lies between 45° 30′ and 77° 40′ N. lat. its most northern point is North-East Cape, or Siwero Vostochinii Noss, between the embouchures of the rivers Yenessei and Lena, which reaches to about 77° 40′, and approaches nearer to the pole than Smith's Sound in Baffin's Bay, the most northern point of America visited by Europeans. The most southern point of Siberia is near 79° E. long., north of the lake of Balkatch, where it extends to 45° 30′ N. lat. From west to east Siberia extends from 60° to 190° E. long. The most eastern point is East Cape, or Vostochinii Noss, which is only about 48 miles from Cape Prince of Wales in America, from which it is separated by the narrowest part of Behring's Strait. The greatest length from east to west exceeds 3600 miles, and the greatest width from north to south is hardly less than 1950. The surface is estimated at 5,400,000 square miles, according to some authors; whilst others assign to it only 3,600,000 square miles.

Boundaries.—This great difference in the estimates arises from the circumstance that a very large tract of country, the steppe of the Khirghis Cossacks, which is considered to belong to the Russian empire, is not included in any of its political divisions, and that the boundary-line between Siberia and the Chinese empire in some places has not been exactly fixed. As Siberia is surrounded on the east by the Pacific, on the north is washed by the Polar Sea, and has on the west a mountain-range, the boundary line is well determined in these parts. But on the south it borders on the Chinese empire and on the steppe of the Khirghis Cossacks. While the Mandshoos were occupied in conquering China, the Russians had pushed their conquests to the frontiers of their country, and established themselves on the north-western tributaries of the Amur river, which the Mandshoos considered as an encroachment on their territories. This led to some aggressions on the part of the Mandshoos; and at one time it seemed likely that the two greatest sovereigns of their time, the emperor Kang-hi and Peter tne Great, would come to blows. But the matter was compromised by the treaty of Nertshinsk (1689), by which the boundary between the Chinese and Russian empires was fixed, and this boundary was confirmed in 1727. According to this treaty the boundary begins on the Pacific east of Tugura or Tugursk Bay, an inlet of the Sea of Okhotzk, between 138° and 139° E. long., and runs southward to the range of mountains called Tugursk, which terminate on the east opposite the most northern part of the island of Saghalien or Tarakaï. This range forms the frontier until it reaches the great chain of the Yablonoi Khrebet, or Khingkhau, of which it is only an offset. The highest part of the last-mentioned range constitutes the boundary-line between the two empires between 132° and 120° E. long. West of 120° E. long. the small river Gorbiza descends from the mountains southward and falls into the Shilka, one of the principal branches of the Amur. [AMUR.] The Gorbiza forms the boundary up to its mouth, and then the Shilka to its confluence with the Argun. The frontier then follows the course of the Argun upwards to its confluence with the Kailar, whence it runs westward in an irregular line, crossing the lake of Khara and the river Onon, one of the branches of the Shilka, until it again joins the Yablonoi Khrebet at the snow-covered summit of Mount Tchokondo. Between the river Gorbiza and Mount Tchokondo a part of Siberia lies to the south of the mountain-range which extends along the northern side of the great table-land of Eastern Asia, and the watercourses of this country run to the Amur. From Mount Tchokondo (between 110° and 111° E. long.) the boundary does not follow the watershed, but runs westward across the basin of the river Selenga, until on the west of that basin it reaches the western extremity of the extensive mountain-range which bears the name of Erghik Targak Taïga [ALTAI MOUNTAINS, vol. i., p. 398], and extends to the banks of the Yenesei (between 93° and 92° E. long.). This wild and nearly uninhabited mountain-range constitutes the boundary between the two empires east of the Yenesei; and west of the river it is formed by the mountains of Sayansk, and more especially that branch of them which extends along the eastern shores of the mountain-lake of Teletskoi, or Altyn (89° E. long.). Thus far the boundary between the two empires was fixed by the treaty of Nertshinsk, and in those parts where it is not formed by nearly inaccessible mountains, pillars have been erected to indicate it. The number of these pillars is eighty-seven, and the most western occurs to the east of Lake Teletskoi, at the mountain-pass called Shabina Dabahn. Farther west the boundary between the two empires was not fixed by the treaty. The country south of the Atlai Mountains, though at present subject to China, was at that time the independent kingdom of Songaria. [SONGARIA.] The Russian maps carry the boundary as far south as 49° 30′ south of the lake of Teletskoi, but the whole of the country in that part south of 52° N. lat. is inhabited by tribes who pay tribute both to the emperors of China and of Russia. Thus the boundary between 89° and 86° is not determined. Farther west it has not been fixed by treaty, but is formed by the rivers Buchtarma and Narym, both affluents of the Irtish. At the mouth of the Narym the boundary between the two empires terminates.

Between the river Irtish and the Ural Mountains the boundary-line runs through the Caspian desert, and more particularly across the steppe of the Middle Orda of the Khirghis Cossacks. It is properly formed by the course of the river Irtish as far north as the town of Omsk. At this place the Ishim line of fortifications begins, which extends westward across the steppe to Petropawlovsk on the river Ishim, and to Zwerinogolovsk on the Tobol. It then follows the course of the Tobol to its confluence with the Ooï, and afterwards this tributary of the Tobol to Troitzk and the base of the Ural Mountains. This line of fortifications was erected in the last century to protect the country north of it against the predatory incursions of the Khirghis Cossacks: but since that time the Russian government has acquired some authority over the chiefs of the Middle Orda of the Khirghis Cossacks, and hence the southern boundary of Siberia on the Russian maps extends much farther to the south. From the mouth of the river Narym this line run southward at some distance from the western extremity of Lake Zaizang to Lake Alakul, the greatest part of which lies within the boundary. From this lake it extends westward to Lake Balkatch, which it traverses; and it then turns north, until it meets the mountainous tract which in these parts runs through the steppe east-south-east and west-north-west, and whose most elevated part is known under the name of Oolutau. It follows generally the watershed of this tract to its termination near 68° E. long., and from that point it extends north-north-west to the Ishim line of fortifications, which it joins near to the town of Zverinogolovsk. It then runs along the line to the base of the Ural Mountains.

Surface.—This immense country, which exceeds Europe in extent by about 1,500,000 square miles, offers less variety of surface than perhaps any other portion of the globe of equal extent. The western half of it, or that which lies west of the meridian of the North-East Cape (105° E. long.), is one uninterrupted plain, whose surface is in many parts a dead level, in others undulating; but there are hardly any elevations high enough to be called hills, except towards the southern extremity, where the Altai Mountains, and the chains called the Mountains of Sayunsk, and their offsets, rise in many parts above the snow-line. The eastern half, or that which lies east of 105° E. long., contains numerous mountain-ranges and hills, which occupy a great extent of country, between which some plains are enclosed. The mountains in some places rise above the snow-line. The plains are at different elevations above the sea; the southern being perhaps 2000 feet above the sea-level, whilst the most northern are so low that a part of them is inundated during hard gales. To give a more precise notion of the surface, soil, and productions of this country, we shall divide it into three regions, which we shall name Western, Central, and Eastern Siberia. The two first comprehend the country west of 105° E. long., and the last the country east of that meridian.

Western Siberia lies between the Ural Mountains (60° E. long.) and 85° E. long., and the surface consists of one extensive plain, with the exception of the most south-eastern angle, where that portion of the Altai-Mountains occurs which is called the Ore Mountains of the Altai, because a great quantity of silver and copper is annually obtained from the mines of this district. According to its productive powers it may be divided into five regions, the steppe, the agricultural district, the mining district, the wooded region, and the northern plain or tundra.

The *Steppe* comprehends the southern part of the plain as far north as 55° N. lat., and extends from the base of the Ural Mountains to the banks of the river Irtish. Along its south-eastern border lies a wide hilly tract, which on the east occupies the whole country between the course of the Irtish from the Chinese frontier to Semipalatinsk and the lake of Balkatch, and hence extends in a west-north-west direction as far west as 68° E. long., surrounding the lake of Koorgaldshin, and approaching the southern banks of the river Ishim, where it flows from east to west. This mountain tract is 300 miles in width, but only the northern portion of it is included in the boundary of Russia. It is not traversed by any continuous range of high mountains, but is interspersed by numerous short ridges, which generally run south and north or south-east and north-west. Some of these ridges attain a considerable elevation, as, for instance, the Manatir Tau, west of Oost Kaminogorsk, and the Semitau, south of Semipalatinsk. The latter is about 2000 feet above the sea, and about 1200 feet above its base. The most elevated ridge seems to be the Oolutau, which between 75° and 68° W. constitutes the watershed of the rivers, and lies on the boundary-line of Siberia. In the wide tracts of undulating ground which separate the isolated chains, the soil generally consists of bare rocks without vegetation, and is partly covered with salt incrustations. The rivers have water in the cold season; in the hot season it is only found in a few places. The numerous small lakes have always a bitter or brackish water, and cannot be drunk. The vegetation consists only of artemisiæ, salsolæ, and salicorniæ. Along the watercourses there are a few poplars, but otherwise the country is destitute of trees and shrubs. The more elevated tracts are covered with grass during the greater part of the year. The animals are wild hogs, argalis, saiga-antelopes, and the dipus jaculans; the birds are the turdus roseus, sturnus roseus, eagles, falcons, and snipes. But farther south, towards the higher ridge of the Oolutau, the country improves. Wells are more frequent at the foot of the hills, and though the grass grows only in tufts surrounded by a bare red clay, it is tolerably abundant, and affords good pasture for the herds of the Khirghis Cossacks. There are a few tracts fit for agriculture. In one of these tracts, which is more extensive than the rest, the Russians established a colony of agriculturists in 1823. It is called Karkaraly. The mountains are partly covered with pine-trees, and in several places copper-ore abounds. This hilly tract contains the sources of the Ishim, and of the Noora, which rises near Karkaraly, and running in a general north-east direction falls into the lake of Koorgaldshin, which has no outlet; but it is stated that in spring it discharges its waters by a channel into the river Ishim.

This hilly tract is separated from the Ural Mountains by a very level plain, which in these parts is only 300 miles wide, but farther north increases to double that width between 52° and 55°, where it occupies the whole country between the Ural Mountains and the Irtish river. This plain contains an immense number of small lakes, the water of which is brackish. The number of these lakes and the saltness of the water have led to the opinion that they are the remains of an arm of the sea, which at some remote period united the Lake of Aral and the Polar Sea in the direction of these lakes and the lower course of the Oby. The tracts which divide these lakes from one another, and rise a few feet above their level, have a soil consisting of sand or of yellow clay, or of both together, and they support only a scanty vegetation. Many parts are covered with a salt efflorescence as white as snow, and produce several kinds of salicorniæ. The river Ishim runs slowly through a bottom never exceeding a mile in width; and on this narrow tract there are bushes and good pasture. The most fertile tracts lie round the lakes. They are overgrown by rushes and canes of high growth, which serve as firewood; and where it has been cleared away, wheat is sown by the Khirghis Cossacks, and gives good crops. The saiga-antelope and the dipus jaculans, and also wild hogs, are common. A great number of swans and wild geese in their migrations from the northern regions to the Caspian Sea and the Lake of Aral visit the larger of the lakes, and are killed by the Khirghis Cossacks.

As this steppe, which is known by the name of Ishim, is very rarely visited even by the Russians, and then only in caravans, we have no meteorological observations. We know in general only that the summer is very hot, and the winter exceedingly cold; and that the quantity of rain is small, and usually falls at the approach of winter. In this season snow is frequent; but it is not heavy, and therefore the rivers are not well filled even in spring when it melts. In summer the rivers are dry, with the exception of the Ishim, which has always a moderate quantity of water, derived from the most mountainous part of the hilly tract of the steppe, in which it rises, and from which it receives its supplies.

The *Agricultural District* extends north of the steppe, between the Ishim line of fortifications on the south and 60° N. lat. Between the rivers Irtish and Oby it advances as far south as 61° N. lat. As this tract is much more than twice as large as the British Islands, comprehending an area of about 280,000 square miles, it would maintain an immense population if the soil were fertile; but, so far as it is known, the soil is of inferior quality. But two hundred years have not yet elapsed since agriculture was introduced into this country; and owing to different reasons, both natural and political, its progress has been very slow. This region presents a great diversity of soil and productions. That part of the country which is contiguous to the Ural Mountains, and extends to the western banks of the river Tobol from the Ishim line of fortifications, or from the river Ooï to the road which leads over the mountains through Ekaterineburg and Toomen to Tobolsk, partakes strongly of the nature of the steppe, and is called the Steppe of Isset, from a river, a tributary of the Tobol, which traverses it from south-west to north-east. The higher country, extending between the watercourses, is nearly a flat, and interspersed with numerous lakes. The surface is covered only with bushes and a scanty grass which grows in tufts; but the declivities of the mountains are overgrown with forests, consisting of several kinds of firs, lime-trees, ash, and alder, and numerous rivers descend from their summits. As these rivers are abundantly supplied with water in spring, they have excavated wide bottoms, which are covered with alluvial soil, and are comparatively fertile. Accordingly agriculture and the rearing of cattle are carried on to some extent. The great number of wild geese and swans which twice annually visit the lakes are an important object to the inhabitants of this region.

North of the great road leading from the Ural Mountains to Tobolsk, the whole country, in its natural state, is covered with trees, consisting of different kinds of firs, birch, and willow. These forests, which still cover a large part of the surface, are valuable on account of the numerous mines of iron and copper which are here found on the lower declivities of the Ural Mountains. The places which have been cleared and appropriated to agricultural purposes are in the neighbourhood of the mining establishments, and more extensively along the banks of the Tobol and a few of its affluents.

That part of the agricultural district which lies between the lower course of the Tobol and Irtish is of a similar description. The southern districts, or those which are contiguous to the Ishim line of fortifications, resemble, in some degree, the Steppe of Ishim, except that the number of lakes is still greater, and that of the watercourses much smaller. The soil is drier, and less favourable to vegetation. The cultivable tracts are only those which are in the immediate vicinity of the lakes, and in the narrow bottoms of the Ishim river. Trees occur only in patches. The northern districts are hilly, especially between the Tobol and Ishim; and their soil is not inferior to that on the west of the Tobol. The cleared spots are tolerably numerous, and the crops are sometimes plentiful; but here also a large part of the country is still covered with forests of pine, fir, poplar, and birch. Between the Ishim and Irtish the country is nearly a flat, but somewhat elevated above the watercourses. It approaches to the character of the steppe, as is shown by the numerous lakes and the scarcity of wood. The trees are of less vigorous growth than farther west, and the cultivated spots are few.

These two tracts of the agricultural district are the best cultivated, and probably also the most fertile region of Western Siberia. Agriculture ceases at the base of the Ural Mountains, at Verkhotorie, between 58° and 59° N. lat., and on the banks of the Irtish, at Denshikova, near 60° N. lat. At the first place barley and oats, and at the last mentioned rye and barley, are grown. These grains are also the principal objects of cultivation in the whole country. Wheat is grown only in a few places, especially on the bottom of the Irtish river. Buckwheat and millet are also grown. Flax, hemp, and tobacco are much attended to, as well as peas and beans. The most common vegetables are potatoes, carrots, turnips, cabbage, onions, radishes, mustard, cucumbers, and pumpkins.. In some places water-melons are grown. No fruit-trees succeed. Horses, cattle, sheep, and hogs are numerous: goats are few. The wild animals are bears, wolves, foxes, martens, polecats, lynxes, squirrels, and hares; the saiga-antelope in the steppes; and elks and reindeer along the northern border, where however they are only seen in the spring.

The eastern part of the agricultural district, or that which lies between the Irtish and the Oby, is called the Steppe of Barabinza. It extends over more than one-half of the region, and is only well known where it is traversed by the road that leads from Tobolsk to Tomsk, and to the mining district. The denomination of steppe seems to be applicable only to the southern part of this region, and even here it differs in some degree from the Steppe of Ishim, which is separated from it by the Irtish. The soil, far from being dry and arid, is partly covered with swamps and lakes, several of which are of great extent, as those of Oobinskoi, Chany, and Chebakly: the more elevated tracts are traversed by many small rivers, which contain water all the year round. In most parts the surface is a dead level, and without vegetation; but in isolated spots it is covered with grass, and contains poplar and birch. The more elevated spots are frequently covered with a salt efflorescence, and the water of some of the lakes is brackish, especially those south of 54° N. lat. This tract is not much inhabited, partly owing to the barrenness of the soil, and partly because it is the seat of the Siberian plague, which every summer swept away a large proportion of the inhabitants, until lately, when an easy remedy was discovered. The northern district of the Steppe of Barabinza differs greatly from the southern, being covered with nearly continuous forests of firs and birch, on a very swampy soil. It contains no lakes, but some morasses are of great extent. No agriculture is carried on, but wild animals are numerous, among which the beaver is considered the most valuable by the nomadic tribes that inhabit these forests and live chiefly on the produce of the chase.

The south-eastern angle of the Steppe of Barabinza contains a very remarkable depression, which begins about 26 miles due north of the town of Semipalatinsk, on the Irtish (50° 25′ N. lat.), and extends in a north-north-east direction to the town of Bernaul, on the Oby (53° 20′), a distance of more than 200 miles. The width varies between 20 and 3 miles. The surface of this depression is very swampy, and at the base of the higher country on both sides there is a nearly continuous series of long narrow lakes united by channels that carry the surplus waters to the Oby. The whole tract is covered with fine fir-trees, which are very valuable for the mining operations carried on at Bernaul and in the Altai Mountains. These immense forests are separated from the mountains by an elevated and treeless steppe, which on the south is about 40 miles wide, but towards the north is double that extent. This steppe has a dry soil and no lakes. It is little adapted to cultivation; but the vicinity of the mining district, and the certainty of finding there a ready sale and a good price for their grain, have induced the Russian settlers to cultivate a part of it; and the remainder supplies good pasture for their horses and cattle.

The winters of the agricultural district are much colder than in Russia west of the Ural. This greater degree of cold is probably due to the extensive steppe which lies south of it, and in which the winter is much more severe than in those parts of Europe which are 20 degrees farther north. At Tobolsk the thermometer every winter sinks to −25°, and sometimes to −30°, and it generally does not rise above −20° for four or six weeks together. The summer heat is very great. In July and August the thermometer usually rises to 85°, and even 90° after mid-day; but the nights are rather cold in comparison with other countries in which the daily temperature is as high. Neither rain nor snow appears to be abundant in the plain; but along the base of the Ural Mountains rain is very frequent in the hottest part of the year. According to an average from the observations of ten years, the number of rainy days at Ekaterineburg in the month of July is 16·4.

The *Mining District* extends over the south-eastern part of Western Siberia, and comprehends the most western portion of the Altai Mountains. Under that head [vol. i., pp. 395-397] we have given a sufficiently long account of the character of these mountains, and the means of subsistence that the inhabitants derive from the numerous mines of gold, silver, and copper; from their extensive fisheries in the Irtish river; from the excellent pasture-ground for horses and cattle on the declivities of the mountains; and from agriculture, which is prosecuted on a limited scale in the wide valleys by which the mountain-mass is furrowed.

The *Wooded Region* lies north of 60°, but, properly speaking, the northern portion of the Steppe of Barabinza, as far south as 57°, ought to be included in it, as the general features are similar. It cannot be determined where this region terminates on the north; for in the extensive bottoms of the river Oby, which are about 200 feet below the general surface of the plain to the east of it, trees occur as far north as 66° N. lat. in the vicinity of Obdursk, and the whole country west of the Oby as far north seems to be in no part destitute of forests, which mostly consist of birch, but north of 64° they do not exhibit that vigorous growth by which trees are characterised all over Siberia. On the plain east of the river Oby the woods do not extend beyond 65° N. lat. The surface of this plain is interspersed with numerous gentle elevations. The whole region is covered with pine and fir species, and the birch is also common. No part of it is adapted to agriculture. Erman however mentions some attempts which have been made at Berezow (near 64° N. lat.) to cultivate rye and barley, which have succeeded, and this therefore may be considered the most northern point at which grain is cultivated in Asia. Several vegetables are grown at Berezow. Turnips attain a great size. The scanty population of this region are either settled along the banks of the river, where they gain their subsistence by fishing, or wander about in the forests in quest of the wild animals. Fish is very abundant in the Oby. At the beginning of spring, when the ice of the river has broken up, they ascend from the Polar Sea in immense shoals as far as the confluence of the Tom with the Oby (56° 30′ N. lat). The most common fish are sturgeon, salmon, and herrings. The river fish are chiefly pike and perch. All the fur-bearing animals mentioned in the agricultural district are very numerous here, and there are also polar foxes, gluttons, sables, and ermines. Beavers are common along the Oby, and otters abound in that river. The reindeer and elk are abundant in the woods. The climate in winter is severe, but the heat in summer is very considerable. Erman incidentally mentions, that the mean annual temperature of the summer at Berezow (64° N. lat.) is 59·92°, or hardly three degrees lower than that of London. The mean temperature of June is 57·20°, that of July 56·12°, and that of August 60·44°. It has been proved that barley may be grown in any country whose mean summer temperature is not below 45°, and accordingly we may conclude that the cultivation of that grain will spread to the north as far as this point.

The most northern part of Western Siberia is a low plain, called the Tundra. The surface is nearly a dead level, and quite destitute of trees. Only a few shrubs occur, whose roots do not penetrate the ground, and even these are of stunted growth. Even in summer ice is found only a few inches under the surface. The soil is covered with moss, except in a few places where it is without vegetation. There is a great number of small lakes, generally well stocked with fish. But the wandering tribes which inhabit this country derive their subsistence partly from their large herds of tame and of wild reindeer, and from the sea animals with which the sea abounds along their coasts, especially the morse and seal. The sea is not deep enough to allow whales to approach the coast, but sometimes dead whales are cast on the shore. The fur-bearing animals are white bears and polar foxes. Within this region, to the north of Obdursk (66° N. lat.), on the west of the river Oby, stands an isolated mountain-mass, called the Mountains of Obdursk. It is not connected with the Ural range, which lies farther west, and both extremities sink down with a steep descent to the level country. The upper part of this range is divided into five summits, of which the most elevated attains a height of 4992 feet above the sea-level. This mountain-range is without vegetation.

Central Siberia lies between 85° and 105° E. long., and comprehends the greater part of the Altai Mountains, the hilly country east of the Oby river, as far north as its affluent the Ket, the vale of the Upper Yenesei, the plain of the Lower Angara river, the wooded plain, and the Tundra; in all six regions.

The *Altai Mountains* may be considered as terminating on the north-west at a line drawn from Semipalatinsk in a north-eastern direction to Biïsk, situated at the confluence of the Katunga and Biya, by the union of which the Oby is formed, and hence to Koosnesk on the Tom, a tributary of the Oby, and to Atshink on the Choolym, another tributary of the Tom. To the north-east of the last-mentioned place the mountains subside into the plain. All the country south-east of the above line is covered with high mountains, but only that part of this mountain system which lies west of 85° E. long., and which bears the name of the Ore Mountains of the Altai, is tolerably well known. East of 85° E. long., only a few of the larger valleys situated as far east as 87° E. long. have been visited, but of the immense mountain-masses which lie between 87° and 90° E. long. we have no account at all. The wide valleys traversed by the tributaries of the Katunga are nearly covered in their natural state with forests of fine larches, pines, and birch-trees. A few agricultural establishments have been made here, and it is stated that they produce rich crops of wheat and rye, except towards the sources of the larger rivers, where the valleys are high. The Calmucks, who are still in nearly exclusive possession of these mountains, have large herds of horses and cattle, and kill annually a great number of elks, deer, bears, gluttons, wolves, sables, lynxes, foxes, and wildcats, with which the mountains abound. Musk-animals are common, but the wild sheep or argali appears to be rare. The metallic wealth has not yet been explored, though it is supposed that this part of the Altai Mountains contains many minerals.

The country which lies west of the Altai Mountains, and extends to the eastern banks of the river Oby, by which it is separated from the Steppe of Barabinza, differs greatly from the last-mentioned tract. Near the mountains its surface rises into numerous hills, but towards the north it extends in a plain. This plain is slightly undulating between the Oby and its confluent the Tom It is almost entirely covered with coniferous trees, among which the pinus cembra is numerous: the cones are collected, and constitute an article of commerce with the countries farther west. Cultivation is however limited, the soil of this tract being sandy and of inferior quality. East of the river Tom the country is a table-land, furrowed by numerous rivers which run in a northern and north-western direction, and along the course of which there are many wide bottoms considerably depressed below the surface of the plain. The higher country is overgrown by dense forests of high trees, mostly birch and poplar, and in the bottoms, which are sheltered against the winds, coniferous trees occur, especially larch, firs, and pinus cembra. These bottoms have a fertile soil; cultivation is carried on in them to a considerable extent, and there are numerous villages. The forests along the foot of the mountains are composed of deciduous trees. The river Ket, which divides this region from the forest region, must be considered as the limit of cultivation in this part of Siberia, as no grain is grown beyond Narym, situated near the mouth of that river.

The *Vale of the Yenesei* is considered the warmest part of Siberia. It is perhaps also the most fertile. It is enclosed by mountain-ridges, which sometimes rise above the snow-line. On the west of the vale, between 88° and 89° E. long., are the Teletskoi Mountains, so called from the lake of that name, which lies to the west of the range. This chain, which may be considered as the most eastern of the Altai Mountains properly so called, attains the snow-line between 51° and 52° 30′; but farther north, where it is called the Kemchugk range, it sinks lower down, and is traversed by several roads. Between Atshinsk and Krasnoyarsk, it approaches close to the western and northern banks of the Yenesei, and terminates farther north near the sources of the Ket. On the south of the vale are the Mountains of Sayansk, which unite the Altai Mountains to the range called Erghik Targak Taïga, and separate Siberia from the Chinese empire. This range extends northward to the vicinity of the town of Sayansk, and the river Yenesei makes its way through it by a long and narrow gorge. Many parts of these mountains are always covered with snow. The Erghik Targak Taïga Mountains are properly the eastern continuation of the Mountains of Sayansk, and are very little known. From this elevated mass a range branches off to the north, which is called the Mountains of Sabinsk, and terminates in lofty hills south of the town of Krasnoyarsk, nearly opposite to the Kemchugk range. The low valley which divides these two ranges is about five miles wide, and constitutes the most northern extremity of the vale. Thus surrounded by mountains, the vale extends about 350 miles from south to north, and nearly 200 from east to west, but perhaps not less than one-half of it is occupied by high mountains. The offsets of the Teletskoi and Sabinsk Mountains also cover a considerable part of the surface. Thus the vale is shortened to about 200 miles, and narrowed to perhaps 100 towards the south, and to less than 50 miles towards the north. The Yenesei flows through a wide bottom covered with alluvium from two to three feet thick, and of great fertility. Wheat, rye, and oats yield from ten to twelve times their seed. The higher ground generally extends in a level plain, which in some parts partakes slightly of the nature of a steppe, being intersected here and there by salt lakes, and producing only a few grasses, but by far the greater part of it resembles the best kind of prairies. It is abundantly watered, and the water-courses are fringed with trees, while the remainder is covered with a rich turf of grass all the year round. Some of the bottoms of these rivers are also wide, and might be cultivated, especially that of the Abacan river, but at present they are used as pasture-ground, and herds of cattle are sent from this country to other parts of Siberia. The rearing of cattle is favoured by the mild winters. The cattle remain the whole year round on the pastures, the cold not being intense, and frequently not occurring before Christmas, with the exception of night-frosts. Snow also generally does not fall in such abundance as to prevent the cattle finding food under the snow. On these plains many useful plants grow in a wild state, as the wild hemp, the wild flax, wild Siberian buckwheat, which is collected and used by the inhabitants in making a kind of porridge, and several sorts of *vaccinium* and *ribes*. The mountains which surround the vale are inhabited by some small wandering tribes, who gain their subsistence by the chase. The wild animals in the woods which cover these mountains are bears, wolves, lynxes, gluttons, elk, deer, and wild hogs. There is a kind of wild goat whose skin is much valued all over Siberia. In the Yenesei and some of its confluents there are otters and beavers. Sables also occur, but their skins are less valued than those which are obtained in the countries east of the Yenesei river.

The most eastern part of the southern portion of Central Siberia is the plain of the Lower Angara. It is surrounded on the west by the Sabinsk range, on the south by the Erghik Targak Taïga Mountains, and on the east [BAIKALIAN MOUNTAINS] by that branch of the Baikal Mountains which divides the course of the Upper Lena from that of the Lower Angara, and which appears not to be distinguished by a peculiar name. Towards the north the plain opens into the wooded lowlands. The course of the Upper Toonguska, which runs from east to west, may be considered as the northern boundary of the plain, as agriculture does not extend to the north of that river. This extensive country is an inclined plain, which sinks towards the north, and in that direction is traversed by several rivers which run to the Lower Angara and Upper Toonguska. It is also much more elevated than the vale of the Upper Yenesei, as the town of Irkurok is 1240 feet above the level of the sea. It may in this respect be compared with the plains of Northern Switzerland and Bavaria, which extend along the northern base of the Alps, as the Plain of the Angara extends along those of the immense mountain-masses of the Erghik Targak Taiga Mountains. Both plains are between 1100 and 1300 feet above the sea-level. The surface of the plain of the Angara is generally hilly, but in the direction from south to north it is traversed by some extensive valleys which are nearly level. Between the rivers Kan and Tshuna there is an elevated tract which terminates only at a short distance from the confluence of the Upper Toonguska and the Yenesei, and which travellers call a mountain-ridge on account of its elevation above the plain. Other offsets of the Erghik Targak Taiga Mountains are no less elevated, though they do not extend to the road which leads from Krasnoyarsk to Irkutsk, but terminate at some distance south-west of it. The greater part of this elevated region is still covered with forests of larch, fir, and birch, and at intervals there are fields which produce moderate crops. Rye, oats, buckwheat, hemp, and tobacco are cultivated with success. In a few places agriculture extends to the narrow valleys which lie between the offsets of the mountain-ranges, but these parts of the region are still inhabited by some small wandering tribes, who keep no domestic animals except camels, and this seems to be the most northern point of Siberia in which these animals are found. Some of them however have a few horses, cattle, or sheep. They hunt the elk, a large deer called *marali*, the *musmon*, a kind of mountain-goat, lynxes, and especially sables and squirrels, all which animals are plentiful in the large forests of coniferous trees with which the lower declivities of the Erghik Targak Taiga Mountains and their offsets are covered. They use as food the roots of some wild plants. The fruit of the pinus cembra is considered a dainty. Erman states that the mean annual temperature of Irkutsk is only 31·5°, or a little below the freezing-point. The winter is extremely severe, and in some places the quicksilver freezes. But the winter temperature is subject to great changes. The difference between the temperature of the morning and of noon sometimes amounts to 45° (from +10° to −35°). This region is characterised by the dryness of the atmosphere. Erman compares the dark colour of the sky to that of the equinoctial regions. He attributes this dryness of the air to the elevated country which extends south of Irkutsk to the Great Wall of China, a distance exceeding 800 miles, and to the prevalence of southerly winds during January, February, July, August, and November, observing that though during the remaining seven months north-westerly winds prevail, they are far from being so intense as the south-westerly winds. Owing to the dryness of the atmosphere, only a small quantity of snow falls on this region.

North of the courses of the rivers Upper Toonguska and Ket, of which the latter is a confluent of the Oby, lies the *Wooded Region* of Central Siberia, and along the Polar Sea extends the *Tundra*. We are less acquainted with these two regions than with that part of Western Siberia which we have described under the divisions bearing the same name. So far as we know them, they do not appear to differ materially in their character or products. According to information collected by Erman, a mountain-range traverses Siberia on both sides of the Yenesei river from east to west, under the polar circle. No such range is marked on our maps, but the course of the rivers renders its existence probable. Agriculture is only carried on in the valley of the Yenesei river. At Yeneseisk several kinds of grain and vegetables are grown.

Eastern Siberia, or that part of it which lies east of 105° E. long., comprehends about one-half of the whole surface of the country. It contains a much smaller portion of land fit for agricultural purposes than the other divisions, which is partly owing to the severity of the climate, and partly to the greater elevation of its surface in those parts which are south of 60° N. lat.

Along the shores of the Sea of Okhotzk, between the Chinese frontier and the town of Okhotzk, the coast is rocky and very high. The country rises with a steep ascent, and at a short distance from the sea the general level is from 2500 to 3000 feet above it. This may also be considered as the general level of the immense tract which extends westward from the sea south of 60° to the meridian of the town of Yakutsk, and then west-south-west to the northern and eastern shores of the Lake of Baikal, having in this part the vale of the river Lena for its northern boundary. It comprehends therefore nearly the whole of the extensive basins of the rivers Aldan, Olekma, and Vitima, with several smaller basins lying between them. This table-land is very imperfectly known, as only a few tracts contiguous to the large rivers have been visited even by the Russians. According to this scanty information it appears that the surface is a succession of plains, separated from one another by depressions, or by ridges of hills. In some parts where these changes of the surface occur at no great distance from one another, the country assumes a hilly aspect; but it does not appear that the hills ever attain the snow-line, which in these parts seems to occur near 5000 feet above the sea-level. The whole region is entirely unfit for cultivation, and it does not appear that any considerable portion of it is adapted for pasture, as none of the numerous tribes of the Yakutes, who live chiefly on the produce of their herds, have settled on it, but the whole has been abandoned to the Toonguses, who get their subsistence by the chace. The Russians have tried to form settlements on the banks of the larger rivers, but they have always soon abandoned them. The surface is generally covered with trees, consisting chiefly of pines, firs, larch, and pinus cembra intermixed with birches. In some places however there are bare rocks, and in others extensive swamps. The number of lakes is said to be very great, and many of them are surrounded by high hills: these lakes are usually covered with ice nearly the whole year round. The fur-bearing animals of this region are bears, wolves, several kinds of foxes and gluttons, squirrels and sables. The sable is of a very superior quality, particularly that which is taken in the valleys of the rivers Olekma and Vitima. A pair of sable skins sometimes fetches twenty pounds, and a whole fur-coat made of them would be worth 1000 pounds. Squirrels are very abundant, and many millions are annually taken. They are usually of a greyish colour, but many are striped. There is also the flying squirrel, but its skin is of little value. Among the other wild animals are numerous reindeer, and the argali or wild sheep. The climate of this region is distinguished by the severity and the length of the winter.

At the south-western extremity of this region lies the Lake of Baikal. The high mountains by which the northern and eastern sides of the basin are enclosed stand on the edge of the table-land, and the upper valleys of the Upper Angara and Bargoozin in their material features exactly resemble the elevated plain. It is only in the lower and wider portion of their valleys, whose surface is slightly elevated above the level of the lake, which is about 1350 feet above the sea, that cultivation has been attempted with some success; but the inhabitants derive their subsistence mainly from fishing. [BAIKAL.]

The mountain-range which constitutes the southern edge of the table-land separates the streams which run northward to the river Lena from those which flow southward to the river Amur, and constitutes the boundary-line between Siberia and the Chinese empire as far west as 119° E. long. We are not acquainted with its elevation and character. Farther west, where it is included within Siberia, it does not rise above the snow-line, except perhaps in two or three places. This range is called in Siberia the Yablonoi, or Stanovoï Khrebet, and its most western continuation comes close up to the Lake of Baikal between 52° and 53° N. lat. From this range another branches off at the source of the river Vitima, near 113° E. long., which runs to the south-west, separating the rivers which fall into the Amur from those which run westward to the Selenga. Where this range, which is likewise known by the name of Yablonoï Khrebet, crosses the boundary-line of Siberia, stands the high summit of Mount Tshokondo, which is always covered with snow, and attains 8175 feet above the sea-level. The other parts of this range are free from snow, at least at the end of the summer, but in some places it rises above the line of trees, and may attain an elevation of 6000 feet. This chain divides the southern portion of Eastern Siberia into the basin of the Selenga, which falls into the Lake of Baikal, and that of the Shilka, one of the principal branches of the river Amur.

The *Basin of the river Selenga*, as far as it belongs to Russia, is divided into two portions by the course of the river, which here runs in a general direction from south to north. The larger portion lies east of the river Selenga, and consists of three valleys, which extend from the summit of the Yablonoi Khrebet westward, and open into the valley of the Selenga. The mountain-masses which lie between the valleys are overgrown with larch and fir, and underwood, consisting mostly of a kind of bush-birch (*betula fusca*, Pall.), which, according to Pallas, is peculiar to these mountains. In the valleys, the common birch and willow are most abundant. The upper portion of the valleys is too cold for cultivation; but in the lower part, which is generally from three to four miles wide, agriculture has been attempted with success, and in modern times it has been considerably improved by Polish emigrants, who have been transplanted into this region since 1772. They cultivate wheat, rye, buckwheat, flax, hemp, peas, and water-melons. The wider valley of the river Selenga itself appears in many parts to have an arid dry soil; but it contains good pasture, and in some places the soil is of considerable fertility, and cultivated by Russian families which have been settled there for 150 years. About twelve miles from its mouth, the Selenga enters a level plain of considerable extent, which may be considered as the delta of the river, as it is traversed by four arms into which the river divides on entering the plain. This plain extends for 22 miles on the shores of the Lake of Baikal, above which it is very slightly elevated. It is partly a steppe covered with sand, and producing only indifferent pasture; but some tracts along the watercourses are very fertile and well cultivated. The western portion of the basin of the Selenga, as far as it belongs to Siberia, seems to consist of two mountain-ranges, of which the southern lies along the boundary-line of the two empires, and the northern skirts the shores of the Lake of Baikal. These two ranges constitute the eastern extremity of the mountain-region known by the name of Erghik Targak Taïga, and are connected with that range south-west of the western extremity of Lake Baikal. Between the two ranges is a wide plain, which opens on the banks of the Selenga, and serves as a pasture-ground for the numerous herds of horses, cattle, and camels of the Buriates, who are in exclusive possession of that tract. The wooded mountains on the east of the Selenga are haunted by wild beasts, such as bears, gluttons, elks, deer, musk animals, wild hogs, ounces, lynxes, wolves, foxes, hares, sables, squirrels, martens, marmots, and wild goats. The great bearded vulture, and *Falco fulvus*, and *Falco palumbarius*, are trained for the chase. Many sheep and goats are kept, and their skins, especially those of the lambs, constitute an important article of export to China. The climate is characterized by severe cold. Even in June night-frosts are frequent, and in winter the thermometer frequently sinks to −35° of Fahrenheit. The rain is abundant in summer, in which season the Baikal is sometimes for weeks together covered with a dense cold fog, which is not dispersed by winds; in winter the atmosphere is clear and dry, and the quantity of snow that falls is very small.

That portion of Siberia which lies east of the basin of the Selenga, and is drained by the river Shilka and its two principal branches the Ingoda and Onon, is called Da-uria, which is said to signify 'boundary-country,' or 'border.' The level of this country is said to be considerably higher than that of the valley of the Selenga and its tributaries, which on an average may be 1500 feet above the sea-level. Pallas observes that the vegetation of Da-uria differs greatly from that of the remainder of Siberia; and he mentions oak and hazel-nut trees, which are not found in Siberia, except in Da-uria. The whole, with the exception of a comparatively small tract along the south-eastern border, is a mountain-region, traversed by several ridges running south-west and north-east, but nowhere rising to a great elevation. In many parts, especially towards the confluence of the rivers, the mountains subside into hills. Those parts of this hilly region which are contiguous to the Yablonoi Khrebet are well wooded; but in proportion as they recede from that range, the forests disappear, and are replaced by isolated groves of *betula fusca* and poplars, and several kinds of low bushes and shrubs: the dryness of the air, the effect of the vicinity of the Gobi, or Great Desert of Central Asia, influences the vegetation of this tract, and prevents the vigorous growth of trees. The valleys along the course of the rivers are rather flat and open, but most of them are fit for cultivation, especially north of 51° 30′, where all the grains of Europe are grown. The mountains and hills are covered for the greater part of the year with grass, which supplies good pasture. Among the wild animals, Pallas mentions wolves, foxes, tiger-cats, hares, and the argali. The most southern portion of this region, or that which lies south of 51° 30′, between the rivers Onon and Argun, is part of the Gobi, or rather, of that portion of it which is called the Steppe of the Kerlon, from the name of the upper course of the river Argun. [AMUR.] The surface is level, with the exception of numerous depressions, some of which are deep enough to preserve the water collected in them during the winter and spring all the year round, so as to constitute lakes; while others during the hot season are converted into marshes. The water of most of them is salt; and as much salt is collected from the lake of Khara or Terey as is consumed in Da-uria. The soil is sandy, and covered with many plants peculiar to this steppe, among which is the *Stellera chamaesjasme*, (Pall.), which here represents the cactus of the deserts of America. The wild animals which are common in this desert are only the dshikketei (*Asinus hemionus*), the Da-urian antelope (*Antelope gutturosa*), and the small hare. Bustards occur in great number. The surface is covered with numerous small stones, among which are jasper, agates, beryls, and topazes. No part of this level country is cultivable. The mountains of this region, especially those which lie between the Onon and Argun, are rich in silver, lead, tin, and zinc, all of which are worked. Though under the same parallel as the basin of the Selenga, and perhaps 500 feet higher above the sea-level, the climate of Da-uria is much less severe. In the beginning of May, when Pallas left the valley of the Selenga, it was still winter there; but as soon as he descended from the Yablonoi Khrebet into the lower country of Da-uria, he found that the spring was considerably advanced, and most of the shrubs and plants were in blossom. But he complains of the sudden changes of temperature in this season, and of the sultry heat of the summer. He considers both as the effect of the vicinity of the Gobi.

The *Upper Vale of the river Lena* is among the agricultural districts of Siberia, corn being grown as far north as the town of Yakutsk, according to Erman. The upper part of this valley is narrow, but it grows wider at Rigi some distance above Ust Kulsk, and still wider at Olekminsk, and near Yakutsk. In all this extent steep hills enclose the valley on the right, and therefore nearly all the villages and settlements are on the left bank of the river. Though the cultivation of corn and several vegetables generally succeeds in this vale, still the greater part of it is covered with fir and pine trees; whilst the numerous islands and the low banks of the river are overgrown with birch, poplar, and willow. The wooded country is used as pasture by the Yakutes. The country round the town of Yakutsk may be considered as the richest pastoral tract in Eastern Siberia, though the ground is always frozen for a depth of 400 feet below the surface, and only a small layer of 2 or 3 feet is free from ice in summer. Its wealth is chiefly derived from the almost innumerable herds of cattle which pasture on the low country which extends from the river eastward to the river Aldan, where it runs south and north along the southern declivity of the elevated table-land which extends farther north. This tract, which is 300 miles from east to west, and perhaps 200 from south to north, is hilly, but no part of it is more than 750 feet above the sea, whilst many tracts are only 200 feet; the town of Yakutsk is 282 feet. The forests are distinguished by the vigorous growth of the trees, and the pastures are rich. A still more extensive tract of rich pasture-land lies to the east of the Lena river, on both sides of the river Vilui. Many rich families of the Yakutes, who inhabit this tract, possess several hundred head of cattle. It does not appear that any attempt has been made to introduce cultivation on the banks of the Vilui river, though grain is grown at Amginsk, in the tract east of Yakutsk.

The whole country east of the middle course of the river Aldan, between 59° and 60°, is a mountain-tract, extending more than 200 miles east and west to the vicinity of the Pacific. The most elevated part of it, which lies nearly in the middle, and is almost 100 miles wide, is more than 2400 feet above the sea-level. It connects the elevated table-land which stretches southward to the boundary-line of the Chinese empire, with the mountain-ranges that occupy the north-eastern portion of Siberia, and is known by the name of the Aldan Mountains. The whole is covered with fir and larch trees, except the more elevated summits, which attain more than 3000 feet, and which do not appear to be numerous. In the highest parts the *Pinus cembra humistrata* is common. In this region all the animals occur which have been enumerated as inhabiting the forests of the elevated table-land, but the skin of the sables is less valued. The Toonguses, a wandering tribe of hunters, inhabit this country.

In proceeding to the northern part of Eastern Siberia, we must first observe, that the tract which extends between 105° E. long. on the west, and the river Lena on the east, and lies north of the basin of the Vilui river, is very little known, and is nearly a blank on our maps; but it is stated that there are some rich pastures, especially on the banks of the upper course of the river Olenek; and this is probable, as the Yakutes have taken possession of it, a nation which is almost entirely devoted to the rearing of cattle, or the keeping of reindeer where the pastures are not fit for cattle. In these parts a mountain-range appears to traverse Siberia from east-south-east to west-north-west; and it is probably the same chain which occurs on the banks of the river Yenesei near the polar circle, where it is broken through by that river.

At the northern extremity of the Aldan Mountains (62° N. lat., and 141° E. long.) is a mountain-knot from which two chains branch off. One of them runs from this point first due east, and then north-east, parallel to the shores of the sea of Okhotzk and the bay of Penginsk. It is called by the Russians Stanavoi Khrebet, and covers two degrees of latitude in width; but some of its branches reach as far north as 67° N. lat. This chain, as far as is known, does not rise above the snow-line; but as the upper part is destitute of trees and shrubs, with which other chains in this latitude are generally covered, it must attain a considerable elevation. At the source of the river Anadir (near 164° E. long.) it divides into two branches. One of them runs first south-east, and then turns south, traversing the peninsula of Kamtchatka [KAMTCHATKA]; the other extends first towards the north, and then turns eastward, in which direction it terminates at Behring's Strait in the capes Vostostchinii Noss, or East Cape, and Tshookotskoï Noss. This last-mentioned chain is very little known, being included in the territories possessed by the Tshooktshes, who do not permit strangers to enter their country, and are not dependent on the Russian government.

The other chain which branches off from the mountain-knot of the Aldan range at first runs north-north-west, but turns west near 64° N. lat., and continues in that direction, parallel to the lower course of the river Aldan, until it approaches the banks of the Lena, where it turns due north, and terminates near 67° N. lat. That part of the range which lies east and west is called by the Russians the Mountains of Verkhow Yansk; but the most northern portion, which divides the basin of the Lower Lena from that of the river Yana, bears the name of the Orulgansk chain. The Verkhow Yansk chain, where it is traversed by the road leading from the Aldan to the Yana river, is about 2250 feet above the sea; but the highest part of the range is about 800 feet more. This chain, according to Wrangel, constitutes a remarkable line for the vegetation of trees. Pines and firs, which, south of it, are the most common forest-trees, cease to grow at its southern declivity, and also the mountain-ash. North of it only larch, birch, poplar, and willow are found; and those trees occur as far north as 68° on the banks of the rivers, though near the last-mentioned parallel they appear only as bushes. The Verkhow Yansk mountains occupy more than 100 miles in width from south to north, and are very rugged, though mostly covered with trees. They are uninhabited, as well as the country which lies south of them, as far as the banks of the Aldan, and north as far as 66° N. lat. This desert tract is called the Tukulan Wilderness, from a river of that name which falls into the Aldan. The lower part of this region, which lies south and north of the mountains, is a nearly level plain, without a tree, whose surface is covered with interminable morasses. A scanty grass occurs only in some more elevated spots.

North of this waste the country between the Lena and Kolyma improves considerably. It is traversed from south to north by several chains of hills, generally of small elevation, but in many places of considerable width. These hills are overgrown with birch and larch, but the trees do not attain their full growth. The greater part of this region is a level plain, without trees, but interspersed with numerous lakes, which contain plenty of fish, and have good pastures on their banks where the settlements of the Yakutes are. The *albuty*, or dry lakes, which constitute a peculiar feature of Northern Siberia, are still more fertile. They are wide and flat valleys, very little depressed below the general surface of the plain. In spring, when the rivers inundate the adjacent country, they are filled with water, which remains there during the summer; but during the winter the ground bursts, and many narrow clefts are formed, by which the water runs off, and in the following summer the whole ground is covered with the finest turf. There are also good pastures near the declivities of the hills, but the remainder of the plain is chiefly covered with moss and is swampy. There are also some wastes of considerable extent, as the swamps, called *badarany*, which occupy nearly the whole tract between the river Indighirka on the west, and the river Alaseï on the east. These are plains covered with moss, on which only a few larches creep along the ground. The surface is wet and swampy all the year round; the number of lakes is very small; running watercourses are entirely wanting; and as there is no grass, this tract is entirely uninhabited. It extends from west to east about 100 miles; but towards the south and north its extent is not known. Along the Polar Sea, and some distance from it, the country is a tundra, or low plain covered with moss, of the same description as that which occurs in Western Siberia. But between the Indighirka and Kolyma the surface is far from being a level. It is traversed by numerous low swells, which generally run south and north, and, terminating on the sea in bluffs, render the coast alternately high and low. The scanty population of this tract subsist almost entirely on the produce of their fisheries in the numerous lakes with which this country is interspersed. Of wild fur-bearing animals only the white bears and the polar fox are common. Their furs, and the elephant bones, which are very abundant, are articles of commerce.

The country east of the Kolyma river is of a different description. The offsets of the Stanovóy Mountains come close up to the river, forming on its banks steep bluffs several hundred feet high, and the whole region is covered with ranges of mountains, frequently rising to 2000 and 3000 feet above the sea. In many places they reach the sea, forming on the shores several elevated capes, as Cape Baranov, Cape Shelagskoï, and North Cape. On the sea-shore however there are many tracts of level ground covered with moss. In the interior the valleys are rather wide, and generally swampy, but also often covered with good pastures. As far as this mountain-region is exposed to the strong north-western gales, it is destitute even of shrubs, but the valleys which are sheltered against the winds are covered with birch, poplar, willows, and the Pinus cembra humistrata, which also frequently occur on the lower declivities of the mountains. The underwood in these forests consists of several shrubs that bear berries. These forests are abundantly stocked with animals. The number of wild reindeer is immense. Elks, argalis or wild sheep, black bears, foxes, sables, and squirrels are very numerous. Polar foxes and wolves are also abundant on the woodless tracts along the coast. The common crow, the snow-bird, the falco melanaetus, and strix nyctea are met with all the year round. Many other kinds of birds come to this country in May, especially swans, in great numbers, four species of wild geese, and eleven species of wild ducks. The animals supply the scanty population with some articles of commerce, and partly also the means of subsistence. But the chief supply of food is from the fisheries in the rivers. The most common fish is the herring; but there is also salmon of several kinds.

The country of the Tshooktshes, or the most north-eastern portion of the Asiatic continent, presents a succession of sterile valleys and bare rocks, whose vegetation is limited to that kind of moss which is the food of the reindeer. In a few sheltered valleys there are some willows which attain the size of shrubs. The climate is extremely severe. Signs of summer are scarcely perceptible before the 20th of July, and on the 20th of August the signs of winter re-appear in the falling of snow and night-frosts. In some parts the rocky masses attain a considerable elevation, and on some of their highest summits, as well as in some narrow valleys, snow lies all the year round. The valleys are generally swampy and full of small lakes. There are a few berry-bearing shrubs. Along the coast, morses, sea-lions, and seals are common; and on the continent, rein-deer, argalis, white wolves, black bears, and the common and the Polar fox. A few families of the Tshooktshes subsist by fishing and killing the sea animals; but the greater number live on the produce of their herds of tame reindeer, and by hunting those which are in a wild state. South of the country of the Tshooktshes is the peninsula of Kamtchatka.

We shall conclude this survey of Siberia with a few observations on the Polar Sea, which constitutes its northern boundary. Nearly opposite the middle of the coast-line of Siberia, or more precisely, opposite the country between the mouths of the rivers Yana and Indighirka, is a group of islands, which are called, from their discoverer, the Liakehoff Islands. They consist of four larger and some smaller islands. The most southern of the larger islands, called Liakehoff Island, is hardly thirty-five miles from Sviatoï Noss, and lies between 73° and 74° N. lat., and between 140° and 143° E. long. It is the smallest of the larger islands, and hardly more than forty miles long from south-west to north-east. Farther north, between 74° 30′ and 76° 10′ lie the three other islands, in an eastern and western direction. They are named, from west to east, Kotelnoï, Fadeyefskoi, and New Siberia. The largest, Kotelnoï, is above 100 miles long from south to north, and about 60 miles broad in the widest part. The two others are about half that size. They do not rise to a great height. Towards the south they have a gentle slope, but on the northern shore they terminate in precipices. Even the summers on these islands are so cold that the snow does not entirely melt, and not a blade of grass grows. They consist of layers of ice, alternating with layers of sand, in which an incredible number of elephant's and other fossil bones are imbedded. Though these bones are annually carried off in great quantities, no diminution is perceptible. It is even stated, that after hard gales a great number of these bones are cast on the shores of the islands, which has led to the conjecture that the bottom of the surrounding sea is of similar composition to the islands. On the southern coast drift-wood occurs in great quantities, and in one place so many trunks of trees have been heaped together, as to form along the shore hills twenty fathoms high, and about three miles long. No drift-wood is found along the northern coast. There are some small rivers in the islands, but as they are never free from ice, the sea-fish do not enter them, and they contain only one kind of small fish, the *gasterotus aculeatus*.

The sea between these islands and the continent does not completely freeze before the last days of October, but along the coast of Siberia the ice is formed much earlier in the year, and soon acquires a degree of firmness. On the contrary, in spring the ice melts much sooner along the coast, which is quite free from it in the month of June, whilst in the open sea it constitutes one unbroken sheet of ice up to the month of July. Even then it would not break if it were not split by the hard frost of the preceding winter. The quantity of ice however is hardly perceptibly diminished even towards the end of the summer. It floats about in the sea in large masses, which, being impelled by currents and winds, are driven against one another with incredible force. These floating masses render the navigation of the Polar Sea extremely dangerous. Vessels sent by the Russian government for the purpose of surveying the coast have frequently been unable to execute the commission; and though this object has been pursued with zeal and skill by able seamen at different times, there is still a tract of coast which has never been surveyed: this tract encloses the most northern cape of Siberia, called the North-east Cape, or Severo Vostotchinii Noss. Nor have the various modern attempts to reach Behring's Strait from the mouth of the river Kolyma succeeded, though it is on record that such a voyage was executed by Dashneff in 1648. Cook, in his last voyage, after passing through Behring's Strait, advanced as far as North Cape, 180° E. long., but found that the masses of ice extended from the coast of Siberia to those of America without interruption. The difficulties and dangers with which all such attempts of discovery and survey were attended, suggested the idea of carrying them into effect by means of *nartes*, or sledges drawn by dogs. Such expeditions are generally undertaken in the latter part of the winter, from March to the end of May, when the cold is much less severe than in the earlier part of the winter. It has thus been ascertained that in winter the large body of the sea is open and free from masses of ice, but this open water occurs in different parts, at different distances from the shore. North of the islands of Kotelnoï and New Siberia, it occurs at a distance of less than twenty miles. Farther east it appears to approach nearer to the continent. Near 165° E. long. it is about 170 miles distant from the shore. Between 175° and 180°, opposite Cape Yacan, it is stated that it approaches within less than four miles; but farther east it is much more remote. In the western parts of this open sea the tides are perceptible, but not in the eastern. Hence it is concluded that there must be a communication with the sea which surrounds the northern parts of Europe. The currents in the Polar Sea run in summer from east to west, and in autumn in the opposite direction.

The expeditions on the ice of the Polar Sea have been obstructed by many difficulties, of which the chief have been produced by the numerous ice-hills, or *torosy*, which are dispersed over the ice. They sometimes constitute single masses with steep declivities; at other times they form regular groups; and frequently they form long ridges. They consist of masses of ice irregularly united, but as the hollow places are filled up with snow, they appear to have a regular form. They vary in height from ten to seventy feet, and are certainly of a different origin from the ice-bergs of the Greenland Sea. Salt is found on the ice wherever it is not covered with a thick layer of snow. Wrangel thinks that it has remained on the surface ever since the sea-water was changed into ice by freezing. In the neighbourhood of the open sea, he says, it is so abundant as to have penetrated the ice to the depth of five inches. It is in the form of small shot, and it has a somewhat bitter taste, but may be used. The persons who annually visit the Liakehoff islands, use it without the least inconvenience. This sea-salt, called rassól, very much retards the progress of the nartes on the ice.

Climate.—Siberia is the coldest country in the northern hemisphere, if we except Greenland and the Arctic Archipelago of North America. It is much colder than any part of Europe situated in the same latitude. North Cape, in Europe, is near 71° 10′, and Ustyansk, at the mouth of the river Yana, in 70° 55′ N. lat. The latter place however is nearly twenty-eight degrees colder, as the following table shows:—

	Mean ann. Temperature.	Mean Tem. of Winter.	Mean Tem. of Spring.	Mean Tem. of Summer.	Mean Tem. of Autumn.
North Cape	+ 32°	+ 24°	+ 30°	+ 42°	+ 32°
Ustyansk	+ 4·39°	— 24·9°	+ 27·01°	+ 40·15°	— 24·70°

Irkutsk is only about 45′ nearer the pole than London, and yet the mean annual temperature is lower than that of North Cape, being 31°; while the mean annual temperature of London exceeds 50°. But Irkutsk is 1240 feet above the sea-level. This elevation however would lower its temperature only three or four degrees.

The climate increases in severity as we proceed from west to east. The causes of this remarkable phenomenon seem to be very complicated. The cold in the eastern districts is somewhat increased by the mountainous nature of the country east of the Yenesei river, and by the extensive and elevated tracts which divide it from the Pacific, and prevent the temperature of the sea from exercising its influence on the climate of these regions. These two circumstances however do not seem sufficient to explain the great difference which exists between the climate of the western and eastern districts. In Western Siberia the winter, though much less cold than in the eastern districts, is still very severe, and this is mainly to be accounted for by its contiguity to the Great Caspian Desert, where in winter an excessive degree of cold is generated by causes which are not yet sufficiently understood. But as this extraordinary region is subject in summer to excessive heat, Western Siberia experiences the effect in its warm and sultry summers. As a fact, clearly proving the greater severity of the winter in Eastern Siberia, we may observe that quicksilver does not freeze in Western Siberia every year, except in very high latitudes; but it would appear that this is the case every winter in the country near Irkutsk, and it is certain that in Yakutsk it remains in a frozen state for two months together even in mild winters, and in severe seasons for three months.

In a large part of Siberia the ground is frozen to a considerable depth, even at the end of the summer. This occurs also in the most north-eastern corner of Europe, between the Petchora and the Gulf of Kara, where the ground is never free from ice at a certain distance from the surface. On the river Oby the ground is certainly frozen at Berezow, in 64° N. lat.; and Humboldt found at Bogoslowsk (59° 45′) small pieces of ice at the depth of six feet in summer Bogoslowsk is situated near the base of the Ural Mountains, and, according to Erman, is 876 feet above the sea. Ice is frequently found near Tobolsk at some depth in summer, but rarely in autumn, and it has not yet been ascertained if permanent ice exists under the surface in the vicinity of that town. Farther east this frozen soil extends much more to the south. Georgi found the ground of the country surrounding the Lake of Baikal frozen all through the year; and it seems that in the south-eastern angle of Siberia this phenomenon is observed, even in those countries which are south of the Yablonoï Khrebet. In the environs of Nertshinsk, even on the banks of the Argun river, a frozen stratum about six feet in thickness has been found. This phenomenon was first observed at Yakutsk, in an attempt made to dig a well. It is now known that in that place the frozen stratum extends to the depth of 400 feet below the surface. ,This frozen state of the ground however does not prevent vegetation, and most of the countries in which it occurs, whose surface thaws in summer to the depth of four or six feet, are covered with large trees. Where however the summer heat is only sufficient to thaw the ground to the depth of a few inches, which is the case in the more northern districts, the roots of the trees extend along the surface, and the trees are low and stunted. Erman did not find the ground frozen at Okhotsk, which is evidently owing to the influence of the sea.

We are unable to give a more exact account of the different regions of Siberia for want of meteorological observations. Erman brought back from his travels such observations, continued for many years at Ekaterineburg, Tobolsk, Berezow, Irkutsk, and Yakutsk, but as he has not yet published them, we shall only add the temperature of two other places, of Bernaul and of Nishnei Kolymsk, of which the former may be considered one of the warmest, and the latter one of the coldest places in Siberia. Bernaul is in 53° 20′ N. lat. and 84° 10′ E. long., and Nishnei Kolymsk in 68° 31′ N. lat. and 160° 56′ E. long. Bernaul is 390 feet above the sea; Nishnei Kolymsk is almost on a level with the sea:—

	Mean ann. Temp.	Mean Temp. of Winter.	Mean Temp. of Spring.	Mean Temp. of Summer.	Mean Temp. of Autumn.
Bernaul	+ 35·13°	+ 6·61°	+ 42·92°	+ 61·82°	+ 29·18°
Nishnei-Kolymsk	+ 12·05°	− 19·03°	+ 36·15°	+ 44·41°	− 13·33°

From this table it appears that Nishnei Kolymsk is much warmer than Ustyansk, which is nearly two degrees and a half farther north. Wrangel, who passed three years at Nishnei Kolymsk, gives a description of the climate of that place. The year is divided into two seasons, the winter and the summer. The river is covered with ice in the beginning of September, and is not free from it before the beginning of June. In October the cold is diminished by thick fogs and the vapours which rise from the sea, which then begins to freeze. In November the frost increases, and it attains its greatest degree of severity in January, when the thermometer sinks to −64°. Respiration then becomes difficult, and the wild reindeer, the true inhabitant of the polar regions, hides itself in the thickest parts of the forests, and stands motionless. In February the cold does not decrease much; in March it begins to decrease more; but the cold which in these months is felt at sunrise is unusually severe to the feelings. Fine days are very rare during the winter, for the prevailing winds, blowing from the sea, carry with them fogs and vapours, which cover the deep blue sky, and the stars cannot be seen. The greatest number of fine days occur at the beginning of the winter, in September. The wind which is called the hot wind blows from east-south-east, and raises the temperature suddenly from between − 45° and − 50° to + 29° and upwards, but it generally does not last more than 24 hours. Towards the end of March, the effect of the heat produced by the sun's rays begins to be perceptible at noon on the snow, but during this time the thermometer at night sinks to − 35°. A sudden rise of the thermometer takes place during the month of June. It sometimes attains + 72·50° at noon. The few plants which grow in this cold climate seem then to vegetate with vigour and to open their blossoms, when suddenly a blast from the sea brings an air charged with a great degree of cold, and destroys the vegetation. In July the heat is greatest, and the weather more constant, but there are innumerable swarms of gnats, which torment men and animals. These gnats however furnish the inhabitants with one of the most important means of procuring food for the winter. They compel the numerous herds of reindeer to leave the forests, and to retire to the treeless country on the shores of the sea. During these migrations, a vast number of these animals are killed by the natives. In August the heat decreases rapidly, and night-frosts are frequent towards the end of that month.

Rivers.—Siberia has a great number of rivers, and as the whole course of most of them, and the greatest part of the course of the remainder, lies through a level and hilly country, nearly all of them are navigable for a great distance. The principal rivers run from south to north, from the agricultural districts to those where vegetation does not supply food to the inhabitants, and hence their great importance for internal intercourse. The tributaries, at least the greater number and the largest of them, run chiefly east and west, and form a water-communication between the agricultural districts themselves, and render it practicable for goods bought from the Chinese at Maimatshin to be transported to European Russia at nearly the same expense as those which are obtained at Canton are carried to Great Britain. Though all these rivers are frozen for more than six months of the year, the advantages arising from them are not thereby materially diminished, as the ice facilitates communication almost as much as the open water.

The *Oby*, *Obi*, or *Ob*, the most western of the larger rivers of Siberia, is the largest river of the Old Continent, not so much in respect of its length as the great extent of country which is drained by it and its numerous affluents. Its basin is said to comprehend more than 1,370,000 square miles, and is only inferior to that of the Amazonas and Plata in South America. [RIVERS, vol. xx., p. 28.] This basin extends from 47° to 74° N. lat., 1890 miles in length, and in the widest part, near 55° N. lat., it is nearly 1200 miles across. The principal branch of the Obi is properly the Irtish, or the western of the two great branches which unite near 60° 20′ N. lat., but the eastern branch has the name of Obi before their union, and is therefore considered the principal river, though it is inferior to the Irtish in length of course. The Irtish rises in the Chinese empire, in the government of Gobdo, or the country of the Western Khalkas Mongols, probably between 46° and 47° N. lat. and 87° and 88° E. long. Its sources have never been visited by Europeans, but it is stated that seven small rivers descend from the ranges of the Altai Mountains, which traverse this part of Asia, and unite as soon as they reach the plain in which the Lake Zaizang is situated. After the union of these seven streams, the river is called Ertish by the Mongols, from which the Russians have made Irtish. The river runs nearly due west, and after about 70 miles falls into the lake of Zaizang. It is certain that this part of the Irtish is navigable, as a Russian expedition ascended it to a considerable distance above the lake in large river boats, and as the Russian fishermen now annually go some miles above its influx into the lake. The Irtish issues from the north side of the lake, several miles from its western extremity. The lake, according to Humboldt, is about 1720 feet above the sea-level. The course of the river is nearly due north, and in a flat country, until it approaches the boundary-line of Siberia, where the mountains come close up to the river on both sides. It then turns to the west-north-west, and in that direction it runs in a narrow valley between rocky hills until it reaches Ust Kamenogorsk. The current in this part is rapid, and at Ust Kamenogorsk the surface of the river is not more than 1311 feet above the sea. It is however navigated, and though not without difficulty, yet with safety. Several considerable tributaries join the Irtish on the right, among which the Buchtarma is the largest, and is navigable to some distance from its mouth. Below Ust Kamenogorsk the mountains withdraw from the left banks of the river, but the Altai Mountains continue to accompany its course to the vicinity of Semipalatinsk. From Ust Kamenogorsk to Semiyarsk the river runs nearly due west, and its course is rather gentle, for at Semipalatinsk the surface is still 1151 feet above the sea. Below Semipalatinsk the Irtish flows through the plain of Western Siberia, and below Semiyarsk turns north-west, in which direction it continues to run to some miles below the town of Omsk, north of 55° N. lat. After the river has left the mountains, it is not joined by any considerable stream except the Om, which drains a part of the Steppe of Barabinza, and is not navigated. Below Omsk the Irtish turns first to the north-east, then to the north, and afterwards it runs again nearly due west to its confluence with the Tobol at Tobolsk. Before this union, the Irtish is joined from the south by the river Ishim, which runs more than 700 miles, but, draining a sterile and sandy country, contains very little water in proportion to its length, and is only navigated in the lower part of its course. The Tobol, which is nearly equal in length to the Ishim, is much more important. It rises near 52° N. lat. and 60° E. long., on a flat swell of the Caucasian Desert, and runs for a short distance to the east, but the remainder of its course is to the east of north, through a level country, though in some places low offsets of the Ural Mountains approach the western banks. No river falls into the Tobol from the right, but it receives several considerable affluents from the left, among which the Ooï, the Isset, the Toora, and Towda are the largest. The Ooï joins the Tobol where the latter enters Siberia, and by this union the river becomes navigable at Ust Ooïsk. In spring, when the river rises from one to two fathoms above its ordinary level, it is navigated by barges of from 200 to 250 tons; but in summer the vessels which navigate it carry only from 20 to 40 tons. The three other affluents of the Tobol above mentioned are also navigable for some distance for small craft. At the confluence of the Tobol the Irtish changes its direction to the north-north-east, but turns to the north-north-west before it meets the Obi.

The Obi rises in the Altai Mountains with two large branches, the Katunga and the Biya. The most remote branch of the Katunga, the Chooya, and that of the Biya, the Choolyshman, originate near 49° N. lat., within the Chinese government of Gobdo. Nearly all the waters collected within the Altai Mountains north of 49° N. lat. and between 84° 30′ and 90° E. long. run either east or west, and uniting between 50° and 51° N. lat. near the meridian of 87° E. long., form a large river, the Katunga. After the union of these rivers, the Katunga runs nearly due north with an extremely rapid course through the northern ridges of the Altai Mountains, until it reaches 52° 30′ N. lat., when it turns west, and entering a hilly region meets the other great branch of the Obi, the Biya. The Katunga is too rapid to be navigable. The place where the Biya, or Choolyshman, as it is called in the upper part of its course, originates, is not known, and we are very imperfectly acquainted with the course of this river above the lake of Teletskoi. It drains that country, which may be equally claimed by the Chinese and Russian governments, as it is inhabited by tribes who pay tribute to both emperors. The Choolyshman falls into the lake of Teletskoi near 51° 40′ N. lat. with several arms. This lake, called also Altyn-kul or Altai Noor, is a true Alpine lake, resembling in grandeur and beauty the Lake of Luzern. It is surrounded by wooded mountains, rising in the vicinity of the lake to the height of 4000 or 5000 feet, and Mount Toulak at its southern extremity attains an elevation exceeding 6000 feet. The mountains are so near the banks of the lake that no road can be made along them. The lake is more than 40 miles from south-south-east to north-north-west, but at its northern extremity an arm runs westward for 20 miles more. At the southern extremity it is about five miles wide, but it grows gradually narrower as it advances towards the north. The western arm is hardly a mile wide on an average. The lake is about 1900 feet above the sea-level. The river issuing from the western arm of the lake, under the name of Biya, in a western direction, soon turns to the north, but by degrees it resumes its western course, running between mountains and high hills, until it joins the Katunga below Biisk, at Katunsk. After this union the river is called Obi, or Ob. The Biya is too rapid for navigation. The Obi flows in a western direction until it is met from the south by the river Charysh, a considerable affluent from the western regions of the Altai Mountains, which, though not rapid, is unfit for navigation, owing to the numerous shoals and the small quantity of water during the greater part of the year. At the confluence of the Charysh the Obi turns to the north, in which direction it continues, with many windings to its confluence with the Tom, when it begins to run north-west until it reaches 75° E. long., from which place it flows west to its junction with the Irtish. Below the mouth of the Charysh the Obi is joined from the east by three rivers, which are navigable and important for the industry of Siberia even in its present state. The most southern of them is the Tom, which rises in the mountains north of the lake of Teletskoi under the name of Mrassa, and runs north and north-west. It begins to be navigable at the town of Kooznesk, and falls into the Obi about 30 miles below Tomsk. The second navigable affluent of the Obi is the Choolym, which rises in the eastern declivity of the mountains of Kooznesk, the prolongation of the mountains of Teletskoi, with two branches, called the White and Black Yioos, which run north-eastward, and after uniting turn to the east until the river approaches within a few miles the western bank of the Yenesei, when it turns north, and having run about 80 miles in that direction, encircles, by a large bend to the westward, the Kemchugh range. It again flows north, but turns to the west, in which direction it continues to its confluence with the Obi. The Choolym becomes navigable at a place called Legostargewa, where it turns north, after the union of its upper branches. The third navigable affluent of the Obi is the Ket, which rises near the most northern extremity of the Kemchugk range, and running in a general western direction reaches the Obi with several arms, the most northern of which falls into that river near Narym. The Ket is navigable to a short distance from its source. The current of the Obi below Katunsk is very gentle, and does not offer the least obstruction to an easy navigation, but in approaching the Irtish it spreads its waters over a low country, and divides into many arms, which enclose large islands, and in this part shoals are numerous.

The Obi, after its confluence with the Irtish, turns northward and flows in that direction to the vicinity of the polar circle, when, increasing to a great width, it turns east at Obdursk, and falls into the Gulf of Obi by three arms, of which the eastern is the largest and deepest. Where the Obi joins the Irtish it divides into two arms, of which the western is called Beresowskye Protok, or Birch River. The two arms unite more than 70 miles farther north, and enclose an island of that length and of a width varying in general from five to six miles. Farther north the river frequently divides again, as the alluvial and low plain which lies to the west of the river is from 40 to 50 miles wide, and the greater part of it is inundated in spring time. The gulf into which the Obi falls is between 70 and 80 miles wide and more than 400 miles long. Except several low islands which occur near the mouths of the river, only a few rocky islets appear, not far from the eastern shores of the gulf, but the gulf itself is so full of shoals, that large vessels find the navigation very difficult. At Tobolsk the Obi generally freezes about the 2nd of November, and at Obdursk in the middle of October. At the first place the ice generally breaks up at the end of April, and at the second not before the middle of May. The gulf is frozen till the beginning of June.

There is certainly no other river that falls into the ocean in which so much fish is taken as in the Obi. According to an estimate of Erman, the quantity of fish consumed within the government of Tobolsk cannot be less than 1,300,000 hundredweight, and is probably much more. The fish taken in the Obi are not all consumed in Siberia, but considerable quantities are sent to the countries west of the Ural Mountains, especially to the mining districts of the government of Perm. The fish taken in the Obi ascend the river in spring from the Polar Sea. But another considerable fishery is carried on in the Upper Irtish, and the fish which are taken there seem to come from the lake of Zaizang. The best places for this fishery are really situated within the Chinese empire, but it is carried on by Russian fishermen, with the connivance of the Chinese authorities.

Some kinds of fish are taken here which are not found in the Obi, as the sterlet and the river salmon. Others are common to both rivers, as the sturgeon and the *Salmo nelma*. It is stated that the number of sturgeon annually taken in the Irtish amounts to 3000, and that of the sterlets to 30,000. The fish are mostly salted or dried. Isinglass and caviar are prepared from them. Most of the fish that are taken in the Irtish are consumed in the mining districts of the Altai Mountains.

The *Yeneseï* is the second river of Siberia in magnitude. It may even be considered the first, if the length of course only is taken into account, and if the Selenga is considered as the principal branch. In that case the course of the Yeneseï exceeds 2500 miles, while that of the Obi falls short of 2400 miles. But the basin of the Yeneseï is much less extensive, as it covers only an area of 1,020,000 square miles, and is inferior to that of the Mississippi in North America. [Rivers.] The two remotest branches of the Yeneseï, the Ta-kem and Selenga, originate in the Chinese empire. Kem is the name by which the Yeneseï is known to the Chinese. The western branch is called by them Ta-kem. It rises where the two vast mountain-chains of the Erghik Targak Taïga and the Tangnu Oöla Mountains [Altai Mountains, vol. i., p. 398] meet one another, and send numerous streams westward into the valley which lies between them. Among these streams two are named as the branches of the Ta-kem, viz. the Bei-kem and the Khua-kem. After running more than 100 miles south-west and west, they unite and form the Ta-kem, or Great Kem. This river continues to run more than 100 miles westward, when it is met by its first great tributary the Kemtshik, or Little Kem, which rises more than 100 miles farther west, as it is supposed, near the sources of the Choolyshman or Biya; but our knowledge of this part of the course of the Yeneseï is very imperfect. After the union of the Ta-kem with the Kemtshik, the river turns north, and traversing the mountains of Seyansk by a valley which is more than 80 miles long, but very narrow and surrounded by steep and high mountains, it enters Siberia (near 93° E. long.), where it is called Yeneseï. Here it flows at first nearly due north, through the extensive vale which bears its name, and extends 350 miles from south to north. In this valley its waters are increased by those of numerous small rivers, which descend from the declivities of the mountain ranges which border the valley. None of them however are navigable, with the exception of the Abakan, which may be navigated by small river-boats as far as Abakansk. The Yenesei becomes navigable before it joins this river, at the town of Seyansk. Before the river leaves the vale it turns eastwards, washes the walls of the town of Krasnoyark and afterwards flowing northward, soon leaves the mountains and enters the plains of Northern Siberia. Here it is soon joined from the east by the Upper Toongooska, a river much larger than the Yeneseï at their junction, which brings to it the drainage of a country more than three times as large as that which previously has sent its drainage to that river.

The remotest branch of the *Upper Toongooska* is the Selenga, which rises south of the most remote branches of the Yeneseï, on the eastern declivities of the Tangnu Oöla [Altai Mountains, vol. i., p. 398], and runs more than 450 miles in an eastern direction within the Chinese empire, where it is joined by two considerable tributaries, the Ekhe, which rises in the lake of Kossogol, on the southern declivity of the Erghik Targak Taïga Mountains, and runs nearly parallel to the Selenga; and the Orghon, which originates in the Khangai Mountains of the Gobi, and runs from south to north. At the confluence of the last-mentioned tributary the Selenga turns to the north, and soon enters Siberia, where it is joined from the east by the rivers Chikoï, Khilok, and Uda; it falls into the Lake of Baikal after a course of about 700 miles. About 18 miles from the lake the river divides into twelve arms, which enclose a delta: the two extreme branches are 20 miles distant from one another at their mouths. Only the central one, called Serednye Ustie, is used by the vessels that ascend to the town of Selenginsk. Besides the waters of the Selenga, which drains an area of more than 140,000 square miles, the Lake of Baikal receives several considerable rivers from the east, among which the Barguzin and the Upper Angara are the largest. [Baikal.] According to Erman, the surface of the lake is only 1350 feet above the sea-level. Its only outlet is the Lower Angara, which leaves the lake not far from its western extremity, and on the northern side. This river runs in a narrow valley enclosed by high rocks, in a nearly northern course, through the Baikal Mountains to the town of Irkutsk. This part of its course is very rapid, as it descends 110 feet in 40 miles, measured along the windings of the river, though not 25 miles in a straight line. Below Irkutsk the current gradually decreases in rapidity; but there occur several small rapids as far as the river runs north. During this northern course it is joined from the west by the river Oka; and from the place of their junction, the name of Lower Angara is changed into that of Upper Toongooska. The lower course of this river lies from east to west between 58° and 59° N. lat.; and before it joins the Yeneseï, it receives from the south the river Choona, which flows more than 300 miles, and rises in the Erghik Targak Taïga Mountains.

The Yeneseï river, after being joined by the Upper Toongooska, runs north-west until it has crossed 60° N. lat. A little below the town of Yeneseïsk it receives from the left the Kem, a small river, which is however important as a link of the extensive line of water-communication which extends from the boundary of the Chinese empire, south of the Lake of Baikal, to the base of the Ural Mountains. The Kem generally runs parallel to the Yeneseï, but towards its mouth it turns east: it is navigable for about 30 miles from its junction with the Yeneseï. North of 60° N. lat. the Yeneseï flows due north, sometimes to the east and sometimes to the west of 90° E. long., until it approaches 69° N. lat., when it turns north-west; and before it reaches 70° N. lat. it enlarges into a wide æstuary full of low islands and shoals, which is called the Gulf of Yeneseï. This gulf is on an average 20 miles wide, and more than 200 miles long In its lower course the river is joined by several large rivers, especially from the east, among which the most extensive are the Middle Toongooska, called also Podkamenaïa Toongooska, from a lake of that name which the Yeneseï forms a little above its confluence with that river; and the Lower Toongooska. These rivers are navigable, though they are never navigated, as they traverse a country whose inhabitants have no occasion for navigation. They were however navigated by those Russians who subjected this part of Siberia to the sway of the emperor. The river Yeneseï freezes towards its mouth about the 10th of October, and the ice does not thaw before the beginning of June.

The length of the course of the *Lena* is about 2000 miles, and the basin is estimated to contain nearly 800,000 square miles. This river rises in the Baïkal Mountains [Baikalian Mountains], hardly more than 20 miles from the banks of Lake Baïkal, and about 50 miles north-east of Irkutsk. It becomes navigable 50 miles from its source, at Kotshuga, a large village, which from this circumstance has become the depôt of goods destined for the north-eastern part of Siberia and for the Russian settlements in North America. The river runs in a northern direction to Ust Kutsk, and then to the north-east, until it has passed 60° N. lat., when it turns east, and continues so to Olekminsk. From this place to Yakutsk it flows east-north-east; and from Yakutsk to 65° N. lat., north-west. The remainder of its course is nearly due north. North of 70° N. lat. it enlarges to three or four miles in width; and at its mouth forms a delta, which projects into the sea, like that of the river Maekhaun, in the peninsula beyond the Ganges. This delta is traversed by several arms of the river, three of which form navigable channels: the western is called Krestovskoi, the central one Toomatskoi, and the eastern Bukooskoi. These channels are wide, but full of shoals. The Lena freezes over in the beginning of September, and is hardly free from ice before midsummer. Among the tributaries of the Lena are some very large rivers. The Vitima, which joins it from the right, south of 60° N. lat., drains the elevated table-land east of the Lake of Baïkal, originating on the northern slope of the Yablonoï Khrebet, not far from the banks of the Ingoda, a branch of the Shilka. It first runs north-east, then north, afterwards nearly west, and again north: its course exceeds 700 miles. It is navigable to a considerable distance from its mouth. Farther east the Lena is joined by the Olekma, which falls into it nearly opposite Olekminsk. The Olekma originates likewise in the Yablonoï Khrebet, between 118° and 120° E. long., and has a northern course. It runs about 500 miles, and does not appear to be navigated: the country on its banks is covered with interminable forests, and no part of it is cultivated. The third confluent which joins the Lena from the right is the Aldan, which drains the eastern part of the elevated table-land, and receives all the waters which collect on it between 125° and 140° E. long. That branch which, from its source, is called Aldan, rises on the Yablonoï Khrebet, between 127° and 128° E. long., and runs to the north-east nearly 400 miles, receiving from the right a considerable tributary, the Maya. It then turns north, and after flowing more than 100 miles in that direction, it has a west course, until it reaches the Lena about 60 miles below Yakutsk. The lower course of the Aldan is certainly navigable, but it does not appear to be navigated. Only one large river joins the Lena from the west: this is the Vilui, which rises not far from the banks of the Lower Toongooska, near 107° E. long. and 63° N. lat., and falls into the Lena near 64° N. lat. and 128° E. long., after a course of 600 miles, running nearly always parallel to the middle course of the Lena. It does not appear to be navigated, nor is there at present any occasion for it.

Besides these large rivers, there are others of less magnitude, but still so large that they would be considered important in any other country. Two such rivers fall into the Polar Sea between the mouth of the Yeneseï and the Lena, the Anakara and Olenek. The first runs more than 500 miles, and the last above 700. East of the mouth of the Lena are those of the rivers Yana, Indighirka, and Kolyma. The Yana flows 500, and the two last-mentioned rivers each 700 miles. All these rivers are navigable, and of importance for the country, as the two greatest necessaries of life, corn and salt, are brought by them from the southern districts of Siberia to the most northern parts. The Kolyma is so favourable to easy navigation, that in 1786 two large vessels were built at Verkhnei Kolymsk, nearly 500 miles from the mouth of the river, and were brought down to the sea with the greatest ease. All these rivers abound in different kinds of fish during the summer.

The Anadyr, or Anadir, falls into the sea of Okhotsk; and so does the Amur, whose northern branches traverse that part of Siberia which lies south of the Yablonoï Khrebet. [Anadyr; Amur.] We must still notice the small river Ud, which falls into the Sea of Okhotsk near 55° N. lat., and which attracted attention some years ago, when it was proposed to remove to its mouth the town of Okhotsk and its commerce, as the harbour of Okhotsk has changed so much as not to admit large vessels. [Okhotsk.] It is said that the entrance of the river Ud forms a safe harbour, and that another good anchorage is found among the Shantar Islands, which are opposite to the mouth of the Ud.

Productions.—The domestic animals vary greatly in size and form in different districts. This is especially the case with horses and sheep. Among the latter, the sheep kept by the Khirghis Cossacks, in the Steppe of Ishim, are distinguished by their thick tails and fine wool: all attempts to transport this species to other parts of Siberia have failed. In 1830 some landed proprietors in the neighbourhood of Irkutsk introduced Spanish sheep, for the purpose of improving the wool of the native sheep.

Siberia is very rich in metals. There are three extensive mining-districts. The most western comprehends the mines of the Ural Mountains. On the eastern declivity of that range the mines occur between 56° and 60° N. lat., where they occupy a tract of land about 40 miles in width. These mines yield great quantities of iron, gold, and copper: there is also some silver and platinum. A silver-mine near Verkhnei Toorinsk was worked some years ago; but the works were discontinued only because the workmen could be employed more advantageously in working the gold-mines. Gold is very abundant in this tract, and is obtained either by regular mining, or by washing the alluvial soil, which contains it in very small grains. In some places platinum is united with the gold. Iron and copper mines are numerous, and the produce is abundant. It is impossible to separate the produce of the mines situated in Siberia from those which are found on the western declivity of the Ural Mountains, as the produce of both is mixed up in the accounts which are published. According to these accounts, the whole mass of iron annually procured from the Ural mines amounts to 7,400,000 poods, or 286,000 hundredweight; and that of copper to 183,000 poods, or 73,200 hundredweight. The annual produce of iron is estimated at 15,000,000 rubles, or 625,000*l.*; and that of copper at 5,490,000 rubles, or 228,750*l.* The produce of gold and platinum was valued at 15,000,000 rubles, or 625,000*l.*, twelve years ago The whole produce of the Ural mines amounted therefore to 1,478,750*l.*, of which perhaps one-half was got from the eastern declivity of the mountains; for though the mines of iron and copper are much more numerous on the west side of the range, all the gold and a great part of the platinum were got on the east.

The second mining-district is that of Bernaul. The mines yield much silver and copper, but less gold and lead. The mines from which these metals are obtained lie mostly in the Altai Mountains and in those valleys which open to the Irtish river. Those which are within the range of the mountain system have been noticed in Altai Mountains, vol. i., 397. To complete this list we shall add that others, called the mines of Salairsk, are situated far to the north of the mountains, north-west of Kooznesk, and north-east of Bernaul. They are very rich in copper-ore; but the ore is poor, and would hardly pay the expense of working if the ore were not very fusible. The northern offsets of the mountains of Teletzkoi, especially the Kemchugk range and the Kooznesk Mountain, near the source of the Tom river, are rich in iron-ore, which, having been neglected, or abandoned to some families of Tartars, appear to have come into notice lately, as it is stated that their produce, which is brought to Kooznesk, had risen some years ago to 60,000 poods, or 24,000 hundredweight. We have no account of the produce of the copper and lead mines. That of the first-mentioned metal must be considerable, as copper coin is annually produced in the Mint of Susank to the amount of 250,000 rubles. The annual produce of the silver-mines from the beginning of this century has constantly been about 72,000 marcs: and there were also obtained from them, between 1799 and 1809, 1470 marcs of gold annually. The produce of the gold has increased lately, as earth has been found which contains small particles of gold, from which it is obtained by washing.

The third mining-district is that of Nertshinsk, which is situated on the east of the Yablonoï Khrebet, in the basin of the river Amur. No mines are worked on the west of the rivers Onon and Shilka, and it does not appear that metals occur in these districts, with the exception of gold, which has been recently met with in small particles. The mines which are worked occur in the low ranges between the Onon and Shilka on the east, and the Argun river on the west. All of them contain lead, and most of them also silver and zinc. The produce of lead amounts annually to 35,000 poods, or 14,200 hundredweight. This gives to the mines of Nertshinsk some importance, as no lead is found in the Ural range, and not much in the Altai Mountains. From these mines also about 390 poods of silver, 4 poods of gold, and 40,000 poods of iron are produced. In 1812 it was discovered that near the southern extremity of these mountains, where they border on the Gobi, rich deposits of tin exist; and they have begun to be worked, but nothing is known of their produce. Antimony and arsenic also exist in this country. There are some iron-mines in the valley of the river Vilui; and it is stated that this metal is found there nearly in a pure state, which is rendered probable by the circumstance that the Yakutes work the mines, and bring their produce to the town of Yakutsk. This iron is stated to be very malleable.

The western parts of Siberia get the salt which is required for their consumption from the salt lakes in the steppes of Ishim and Barabinsk, in some of which the salt crystallizes spontaneously. Two lakes of this kind occur also in the vale of the Yeneseï, on the western declivity of the Teletzkoi Mountains; one of them gives an annual produce of 130,000 poods. The countries bordering on the river Lena obtain salt partly from some salt-springs which occur in the vicinity of the town of Ust Kutsk, and partly from the river Vilui, where, according to Erman, there are some lakes in which the salt crystallizes, and he adds that from the same country rock-salt is brought to Yakutsk. Da-uria obtains its salt from one of the lakes of the Gobi, called Dabassunei Lake, not far from that of Khara. Several kinds of precious stones occur in Siberia, and diamonds have been found along the eastern declivity of the Uralian range. The amethysts, topazes, emeralds, and red turmalines are of great beauty; zircons of extraordinary size have been found near Miask, south of Ekatarinburg. Several precious stones are brought from the Altai Mountains, the most valuable of which are jasper and porphyry of great beauty, of which a quarry is worked nearly in the centre of the Altai Mountains, in the valley of the river Charysh. The mountains of Da-uria contain beryls, topazes, emeralds, and some other stones of less value. In the Baikal Mountains, especially towards the western extremity of the lake, lapis-lazuli of a very fine quality is found. The most important of these minerals for domestic economy is a kind of mica, which divides into flat pieces like glass, and is extensively used all over Siberia and even in European Russia for windows. This mineral occurs in several places in Eastern Siberia, but the most extensive deposits are on the banks of the river Vitima, about 150 miles from its mouth, whence large quantities of it are annually taken. It is called Russian glass.

The tusks of the fossil elephant constitute an article of commerce, and many persons make the discovery of them the business of their life. [ELEPHANT, vol. ix., p. 352.] These fossil bones of the elephant, mixed with those of many other animals, such as the rhinoceros, are very rare in the southern districts of Siberia, nor are they found everywhere in the northern districts. They are deposited in immense masses, which occur more frequently and are of larger extent as we proceed from south to north. The greatest number of these bones are brought from the Laikhovian Islands, but they are also numerous in the north-eastern part of Siberia east of the river Lena. They are generally found at a certain depth, mostly in hills of clay, rarely in mould, and never in sand. The harder and more consistent the clay is, the better the bones are preserved. Where the clay hills are sheltered by more elevated ground, the bones occur in much greater numbers than on the flat shores or on the level tundras. Those who are occupied in finding them follow the banks of the rivers after the inundations of the spring have subsided. The rapid course of the rivers during the inundations undermines part of the high banks, and thus the bones which are imbedded in them are brought to light. Several hundred poods of bones are annually collected.

Inhabitants.—When the Russians first entered Siberia, they found the country in possession of numerous tribes more or less addicted to a nomadic life; none of them cultivated the ground, and they had no permanent places of abode, with the exception of some Tartars in the vicinity of Tobolsk. Some of these tribes belonged to widely-spread nations, but others, often consisting of a small number of families, constituted separate nations. The small number of individuals in the several tribes rendered them unable to make effectual resistance to the Russians, who gradually subjugated this immense country. In this struggle some of the smaller tribes seem to have entirely disappeared, or perhaps a remnant of them united itself to some neighbouring tribe, and was gradually incorporated. The Yakutes on the Kolyma river preserve a tradition that the country on both sides of that river was once inhabited by a nation called Omoki, which left that country and emigrated westward; but there seem to have been no traces of this tribe when the Russians took possession of Siberia. Though it is certain that several tribes or nations have disappeared, there are still about thirty tribes, differing more or less in physical character and in language. Some of them belong to the Caucasian race, and others are akin to the Mongols. In noticing these tribes, we begin from the Ural Mountains and proceed eastward.

The most north-western part of Siberia is occupied by the Samoyedes. [SAMOYEDES.] South of the Samoyedes are the Ostiaks, who occupy both banks of the river Obi from Obdursk upwards to the confluence of that river with the Irtish, and even south of this place there are some families. They do not seem to extend on the west to the Ural Mountains, as that part of Siberia is in possession of the Vogules; but they occupy the northern districts of the steppe of Barabinza, as far south as 60° N. lat. Eastward they are spread over the whole of the wooded region to the banks of the Yeneseï. They are described as being of rather low stature and feeble; the lower limbs are very thin. The face is pale, and flat, and without any characteristic feature. The hair generally approaches to red, or at least is light. Their language shows their kindred with the Finns, and in one-third of the words which he collected, Erman found that the roots occurred in the language of the Hungarians. As however this nation is spread over an immense tract of country, there is some difference between the language of those who live north of Berezow and those who occupy the banks of the Obi before its confluence with the Irtish. The first dialect is called *Nisovi*, and the second *Verkhovi*. In the latter a great number of words occur which are derived from the languages of the Vogules and Tartars, who live to the west and south of them. The Ostiaks derive their subsistence chiefly from their fishing in the rivers, and are exclusively occupied in this way during the summer. In winter they hunt the wild animals, especially reindeer and elks, and also bears, foxes, and squirrels. Dogs are the only domestic animals that they keep, and they use them in winter for drawing their sledges. For more than a century a portion of them have been converted to Christianity, but it is stated that they still adhere to most of their heathen practices. The majority are still addicted to that religious worship which is known by the name of Shamanism. The priests are very expert jugglers, and their dignity is hereditary. The number of Ostiaks, some thirty years ago, was estimated at 100,000 individuals; but Erman was informed that their number was decreasing, which is probably to be attributed to the circumstance that the Russians, who have settled in their country, have found the means of occupying the best fishing-places. The fur dresses made by them of reindeer skins, and their boots, which are made of the skin taken from the legs of these animals and cut into thongs, are much valued, and are an article of export. The boots are much used in European Russia.

The Vogules live to the west of the Ostiaks, occupying the woods, and the mountains, valleys, and plains included within the Ural range and its declivities; they are even in possession of a narrow level tract along their base. In the plain they are found as far southward as the Toora. They are noticed under RUSSIA [vol. xx., p. 247].

In the agricultural district which extends south of the country occupied by the Vogules and Ostiaks, the population consists of Russians and Tartars, and in most parts the latter are more numerous. The Tartars settled in these countries before the Russians took possession of them, and they are distinguished by several names. Those who live on the west of the Tobol are called Tooralinzes. They resemble in their habits the Tartars of Kasan [RUSSIA, vol. xx., p. 247], but in their features they approach nearer to the Mongol race. Though the basis of their language is Turkish, many words of Russian or Vogulian origin are mixed with it. They are chiefly occupied in agriculture and the rearing of cattle; in winter they hunt the wild animals of the forests. They have been converted to Christianity, but it is said that by this conversion they have partly lost that degree of civilization which the Tartars of Kasan, who have adhered to the Islam, have preserved to the present day. The Tartars who live east of the river Tobol as far as the banks of the Irtish, are known by the name of Tartars of Tobolsk. They are distinguished from their western neighbours by having adhered to the Islam, and by their fondness for travelling: hardly a caravan goes to Bokhara of which they are not the leaders. The Barabinzes, another tribe of Tartars, inhabit the steppe which bears their name. They seem to have made less progress in agriculture, and to have retired to the wooded northern regions of the steppe, where they cultivate small spots, and chiefly live on the produce of the chase. The most eastern of their tribes inhabit the mountains of Kooznesk, and are called Koosnezi, that is, smiths, on account of their occupation. They unite agriculture with mining, and produce annually a large quantity of iron, though in a very clumsy way. The number of Tartars in all these parts probably exceeds 120,000. A considerable number of Bokharians have settled among the Russians and Tartars. It appears that some of them emigrated before the Russians had taken possession of the country, and most of these families have adopted the manners of the Tartars, and at present can hardly be distinguished from them. They have however preserved their own language, and many of them are employed as interpreters in the commercial intercourse between the Russians and the merchants of Bokhara who visit Siberia. Others are merchants themselves.

The Bashkires are noticed under RUSSIA [vol. xx., 248]. We shall here only observe that this tribe is not found north of Ekatarinburg, but that between this place and Slatoust they constitute the bulk of the population. Between Slatoust and Troisk many families of Chuvashes, Teptiares, and Metsheriakes [vol. xx., 247 and 248] are settled among them. It is however observed that the Bashkires do not live near the base of the Ural Mountains, but always at some distance from them. Though this nation is numerous on both sides of the range, the range itself is occuried by Russian and Tartarian families.

The Khirghis Cossacks, commonly called Kirghises, are one of the widest-spread nations in Asia, nearly the whole of the Caspian Desert being in their possession. Though a considerable portion of this nation is in some degree dependent on Russia, and another portion on China, their dependence is rather nominal than real, and their country is considered a part of TURKISTAN. We add here a few observations on their relation to the Russian government. That part of their country which is contiguous to the Ishim line of fortifications is inhabited by the Middle Orda. Internal discord, civil wars, and the growing power of the Soongares [SOONGARIA] had thrown the different tribes of this orda into such disorder, that in 1732 some of their princes submitted to the sway of Russia, but they continued their predatory incursions into the south-western parts of Siberia, and did not pay any tribute. After the downfall of the power of the Soongares (1756), they took the oath of allegiance to the Chinese emperor; and one of their sovereigns, Ablai, relying on the assistance of both emperors, tried to increase his influence on the orda, and to have the whole power in his hands, and it seems that he nearly succeeded in obtaining his end. About that time the Kirghis ceased to be troublesome to the inhabitants of Siberia; and when the death of Ablai (1795) was followed by new dissensions among the chiefs of the orda, Russia was enabled to increase its influence over them. It was then agreed that the khan or sovereign of the nation should not be considered as such till he was recognised by the Russian government. In 1823, at the request of the Khirghis, Russia established an agricultural settlement at Kar-Karaly, not far from the norther declivity of the Ulutan Mountains (near 50° N. lat. and 75° E. long.), and it then succeeded in forming a kind of central government among them. The families and tribes which have submitted to Russia are divided into *aules* and *volostes*, and form together an *okrughi*. Each aule is governed by the elders of the families that compose it, and each voloste is managed by a chief called sultan. But the supreme authority of the okrughi is vested in a divan or *prikas*, at the head of which an old sultan is placed, and which consists of two deputies sent from Petersburg, and of two others chosen by the Khirghis themselves. The president of the prikas is also chosen by the Khirghis for three years, and is paid by the Russian government. To ensure obedience to the decisions of the prikas, the Russians have placed 200 Cossacks and 40 infantry, with a few pieces of artillery, at Kar-Karaly; and some Cossacks are stationed on the road which leads from this settlement to Semiyarsk on the Irtish, to maintain the communication between these two places. The Middle Orda is stated to be composed of 210,000 kibitkas, or families, but probably less than one-half of them have submitted to Russia.

The interior of the Altai Mountains is inhabited by a tribe of Calmucks, who are called the Calmuck mountaineers. They are found in the upper valley of the Charysh river, in the valleys of the different upper branches of the Katunga, and as far east as the banks of the Choolyshman. Those who inhabit the eastern districts, namely the valleys of the Chooya, Bashkaus, and Choolyshman, pay tribute both to the emperor of China and of Russia. Pallas was of opinion that they were a mixture of Khirghis Cossacks and Calmucks, but modern travellers find in them the true physiognomy of the Calmucks. They lead a wandering life, and live chiefly on the produce of their horses, cattle, and sheep; in some places they have also camels. In winter they hunt the wild animals of their forests. On the banks of the river Choolyshman they cultivate barley, tobacco, and a little wheat. In summer they live with their herds on the higher declivities of the mountains, and in winter they descend to the wide and flat valleys which are so common in that part of the Altai Mountains. They are acquainted with the working of iron, and they make their own guns, and the pipes that they use, which are also of iron. They also make iron balls for their guns, and their own powder. According to their statement, saltpetre and sulphur are found in their country. They do not, like the other tribes of the Calmucks, adhere to Buddhism, but they are still heathens. A few of them who have settled in the vicinity of Biysh on the Obi have embraced Christianity, and they cultivate the ground. The number of Calmuck families in the Altai Mountains, in 1816, was stated at 1500, but their pasture-grounds begin to decrease on account of the agricultural settlements of the Russians, which increase rapidly, and advance farther into the valleys.

The nations hitherto noticed occupy extensive tracts of country; but between the lakes of Teletskoi and the neighbourhood of Irkutsk there is a number of small tribes: the most eastern of them are the Telesses or Telengutes, who occupy the western declivities and valleys of the mountains of Teletskoi, which terminate on the eastern banks of the lake of Teletskoi, and the mountains which extend from the northern extremity of the lake along the eastern banks of the Biya as far north as the range which is known by the name of Kuznesk or Salaïrsk Mountains, in which the Tom river originates. It was formerly thought that this tribe, which was well known two centuries ago, had become extinct, but a modern traveller has found that they still occupy these places to the exclusion of all other nations; but their number is very small. If we may judge from their physical character and their language, they belong to the Turkish nations. They live in the mountain valleys, chiefly on the produce of their herds of cattle and horses, and partly by hunting the wild animals. Their religion is Shamanism.

On the eastern declivities of the mountains of Teletzkoi there are four nations of Turkish origin; the Biryusses, the Beltires, the Sagaï, and the Katshinzes. These tribes are in possession of the mountains and adjacent country as far east as the banks of the river Abakan, an affluent of the Yeneseï. The most southern tribe, which approaches the source of the Akaban, but extends nearly to 53° N. lat., are the Biryusses. Formerly they lived entirely in the mountains, but now they descend to the valleys, where they have fine meadows along the river, and cultivate rye and barley. Though they have cattle and sheep, they still are much given to hunting, and their country abounds in elks, deer, wild hogs, sables, lynxes, beavers, otters, gluttons, and squirrels. A few of them have become Christians, but the larger number are stated to adhere to Shamanism. North of them live the Beltires and Sagaï, two small tribes which seem to live together. Their physiognomy proves their true Turkish origin; though their language contains Mongol roots, and their pronunciation differs considerably from that of the Tartars. They live principally on the produce of their herds of cattle and horses, both of which domestic animals are distinguished by their size. They pass the summer on the mountains, but in winter they occupy with their herds the western banks of the Abakan. The Beltires have made some progress in cultivating grain, especially summer-rye and barley. The Sagaï do not cultivate the ground, but use as food several roots which grow spontaneously in the mountain-tract. They have been baptized, but the shamans appear to have preserved their authority among them.

The most northern of these Turkish tribes are the Katshinzes, who occupy the country along the banks of the two rivers called Yoos, and extend eastward to the banks of the Yeneseï. The greater part of their country is a fine prairie covered with a thick turf, and enjoying a mild climate. On these natural meadows the cattle find pasture all the year round, as the quantity of snow which falls is far from being great. Their language also contains many Mongol words, and approaches that of the Yakutes. As their country does not abound in animals, they derive their subsistence from the large herds of cattle and horses. The cattle are large, but the horses are small. They also keep many of the large-tailed sheep. Cultivation, which was introduced among them about one hundred years ago, seems to have made some progress. They sow Siberian buckwheat and barley. Only a small number of them, who have settled as agriculturists on the banks of the Choolym, have embraced Christianity; the others adhere to Shamanism.

Between the rivers Abakan and Yeneseï are the Koibales, and many families belonging to this tribe are found east of the last-mentioned river, under the name of Motores and Kandym. Their face resembles that of the Toongoses, being flat and round. Pallas considers them to be the principal stock of the Samoyedes, and thinks that those tribes of Samoyedes which are at present found along the Polar Sea [SAMOYEDES] were at a remote period separated from them. All of them have embraced Christianity, but they have preserved the shamans. They are an industrious race, having adopted agriculture and the use of the plough; but they still consider their cattle, horses, and sheep as their principal wealth. They also keep some camels. The Koibales are excellent hunters, and their country abounds in elks, deer of several kinds, sables, beavers, otters, lynxes, and squirrels. This tribe alone manufacture the wild hemp and flax which grows in these parts of Siberia. They make ropes of it.

In the mountains which divide the valley of the Yeneseï from the plain of the Lower Angara there are several tribes allied to the Koibales in origin and language. The most northern, on the banks of the river Kam, are called Kamashes, and south-east of them, on the Uda, are the Karakas and Kangut. These two tribes do not cultivate the ground to any great extent, nor have they large herds, except of reindeer; but their country abounds in wild animals, and the skins of their sables are much valued. They still adhere to Shamanism. Four small tribes inhabit the northern declivity of the Erghik Targak Taïga Mountains. They are called by the Russians Silpigursk, Udinsk, Karagansk, and Kamgatsk. The last-mentioned tribe is said to be of Turkish origin, but the others are Samoyedes. They have herds of reindeer, but principally live by the chase.

In the undulating country which lies between the lower course of the river Choona, an affluent of the Upper Toongooska, and the Yeneseï, are the Yarinzes, whose language shows that they also belong to the Samoyedes. They are chiefly agriculturists, and pay great attention to the rearing of cattle. Their number is small.

Nearly contiguous to this country, but on the western side of the river Yeneseï, and north of the town of Yeniseïsk, are the Kasuimskie Ostiaks, also called the Ostiaks of the Yenesei. This tribe differs greatly in physical character as well as in language from the Ostiaks on the river Obi, and in both respects approaches closely to the Samoyedes, and especially to the Yarinzes. Their country is unfit for agriculture, and they are chiefly occupied in fishing, but they keep many reindeer, and hunt the wild animals with which their country abounds. This is the most northern of the southern tribes which are of Samoyede origin, but even their most northern settlements are still more than 700 miles distant from the countries that are inhabited by the northern Samoyedes.

The most populous of all the nations that inhabit Siberia, next to the Russian, are the Buriates, who occupy the country on both sides of the Lake of Baikal, and extend towards the east as far as the western banks of the river Onon. An account of this great division of the Mongolic nation is given under BURIATES. It is now quite certain that their priests have a very rich literature, mostly on the subjects of Buddhism, which a great part of the Buriates have embraced, but the classical sacred books are written in Sanscrit. South of the Buriates, along the very boundary-line of the Chinese empire, between the rivers Selenga and Onon, a small number of Khalkas Mongols are settled.

The most widely dispersed of the native nations of Siberia are the Toongooses. They occur even in Da-uria, particularly between the Onon and Argun, and the northern districts of Mandshooria are also peopled with them. In these parts they unite agriculture with the keeping of animals, especially the reindeer. Farther north they are in possession of the country that encloses the Lake of Baikal on the north, and hence they extend to the Polar Sea. On the shores of this sea they are found from the Choun Bay on the east (170° E. long.) to the Gulf of Katunga (110° E. long.). Along the banks of the river Yeneseï they are found from some distance below Toorookhansk upward to the mouth of the Upper Toongooska, and along the shores of the Sea of Okhotsk from the boundary-line of the Chinese empire to the town of Okhotsk. Some parts of this extensive country are exclusively occupied by them; in other parts they are found by the side of the Yakutes, Yookahires, and Choowanzes. Those who live along the Sea of Okhotsk are called Lamootes, a word which signifies 'inhabitants of the shore.' Another numerous tribe which occupies the country east of the Yeneseï in the vicinity of Yeneseïsk is named Chapogires. The Toongooses are considered as the best formed of the native tribes of Siberia. They are generally of middling size, of a fine shape, and slender. Their face is less flat than that of the Mongols, their eyes small and lively, and their nose well formed, though rather small. Many of them have no beard, and the rest have very little. Their hair is black and lank, and rarely grows grey in old age. They are most accomplished horsemen. Though widely spread over an immense country, the language of the most distant tribes of the Toongooses is said to differ very little, and to agree with that of the Mandshoo. Many roots are found in the Mongolic and Turkish languages, and even in some of the languages of Europe, especially the Slavonian and Finnish. With the exception of those who live in Da-uria, the Toongooses do not cultivate the ground, but live partly by their herds of reindeer and sheep. In the southern districts they have also horses, but not cattle. They are very skilful hunters. When they have lost their reindeer and sheep by any misfortune, they settle on the banks of the rivers and gain their livelihood by fishing, but do not generally change their abode, which is the case with all the others. The Toongooses have acquired some skill in working iron and in tanning. Their religion is Shamanism

The Yakutes, the most populous of the nations of Eastern Siberia except the Buriates, live in the country which is inhabited by the Toongooses. But the Yakutes are almost entirely occupied with the care of their herds of cattle and horses. They do not keep reindeer, and they neglect both the chase and fishing, except a few families, who by some chance are settled in such parts as have no pasture-ground. As the rearing of cattle and horses, and the dairy, almost entirely engross their attention, the bulk of this tribe is found in the vicinity of the town of Yakutsk, which has derived its name from them, where an extensive country with a fertile soil is found between the Lower Aldan and the Lena, and along the banks of the river Vilui. Many families in these parts possess several hundreds and even thousands of cattle; but in other parts also they have taken possession of all the tracts which can be converted into pasture-grounds as far north as 66°. Some families are met with even on the shores of the Polar Sea, but they obtain their subsistence by fishing and hunting. The Yakutes are Turks, as is proved by comparing their language with that of the Tartars of Tobolsk. Erman, who has investigated this point, found that of 297 words of the Yakute language, only 114 did not occur in the dictionary of the Turkish language of the Tartars, and he thinks that it can hardly be doubted that a Yakut born on the Aldan could make himself understood by an Osmanli of Constantinople. The number of roots which the Yakute language has in common with the Mongol languages seems to be small. As many of the Yakutes are wealthy, they begin to pay some attention to the education of their children. They appear also to have attained a considerable degree of skill in tanning, and in working iron, which they get from the mines on the upper course of the river Vilui. Towards the end of the last century, as appears from Sauer, the Yakutes still adhered to Shamanism; but if we may judge from what is said by Erman, those at least in the vicinity of Yakutsk have been converted to Christianity.

The Yookahires are only found north of the polar circle, and mostly in parts where the wooded regions border on the tundras. They only live east of the Lena, and as far as the vicinity of Choun Bay. The unsuccessful wars with the Tshooktshes have much reduced their numbers. They have lost most of their herds of reindeer, and have been obliged to turn hunters, and gain chiefly their subsistence by the chase of the wild reindeer and the wild geese, which are more numerous here than in any other part of the world. The Yookahires have black eyes, dark hair, and rather long but regular features. They are extremely fair; and a modern writer says that they resemble the Russians, whose language is generally spoken among them. They live in tolerably large houses, built of timber, and do not wander about, as the animals which supply them with food pass through the places inhabited by them twice a year. In winter they hunt sables, ermines, gluttons, and foxes; the sable is still numerous in these parts, and its skin is much valued. In some places where their settlements are distant from those of the Russians, they still speak their own language. By these the Shamans are still considered as priests, but in the vicinity of the Russian settlements only as jugglers. The tribe of the Choowanzes have been almost destroyed in their wars with the Tshooktshes and the few families still remaining have united with the Yookahires.

The Tshooktshes occupy the most north-eastern peninsula of Asia. To the west this tribe is met with as far as Choun Bay, and southward they are in possession of the whole basin of the Anadyr river. They do not pay any tribute to the Russians, except a small contribution to maintain the fair at Ostrownoye, which is numerously attended by them. The Russians do not consider them as subjects of their emperor, and the Tshooktshes are very jealous of their independence. On this account they do not easily permit Europeans to enter their country.

This country appears to be inhabited by two tribes, different in language and in physical character, as well as in their mode of living. One of these tribes, which is called the *sedentary* Tshooktshes, on account of their having fixed habitations, speak a dialect of the language of the Esquimaux, whom they also resemble in person. They occupy the coast, and live on the produce of their fishing. The others are the nomadic Tshooktshes, who constitute one nation with their neighbours the Koriakes. They differ from the sedentary Tshooktshes in their stature and features. Cook probably saw them, when he says in his last voyage, that the natives of America which he had seen before were rather low in stature, with round chubby faces and high cheek-bones, whilst the Tshooktshes have long visages, and are stout and well made. This tribe lives for the greater part of the year in the interior, where they find pasture for their large herds of reindeer on the mountains and in the swampy places, but are frequently obliged to change their place of abode.

These two tribes live in peace, and a considerable intercourse exists between them. The sedentary Tshooktshes exchange the produce of their fishery, namely, the flesh and ribs of the whales, the thongs of the skin of the morse, and train-oil, for the skins of reindeer and dresses made of this material.

As their country is generally destitute of trees, they pour train-oil on the bones of the whale, and use them as fuel. No drift-wood is found on the coast inhabited by the Tshooktshes. The whales only are found in abundance along the coast of the Polar Sea as far west as the island of Koliutshin: they are much more rare between that island and Cape Shelagskoi, and they do not occur west of this cape. This is partly also the case with the morse and seal, and for that reason the eastern part of the coast which is inhabited by the Tshooktshes is much more populous than the western. The sedentary Tshooktshes also kill common bears, white bears, and polar foxes, but in general they are not much given to hunting, though their country abounds in wild animals, especially reindeer and argali; but they are merchants. The nomadic Tshooktshes live on the produce of their reindeer alone. There exists among the Tshooktshes an hereditary slavery. The slaves are found in the rich families, and are not permitted to leave them; they cannot acquire property, and are employed in the meanest and most difficult labour. The Tshooktshes themselves are not able to give any account of the origin of this slavery. These tribes still adhere to Shamanism. In the country of the Tshooktshes, on the Bay of Anadyr, there is still a small remnant of a tribe, called Onkilon, which is little known, but is stated to resemble the Esquimaux in stature and language.

The Koriakes inhabit the northern part of the peninsula of Kamtchatka and the country about the gulfs of Penshinsk and Ishiginsk, as well as the mountains of Stanovoï Khrebet. They differ greatly from the Tshooktshes, being short, and having a small head, a short nose, and a very large mouth. Their hair is black, and their beard very thin, but the eye-brows very long. They are said to speak three different dialects, one of which is also used by the Tshooktshes. Like the Tshooktshes, they are divided into two classes, maritime and nomadic Koriakes, but it is said that both of them are inferior to their neighbours in strength of body as well as in their mental faculties. They also adhere to Shamanism. The peninsula of Kamtchatka is inhabited by Kamtchatdales. [KAMTCHATKA.]

Population.—The population of Siberia is now estimated at more than two millions and a half, exclusive of the Middle Orda of the Khirghis Cossacks, which is computed at more than a million of individuals, in 210,000 families or kibitkas. [RUSSIA, vol. xx., p. 257.] But this population is very unequally distributed over the surface of the country. Even the most populous districts, namely, the agricultural region in Western Siberia, the vale of the river Yeneseï in Central Siberia, and the plain of the Lower Angara, would be considered very thinly peopled in any part of Europe, but they are thickly inhabited when compared with other parts of Siberia, where several tracts occur extending over a surface of from 20,000 to 30,000 square miles, which are entirely uninhabited, as for instance the country south and north of the Verkhnei Yansk Mountains. In other places a few families live at the distance of one or two days' journey from one another.

The majority of the present inhabitants are Russians; all the other tribes do not yet amount to one million. According to an estimate made about 50 years ago, the population of these tribes was as follows:—

Samoyedes	24,000
Ostiaks of the Obi . .	66,000
Vogules	11,000
Bashkires and Choowashes .	3,000
Tooralinzes	80,000
Tartars of the Tobolsk . .	18,000
Barabinzes and Kooznezi .	10,000
Kalmucks	50,000
Telesses	1,200
Biryusses, Beltires, and Sagai .	1,000
Katshinzes	2,000
Koibales, Kumashes, Yarinzes, &c.	6,000
Kasuimskie Ostiaks . .	40,000
Buriates	250,000
Khalkas Mongols . . .	15,000
Toongooses	60,000
Yakutes	120,000
Yookahires	1,200
Koriakes	1,700
Tshooktshes	3,000
Kamtchatdales . . .	2,700
	763,800

More recently, when a census of these tribes was taken for the purpose of regulating the tribute or *yesac*, it was stated that the population of most of them had increased, and in some tribes considerably. This census has not yet been published, but it is to be presumed that it is included in the estimate which carries the population of Siberia to 2,645,100 [RUSSIA], and that all the tribes, exclusive of the Russians, exceed one million individuals. If we suppose the estimate not to be exaggerated, which probably is the case, there is only one inhabitant in Siberia on each square mile and a quarter.

Political Divisions and Towns.—The administration of Siberia was formerly vested in one governor-general, who resided at Tobolsk, and whose authority was more extensive than that of the governors of the Russian governments in Europe. In 1822 it was found expedient to divide Siberia into two general governments, those of Western and Eastern Siberia. Western Siberia consists of the governments of Tobolsk and Tomsk and the province of Omsk; and Eastern Siberia of the governments of Yeneseïsk and Irkutsk, and the provinces of Yakutsk, Okhotsk, and Kamtchatka, to which are added the Russian settlements on the western coast of North America as far south as California. All these divisions are governed by separate officers, who receive their orders from the governor-general, and can only apply to the court of Petersburg through him. A small but very important portion of Siberia is not subject to the authority of the general governor, but is united to the European governments of Perm and Orenburg.

That part of the government of Perm which is on the east of the Ural Mountains extends along their base from 55° 30′ to 61° N. lat., and is the most populous, best cultivated, and most industrious portion of Siberia. In its northern districts are the Vogules, and in the southern the Bashkires, but the greater part is inhabited by Tooralinzes and Russians. Nearly all the numerous mines of the mining-district of the Ural are included in this division. Besides Ekatarinburg or Yekatarinburg [EKATARINBURG], which is the seat of administration for the mines, it contains several remarkable places, as Berezow, with 2000 inhabitants, in whose vicinity gold is obtained by mining and also by washing; Newansk, with 10,000 inhabitants and extensive iron-works, where gold is also got by washing; Alpayewsk, with 2000 inhabitants, and iron-works; Nishnei Taghilsk, with more than 20,000 inhabitants, in a district noted for its rich iron and copper mines and its washings of gold and platinum. In this place there are also extensive manufactures of lacquered-ware. Kushwinsk, farther north, with about 6000 inhabitants, is built in the centre of a district rich in iron-mines; in its vicinity is the iron-mountain called Bladogat, which rises to 1370 feet above the sea-level. Verkhoturye has 3000 inhabitants, and is considered the most northern point where the alluvial beds that contain gold particles occur. They have been traced southward to the source of the Ural river, a distance exceeding 600 miles. All these places are near the base of the Ural Mountains. At a considerable distance from the mountains is Irbit, where a fair is annually held, which was formerly much frequented, but since the establishment of the great fair of Nishnei Novgorod it has lost much of its former importance. But even at present the value of the goods brought to this place amounts to 35,000,000 rubles, or nearly 1,500,000*l.* Dalmatow, on the river Isset, has 1500 inhabitants, and also an annual fair.

Only a small portion of the government of Orenburg lies east of the Ural Mountains. It is partly inhabited by Russians and Choowashes, and partly by Bashkires. Its wealth consists chiefly in cattle. The largest town is Chelyabinsk, on the small river Mias, not far from the base of the Ural Mountains, with 5000 inhabitants. North-east of Chelyabinsk is Miask, the most southern place where gold is obtained by washing. Troitzk, on the river Oöi, with 3000 inhabitants, is a place of some trade, but its commerce is now limited to trade with the Khirghis Cossacks who inhabit the country south of the Oöi.

I. *Western Siberia* comprehends the whole of the basin of the river Obi and its affluents, with the exception of those portions which are united to the governments of Perm and Orenburg, and the basin of the upper course of the rivers Choolym and Ket, which belongs to Central Siberia.

1. The government of Tobolsk comprehends the whole of Western Siberia north of 60° N. lat. and the western half of it south of that parallel, exclusive of the country of the Khirghis Cossacks. It is divided from the last-mentioned region by a line running parallel to and only at a short distance north of the Ishim line of fortifications, and from the government of Tomsk by a line running nearly south and north across the Steppe of the Barabinzes. The continuation of this line through the country north of the river Obi to the source of the river Taz, which falls into the Gulf of Obi, separates Tobolsk from the government of Yeneseïsk, which belongs to Eastern Siberia. The nations which inhabit it are Samoyedes, Ostiaks of the Obi, Vogules, the Turkish tribes of the Tartars of Tobolsk, and of the Barabinzes and Bokharians. The number of Russians however is greater than that of all these nations taken together. No metals are found except some bog-iron; but salt is got from several lakes. The wealth of the southern districts consists in the produce of agriculture and the herds of cattle; those of the northern, of that of the fisheries in the river Obi, and of the numerous wild animals that inhabit the extensive forests. In the southern districts wood is scarce, except along the base of the Ural Mountains.

The capital is Tobolsk, where the governor-general of Western Siberia resides. [TOBOLSK.] In the comparatively populous district which extends south-west to the boundary of Perm are Toorinsk, on the river Toora, with 7000 inhabitants, mostly Tooralinzes, who carry on a considerable trade in furs, and have many tanning-pits; and Tioomen, with 10,000 inhabitants. Tioomen is the oldest city in Siberia, having been founded by Tartars in the time of Genghis Khan, whence it still is called by them Genghistora, that is, city of Genghis. There are some tanneries and soap-houses, and some worsted stuffs are made. The commerce is mostly in grain, and partly also in furs and a great number of articles made of wood. On the banks of the river Tobol are the towns of Yalootorovsk, with 2000 inhabitants, and Koorgan, with about 1000 inhabitants. In the vicinity of the last-mentioned place there are numerous ancient tombs in the form of small hills; they are called *koorgani.* One of them, called by Pallas a royal mausoleum, is nearly 800 feet in circumference. East of Tobolsk is Tara, built on the west bank of the Irtish, with 3600 inhabitants, who carry on a considerable trade in the agricultural produce of the adjoining country and of the fishery in the river and the lakes. Vessels of 300 tons burden go from here to Tobolsk. Surgut, north-east of Tobolsk, on the river Obi, is a small place with 1500 inhabitants: it has some trade with the Ostiaks who inhabit the country north of the town. Berezow, on the west bank of the Obi (63° 56′ N. lat.), has 3000 inhabitants, and a considerable traffic in furs and fish. It is the most northern place in which rye and barley succeed. Still farther north is Obdursk, near the polar circle, a small and miserable place, which however is of some importance as it is the principal market to which the Samoyedes who inhabit the country between Arkhangelsk (Archangel) and the river Yenesei bring the produce of the chace.

2. The province of Omsk consists properly of two lines of fortifications and of the country of the Khirghis Cossacks. The western line lies across the steppe of Ishim, and is called the line of Ishim. The other line is called the line of the Irtish, and extends along the banks of the Irtish from the town of Omsk to the boundary of the Chinese empire. Both lines were erected for the purpose of keeping in awe the Khirghis Cossacks. Along the line of the Irtish there is cultivation in many places, but otherwise the whole country is a steppe, and only fit for pasture. The capital, Omsk, is built on the east bank of the Irtish, at the point where the two lines of fortifications meet. It is a well-fortified place, with 7500 inhabitants, and contains a military school for the Cossacks and a college for those who wish to learn the languages of Western Asia. From this place, as well as from two of the fortresses, from Petropawlawsk on the Ishim, and from Semipalatinsk on the Irtish, caravans depart for Tashkend in Kokan, and for Bokhara, traversing the steppe of the Khirghis Cossacks. Ust Kamenogorsk, on the Irtish, has about 2000 inhabitants. The new agricultural colony of Kar-Karaly, with the steppe of the Khirghis Cossacks, belongs to this province.

3. The government of Tomsk extends over the greater part of the steppe of Barabinza, over the Altai Mountains west of the Choolyshman and the Lake of Teletzkoi, and over the hilly country which is on the east of the Obi river, and reaches as far north as the course of the Ket river. In the western districts there are the Barabinzes, in the eastern the Tartars called Kooznezi, and within the Altai Mountains the Mountain Kalmucks. The mountains are rich in metals (silver, copper, lead, iron), and in grass; the steppe abounds in wild animals, and the eastern districts in agricultural products, but even here cultivation does not extend much beyond the bottoms of the rivers. The capital is Tomsk, a town containing from 8000 to 9000 inhabitants, on the banks of the river Tom, and on the great road leading from Western to Eastern Siberia. Owing to the last-mentioned circumstance, it has an active trade with Tobolsk and Irkutsk. It is rather a well-built town. Kooznesk, on the river Tom, with 3500 inhabitants, lies in a district which abounds in iron and copper mines, the produce of which is brought to this place. Bernaul, on the west and elevated banks of the river Obi, is the centre of the mining industry in the Altai Mountains, as the ore of most of the mines is brought to Bernaul to be smelted, owing to the want of fuel in their neighbourhood. It contains between 8000 and 9000 inhabitants, extensive furnaces, and a school of mineralogy. Many Germans are employed in the town and vicinity, and a German church and school have been erected: there is also a public library. The principal mining-districts are noticed in ALTAI MOUNTAINS [vol. i., p. 397]. At Kolywan, which stands in a valley of the Altai Mountains on the small river Loktefka, there is a manufactory in which many objects are made of porphyry. Biysk, a fortress on the river Biya, not far from its confluence with the Katunga, has 2000 inhabitants.

II. *Eastern Siberia* comprehends a very small portion of the basin of the Obi river, that of the upper course of the rivers Choolym and Ket; but it comprises the whole of those of the Yeneseï, Lena, Yana, Indighirka, Kolyma, and Anadyr; and also Da-uria, or that part of the basin of the Amur river which belongs to Siberia. It contains the following governments and provinces:—

1. The government of Yeneseïsk extends from the mountains of Sayansk, or from the boundary of the Chinese empire to the Polar Sea and to the North-east Cape, being about 1800 miles in length. It comprehends the whole basin of the Yeneseï, with the exception of the upper basins of its confluents the Upper and the Lower Toongooska; the upper basins of the Choolym and Ket rivers, which fall into the Obi, belong also to this division. It is partly divided from Tobolsk by the river Taz; and from Yakutsk, which lies east of it, by the Anakara. The tribes which inhabit it are the following, enumerated from north to south: the Samoyedes, Yakutes, on the Anakara and Lower Toongooska; Toongooses, east of the Yeneseï, especially that tribe of them which is called Chapoghires; Kusuimskie Ostiaks, west of the Yeneseï; the Yarinzes, Kamashes, Karakas and Kaugut, Silpigursk, Udinsk, Karagansk and Kamgatsk, east of the Yeneseï, above its confluence with the Upper Toongooska; and west of it are the Katshinzes, Beltires, Sagaï, Biryusses, and

Koibales. Agriculture does not extend north of the town of Yeneseï (58° N. lat); but it is in a prosperous condition in the vale of the Yeneseï, south of Krasnoyark, though even there cattle constitute the principal wealth of the inhabitants. Iron-ore abounds in the mountains that enclose the vale, and it is worked in a few places. North of the town of Yeneseïsk the inhabitants live chiefly by fishing. The capital of this government is Krasnoyark, on the Yeneseï, with 3300 inhabitants. Being situated on the great road that leads from Tomsk to Irkutsk, it carries on an active commerce. There is a literary society in this town which publishes a periodical work. Yeneseisk, farther north, was formerly the capital, and is still the most populous place, having between 4000 and 5000 inhabitants. As this place is on the great water-communication between Eastern and Western Siberia, the commerce is much greater than that of Krasnoyark. The fair in the month of August is much frequented. Atshinsk, west of Krasnoyark and the Kachooga Mountains, contains between 1500 and 2000 inhabitants, and has some commerce, as the river Choolym is here navigable for large river barges, by which the produce of the vale of the Yenesei is carried to the countries farther west. Toorookhansk (near 66° N. lat.), on the Yeneseï, is small; but at certain seasons of the year it is visited by the neighbouring nomadic tribes, who exchange their furs for tobacco, flour, and other necessaries.

2. The government of Irkutsk comprehends the basin of the greater part of the Lower Angara and the Upper Toongooska, and also that of the Potkamenaïa Toongooska; it also comprehends the upper basin of the Lena to 60° N. lat., that part of the elevated table-land of the Baikal which lies west of the river Vitima, and all the countries whose drainage runs to the Lake of Baikal; to which is to be added Da-uria, or the country east of the Yablonoï Khrebet. No part of this government, except the table-land of the Baikal and the more elevated parts of its numerous mountains, is too cold for cultivation; and in many parts agriculture is successfully cultivated: cattle, horses, camels, and sheep constitute the principal sources of wealth. The Buriates occupy the countries on both sides of Lake Baikal, and as far east as the Yablonoï Khrebet. Near the boundary of Mongolia are the Khalkas Mongols; the Toongooses are found in Da-uria, on the table-land of the Baikal, and in the valley of the Lena.

The capital is Irkutsk, the residence of the governor-general of Eastern Siberia. This town is built on the east bank of the Lower Angara, opposite the mouth of the river Irkut, from which its name is derived. It is about 25 miles from the banks of Lake Baikal in a straight line. A small river, the Ushakowka, falls into the Angara, within the town. The streets run parallel to the Angara, are straight and wide, but not paved. In 1829 it contained 1900 houses, and about 18,000 inhabitants; only about 50 houses were of brick, the rest were of timber. The palace of the governor-general, the medical institution, the grammar-school, and the hall of the American Company, are buildings which would be ornaments to any town in Europe. Besides the grammar-school, in which the Chinese and Japanese languages are taught, there is a seminary for the clergy, and another in which young Toongooses and Buriates are instructed for the purpose of becoming teachers in their tribes, a public library, a museum of natural history, a military school, and a school for navigation. Irkutsk is the centre of the commerce of Eastern Siberia, as the commerce with China at Kiachta and Maimatshin is carried on by the rich merchants of this town, who send the goods obtained at these places to Tobolsk, Moskwa, and Petersburg; and as the American Company has here its principal depôt, from which the eastern coasts of Siberia and the Russian settlements in North America [NORTH-WESTERN TERRITORY] are provided with flour and other necessaries, and to which they send their furs. The place is 1240 feet above the sea-level, and the climate is very cold; but it is healthy and pleasant, owing to the dryness of the atmosphere. At Telma, north-west of Irkutsk, is a considerable manufacture of cloth, a smaller one of linen, and some glass-houses. From Irkutsk a road leads north-east over the mountain-pass of Baghendaisk, which is 1665 feet above the sea, to the village of Kotshuga on the Lena, where the goods are embarked that are destined for the province of Yakutsk and the American settlements. Kotshuga is 1503 feet above the sea-level. In the country south of Lake Baikal is Verchnei Udinsk, on the river Uda, not far from its confluence with the Selenga; it has about 4000 inhabitants, who are engaged in commerce with Kiachta and Nertshinsk. At Selenginsk, a small place, there is an English missionary establishment for converting the Buriates. West of it, in a steppe, is the seat of the Khamba Lama, the chief of the Buddhist religion among the Buriates: like the Dalai Lama in Tibet, the soul of the Lama is supposed to pass into his successor. Close to the boundary of the Chinese empire is the commercial town of Kiachta with Troizko Sawsk. [KIACHTA.] In Da-uria is the town of Nertshinsk, at the confluence of the river Shilka with the river Nertsha, a miserable place with 1000 inhabitants. Not far from the banks of the river Argun is Nertshinskoi Sawod, with 3600 inhabitants, the seat of administration for all the mines of this district. Zuruchaitoo, on the river Argun, was once a place of some importance when the commerce between Russia and China passed through it, before the new road through Kiachta and Maimatshin was established; it is now in ruins.

3. The province of Yakutsk extends over all the north-eastern part of Siberia, from the Anakara and Vitima rivers eastward to the country of the Tshooktshes, with the exception of the coast of the Sea of Okhotsk and the adjacent mountain-ranges, which constitute the province of Okhotsk. Grain is only cultivated in the vale of the Lena as far as Yakutsk; but the crops are uncertain, owing to the shortness of the warm season. It is stated that barley is grown on the banks of the Omekon, one of the upper branches of the Indighirka. The population is most dense between 61° and 63°, in the vale of the Lena, the country about the lower course of the Aldan, and in the basin of the Vilui. In the latter there are mines of excellent iron. Cattle and horses are numerous in these parts; but in others they are few, and north of the polar circle there are scarcely any. In these parts the inhabitants obtain their subsistence by fishing and hunting. The most numerous and most wealthy tribe are the Yakutes, who are breeders of cattle, horses, and sheep. The Toongooses are only hunters, and the most wandering of all the tribes of Siberia. The Yookahires and Koriakes live partly by the produce of their fishing, and partly on their herds of reindeer and by the chace. The capital is Yakutsk, on the west bank of the river Lena, with more than 4000 inhabitants. From this place the road to Okhotsk leads over the Aldan Mountains, where it rises to 2750 feet above the sea-level. Yakutsk is one of the best markets in Siberia for furs, especially sable, as this animal is very abundant in the wilderness south of the road leading to Okhotsk, and the fur is of the best quality. In the northern districts are some places, as Ust Yansk and Nishnei Kolymsk, to which the native tribes resort to exchange their furs for flour, tobacco, and other articles.

4. The province of Okhotsk extends along the sea of that name, from the innermost corner of the Bay of Penshinsk to 58° N. lat., comprehending the lower coast and the mountains at the back of it. The inhabitants are Koriakes and Toongooses, among whom a few Yakutes are settled, who rear cattle. The two first-mentioned tribes live by fishing and hunting, and have only herds of reindeer. There is no cultivation here. The capital is Okhotsk. [OKHOTSK.] At the most northern recess of the Bay of Ishiginsk, one of the great inlets of the Sea of Okhotsk, is the small town of Ishiginsk, with 500 inhabitants, who live chiefly on the produce of their fishery, but have also some commerce with the Koriakes.

5. The province of Kamtchatka. [KAMTCHATKA.]

Manufactures.—The number of manufacturing establishments is not great, if we except tanneries, which are rather numerous in some of the larger towns, as Tobolsk, Tioomen, and Yeneseïsk, and the iron-foundries in the towns at the base of the Ural Mountains, in which several kinds of utensils are cast, and also cutlery is made. There are also a few glass-houses at Yeneseïsk, and at Telma, near Irkutsk. Though their number is small, the produce seems to be equal to the demand, as that kind of mica which is called Russian glass is in general use in all the smaller towns, and even in most houses of the larger towns. To these manufactures may be added coarse woollen stuffs and linen. An article of export is made at Ekatarinburg by the jewellers and cutters of precious stones. Notwithstanding the small number of manufactures, the importation of manufactured goods from Europe is inconsiderable, which is also the case with those from China, Songaria, and Bokhara, which consist only of a small quantity of silks, nankins, and other coarse cotton goods. This is the effect of the climate, which the manufactured goods of foreign countries do not suit. During nine months in the year the dress of the poor, as well as of the rich, consists of furs or sheep-skins, or the hides of the reindeer prepared in a peculiar way; and it is in the manufacture of these objects that the nomadic nations, especially the Samoyedes and Ostyaks, excel. Accordingly they not only sell their furs to their more southern neighbours, but also dresses made of reindeer-skins, and boots made of the skin that covers the feet of these animals, which is cut into narrow thongs, and then twisted with great ingenuity. The Russians and the Turkish tribes use a coarse brown cloth, which is made at home, and is not often brought to market, except in a few large towns. The Turkish tribes also use a kind of coarse carpet made of cow's hair.

Commerce with Foreign Nations.—Though the ocean washes the northern and eastern sides of Siberia, this country has no maritime commerce. The extremities of the Polar Sea are indeed free from ice for a few weeks in the summer, and small vessels might venture to navigate these parts, which indeed is done occasionally, as vessels go from Archangel to the mouth of the Obi and Yenesei, though they are generally dragged over the peninsula which separates the Gulf of Kara from that of the Obi. But the whole sea that washes the coast between the mouths of the Yenesei and North Cape (180° long.) cannot be navigated This circumstance deprives Siberia of most of the advantages which it otherwise would derive from the navigation of the large rivers which fall into the Polar Sea. The Sea of Okhotsk may be navigated for about five months, the harbours being frozen over about seven months in the year; but this navigation is of little advantage to Siberia. The country which extends along the shores of that sea, in some parts to a distance of 500 miles inland, in others of nearly 1000, is an elevated tract covered with ridges of mountains, and does not supply the least object of commerce, except the furs of some wild animals. Being almost a wilderness, and producing very little food for man, it renders the transport of goods from the interior of Siberia to the Sea of Okhotsk very expensive. Accordingly nothing is sent from Okhotsk to Yakutsk and the interior of Siberia, except the furs which are collected by the American Company in the Russian settlements of North America; and nothing is carried from Yakutsk to Okhotsk except a few necessaries, chiefly flour and tobacco; and the price of these articles is generally increased fourfold by the expense of the transport.

But Siberia carries on an extensive commerce with Russia, Bokhara, Tashkend, and China. The most important is the trade with Russia. The transport of the goods is effected by a road which leads from Perm in Russia to Ekatarinburg and Tobolsk. West of Ekatarinburg it crosses the Ural Mountains by a mountain-pass, the highest part of which, near Bilimbayewsk, is 1698 feet above the sea. By this road the produce of the rich mines of Siberia is brought to Europe, as well as a great quantity of furs, and some leather and skins, which are chiefly collected among the nomadic tribes of the northern districts. The last-mentioned article, and the goods brought from Kiachta, consisting of tea, and some silks and cottons, go to the great fair of Nishnei Novgorod, where the Chinese goods in 1838 were estimated to amount to 18,000,000 rubles, or 787,500*l.*, and the furs to 7,500,000 rubles, or 328,145*l.* The returns consist of several articles of Russian and English manufactures, partly for the consumption of the country, and partly for sale to the Chinese at Kiachta.

The commerce which is carried on at Kiachta with the Chinese has been noticed under KIACHTA. We shall only add that, according to information obtained by Erman, the quantity of tea imported at that place in 1829 was estimated at between 5,600,000 and 6,000,000 lbs., of the value of from 1,680,000*l.* to 2,000,000*l.* Tea seems to be more used in Siberia than in England. There were also imported about 320,000 pounds of tea in cakes, valued at 45,000*l.* This tea is chiefly consumed by the Mongol tribes, the Buriates and Calmucks, and the Tartars. The second article of importance was that kind of coarse cotton-stuffs which is called *kataïka*, and is extensively used by all persons of Russian origin born in Siberia. Erman does not state the amount of this article. The third article is rhubarb, of which about 400,000 lbs. are imported, and valued at 90,000*l.* No estimate is given respecting the other articles, cottons, silks and satins, and some minor objects: but from the statement of Erman it would appear that the whole money value of the imports at Kiachta can hardly fall short of 3,000,000*l.*, whilst Cochrane estimates them at only one million and a half. The chief articles of export are furs of sables, foxes, otters, wild cats, beavers, and squirrels. Of the last-mentioned article some millions of skins are imported, the greater part of which are taken on the table-land east of Lake Baikal. The Chinese buy only the most common kinds of fur: the best go to Nishnei Novgorod and Moscow, and from thence a great portion of them go to Persia and Turkey. The amount of this article is not stated. The Russians export also coarse woollen cloth made in Poland, and coarse cotton-stuffs to the value of 45,000*l.* These two articles do not go to China, but are bought for the use of the Kalkas Mongols. As the Russian copper money is worth more than the nominal value for which it is current, it constitutes at Kiachta a considerable article of export. In this commerce the wealthy merchants of Irkutsk are engaged. The goods from Irkutsk to Kiachta, and from Kiachta to Irkutsk, are conveyed, from May to November, by large vessels which navigate the Lake of Baikal and the river Selenga, and in November and December by carts on a road which passes over the high mountain-ranges that enclose the western portion of the lake called the Kultuk, and in winter by sledges on the ice of the lake itself. The greater part of the Chinese goods is afterwards sent to Western Siberia and to Europe at a comparatively small expense, nearly the whole transit being by water. The barges that convey these goods, after departing from Irkutsk, descend the Lower Angara and Upper Toongooska to the town of Yeneseisk on the Yeneseï. A little below this place the small river Kem joins the Yeneseï, which is navigable for some distance from its mouth, and to a point only 40 miles from where the river Ket becomes navigable. The goods are carried by land over this portage, and then descend the Ket until they reach the Obi, and afterwards the last-mentioned river to its confluence with the Irtish, from which point they are conveyed by water to Tobolsk. From Tobolsk they are conveyed by land over the Ural Mountains to Perm, where they are again shipped for Nishneï Novgorod and Moskow.

The inhabitants of Siberia have also some commerce with Kuldsha, the capital of the Chinese government of Ili, or of Songaria, but this is not authorised by the Chinese court, and is therefore carried on under the name and protection of one of the sultans of the Khirghis Cossacks, who inhabit the country contiguous to the Chinese boundary. The Russian caravans depart from Semipalatinsk on the Irtish, traverse the steppe of the Middle Orda of the Khirghis, pass near the western extremity of Lake Zaizang, ascend the range called Tarbagatai, at the southern base of which they reach the town of Tarbagatai, or Chugutshak, and proceeding southward traverse the mountains of Iren Khabirgan, when they reach the town of Kuldsha. The Russians export to this place only live cattle, and they receive in return a kind of cotton-stuff of good quality, called *base*, which is manufactured in some towns of Chinese Turkistan, especially at Aksu.

In modern times a regular commercial intercourse has been established between Siberia and the khanat of Khokan, by means of caravans passing through the steppes of the Khirghis Cossacks. These caravans depart from Petropawlawsk on the river Ishim, or from Semiyark, or Semipalatinsk, two small places on the northern banks of the Irtish, and follow different roads, all of which however unite at the base of the Ala-tau Mountains (near 43° N. lat.), which divide the basin of the Talas from that of the Syr Daria, or Jaxartes. After having passed over this range they proceed southward, until they reach the towns of Tashkend and Khokan. These caravans are not composed of Siberians, but of Bokharians, Armenians, and Siberian Tartars. These Tartars can proceed with their goods to the town of Kashgar in Chinese Turkestan, from which place the Russians are excluded by the Chinese government, but the Siberian Tartars are admitted. As some articles of this trade are derived from the town of Yarkhand in Chinese Turkistan, all the goods brought to Siberia by these caravans are known in the last-mentioned country by the name of Yarkhand goods. The articles imported to the abovementioned places consist of cotton goods, neither so fine nor so well worked as those brought from Kiachta, but they are cheaper and wear better; of some stuffs made of silk and cotton mixed, and of several kinds of calicoes. Among the imports are cotton girdles called *kushak*, which are used by the lower classes all over Siberia instead of buttons, which are not in use. The strongest kind of kushak is imported in this way, and also several kinds of dried fruit, especially apricots, grapes, prunes, pistachio nuts, and dates. But the principal articles brought to Petropawlawsk, &c. are derived from the Khirghis Cossacks, and consist of cattle and horses, of which latter the consumption in the mining district is very great, and of felts made of the hair of camels and cattle, and of coarse carpets made of wool. The articles exported from Siberia by this way are chiefly corn for the consumption of the Khirghis Cossacks, and, for the commerce with Khokan, Russian leather, otter-skins and seal-skins, woollen cloth, looking-glasses, razors and some cutlery, combs of European manufacture, and particularly large quantities of iron and copper from the Ural mines.

The commerce which is carried on between the town of Troizk, on the river Ooï, in the department of Orenburg, and the town of Bokhara, is of a similar description. The caravans, which are composed of Bokharians and Armenians settled at Bokhara, traverse the steppe of the Little Orda of the Khirghis Cossacks. This commerce was formerly much more important; for three caravans, consisting of more than 1000 camels, annually arrived at Troizk; but since the Bokharians have been permitted to go with their goods to the fair of Nishnei Novgorod, only one caravan of from 800 to 1000 camels comes annually to Troizk. Besides the articles brought from Khokan, the Bokharians import large quantities of raw cotton, and a few shawls of great value, which, according to the statement of the Russians, are made of fine and downy hair from the bellies of the camels, which is annually taken off for that purpose by very close combs. The exports from this place are also the same as those from Petropawlawsk, but guns must be added. The Khirghis Cossacks also bring to Troizk their cattle and the other goods above mentioned.

Internal Commerce.—There is a considerable commerce carried on between the southern agricultural districts and the northern, which are inhabited by nomadic nations. A great number of Russian merchants at certain periods, especially in February, visit certain places to which the nomadic nations resort, to buy from the latter their furs and other objects. The Russian merchants give in return flour or bread, and a few manufactured articles. These places of commerce are very small, but are full of people at the time of the fairs. Among these places are Obdursk on the Obi, Toorookhansk on the Yeneseï, Ust-Yansk on the Yana, and Ostronoye on the Aniuy, one of the confluents of the Kolyma. The most frequented are the first and the last.

The fair of Obdursk is attended by all the nomadic nations that live between the town of Archangel on the White Sea, and the river Yenesei, by Samoyedes, Syrianes, Ostiaks, and Vogules. They buy from the Russian merchants great quantities of ready-made rye bread, tobacco, iron saucepans, coppers, axes, knives, needles, fire-steels, and some other smaller articles: they give in exchange the furs of polar foxes, blue, grey, and white; common foxes, black, red, and white; of beavers, wolves, and polar bears; dresses made of reindeer skins; reindeer skins, reindeer flesh, and live reindeer for slaughter; with elephants' tusks, feathers, and goose-skins. It is stated, that besides the tribute paid to the crown, which consists of furs, the Russian merchants buy at this fair annually furs to the amount of 150,000 rubles, or 6563*l.*

The fair at Ostrownoye is nearly as important, as the goods obtained there are said to amount to 200,000 rubles, or nearly 9000*l.* This fair is attended by the tribes that inhabit the north-eastern peninsula of Asia, the Yookahires, Lamutes, Toongooses, Choowanzes, Koriakes, and particularly the Tshooktshes. The furs are the principal article brought by these tribes, and the greatest part are brought by the Tshooktshes from the north-west coast of America. They consist chiefly of the skins of black and silver grey foxes, of polar foxes, lynxes, gluttons, river otters, beavers, and an extremely beautiful kind of marten which is not found in Siberia. They also bring skins of the black as well as of the ice bear, and tusks and skins of the morse; the ribs of the whale, which are fixed under the sledges, as bars of iron are fixed in other northern countries, and are an important article of inland trade as far south as Yakutsk, and west as far as the banks of the Yeneseï lastly, seal-skins, which are used as sacks and for trunks, and dresses made of reindeer-skins. The Russian merchants give in return tobacco, several kinds of iron utensils, as pots, axes, knives, fire-steels, needles, dishes and basins of copper, tin, or wood, and great quantities of beads, which are used as ornaments by the women. The Tshooktshes, most of whom have frequent dealings with the native tribes of the north-west districts of America, are in general sufficiently skilful in trading with the Russians; but they are easily cheated out of their goods when spirits are offered to them, which however are only smuggled into the country in very small quantities, as the Russian government has prohibited the importation of this article.

We have still an observation to make on the commercial intercourse of the Tshooktshes with the tribes of the north-western parts of America. That portion of the Tshooktshes who live in permanent habitations belong to the family of the Esquimaux, and seem to have emigrated from America, as the tribes that inhabit the eastern shores of Behring's Strait speak a language which differs in very few words. This circumstance must have greatly contributed to maintain an intercourse between the two continents. The island of Imaklitt, one of the group of the Diomede or Gwosdef Islands, is generally the place where the exchange of goods takes place. The most active merchants are the American inhabitants of the two small islands called King's islet or Ookivok and Asiak or Ajak, especially those of the last-mentioned island, who dispose of the Russian goods which are obtained from the Tshooktshes along the coast of America, as far south as the peninsula of Aliaska, and would probably carry them still farther to the east, if the settlements of the American Company did not provide the tribes in those parts with such articles. The Tshooktshes, as well as the Americans, visit the island of Imaklitt in summer in their boats call *baidares*, which are made of whale-bone, and in winter in sledges which are drawn by dogs. The Tshooktshes bring tobacco, some iron utensils and ornaments obtained from the Russians, with a considerable number of reindeer dresses, as this animal does not appear to be common in any part of North America. The Asiakmutes, or inhabitants of the island of Asiak, bring the various furs above mentioned, and a great number of morse-tusks. The American tribes which inhabit the country north of Cape Prince of Wales, as far as Icy Cape, also visit the island of Imaklitt to obtain Russian goods. The knowledge of the extensive commerce thus carried on between the two continents by savage tribes, which we owe to Wrangel, explains how the iron pots and knives which Captain Beachey found among the inhabitants of Icy Cape, and the knives which Franklin saw on the northern coast of America, and which were all of Russian manufacture, found their way to these remote places.

History.—Europeans had not the least knowledge of the existence of Siberia up to 1580. It is however certain that a part of it was conquered by Gengis Khan and his successors; for it appears that the Buriates were subjected to the Kalkas Mongols by that conqueror; and when the Cossacks had passed the Ural Mountains, they found that the country on both sides of the river Irtish was subject to Kutshúm Khan and his Tartars or Turks. It is very probable that this sovereignty had been established in these parts when those of Casan and Astrakhan were founded on the west and south of the Ural Mountains. During the war by which the Czar Iwan Vasilievitsh made himself master of the khanat and town of Casan (1552), the countries contiguous to the western base of the Ural Mountains had fallen into great disorder, and were filled with robbers. The sovereign of Moscow made every effort to re-establish order in these countries by punishing the authors of the disturbances. Among them was a Cossack called Yermák Timoféyew, who for a long time had robbed the vessels that navigated the Volga, and had a considerable number of accomplices. Seeing the energy with which the Czar pursued the robbers, he turned his thoughts to the East, and in 1580 he passed the Ural Mountains with his small army, and entered the territories of Kutshúm Khan, and by his activity, energy, and military skill, within two years he had taken the town of Tshingistora, now called Toomen, and the residence of the khan, called by the natives Isker, but by the Cossacks, Sibir, from which the country was afterwards named. He then ventured to offer his conquest to the Czar, on the condition of a free pardon, which of course was granted. He continued his conquests with effect until he was drowned in the Irtish in 1584

After his death his conquests were lost to Russia, but the power of Kutshúm Khan had been broken, and he was unable to resume his former position. The Russians continued gradually to gain on him, until his empire was entirely destroyed, and all the country west of the river Obi was subjected to the sway of the Czar. In 1604 the town of Tomsk was built, which constituted a fresh point from which the bold spirits of the age might proceed farther east. Their first attempts were successful, but as the country south and east of Tomsk was better peopled than other parts of Siberia, and the mountains to the south were then in the possession of the powerful and warlike tribe of the Eastern Khirghis, they were soon checked in their enterprises. In 1614 the different Turkish tribes that inhabited those parts, joined by the Khirghis, rose against the inhabitants of Tomsk, laid waste the whole country to the very gates of the town, and besieged the city itself. No succour could be sent from Europe, as Russia was then in great internal disorder, owing to the unsettled state of the country after the death of Boris Godoonoff, and the wars which preceded the accession of the family of Romanoff to the throne of Russia. But the inhabitants of Tomsk maintained their footing, though their progress for some time was retarded; and several years afterwards, when the Eastern Khirghis, in despair of resisting the Cossacks, left the country and emigrated to the west, the progress of the Russians was very rapid. Small parties of adventurers, issuing from Tomsk, advanced to the banks of the Lake Baïkal, entered the basin of the river Lena, where they subjected, though not without considerable difficulty, the powerful nation of the Yakutes, and after passing the Aldan Mountains, reached the Sea of Okhotsk in 1639. Thus, in a period not exceeding sixty years, the Russian arms advanced from the Ural Mountains to the shores of the Pacific Ocean. But all Siberia was not so easily subjected. The populous nation of the Buriates had been attacked and partly conquered in 1620, but they frequently rebelled, and their complete submission was not effected before 1658. Soon afterwards the town of Irkutsk was built by Iwan Pochaboff (1661). Thus the whole of Siberia, with the exception of Da-uria, was subjected to Russia in about eighty years, without the government having been at the least expense; for all these wars had been undertaken and brought to successful issue by private adventurers, mostly Cossacks, who were induced to such undertakings by the desire of plunder and by their roving habits. Their success must certainly appear wonderful, when it is considered that they were without the least education, and that they nearly always proceeded to those undertakings without having previously concerted any plan. The conquest of Da-uria was completed in the same way. Khabarow, a Pole by birth, had escaped from Yeneseïsk with a few exiles, and after wandering about for some time in the woods which surround Lake Baïkal, he and his followers settled, beyond the present boundary of Siberia, on the Amur, in 52° 9′ N. lat., where they built a small fortress, called Albasin. As they had offended their neighbours, some tribes of Toongooses, they feared they might be overpowered by numbers, and, like Yermák, offered their conquest to the emperor of Russia, soliciting at the same time his forgiveness for their offences. Meanwhile the Toongooses had applied to the Chinese for assistance. In 1684 an army composed of Mandshoos and Chinese appeared before Albasin and took it, but permitted the Russians to go to Nertshinsk, which had been built in 1658, when the Buriates were completely subjected. But the Russians returned the following spring and rebuilt Albasin. A Chinese army however came again in the month of July, took the place after a stout resistance, and sent a considerable number of the prisoners to Peking. These events caused a dispute between the courts of Peking and Petersburg; but by the intervention of the Jesuits who resided at Peking, a treaty was concluded in 1689, by which the present boundary between Siberia and the Chinese empire was firmly established. This treaty was confirmed by the treaty of 1727, in which Kiachta and Maimatshin were appointed as the only places where a commercial intercourse between the two countries should take place. At the same time Russia obtained permission to send every ten years a spiritual embassy to Peking, in order that the prisoners taken at the last conquest of Albasin, and their offspring, might receive instruction in their religion.

(Pallas, *Reisen durch verschiedene Provinzen des Russischen Reiches*; Georgi, *Beschreibung der Bewohner des Russischen Reiches*, Fischer, *Sibirische Geschichte*, Petersburg, 1768; Sauer's *Account of a Geographical and Astronomical Expedition to the Northern Parts of Russia, performed by Billings*; Humboldt's *Fragmens Asiatiques*; Sarytcheff's *Account of a Voyage of Discovery to the North-east of Siberia*; Klaproth's *Magazin Asiatique*; Cook's *Third Voyage to the Pacific Ocean*; Eversman's *Reise nach Buchara*; Ledebour's *Reise in den Altai*; Cochrane's *Narrative of a Pedestrian Journey through Russia and Siberian Tartary*,; Erdman, *Beiträge zur Kenntniss des Innern von Russland*; Kotzebue's *Voyage of Discovery into the South Sea*, &c.; Beechey's *Voyage to the Pacific*, Erman, *Reise um die Erde*; Rose, *Reise nach dem Ural, dem Altai, und dem Caspischen Meere*; Wrangel's *Reise längs der Nordküste von Siberien und auf dem Eismeere*, and *Statistische und Ethnogr. Nachrichten über die Russischen Besitzungen in Nord America*; Baer *on the Ground-Ice or Frozen Soil of Siberia*, in 'London Geog. Journ.,' vol. viii.; and Ritter, *Erdkunde von Asien*, vols. i. and ii.)

SIBTHORP, JOHN, the youngest son of Dr. Humphrey Sibthorp, professor of botany at Oxford, was born in that city Oct. 28, 1758. He took his master's degree in 1780, and afterwards obtained a Radcliffe travelling fellowship. In 1783 he took the degree of M.B.; and, leaving Oxford for a time, pursued his medical studies at Edinburgh. He next visited France and Switzerland, and made some interesting botanical discoveries at Montpellier, which he communicated to the Academy of Sciences in that city.

In 1784 he returned to England, and having taken the degree of Doctor of Medicine, was appointed to succeed his father, who had resigned the professorship of botany. Part of the same year was spent at Göttingen, where he formed the plan of his voyage to Greece, which soon after he executed. His object being to study the botany of that country, which had been so little investigated by the moderns, he engaged at Vienna Mr. Bauer, an excellent draughtsman, with whom he set out on his expedition, in March, 1786. In the autumn of that year he visited Naples and Crete, and wintered at Constantinople. In the spring of 1787 he visited Cyprus and other Greek islands, and touched at the coast of Asia Minor. In June, 1787, he made some stay at Athens, in order to recover his health, which had been much impaired by the heat of the weather and by confinement on ship-board. From that city he made excursions to various parts of Greece; and embarking at Patras on September 24th, 1787, reached England, after a tempestuous voyage, during the first week in December.

He now enjoyed some years of learned leisure, engaged in the duties of his professorship, and in superintending the labours of his draughtsman. He was one of the first members of the Linnæan Society, and became a fellow of the Royal Society in 1789. His reputation gained him an increase of his stipend, with the title of Regius professor, which was conferred on him in 1793. But nothing could deter him from attempting to accomplish his purpose of forming a complete Flora of Greece. Accordingly, in March, 1794, he set out on his second journey to that country. He now examined the Troad, paid a second visit to Mount Athos, and spent two months at Athens. He passed the winter of 1794 at Zante, where an apothecary furnished him with a complete Herbarium of the island. In February, 1795, he left Zante for the Morea, where he remained for two months, and returned to Zante at the end of April. He here embarked on board a vessel bound for Otranto. The voyage, which is usually accomplished in five days, occupied more than three weeks; and the inclemency of the weather to which Dr. Sibthorp was exposed hastened the progress of a consumption, of which he had before experienced the symptoms. In the autumn of 1795 he reached England: his health now grew rapidly worse; and on February 8, 1796, he died at Bath, in the thirty-eighth year of his age.

Of the value and extent of Dr. Sibthorp's labours, some notion may be formed from the fact that the number of species collected from his manuscripts and specimens amounts to three thousand. Unhappily, he lived to finish only one work, a 'Flora Oxoniensis,' published in 1794. In his will he bequeathed to the University of Oxford an estate of 200*l*. a year, for the purpose of publishing his 'Flora Græca,' in ten folio volumes, with a hundred plates in each; and a prodromus of the work, without plates. [DIOSCORIDES.]

SIBTHO'RPIA, a genus of plants named after Dr. Humphry Sibthorp, formerly professor of botany at Oxford, the successor of Dillenius, and the father of Dr. John Sibthorp. [SIBTHORP.] This genus consists of small creeping, rooting, tufted herbs with small alternate uniform leaves, a 5-parted calyx, 5-lobed subrotate corolla, 4-5 nearly equal stamens, a capitate stigma, and a suborbicular capsule dehiscing at the top. The flowers are axillary, solitary, and inconspicuous. One of the species, *S. Europæa*, is a native of Europe, and is found in Portugal, Spain, and France, and in Devonshire and Cornwall in England. This genus is referred by most botanists to the order Scrophulariaceæ; but it differs from this order in its globose placenta and regular flowers. It differs from Primulaceæ in its stamens, being alternate with the lobes of the corolla, and in its capsule being 2-celled; hence Don has proposed to place this and some other doubtful genera in a new order, Sibthorpiaceæ, which possesses characters intermediate between those of Scrophulariaceæ and Primulaceæ.

SIBYL (Σίβυλλα) is the name by which several prophetic women were designated, all of whom belong to the mythical ages of antient history. But Pausanias (x., c. 12), who gives an account of the sibyls, applies the same name to female soothsayers of the historical times. (Strabo, xiv., p. 645.) In more correct language however the name is only applied to mythical personages. It was believed that the sibyls were maidens who possessed a knowledge of the future, and of the manner in which evils might be averted, and especially of the manner in which the wrath of the gods might be appeased, and that they communicated their knowledge in inspired verses. They acquired their knowledge by direct inspiration. (Varro, *ap Lactant.*, i. 6; Cic., *De Div.*, i. 2; Plat., *Phaedr.*, p. 244.) The number of such prophetesses appears to have been very great in antient times, and we know of Egyptian, Hebrew, Persian, Babylonian, Greek, and Italian sibyls. Varro enumerates ten sibyls, while others only knew four. (Ælian., *Var. Hist.*, xii. 35; comp. Suidas, *v.* Σίβυλλα.) Varro however appears in some cases to make two sibyls out of two epithets belonging to the same person, while on the other hand he does not mention the Hebrew sibyl, Sabbe. (Paus., x. 12, 5.) We shall in this article only mention the most celebrated sibyls.

The most antient sibyl was Herophile, a daughter of Zeus and Lamia (Paus., x. 12, 1), probably the same who is called by Varro the Sibylla Libyca. The Erythraean sibyl was supposed to be a native of Babylonia, but some thought that she was born at Erythrae. She lived before the Trojan war, the cause and issue of which she was believed to have predicted. (Varro; Paus., x. 12, 1.) In the time of Pausanias, a hymn on Apollo was very familiar to the inhabitants of Delos, which was attributed to this sibyl. In this hymn, a fragment of which is preserved in Pausanias, she calls herself the daughter of one of the Idaean nymphs and of a mortal. The Samian sibyl was supposed to have been a priestess in the temple of Apollo Smintheus. She spent the greater part of her life in Samos, but, like most other sibyls, she is described as travelling about and communicating to men her inspired wisdom. Thus we find her at Claros, Delos, and Delphi. She is said to have died in Troas, where a monument was erected to her in a grove sacred to Apollo Smintheus. The inscription of this monument is preserved in Pausanias (x. 12, 3). Cumæ in Ionia was also celebrated for its sibyl; but the sibyl of Cumæ in Campania, called Demo, has acquired more celebrity than any other. The antient legend about her is related by Virgil (*Æn.*, iii., 441, &c.). In the reign of Tarquinius Priscus, or, according to others, in that of Tarquinius Superbus, there appeared before the king a woman, either herself a sibyl or sent by a sibyl, who offered to the king nine books for sale. The king refused to purchase them, whereupon the woman burnt three of the books, and returning, asked for the remaining books the same price as she had asked for the nine. The king again declined purchasing; but when the woman, after burning three books more, returned and asked for the three remaining the same price which she had before asked for the nine, his curiosity was excited, and he purchased the books; whereupon the strange woman vanished. These three books were the Sibylline Books which play such a prominent part in the history of Rome: they contained the 'fata urbis Romæ.' (Dionys., iv., p. 259; Varro, *ap Lactant.*, i. 6; Gellius, i. 19; Plin., *Hist. Nat.*, xiii. 27.) Now who this sibyl was, is differently stated. Some of the antients represent her as the Erythraean sibyl, others say that she had come from Cumæ in Ionia and others that she was the sibyl of the Italian Cumæ. Modern writers are likewise divided in their opinions. Niebuhr (*Hist. of Rome*, i., p. 506) thinks that it was the Ionian prophetess; but his arguments are not convincing, and it is by far more probable that the sibylline oracles of the Romans were derived from the neighbouring town of Cumæ in Campania. (Hartung, *Die Relig. der Römer*, i., p. 129, &c.; Göttling, *Gesch. d. Röm. Staatsv.*, p. 212.) The Sibylline Books, which were henceforth in the possession of the Roman state, are said to have been written on palm-leaves, partly in verse and partly in symbolical hieroglyphics. The public were never allowed to inspect them, but they were kept in the temple of Jupiter Capitolinus, where they were preserved in a stone chest in a subterraneous vault, and under the care of especial officers (duumviri sacrorum, interpretes, or sacerdotes sibyllae), who had been appointed by the Tarquinius who purchased the books. These officers had to consult the Sibylline Books (adire libros sibyllinos) on all occasions when the gods manifested their wrath by inflicting calamities upon the Romans, and when human help and human wisdom were not thought capable of averting their anger. The answers which were derived from them were almost invariably of a religious nature, as they either commanded the introduction of some new worship, or the institution of new ceremonies and festivals, or the repetition of old ones. But during the time of the republic, they do not seem to have ever been used, like the Greek oracles, as a means to ascertain the future, or what political measures were to be adopted in order to attain a certain political object. The manner of consulting them, as Niebuhr and others suppose, was probably the following:—they opened the volumes at random, and whatever passage first met their eye was thought to contain the suggestions adapted for the present case. The keepers of the Sibylline Books were at first only two, with two attendants; and one of the first duumviri appointed by Tarquin was condemned by the king to suffer the punishment of a parricide for blabbing. (Dionys., iv., p. 260; Val. Max., i. 1, 13.) After the banishment of the kings, the two keepers of the Sibylline Books were appointed by the people, probably in the comitia centuriata, for life. They were exempt from all civil and military offices; and whenever they had to consult the sacred books, they were authorised by a senatus consultum, and they consulted them in the presence of their attendants. The numbers of these priests was afterwards, perhaps in the year B.C. 368, increased to ten, and half of them were to be plebeians: in the time of Sulla their number was increased to fifteen.

In the year 83 B.C. the temple of Jupiter, on the Capitol, was burnt, and the Sibylline Books were consumed by the flames. In order to restore the books, the senate sent ambassadors to various towns of Italy, Greece, and Asia Minor, to collect Sibylline oracles, both from public and private sources. These ambassadors collected about one thousand verses, which were again kept in the temple of Jupiter, after it had been restored. (Dionys., iv., p. 260.) This collecting and restoring the antient oracles brought to light a great many spurious ones, and rendered the people more familiar with these oracles than they had been before, and the superstition of the time made great abuse of them. Augustus therefore ordered that on a certain day all Sibylline books which were in the possession of private persons should be delivered up to the praetor urbanus, and burnt. On this occasion more than two thousand such books were delivered to the flames; and those oracles which were in the keeping of the state, and were considered to be genuine, were now deposited in two gilt chests in the temple of Apollo, in the basis of his statue, and entrusted, as before, to the quindecimviri. (Suet., *Aug.*, 31; Tacit., *Annal.*, vi. 12.) Whether this collection was not made with sufficient discernment, or whether the keepers contrived to introduce new or spurious verses, is not clear; but, some years afterwards, Tiberius found it necessary to institute a fresh examination of the Sibylline oracles, and to strike out many which were considered to be spurious. (Dion Cass., lvii., p. 705, Steph.) Not many years afterwards a proposal was made to add a new volume of Sibylline prophecies to the authorised collection. (Tacit., *Annal.*, vi. 12.) In the reign of Nero the Sibylline Books were burnt a second time, but were again restored, and used as before. In the year 270 A.D. several members of the senate advised to consult them respecting the issue of the war against the Marcomanni. (Fl. Vopisc., *Aurel.*, 18.) About this time the Christians, in their zeal to convert the heathens, began to refer to the Sibylline oracles as containing prophecies respecting the Messiah; and such prophecies may have been found in them, either owing to the vagueness of the oracles, which might be applied to any circumstances, or it may be that at this time a number of Sibylline oracles were forged and circulated. The collection which was in the keeping of the state was burnt a third time in the reign of Julian (A.D. 363); and a fourth time in the reign of Honorius, by Stilicho, A.D. 395. (Rut., *Itin.*, ii. 51.) But it was restored each time; and notwithstanding all the forgeries which must have crept into it, the collection continued to be held in great esteem, as it was a useful instrument in the hands of the various parties, political as well as religious. Hence we find them consulted even as late as the middle of the sixth century of our æra.

A complete collection of Sibylline verses was compiled and edited by Gallæus, Amsterdam, 1689, 4to.; but it contains a great many spurious verses, and such as were made by the early Christians who pretended to be inspired. In 1817 A. Mai published a collection of fragments from the Sibylline Books, which he discovered in a MS. of the library at Milan. Another collection of fragments was published by C. L. Struve, under the title 'Sibyllinorum Librorum Fragmenta,' Regiomont., 1818, 8vo.

SICARD, ROCH AMBROSE CUCURRON, was born at Fousseret, near Toulouse, on the 20th September, 1742. He completed his studies at this city, and entered into holy orders; but while thus engaged he felt impelled to enter upon a new career, for which, as his success afterwards proved, he was peculiarly adapted. The archbishop of Bordeaux wished to establish a school for the deaf and dumb, and he fixed upon the Abbé Sicard to second his project, who went to Paris to learn the method of instruction there pursued by the Abbé de l'Epée. He returned to Bordeaux in 1786, and the new establishment prospered under his care. This success obtained for Sicard new preferment, under the title of vicar-general of Condom, with that also of canon of Bordeaux. Very eager for honorary distinctions, the vanity of Sicard was flattered by the attentions paid to him: he became a member of numerous academies and literary and scientific societies, and he felt pleasure in assuming the titles thus conferred upon him. These literary honours did not however cause him to relax in his zeal for the education of the deaf and dumb, in which pursuit he became so distinguished that public opinion pointed to him as the most worthy to be the successor of the Abbé de l'Epée, who died in 1789. To obtain this honourable office it was necessary that the candidates should undergo an examination before a commission from the three academies named by the king. Three candidates entered into competition with Sicard: the Abbé Salvan, instructor at Riom in Auvergne, afterwards a joint director at the institution for the deaf and dumb at Paris; Father Perrenet, an Augustine; and the Abbé Masse, to whom the commune of Paris had temporarily entrusted the management of the institution. The last-named candidate did not submit to the examination, and after a minute investigation into the acquirements of the other three, Sicard was chosen, and the choice of the commissioners was confirmed by Louis XVI., in April, 1790.

The establishment at Paris was supported during the latter part of the Abbé de l'Epée's career by the government. From 1778 to 1785 a decree of the council had secured a revenue of 240*l.* (6000 livres) from the estate of the suppressed convent of the Celestines for the institution of the deaf and dumb, which only ceased when the National Assembly declared the confiscated possessions of the antient monasteries to be national property. In July, 1791, the Assembly granted a donation of 12,700 francs (508*l.*) to the institution, which was then removed to the convent of the Celestines. Since then it has been removed to the buildings of the seminary of St. Magloire, where it still continues. In 1791, though the oath affirming the civil constitution of the clergy was not required from Sicard, he was willing to acknowledge liberty and equality, and this acknowledgment he accompanied with a gift of 200 livres. Notwithstanding this concession, he was arrested on the 26th of August, and confined till the 2nd of September. On this occasion, the pupils of Sicard addressed to the Assembly an eloquent petition, which demonstrated the intelligence which Sicard had called forth in them. This petition was presented by Sicard's most celebrated pupil Massieu at the bar, and read by one of the secretaries: it was highly applauded, and a decree was made, directing the minister of the interior to give an account of the cause of Sicard's arrest. Other matters caused this decree to be disregarded, and on the 2nd of September Sicard was transferred to L'Abbaye; at that time this was like a sentence of death. During the two following days Sicard felt the danger of his position, which he has narrated with great prolixity. The weapon of the executioners was already raised over Sicard, when a watchmaker named Monnot placed himself before the intended victim, saying, 'It is the Abbé Sicard, one of the most useful men in the country · you shall run through my body to get at his.' Sicard then said, 'I am the instructor of the deaf and dumb; and as these unfortunates prevail more among the poor than the rich, I am more to you than to the rich.' This address produced such an effect, that the murderers embraced him, and proposed to take him home in triumph. An affected scruple of justice prevented him from allowing this to be done: he said he had been imprisoned by a constituted authority, and to that authority alone could he look for his freedom. During two days and two nights he remained in prison, in imminent danger of being massacred. He wrote to the president of the Assembly stating his situation, and the devotion of Monnot, and a decree was made declaring that this brave man deserved well of his country. But the commune of Paris, though apprised of the interest Sicard excited, passed on to the order of the day. On the 4th of September Sicard knew that he was to be sacrificed that evening; and it was only by the decisive steps taken by several of his friends in the Assembly to whom he wrote that his life was saved. Even on his release, so great was his desire of popular applause, that, instead of retiring in quietness to his pupils, he went to the Assembly, accompanied by his preserver Monnot, to exhibit himself, and to thank those who had been instrumental in his deliverance.

After his restoration to his pupils, he did not experience further persecution, but occupied himself solely with them during the reign of terror. After the fall of Robespierre, when the National Convention took up some useful projects, a normal school was created, in which Sicard was appointed a teacher of grammar. In his first lecture, in 1795, he extolled philosophy so highly when applied to education, as to leave religion nearly out of the question. On another occasion he analysed grammatically the following phrase: 'Frenchmen should rally round the Convention, which will persecute the disaffected, to whatever party they belong.' He contended against the revolutionary freedom of thou-ing and thee-ing, and contributed with Laharpe to banish its use from the normal schools. His scientific course had great success, which is to be less attributed to his grammatical innovations, than to the simple and ingenious manner in which he submitted the forms of grammar to the operation of analysis. His lectures were much frequented, and occasionally by Garat, Volney, Wailly, and others. He was soon after engaged in contributing to and otherwise assisting in the publication of political and religious papers in various periodicals, and was brought under the notice of the Directory, and banished. It was a considerable time, and only after humiliating submissions, that he was restored to his pupils. But the establishment had been neglected during his proscription, the resources had been cut off, and the ceremonies of religion forbidden. This state of things was changed on his return. He set up a printing-press in the Institution, had his own works printed by the pupils, and from that time employed himself solely in perfecting the methods of instruction transmitted to him by his illustrious predecessor. The Abbé de l'Epée had translated things by signs, and signs by words, and he had applied his system only to physical objects: in explaining intellectual things and operations he adopted the reverse of this order; he taught them the verbal expressions first, and then explained these by signs. In the latter operation the eyes and memory only of the pupils were exercised; the words conveyed no knowledge to their minds, and consequently the signs for them were without meaning. Sicard applied De l'Epée's process for material objects to metaphysical ideas also, and thus succeeded in giving to his pupils that development of intellect of which he found them capable. The public examinations of his pupils contributed to extend his reputation; on these occasions he exhibited successively his favourite pupils, Massieu, Clerc, and Berthier. Foreigners crowded to these examinations, which were also attended by many persons of the highest distinction. The chief works of Sicard are his 'Théorie des Signes,' 'Cours d'Instruction d'un Sourd muet de Naisance,' and 'Elémêns de Grammaire Générale appliquée à la Langue Française.' He wrote and translated several other works, and he was a member of most of the learned societies of his time. In 1815 he visited England with Massieu and Clerc, and was very honourably received and noticed. The old age of Sicard was not one of ease and plenty, though his life had been passed in assiduous labour, 'for he was involved by his good nature in becoming responsible for the pecuniary engagements of others, and was consequently obliged to put his expenses on the most economical scale. His death took place in May, 1822. Three funeral orations were pronounced to his memory; one of them was by his unfailing friend M. Lafond de Ladébat, in the name of the Directors of the Institution for the Deaf and Dumb.

(*Biographie Universelle.*)

SICILIES, TWO, UNITED KINGDOM OF THE, *Regno Unito delle Due Sicilie*, the title of an Italian monarchy, which comprises the southern part of the peninsula, being nearly one-third of continental Italy, and also the island of Sicily. It is the largest and most populous of the Italian States. The area of the kingdom has been variously estimated, but there has been hitherto no trigonometrical survey of the whole, though a commission of engineers is at present employed on a survey. According to an admeasurement made on the map of Rizzi Zannoni, which, though not faultless, is the best general map of the kingdom, the area of the Continental territories would be about 23,000 Italian square miles, the Italian mile of length being 60 to one degree of latitude. If to this we add about 7700 miles for the area of Sicily, the total area of the united kingdom will be 30,800 Italian square miles, or about two-thirds of the area of England. In 1837 the population amounted to above eight millions, of which six millions were in the Continental territories, and about two millions in Sicily. In the administrative language the Continental territories are styled 'Dominj di quà dal Faro,' while Sicily is designated as 'Dominj di là dal Faro.' Writers also use the denomination of Sicilia Citeriore and Sicilia Ulteriore, the designation having reference to Naples, the capital. A geographical and statistical account of each of these two great divisions is given under NAPLES, KINGDOM OF, and SICILY.

In the present article we propose to give a brief sketch of the history of the country, and an account of the present system of government.

The Sicilian monarchy originated with the Norman conquest of Sicily and Apulia in the latter part of the eleventh century. An outline of the antient history of the island of Sicily, as well as of its subsequent vicissitudes previous to the Norman conquest, is given under SICILY. With regard to the Continental provinces, which, in the ante-Roman times were inhabited by numerous nations, the Marsi, Peligni, Marrucini, Vestini, Prætutii, Frentani, Samnites, Hirpini, Campani, Lucani, Appuli, Calabri, Salentini, and Bruttii, some of which were derived from the great aboriginal Sabine stock, and other from Greek colonies, an account of their antient history and of their remains of antiquity still existing is given under APULIA; BASILICATA; CALABRIA; CAMPANIA; CAPUA; CUMÆ; LOCRI (Epizephyrii); MAGNA GRÆCIA; NAPLES, CITY OF; PÆSTUM; POMPEII; PYRRHUS; SAMNITES; SOCIAL WAR; TARENTUM, &c.

Those various countries, being finally subjugated by the Romans at the end of the Second Punic War, were administered either as Municipia, Coloniae, or Praefecturae. The municipia retained their local administration and customs, but were subject to the Roman law. This was the condition of Cumæ, Acerræ, Suessa, Atella, Formiæ, Barium, and other places, most of which became colonies under the empire. The colonies were very numerous, and among others are Puteoli, Pompeii, Nola, Sinuessa, Casilinum, Calatia, Teanum, Abella, Pæstum, Buxentum, Saticula, Æsernia, Boianum, Sepinum, Sipontum, Venusia, Brundusium, Hydruntum, Lupia, Tempsa, Croton, Mamertum, Petilia, Scylacaeum, Thurium, and other places. These colonies had their civil institutions framed after the model of the great parent city Rome; they had their decuriones, decemviri, ædiles, quæstores, and other magistrates, and their public acts were designated by the term 'Ordo et Populus,' or 'Senatus Populusque' (Nolanorum, Minturnensium, &c.). Several towns, which in the time of the Roman republic were free allies, 'socii,' paying merely a tribute to Rome, such as Neapolis, Nucera, Salernum, Lucera, Beneventum, Tarentum, Locri, Rhegium became afterwards colonies, in consequence of the civil wars or under the empire, some by having a colony sent to them, others by merely having their civil institutions assimilated to those of the real colonies.

The prefectures had no laws or magistrates of their own choice, but were governed as subject towns by prefects sent from Rome. In this class were Fundi, Venafrum, Allifæ, Arpinum, Capua, and others.

Hadrian changed the form of administration in Italy, which he divided into seventeen provinces. The regions now called the kingdom of the Two Sicilies, were by this arrangement made to consist of part of the province of Campania, which embraced also Latium, and of the four provinces of Apulia and Calabria, Lucania and Bruttii, Samnium, and Sicily. Campania and Sicily were administered by 'consular' governors, the others by correctors. The government thus became more uniform and absolute, and the towns lost most of their former privileges. Constantine retained the division of provinces, and placed those of southern Italy under the superintendence of the Vicar of Rome, whilst the provinces of northern Italy were under that of the Vicar of Italy, who resided at Milan.

The Christian religion spread gradually into southern Italy during the second and third centuries of our æra, as is proved by the memorials of the martyrs who suffered at Nola and Puteoli, especially under Diocletian, but heathenism continued to prevail in most of the towns till after the reign of Constantine. Such was the case with Naples in particular, as appears by a passage of Symmachus (b. viii., Epist. 27) which is quoted by Giannone, in contradiction to the popular notion of the early conversion of the whole country to Christianity. Under the successors of Constantine the churches of south Italy and Sicily were placed under the jurisdiction of the bishop of Rome, and were called 'Suburbicariæ,' in the same manner as the corresponding provinces were, for civil matters, placed under the administration of the Vicar of Rome. Until the reign of Valentinian III., the jurisdiction of the bishop of Rome, according to Sirmond, Dupin, and Giannone, did not extend beyond these suburbicarian provinces or dioceses, of which he was the only metropolitan, and of which he ordained the bishops. The bishop of Rome was styled patriarch by the Greeks.

After the fall of the Western Empire, and the re-establishment of the Gothic prince Theodoric as king of Italy, the provinces of south Italy retained the same form of administration which they had under the Roman emperors, but the Goths introduced the practice of sending a comes or count to every town as civil governor, besides a judge to administer justice. Theodoric enacted many useful ordinances for the administration of the country, and both under him and his immediate successors Italy enjoyed peace and security.

Justinian having taken Italy from the Goths, established the office of exarch or imperial lieutenant, whose residence was fixed at Ravenna. The exarch appointed certain officers, styled dukes, to be civil and political governors of considerable towns, and thus Naples, Tarentum, Gaeta, Amalfi, Surrentum, and other places had each its duke, dependent on the Byzantine exarch at Ravenna, who also kept a military garrison in each of those towns.

Longobard Period.—The earlier Longobard conquerors did not extend their conquests beyond Spoleto; but after a few years, about 580, the precise date being a matter of controversy, a considerable Longobard force entered Samnium, and took Beneventum, where they established a duchy under one Zoto. This duchy became one of the most important in the whole dominions of the Longobards, having extended its dominion not only over the mountainous region of Samnium and the Abruzzi, but also over part of Campania, including Capua, and over a great part of Apulia. It was under duke Zoto that the Longobards, who were still heathens, about the year 582, pillaged the monastery of Monte Casino. The monks took refuge at Rome, whence they were allowed to return many years after, when the Longobards, having embraced the faith of the Western Church, not only protected the monks, but rebuilt or restored the monastery about the year 690.

The duchies of Naples and Gaeta, the towns of Amalfi and Surrentum, the peninsula of Iapygia, and part of the country of the Bruttii remained under the Eastern emperors, but in a state of almost constant war with the Longobards of Beneventum. About the year 663, Constans II. came from

Constantinople with a large armament, and landed at Tarentum with the intention of driving away the Longobards. He besieged Beneventum unsuccessfully, and his troops were defeated near Formiæ by Romuald the Longobard duke, in consequence of which, after committing many depredations, he withdrew to Sicily, where he was soon after smothered in a bath at Syracuse by one of his domestics (A.D. 668). After this, Romuald, duke of Beneventum, took from the Greeks Salernum, Barium, Brundusium, Tarentum, and most other towns on the coast (A.D. 774). Charlemagne having defeated and taken prisoner Desiderius, the last king of the Longobards, received the allegiance of all the dukes of the various provinces of the Longobard kingdom, except Arechis, duke of Beneventum, who, relying on the extent and remoteness of his territories, protected by mountains and strong passes, defied the power of the Franks, and assumed the title of an independent prince. Arechis was a man of abilities. He embellished and fortified Salernum and Beneventum; he encouraged learning, and was the friend of the historian Paulus Diaconus, who took refuge at his court. In 787 Charlemagne having come again into Italy with an army, entered the dominions of Arechis, and advanced as far as Capua. Arechis sued for peace, and agreed to pay tribute to Charles, and gave him his son Grimwald as an hostage. Arechis died shortly after, and was succeeded by Grimwald, whom Charlemagne released on condition of his acknowledging Charles as his suzerain in all public acts, and also razing the walls of Salernum, Compsa, and other places. Grimwald having eluded the last condition, Pepin, son of Charlemagne, and king of Italy, marched against him about the year 801, but was repulsed. To his summons to pay him allegiance Grimwald replied by the following distich:—

> 'Liber et ingenuus sum natus utroque parente
> Semper ero liber, credo, tuente Deo.'

In 806 Grimwald died, and was buried in the church of Santa Sophia at Beneventum, with an inscription over his tomb, in which he is called the 'Saviour of Beneventum against the phalanxes of the Franks.' Having left no sons, his treasurer and namesake, Grimwald, styled II., was elected in his place. He made peace with Charlemagne, and agreed to pay tribute to the kingdom of Italy. After a war against the duchy of Naples, which acknowledged the authority of the Eastern emperor, Grimwald II. made peace with the Neapolitans.

About 830, the Saracens, who had taken possession of Sicily, landed at Tarentum, drove away the Byzantine garrison and governor, and from that time they made frequent incursions into Apulia. They also took Brundusium, Barium, and other towns, most of which however they abandoned after sacking them.

A.D. 839. Sicardus, prince of Beneventum, being murdered by his subjects, his treasurer Radelchis was elected in his place. But Siconulphus, brother of Sicardus, being supported by the counts of Compsa and Capua, and by the Neapolitans, was proclaimed prince at Salernum in 840. A long war ensued, in which both contending parties called in to their assistance bands of Saracens from Africa and Spain, who devastated a great part of the country. The inhabitants at last implored the interference of Louis II., king of Italy, and son of the emperor Lotharius, who came with an army and drove away the Saracens as far as Bari.

851. An arrangement was made through King Louis, by which the old Longobard principality of Beneventum was divided into two, Radelchis retaining the northern part, or the country of Samnium, which extended as far as the Adriatic, with the title of Prince of Beneventum, and Siconulphus assuming the title of Prince of Salernum, which principality embraced Campania and Lucania. Both princes acknowledged themselves vassals of Louis, king of Italy.

852. Landulf, count of Capua, declared himself independent of the prince of Salernum, and thus a third state was formed out of the former principality of Beneventum. In 856, Lando, son of Landulf, built the new city of Capua on the banks of the river Vulturnus, and transferred to it the inhabitants of old Capua, which had fallen to decay.

876. The people of Bari, supported by the Byzantines, drove away the Saracens, and their town became the residence of the Byzantine governor, or strategos, of those parts of Apulia, Calabria, and the country of the Bruttii which still remained under the dominion of the Eastern emperor. Naples and Amalfi had their own dukes, who were elected by the citizens, subject to the approval of the court of Constantinople.

890. Leo the Philosopher, emperor of the East, availing himself of disputes concerning the succession to the principality of Beneventum, took possession of that city, and put an end to the Longobard principality of Beneventum, which had lasted more than three centuries.

900. The people of Beneventum, supported by Guy, duke of Spoleto, having driven away the Byzantines, proclaimed Atenulfus, count of Capua, as their prince. Atenulfus however and his successors continued to reside at Capua, which city thus became the capital of an extensive principality which embraced Campania, Samnium, and part of Apulia and of the present Abruzzo.

963. Landulfus II., prince of Beneventum and count of Capua, died and was succeeded by his two sons, Landulfus III. as prince of Beneventum, and Pandulfus, called 'Iron Head,' as count of Capua; and soon after Otho I. of Germany, emperor of the West, went to Capua, where he received the homage of the two brothers, as well as of Gisulfus, prince of Salernum. On this occasion Otho raised Capua to the rank of a principality in favour of Pandulfus. In 969 Landulfus died, and Pandulfus took possession of Beneventum also; and lastly, in 978, Gisulfus, prince of Salernum, died without issue, having appointed for his successor Pandulfus, who thus re-united under his sway the whole of the former duchy of Beneventum. Pandulfus, the 'Iron Head,' appears to have been a remarkable prince, both as a soldier and a statesman, and he is extolled as such by the anonymous chronicler of Salernum, who was his contemporary. But after his death, A.D. 982, his dominions were divided between his two sons, one of whom had Salernum, and the other Beneventum.

982. Otho II. came with an army with the intention of expelling the Byzantines from Apulia, but having failed, he revenged himself upon the people of Beneventum, who had forsaken him, by sacking their town. In consequence of this defeat of Otho, the Byzantines recovered in some degree their former preponderance in South Italy, seized the whole of the great Apulian plain as far as the Apennines, and built a town, which still exists, and which they called Troia. They also appointed a new officer, with the name of Catapan, to rule over Apulia, and fixed upon Bari for his residence. [CAPITANATA.]

About the year 1016, a party of Norman pilgrims from the duchy of Normandy in France, where their countrymen under Rollo had settled about a century before, returning from Palestine, landed at Salerno for the purpose of visiting the sanctuaries of Monte Casino and Mount Gargano. Waïmar, the prince of Salermo, struck with the comely persons and gallant bearing of the strangers, received them with marked attention, and induced them to tarry a while in his capital. In the mean time it happened that a Saracen squadron anchored at Salerno, and threatened to plunder the country unless they were paid a large sum of money. The natives of Salerno, as well as those of the neighbouring principalities, exposed to frequent attacks of Greeks and Saracens, had become dejected and timid, and did not think of resistance. Whilst their prince was preparing to pay the money, the Saracens landed on the beach outside of the walls of Salerno, where they feasted and caroused in heedless security on the provisions which were supplied to them. The Norman knights, to the number of forty, some say more, indignant at the sight, suddenly sallying out of the town, fell upon the Saracens, who were either asleep or otherwise unprepared for defence, made great slaughter of them, and drove the remainder to their boats. The prince and citizens of Salerno loudly expressed their admiration and gratitude to the strangers, and offered them an honourable settlement in the country, which the pilgrims declined, but promised that on their return to Normandy they would send some of their countrymen. Soon after, one Osmond Drengot, accompanied by his brothers Rainulf, Asclittin, and other relatives, made their appearance at Capua, where they were well received by Pandulfus IV., prince of Capua and Benevento. It happened about this time (A.D. 1017) that an insurrection broke out at Bari among the natives against their Byzantine rulers. The insurgents, headed by a certain Melo, of Longobard descent, and Dato, his brother-in-law, proceeded in expelling the Greek Catapan and garrison. But new troops coming from the East, laid siege to Bari, and as the inhabitants appeared disposed to surrender, Melo and Dato contrived to escape to Capua, where they found the Norman emigrants, whom Melo engaged to join him, together with other militia from the neighbouring principalities of Salerno and Benevento. With these troops Melo entered the plains of Apulia, and defeated the Greeks, but was at last defeated himself near the site of Cannæ in the year 1019. The Normans however protected his retreat, and Melo returning to Capua, and having recommended his Norman friends to Pandulfus, prince of Capua, and Waimar, prince of Salerno, set off for Germany to induce the emperor Henry II. to interfere in the affairs of Southern Italy. Henry however was busy about other matters, and Melo, after repeated journeys, died in Germany The Normans of Capua were located, some in the domains of the abbot of Monte Casino, and others under the command of Dato, at a fort on the banks of the Liris, which commanded the passage of that river. But Pandulfus, prince of Capua, and his brother Adinulfus, abbot of Monte Casino, were induced by large bribes from Basilius II., emperor of the East, not only to pay allegiance to him, but also to betray into his hands Dato, who, being seized by the Greeks, was taken to Bari, and there being tied in a sack, was thrown into the sea, as being guilty of high treason. The emperor Henry, hearing of these transactions, and being indignant at the encroachments of the Greeks, and the connivance of the Longobard princes, in breach of their sworn allegiance to the emperors of the West, assembled a force with which he crossed the Alps about the year 1022, and was joined by the contingents sent by the bishops of Milan, Verona, Vercelli, Piacenza, and other cities, most of which had in that age their respective bishops at the head of their municipal administration. The emperor sent 15,000 men under Poppo, patriarch of Aquileia, along the coast of the Adriatic, to attack the Greeks in Apulia; and another body of 20,000 men, under Pelegrinus, archbishop of Cologne, he sent by the way of Rome, with orders to seize the abbot of Monte Casino and the prince of Capua. Henry himself followed more leisurely with the remainder of his army. The Norman settlers, who had increased in number, being joined by many of their countrymen from Normandy, followed the imperial standard, the abbot Adinulfus fled to Otranto, and Pandulfus was taken by the emperor and sent as prisoner to Germany, and the principality of Capua was given to the count of Teano. On returning to the north, Henry recommended his German auxiliaries to the new prince of Capua; but after the emperor's departure, the Normans, being neglected by the native princes, took possession of a district of Campania on the borders of the duchy of Naples, and with the consent of that duke, where they built a town, A.D. 1020, which was called Adversa or Aversa, being considered as a bulwark of Naples 'adversus' Capua. [AVERSA.] Rainulfus assumed the title of count of Aversa, which title was confirmed some years after by the emperor Conrad. This was the first Norman state established in Italy.

Norman Period, from 1020 *to* 1194.—A fresh band of Normans, headed by William, Drogo, and Hunfred, sons of Tancred, count of Hauteville, near Coutances in Normandy, a powerful baron, came to seek their fortunes in Italy, and entered the service of Waïmar IV., prince of Salerno, whom they assisted in taking Sorrento, Amalfi, and other places.

1037. Maniaces, Catapan of Apulia, having prepared an expedition to recover Sicily from the Saracens, requested and obtained of the prince of Salerno the assistance of his Norman auxiliaries. The expedition proved successful, and put an end to the dominion of the Saracen emirs, who were lieutenants of the Zeiride sultan of Tunis and Kairwan, A.D. 1038. The Normans, and especially their leader William of Hauteville, surnamed Bras-de-Fer, or the 'iron-arm,' gave material assistance to the Byzantines in this campaign; but being ill requited by Maniaces, they left him, and crossing the Strait of Messina, they marched through Calabria, and seized Melfi, Venosa, Ascoli, and other towns of Apulia. They made Melfi their capital, and having formed an alliance with the Longobard prince of Benevento, they repulsed all the forces which the Byzantines sent against them, and took the whole of Apulia, with the exception of Bari, Tarentum, and a few other maritime towns which were garrisoned by the Greeks.

1043. The Normans having divided the conquered territories into so many fiefs among their leaders, appointed one of them, William Bras-de-Fer, to be above the rest as president in the council and captain-general in the field, with the title of count of Apulia, amidst the acclamations of the united militia, Norman, Longobard, and Apulian. The Norman county of Aversa remained separate and independent, but its count, Rainulfus, as well as Waimar, prince of Salerno, attended the diet of the Norman barons of Apulia at Melfi, in which William was proclaimed.

1046. William Bras-de-Fer died, and his brother Drogo was proclaimed count of Apulia.

1047. The emperor Henry III. repaired to Capua, and gave to Drogo the investiture of the county of Apulia; and being dissatisfied with Pandulfus, prince of Benevento, he made a grant of the principality to both the count of Apulia and the count of Aversa, who divided the territory between them, but did not take the town of Benevento.

1053. Pope Leo IX. having marched with an army against the Normans, was defeated and taken prisoner; as however he was treated by them with the greatest respect, he not only confirmed the count of Apulia, but gave the Normans all the lands that they might conquer in Calabria and Sicily as hereditary fiefs of the see of Rome. Robert of Hauteville, called Guiscard or Wiskard, 'the wise,' having succeeded his brother as count of Apulia, readily availed himself of this grant by taking a great part of Calabria from the Byzantines. His younger brother Roger had the greater share in this new conquest, which he completed by taking Rhegium and Scylacæum.

1059. Robert Wiscard was by common consent of the Norman chiefs proclaimed duke of Apulia and Calabria. He assumed the ducal coronet and furred robe, and was confirmed by pope Nicholas II., in a council held at Melfi, on his paying allegiance to the see of Rome. The pope moreover granted him the investiture of the island of Sicily, which he engaged to take from the Saracens, who had recovered it through the weakness and mismanagement of the Byzantine governors. The pope granted in like manner to Richard, Norman count of Aversa, the investiture of the principality of Capua, which he had taken from Landulfus, the last Longobard prince of Capua. Duke Robert created his brother Roger count of Calabria.

1061. Roger invaded Sicily, being supported by one of the Saracen chiefs, and surprised Messina.

1070. Robert Wiscard took Bari, the last stronghold of the Eastern emperors in Italy, after three years' siege. He then joined his brother in Sicily, where they took Palermo, and allowed the Mohammedan population the free exercise of their religion.

1075. Robert Wiscard took Salerno, and drove away Gisulfus, its Longobard prince.

1077. Landulfus, prince of Benevento, dying without issue, Robert annexed the principality to his other dominions, giving the town of Benevento, with a small territory around, to the pope. Thus ended the last Longobard principality in Southern Italy.

1081. Robert Wiscard, whose daughter had married the son of Michael Ducas, emperor of Constantinople, sailed with an armament to the liberation of Michael, who had been deposed by Nicephorus Botoniates. Having entrusted the administration to his second son Roger, he took with him his eldest son Bohemund. Corfu and Durazzo fell into his hands, and marching thence overland, he defeated the forces of Alexius Comnenus, who had taken possession of the Eastern throne. He soon after returned to Italy to the assistance of pope Gregory VII., who was besieged in Rome by the troops of the emperor Henry IV. He liberated the pope, who followed him to Salerno. [GREGORY VII.]

1085. Robert having reimbarked for the East, where his son Bohemund was carrying on the war against the emperor Alexius, fell ill and died in the island of Corfu, at the age of sixty. Robert Wiscard was the founder of the Sicilian monarchy, and a very distinguished personage in the middle ages. He bequeathed Sicily and part of Calabria to his brother Count Roger, with the exception of the city of Palermo, which he had chosen for his own capital; to his second son Roger he left the duchy of Apulia, with Salerno and the rest of his continental dominions; and to Bohemund he gave his Eastern conquests. Bohemund afterwards having joined the great crusade, became the founder of the kingdom of Antioch.

1090. Noto, the last Saracen garrison in Sicily, surrendered to Count Roger, who assumed the title of 'Great Count of Sicily.' He established feudality in those towns and districts which he had taken by force from the Saracens; the rest of the country was considered crown domains, the proprietors of which remained undisturbed, under the name of allodialists or burgensatici. He instituted the Sicilian parliament, or assembly of the great feudatories, both ecclesiastical and lay, who met when convoked by the prince. In 1091 he sailed to Malta, and obliged the Gaït, or Saracen governor, to pay tribute to the count of Sicily. Count Roger protected all his subjects, both Christians, Saracens, and Jews, and was popular with all. He even formed a body-guard of Mohammedans.

1101. Count Roger of Sicily died, much regretted, and was buried with great pomp at Mileto in Calabria. He was succeeded by his son Roger.

1111. Duke Roger of Apulia died at Salerno, and was succeeded by his son William, who, being harassed by his refractory vassals, applied to his cousin Count Roger II. of Sicily, entreating him to come to his assistance, in reward for which he gave him the city of Palermo, which Robert Wiscard had kept for himself.

1127. Duke William died at Salerno, having no issue, upon which Count Roger of Sicily came with an armament to claim the inheritance, and, after much opposition from some of the barons, succeeded in establishing his authority over all Apulia, Calabria, and Salerno. Pope Honorius II. however opposed his claim, and excommunicated him, and preached a crusade against him. The pope invaded Apulia with an army, but was obliged to retire.

1128. A conference took place near Beneventum, between Roger and the pope, in which the latter gave him the investiture of the dukedom of Apulia and Calabria. Roger was now master of the whole of the states which have since constituted the united Sicilian monarchy, with the exception of the principality of Capua, which was possessed by another Norman dynasty, and the duchy of Naples, which still retained its independence and its elective dukes under a nominal allegiance to the Eastern emperors.

1130. Roger having assembled a parliament at Salerno, to which he called not only his feudatories and prelates, but also the most learned men of his dominions, it was decided in that assembly that he should assume the title of king of Sicily. This resolution was unanimously confirmed by the Sicilian parliament which he soon after convoked at Palermo; and on Christmas-day of that year Roger was solemnly crowned in the cathedral of Palermo by the four archbishops of Palermo, Salerno, Capua, and Benevento. He assumed the title of 'Rex Siciliæ, Ducatus Apuliæ, Principatus Capuæ.' Robert, prince of Capua, carried the crown in the procession. Pope Innocent II. refused to acknowledge Roger's new dignity, and Roger on his part acknowledged Anacletus, Innocent's competitor, as pope.

1135. King Roger, being annoyed by the hostile conduct of the prince of Capua, seized that principality and annexed it to his other dominions.

1136. The emperor Lotharius II. and pope Innocent II. took Capua and great part of Apulia, and appointed Rainulf, count of Avellino, duke of Apulia. Roger withdrew to Sicily, but in the following year, Lotharius having returned to Germany, he landed at Salerno and retook Capua, Nocera, and other towns. The war between him and Rainulf lasted two years.

1138. Rainulf died of a fever in Apulia, and Roger soon after subdued that province.

1139. Pope Innocent marched with troops into Campania, but was surprised and taken prisoner by Roger, who treated him with great respect, and on the 25th of July a treaty was concluded between them, by which the pope granted to Roger the investiture of the kingdom of Sicily, the king swearing allegiance to the see of Rome, and promising the payment of an annual tribute. About the same time Sergius, duke of Naples, having died, the Neapolitans chose for their duke the eldest son of king Roger, but retained their municipal laws and liberties.

1140. King Roger crossed the river Pescara and seized that part of Abruzzo which lies between the Pescara and the Tronto, and thus the Sicilian kingdom attained its compact form and the boundaries which it has retained to this day. Roger assembled a parliament at Ariano, in which a new silver coin was ordered to be struck, called a 'ducat.' In 1146 he sent an armament to Tripoli in Barbary, which he took, as well as the towns of Mahadia and Sus, the island of Jerbi, and other places. Being offended at the emperor Manuel Comnenus for some slight, king Roger sent his admiral, George of Antioch, who seized Corfu, invaded Acarnania, and took Thebes and Corinth, which he plundered. He returned to Sicily with a large booty and many spinners and weavers of silk, whom Roger settled in his palace at Palermo. Thus the manufacture of silk was introduced into Sicily.

1151. Roger named his son William his colleague on the throne.

1154. Roger died at the age of fifty-nine, leaving his third wife pregnant. She was delivered of a daughter, Constance, who was afterwards wife of the emperor Henry VI. and mother of Frederic II. King Roger was the third great man of his family. Robert Wiscard and Count Roger laid the foundations of the monarchy by their conquests, and King Roger consolidated the whole into a regular form, made a body of laws, and established an orderly system of administration.

1154. William I., called 'the bad,' succeeded, but did not imitate his father. He began well by defeating by land and by sea the armaments of Manuel Comnenus, as well as the troops of the sultan of Egypt. He also extricated himself with honour out of some disputes which he had with the pope. But afterwards trusting implicitly to his favourite minister and admiral Majone, a covetous and cruel man, he involved the kingdom in a civil war.

1160. Majone was killed by a band of conspirators, but the rebellion continued until it was put down by force. In 1162 peace was established in the kingdom.

1166. William I. died at Palermo, and was succeeded by his son William II., a minor, under the guardianship of his mother. The first years of his reign were distracted by revolts of the barons, and by popular tumults in Palermo, where the Saracens, or Moslems, who formed a considerable and wealthy part of the population, being accused of heinous crimes, were treated with great rigour.

1174. William raised the splendid cathedral of Monreale near Palermo.

1177. William married Joan, daughter of Henry II., king of England, who was received at Palermo with great pomp.

1178. A Sicilian fleet sailed to the coast of Syria, and retook Tyre and Antioch from the arms of Salaheddin.

1184-85. A Sicilian armament was sent to Thessalonica to support the claims of Alexius Comnenus against the usurper Andronicus. The war ended with the dethronement and execution of Andronicus by the people of Constantinople. About 10,000 Sicilian soldiers perished in battle.

1185. William having no issue, the princess Constance, his aunt, was married to Henry, son of the emperor Frederic I., and declared heiress apparent of the kingdom.

1188. Another Sicilian fleet, under William's great admiral Margaritone of Brindisi, sailed to Syria, and relieved Tyre and Antioch, which were besieged by Salaheddin.

1189. William II. died at Palermo. He was styled 'the good,' a surname which he deserved for his integrity, his love of justice, and his care for the welfare of his subjects. The Sicilian parliament, being convoked by the chancellor of the kingdom, proclaimed his cousin Tancred, count of Lecce, an illegitimate son of Roger, the eldest son of king Roger. This was done through fear of Henry VI. and his German followers, who would have taken possession of the kingdom through the claim of Constance, Henry's consort. Tancred had a great reputation for courage, generosity, and love of learning.

1190-91. Richard I. of England landed in Sicily, and had several interviews with Tancred with respect to his sister the dowager queen of Sicily and her widow's settlement.

1191. Henry VI., now emperor of Germany, invaded Apulia, and took Salerno. Returning to Germany, he left behind his wife Constance, who was made prisoner by the people of Salerno, and given up to Tancred, who generously restored her to her husband. Tancred drove away the German troops from Apulia.

1194. Tancred died at Palermo, leaving a son William, a minor, to succeed him under the guardianship of his mother, queen Sybilla. Henry VI. having again entered Apulia with a large force, and being supported by the turbulent barons, overran the country as far as Rhegium, crossed the strait, and took Messina, Syracuse, and Catania. He then marched to Palermo, and queen Sybilla and her son William having retired to a castle, the city opened its gates to Henry, who was acknowledged king and solemnly crowned.

1195. Henry having seized the persons of queen Sybilla and her son William, confined them first to a monastery, and had the child barbarously mutilated and deprived of sight. The boy expired in prison shortly after. He also put to a cruel death their principal adherents. Thus ended the Norman dynasty, which had reigned with glory over Sicily for more than a century.

Suabian Dynasty. 1194-1260.—A revolt, caused by the cruelties of Henry VI. and the brutality of his German followers, broke out in Sicily. It was quelled by massacre, and the prisoners were put to a cruel death, some being empaled, some burnt alive, and others flayed alive. The town of Castrogiovanni however persisting in the revolt, Henry went to besiege it, when he was taken ill and died, A.D. 1197. Constance remained regent for her son young Frederic II. She restored peace, sent away the Germans, and put herself entirely into the hands of her subjects, who loved her as being the daughter of King Roger.

1198. Frederic II., then four years old, was crowned king at Palermo. Not long after Queen Constance died, leaving her son at Palermo, where he was educated under the political tutorship of the pope.

The events of the life of Frederic are related under FREDERIC II. of Germany. Under his reign Sicily and Apulia enjoyed comparative tranquillity and considerable prosperity. Frederic was a legislator: many of his 'Constitutions,' or code of laws for his Sicilian kingdom, are deserving of praise, considering the time when they were enacted. He was the founder of the third estate, or commons, in the island of Sicily, having called to sit in the Sicilian parliament two 'prudhommes,' or 'wise men,' for every demesne town. He also established a municipal body in every commune. Although emperor himself, he caused the German diet to recognise the kingdom of Sicily as independent of the empire. He took away from the barons the exercise of criminal jurisdiction, which in their hands was a formidable means of oppression, and gave it to the king's judges. He abolished the trials called the 'judgments of God,' and judiciary duels. He encouraged public instruction, founded a university at Naples, and schools at Palermo and in other towns.

1250. Death of Frederic II., a great prince, and a benefactor to Sicily. Conrad succeeded him, but died in 1254, leaving his only son Conradin two years of age. Manfred, a natural son of Frederic, assumed the regency of the kingdom of Sicily.

1258. Manfred was crowned king at Palermo with the assent of the parliament on the rumour of the death of Conradin. The events of his reign are given under MANFRED.

1266. Battle of Benevento, between Charles of Anjou, whom the pope had crowned king of Sicily, and Manfred. Manfred was defeated and killed, and Charles was acknowledged king of Sicily, Apulia, Calabria, &c. His government was tyrannical and rapacious, and his French soldiers were insolent and dissolute. [ANJOU, DUKES AND COUNTS.]

1267. Expedition of the young Conradin to recover his paternal kingdom. He was defeated by Charles of Anjou at Tagliacozzo, and betrayed into his hands.

1269. Public execution of Conradin at Naples. [CONRADIN.]

Anjou and Aragonese period.—1282. Sicilian vespers, or general massacre of the French in the island of Sicily, to the number of about 4000. The Sicilians called to the throne Pedro, king of Aragon, who had married Constance, daughter of Manfred. Charles of Anjou retained the continental territories, and fixed his residence at Naples. Both styled themselves king of Sicily, and the usage began gradually to prevail at Naples of calling the island Sicily 'ultra pharum,' and the continental territories 'Sicily citra pharum.'

1285. Pedro died, and was succeeded in Sicily by his second son, James; the eldest, Alonso, having succeeded to the crown of Aragon.

1291. Alonso having died, James succeeded to the crown of Aragon, and at the suggestion of Pope Boniface VIII., a friend of the Anjous, he ceded Sicily to Charles II. of Naples, the pope granting him in exchange the investiture of Sardinia. [SARDEGNA, *History of*.] The Sicilians however refused to be given up to the Anjous, and in 1256 the parliament proclaimed Frederic, younger brother of James, king of Sicily.

1296-1337. The reign of Frederic was stormy; he had to struggle against his own brother, who joined his Aragonese troops to those of the Anjous from Naples and from France, and against Pope Boniface VIII., who supported both by the terrors of church excommunication. The foreigners landed repeatedly in Sicily, but were ultimately defeated.

1302. Peace of Castronovo, which put an end to a war of twenty years. Frederic was acknowledged by the Anjous on condition of marrying Eleanor, Charles's daughter, and on the further condition that after his death Sicily should revert to Charles and his successors.

1309. Death of Charles II. at Naples. He was succeeded by his son Robert, who put himself at the head of the Guelphs of Italy, while Frederic of Sicily took the part of the emperor. A desultory war was renewed between Sicily and Naples.

1331. Frederic, in a parliament assembled at Syracuse, named his son Peter his colleague and successor, and had him crowned at Palermo.

1337. Frederic II. of Sicily died after an eventful but a successful reign of forty years. His son Peter II. succeeded him.

1342. Peter of Sicily died, leaving his son and heir Louis a minor, under the guardianship of John, duke of Randazzo, an able statesman. Hostilities continued between Sicily and the Anjous.

1343. Death of Robert of Naples. His love of letters has consecrated his memory; he was the friend of Petrarch and Boccaccio.

.343-82. Joan I. succeeded her father Robert. For the events of her reign see JOAN I. of Naples.

1348. Treaty of peace by which Louis of Sicily and his successors are acknowledged by the Anjous of Naples as legitimate kings of Sicily.

1355. Louis of Sicily died, and was succeeded by his brother Frederic III. Sicily, under the weak reign of Frederic, was a prey to factions. The barons encroached on the domains of the crown, as well as on the liberties of the towns.

1377. Frederic dying without male issue, the crown devolved upon Martin, called the younger, son of Martin, Infante of Aragon, and who had married Mary, daughter of Frederic. He was opposed by the refractory barons, who kept Sicily in a state of anarchy.

1382. Joan of Naples put to death by Charles of Durazzo, who succeeded her.

1386. Charles, being murdered in Hungary, was succeeded by his son Ladislaus.

1398. Martin of Sicily, being supported by his father, Martin the elder, who had become king of Aragon in 1395, was crowned at Palermo. He restored the authority of the crown, and checked the turbulent barons.

1409. Martin of Sicily died in an expedition to Sardinia, and was succeeded on the throne of Sicily by his father, Martin the elder, king of Aragon, who died next year.

1412. Ferdinand I. of Aragon, nephew of King Martin was proclaimed king of Sicily after an interregnum of two years. He sent the Infante Don Juan to govern the island.

1414. Ladislaus, king of Naples, died after a stormy reign. He was mostly employed in foreign wars, and was careless of the welfare of his subjects. He was succeeded by his sister JOAN II. of Naples.

1416. Alfonso, son of Ferdinand, having succeeded his father as king of Aragon and Sicily, recalled the Infante Don Juan and appointed a viceroy to govern Sicily. This was the beginning of the Spanish viceregal government in Sicily, which lasted three centuries, to the great disappointment and disadvantage of the Sicilians.

1435. Joan II. of Naples died, and bequeathed her crown to Réné. [RENE OF ANJOU.]

1442. Alfonso V. of Aragon and I. of Sicily took Naples and drove away Réné. Thus Sicily and Naples were temporarily reunited. [ALFONSO V.]

1458. Alfonso died after a long and eventful reign. He had some brilliant qualities, but was too fond of war, and was too subservient to the feudal interest. His illegitimate son Ferdinand succeeded him at Naples. The events of his reign are related under FERDINAND I. OF NAPLES. Alfonso's brother Don Juan succeeded to the crowns of both Aragon and Sicily, and Sicily was again governed by viceroys from Spain.

1479. Ferdinand of Aragon and Castile, called the Catholic, son of Don Juan, succeeded his father both in Aragon and Sicily. He was styled Ferdinand II. of Sicily. [FERDINAND V. OF CASTILE.]

1494. Alfonso, son of Ferdinand of Naples, succeeded to that crown after his father's death. The French, under Charles VIII., who had inherited the claims of the Anjous, invaded that kingdom. Alfonso escaped to Sicily, where he turned monk, after abdicating in favour of his son Ferdinand. Sicily remained quiet under the government of Ferdinand of Spain.

1496. Ferdinand, styled II. of Naples, recovered his kingdom, which the French were obliged to evacuate by a general league of the Italian powers against them. He died soon after, and was succeeded by his uncle Frederic, who, being threatened by Louis XII. of France, applied to his relative Ferdinand of Aragon and Castile, who ordered Gonsalo of Cordova, his captain-general in Sicily, to proceed to the mainland, with a secret understanding between Ferdinand and Louis XII. that they were to divide the kingdom of Naples between them. Pope Alexander VI. (Borgia) became a fit party to this disgraceful transaction, by granting a bull of investiture to the two crowned plunderers. Louis invaded the kingdom from the north and Gonsalo advanced from the south, both putting garrisons in the towns which they occupied. Frederic, finding himself betrayed by his own relatives, left Naples and asked the French king for an asylum in his dominions.

1501. Louis XII. granted to Frederic the duchy of Anjou with a pension. Frederic died in France in 1504. His eldest son Ferdinand died in Spain childless, and his other sons died young and without issue. Thus ended the Aragonese dynasty of Naples.

1503. The French and Spaniards quarrelled about the partition of the kingdom of Naples, and Gonsalo settled the dispute by defeating the French at Cerignola in Apulia and driving them out of the country. The whole of the Sicilian kingdom acknowledged Ferdinand of Spain, who governed both countries by viceroys.

1516. Ferdinand died, and was succeeded by Charles V. of Germany, styled I. of Spain, II. of Sicily, and IV. of Naples. [CHARLES V. OF GERMANY.]

Spanish Viceregal period for both Naples and Sicily. 1503 to 1734.—During this long period those fine countries retrograded in many respects. The national spirit became extinct, and the ruling country, Spain, being itself in a state of decay, could not infuse any new vigour into its dependencies. The administrative, economical, and judicial systems, imperfect as they were under the former rulers of Naples and Sicily, became worse under the administration of the Spanish viceroys. Several of those viceroys were men of good intentions and of strict integrity, but their tenure of office being short and depending upon the intrigues of the distant court of Madrid, they had not the means or the time to effect any enlarged plan of improvement. The names of some of them however are recorded with honour in the annals of the kingdom. They embellished the chief towns, but the country was neglected. It was overrun by outlaws, its resources were wasted, and the population decreased. In Sicily the parliament maintained some sort of national spirit, but in the Continental territory the parliaments had never been convoked so regularly as in Sicily, and at last fell totally into disuse. The last parliament sat at Naples in September, 1642. On the other side the tribunal of the Inquisition was established in Sicily, but was firmly rejected by the Neapolitans. Alarming insurrections broke out both in Naples and in Sicily; that of 1647 is related under ANIELLO TOMMASO. In 1671 Messina revolted against the Spaniards, and admitted a French garrison, France being then at war with Spain. A few years after, peace being made between the two powers, the French abandoned Messina, ten thousand of whose inhabitants emigrated to avoid the vengeance of Spain. At last the war of the Spanish uccession broke the power of Spain in Southern Italy.

1708. The Austrian troops under Marshal Daun conquered Naples on behalf of the Archduke Charles, who claimed the crown of Spain. Sicily remained quietly under Philip V. of Spain. By the peace of Utrecht, Charles, now emperor, resigned his claims to Spain, but retained Naples, Sardinia, and Milan, and by the express intervention of Queen Anne of England, Sicily was given to Victor Amadeus of Savoy, with the title of king.

1714. Victor Amadeus made his solemn ingress into Palermo, and having assembled the Sicilian parliament, he manifested enlightened views of administration. The census of the island of Sicily being taken on that occasion, gave a return of 1,153,000 inhabitants, of which Palermo reckoned 120,000.

1718. The expedition sent by Cardinal Alberoni in time of profound peace took Sicily from King Victor, but England and Austria obliged the Spaniards to evacuate the island, and by a new arrangement Sardinia was given to King Victor and Sicily to the emperor Charles. Thus Sicily and Naples were again united under a foreign crown. [ALBERONI; SARDEGNA.]

1734. A new war having broken out in Europe on the occasion of the disputed succession of Poland, Spain undertook to reconquer both Naples and Sicily. The Infante Don Carlos, son of Philip V., marched with a well appointed army and took Naples from the Austrians. He then proceeded to Sicily, which he also conquered after some resistance. At the same time Philip V. made a solemn renunciation of Naples and Sicily in favour of his son Don Carlos, who assumed the title of King of the Two Sicilies, and his heirs.

1735. *Restoration of the Sicilian Monarchy.*—This was the beginning of a new æra for the countries of Naples and Sicily. They resumed their rank as an independent monarchy, and also their nationality, which is an essential condition to the well being of a people. Don Carlos proved a good sovereign: he completely identified himself with his new subjects, and he set his mind on restoring the monarchy to that unity of administration and that political rank and independence which it had assumed under its first king Roger. Charles gave himself the example of respecting the laws; he chose able ministers, among others Tanucci, to assist him; he checked the power of the barons, and took the first steps towards the extinction of feudality, which was afterwards effected under his successor. He created a national army and navy, encouraged useful studies, established workhouses for the destitute, built a new mole and quays at Naples, the splendid theatre of S. Carlo, the museum, and the magnificent residence of Caserta, on which last he spent large sums which might have been more usefully employed. But the finances were in a flourishing condition, and the country enjoyed peace, and a degree of prosperity to which it had been a stranger for centuries.

1759. Charles, having by the death of his brother Ferdinand VI. of Spain succeeded to the crown of that monarchy, resigned his kingdom of the Two Sicilies to his son Ferdinand, then eight years old, appointing a council of regency during his minority. The first part of the reign of Ferdinand, till the epoch of the French revolution, was spent in forwarding the system begun by Charles. A sketch of the long reign of Ferdinand is given under FERDINAND IV. of Naples.

1799. A French army invaded the kingdom of Naples in January, after a desperate resistance on the part of the populace, and established a republic. Ferdinand had escaped to Sicily. In the following May the French troops retired from Naples, being recalled to the north to fight the Austrians and Russians; and in June the troops of Ferdinand, joined to a large Calabrian militia, led by cardinal Ruffo, retook the capital and the whole kingdom. A fearful reaction and proscription took place.

1806. A French army sent by Napoleon invaded the kingdom, and entered Naples without opposition. Ferdinand took refuge in Sicily. A partisan war was carried on for several years in Calabria between the French and the natives. Joseph Bonaparte was proclaimed king of Naples. In the same year feudality was abolished by a royal decree.

1809. Joachim Murat was appointed by a decree of Napoleon to the throne of Naples, in lieu of Joseph, appointed by another decree to the throne of Spain. [MURAT, JOACHIM.]

1812. A new representative constitution upon a liberal scale was proclaimed in Sicily, and feudality abolished by the vote of the Sicilian barons in parliament assembled.

1815. The last parliament of Sicily convoked by king Ferdinand. Murat makes war against Austria, is defeated, and the Austrians enter Naples and restore king Ferdinand.

1816. Ferdinand assumes the title of Ferdinand I., King of the United Kingdom of the Two Sicilies, and the legislation and administration of both divisions of the kingdom were reduced to a uniform system. Thus the Sicilian constitution was virtually abolished. The French civil code was retained with some modifications.

1818. A new concordat for the Two Sicilies agreed upon by the pope.

1820. Military revolution at Naples; the Spanish constitution of 1812 is proclaimed; and a united parliament for Naples and Sicily is convoked. Palermo however and other towns of Sicily proclaim the independence of that island under the same king: in short, a repeal of the union which had been enforced by Ferdinand. The parliament of Naples sends troops to Sicily, and Palermo is retaken.

1821. An Austrian army marches upon Naples with little opposition. The constitution is abolished, and Ferdinand is restored to absolute power.

1825. Ferdinand dies and is succeeded by his son Francis.

1830. Francis dies after a short and comparatively unimportant reign, and is succeeded by his son Ferdinand II., the present king.

The authorities for the history of the Two Sicilies are very numerous: the old chroniclers, for the Norman, Suabian, and Anjou periods; and Panormita, Pontanus, Valla, Collenuccio, and Albino, for the Aragonese dynasty. The general history of the kingdom has been written by Costanzo, Summonte, and above all by Giannone, whose history is a classical work, and has been worthily continued down to the present times by General Colletta.

SICILY (in Latin, *Sicilia;* in Greek, *Sicelia*, Σικελία), a large island in the Mediterranean Sea, which is separated by a narrow channel, called Faro di Messina, from the coast of Calabria. It is in the shape of a triangle, the apex of which, formed by Cape Lilybæum, is towards the west, and is about ninety miles distant from Cape Bon on the coast of Tunis. The north-east point, Cape Pelorus, now Capo di Faro, faces the rock of Scylla on the Calabrian coast, from which it is three miles distant, and the south-east point, Cape Pachynus, or Passaro, is sixty miles from the island of Malta. The length of the northern and southern sides of the island on the map, not including the windings of the coast, is about 175 miles each; and that of the eastern side is about 115 miles. A succession of mountain-groups extend across the island from east to west, bearing various names: the Mounts Pelorias, or Dinamari, between Melazzo and Taormina, which seem to be a continuation of the Apennines of Calabria; the Heræi Montes, farther west; the Nebrodes, now Monti Madonia, south of Cefalù and Termini, the highest summit of which, near the town of Polizzi, is said to be 6000 feet high; the Cratas, the ramifications of which extend to Palermo, and one of the highest summits of which is that of Calatamauro, near Corleone; and, lastly, Mount S. Giuliano, or of Trapani, the antient Eryx. These mountains are much nearer to the northern than to the southern coast, and the longest watercourses are consequently on the south side of them. Toward the centre of the island are the limestone mountains of Enna, now Castrogiovanni, about 3000 feet high, and Mount Artisino, which is still higher; both of these are offsets of the Nebrodes ridges: and farther south the lower groups of the mountains of Noto, formed of tertiary rocks, extending to Cape Passaro; and the hills of Modica, the Hybla Minor of the antients. Few summits in Sicily, with the exception of Ætna, exceed 4000 feet in height. Towards the eastern coast rises the detached group of Ætna, which occupies an area nearly ninety miles in circumference, the highest summit of which is 10,874 feet above the sea. [ÆTNA.] At the southern base of Ætna lies the plain of Catania, the largest in the island. There are smaller plains along the southern coast, near Alicata, Terranova, Marsala, and at Melazzo on the northern coast; but the larger part of the surface of the island consists of mountains and valleys. The northern coast is generally high, the mountains in many places coming close to the sea. Few of the rivers are perennial. Of these few the principal are, the Giaretta, or Simæthus, which flows eastward through the plain of Catania; the Fiume Salso, the antient Himera, which flows southward, and enters the sea near Alicata; and the Belice, or Hypsa, which flows into the sea near Selinunte, the site of the ruins of Selinus. Most of the rest are torrents, with a short and rapid course—dry or nearly so in summer, but swelling into formidable floods in the rainy season, when, for the want of bridges, they become impassable for days together. These are called 'fiumare' in the language of the country.

Most of the mountains have been in the course of ages stripped of their antient forests, and they now present a naked and barren appearance. The sides of Ætna however are still covered with fine forests of oaks, beach, maple, birch, fir, and magnificent chesnut-trees. A few other forests are scattered over the surface of the island, the principal being that of Caronia, near the northern coast; that of Capellaro, south of Palermo; the woods near Castelvetrano, on the southern coast; and the forest of Giummia, west of Caltagirone. The mineral productions of Sicily consist of copper and silver, which were once worked, but are now abandoned; cinnabar, sulphur, which is found in great abundance, especially near San Cataldo, Galati, Butera, Bifara, Tavara, and Montegrande, and forms a considerable article of export from Alicata, Girgenti, and Palma. The quantity exported amounts annually to between 500,000 and 600,000 cwt., of which the greater part goes to England and France, at the average price of about one 'oncia' (or 10*s.* 6*d.*) the cwt. at the place of embarkation. Several of the sulphur-mines are let by the proprietors to English and other foreign houses, under an agreement with the government for a moderate fixed duty to be paid on the exportation. The infringement of the convention on the part of the Neapolitan government has given rise to the so-called 'Sulphur Question' between Great Britain and Naples, which attracted the attention of parliament in the session of 1840.

Sicily seems to contain no iron. Marble, alabaster, and other kinds of fine stones are found in abundance. Amber is found near Catania. There is rock-salt near Castrogiovanni, but the greater part of the salt consumed or exported is sea-salt, which is made in extensive salines or salterns along the coast, especially near Trapani, Marsala, and Agosta. The exported salt is mostly put on board Baltic or Norway traders.

Sicily has no lakes except that of Biviere, near the east coast, between Catania and Syracuse, which is about twelve miles in circumference, and abounds with fish; and the lake of Pergusa, near Castrogiovanni, in the centre of the island, which is about four miles round.

The sea around the coast of Sicily abounds with fish of various sorts, but the most productive fisheries are those of the migrating fish, the sardine and tunny. The tunny is caught in the months of May and June in the tonnare of Trapani, Termini, Cefalù, Melazzo, Capo Passaro, &c. The quantity is about 20,000 cwt., most of which is consumed in Sicily and Naples and other parts of Italy.

The cultivation of corn is said to occupy about one-half of the tilled land. They reckon five qualities of wheat, the best of which is that of Termini, and the lowest quality that of Catania. The difference of price between these two is about one-eighth. But corn is generally dear in the seaport towns, owing to the want of roads in the interior; and it is no uncommon thing to see the corn of Apulia, and even of Egypt and the Crimea, brought by sea to Messina and other ports, and there sold cheaper than Sicilian corn. This tends to discourage native agriculture. The lower classes, especially in the interior, eat barley bread. Indian-corn and beans are cultivated to a small extent. Wine is made in abundance, especially in the southern part of the island. The white wines of Marsala, Castelvetrano, Catania, and Bronte or Ætna wine, are exported in considerable quantities. The firm of Woodhouse alone exports 5000 barrels yearly. Their establishment at Marsala, which has existed since Nelson's time, is on a large scale, with distilleries of brandy. The amarena of Agosta and the muscat of Syracuse are fine dessert wines. The red wine of Faro is a good common wine; that of Melazzo is somewhat inferior, and that of Mascali is still poorer. Sicilian wine, especially white, is exported to England, Germany, Spanish America, and Brazil. More than 20,000 barrels of both white and red are sent annually to Holland and the Baltic ports, where it is mixed with the French wines. Sicily sends also wine, both white and red, to Malta, the Levant, and the Black Sea. Much remains to be done for the improvement of Sicilian wines, both in the cultivation of the vine and in the process of wine-making. The distillery of alcohol has been greatly improved of late years by means of the new French alembics of Berard and Cellier; and a considerable quantity of spirit is exported to South America, as well as tartar, both white and red. Dried raisins, called zibib, are exported from Messina to the amount of about 6000 barrels. Messina is also the depôt for the currants of the Lipari Islands, of which about 12,000 barrels are yearly sold and exported to Trieste, England, and America.

Olive-oil is not produced in great quantity, and is generally of an inferior quality, owing to bad management; it is produced chiefly along the northern coast, and not much of it is exported. The oil of Tusa and Cefalù is considered the best. Olive-plantations might easily be spread all over Sicily. Linseed-oil is made at Catania, and along the southern coast, and exported to Venice and Trieste. But the French oils extracted from poppy and colza have in great measure superseded the linseed-oil. Lemons and oranges are plentiful and fine, and are exported in considerable quantities; but for want of roads, much of the fruit is left to rot on the ground. Lemon-juice, or citric acid, and essences of lemon, citron, orange, aniseed, lavender, rosemary, and bergamot, constitute another branch of industry, which might be greatly extended. Silk was once a staple article of Sicilian export, especially to England; but it has been since driven out of the market by the silk of Bengal. The Sicilian silk is now sold, though in a less quantity, to French and Swiss manufacturers. The silk of Foria is the best; and next to it is the silk of Piana, Rametta, and S. Martino. Messina is the great mart for silk. The annual exportation is said to be 900 bales of 300 lbs. each.

Liquorice-juice is made chiefly at Catania, Patti, and Palermo, and exported to the amount of 5000 chests to England and the north of Europe, where it is employed in brewing. The pods of the caroob-tree, which grows wild in the southern part of the island, are exported to Trieste, Naples, Leghorn, and Genoa: they are chiefly used as forage for horses. Manna, which is an exudation of the sweet sap of the ornus, a species of ash which grows in the mountains of Sicily, is procured by making vertical incisions in the bark of the tree. The best manna is that of Gerace, which is produced in the country between Termini and Mistretta, and that of Capace. About 2500 cwts. are yearly exported. Almonds are exported to the quantity of about 12,000 cwts., chiefly to Germany and the north of Europe. The best almonds are those of Avola, near Syracuse, Mascali, and Palma; those of Girgenti and Terranova are inferior. Of pistachio nuts about 3000 cwts. are exported. Sumach, a dyeing substance extracted from the sprigs and dried leaves of a shrub, the *rhus coriaria*, is exported chiefly to England. The best sumach is that of Alcamo and Trapani. Kid-skins and lamb-skins, both dressed and undressed, are shipped from Messina to Germany and England. The other articles of Sicilian produce are—rice, nuts, walnuts, dried figs; cantharides, which immigrate from Africa; honey, wax, gum, soda, but the trade in soda is now greatly declined; and cotton, which is cultivated to a considerable extent near Catania, Biancavilla, Patti, Pachino, Terranova, &c. The sugar-cane, *cannamele*, which was once extensively cultivated in Sicily, is now entirely abandoned. The above list of valuable products shows not so much the actual wealth of Sicily as its natural capabilities.

Cattle are few in number, and mostly poor, owing to the want of the artificial grasses, and to their being neglected and left in the fields without stabling. The best horned cattle are those of the district of Modica. Sheep are numerous, but little attention has been paid to improving the breed, and the wool is bad. Cheese is made from ewes' milk. Goats are in many places preferred to sheep. The government has established a stud of foreign stallions to improve the breed of horses. Wolves are common in the mountains and forests, and snakes in the low plains.

The population of Sicily, which by the census of 1798 was 1,660,000, had risen in 1831 to 1,943,000; and in 1836 it exceeded 2,000,000. (Serristori, 'Statistica d'Italia.') This population is distributed very unequally over the surface of the island. The coasts, especially the northern and eastern, are thickly studded with towns, whilst the interior of the country is comparatively uninhabited. The tract between Messina and Catania is the most populous part of the island, whilst in the west the tract between Alcamo and Trapani is almost a desert. The mountains are generally uninhabited. The want of roads, and the greater resources for industry afforded by the proximity of the sea, serve to explain this inequality.

Sicily was formerly divided into three great divisions, called Valli: namely, Val di Mazzara, in the west; Val di Demona, in the east; and Val di Noto, in the south. It is now divided for administrative purposes into seven provinces: Palermo, with 78 communes; Messina, 97 communes; Catania, 65 communes; Girgenti, 45 communes; Siracusa, 36 communes; Castanisetta, 29 communes; and Trapani, 20 communes. Every province is administered by an Intendente, and every commune has a Sindaco. For judicial purposes the provinces are divided into Judicatures, each having a judge of first instance for criminal and police matters. In the head town of each province is a collegiate court for civil suits. There is a 'Gran Corte Civile,' or court of appeal, in each of the three principal cities, Palermo, Messina, and Catania, and a supreme court of justice at Palermo. Commercial tribunals exist at Palermo, Messina, and Trapani. For scientific instruction there are three universities, Palermo, Messina, and Catania; and 21 colleges in the various provincial towns. There is an institute for female education at Palermo, under the name of 'Educandato Carolino;' naval schools at Palermo, Termini, Cefalù, and Messina; a veterinary school at Palermo, and an academy of the fine arts in the same city.

Elementary instruction is much neglected; some elementary schools exist in the towns, but few or none in the rural communes. The proportion of illiterate persons is very great; it forms in fact the great majority of the people.

The ecclesiastical establishment consists of three archbishops—Palermo, Monreale, and Messina; eleven bishops—Siracusa, Mazzara, Cefalù, Patti, Nicosia, Piazza, Gerace, Girgenti, Caltagirone, Catania, and Lipari; thirteen abbotships of royal presentation; and about 30,000 secular priests. The regular or monastic clergy consists of 7591 individuals, including lay brothers, distributed among 658 convents, of which 409 are possessed of property, and 249 are of the mendicant orders. The number of the convents of nuns is not ascertained. Sicily having remained undisturbed by revolution or French invasion, the property of the convents has remained untouched. (Serristori, *Statistica*.) No other form of worship is allowed in Sicily than that of the Roman Catholic Church. There is no permanent Jewish population. There are however colonies of Greek or Epirote origin, which migrated thither at the epoch of the Turkish invasion of Greece: they have retained the Eastern ritual, and have their own papas, but acknowledge the pope as their spiritual head, being of what is called the Greco-Latin Church. They are distributed in five or six localities: Piana de' Greci, near Palermo, containing about 5900 individuals; Palazzo Adriano, 5450; Mezzojuso, 4623; Contessa, 3000; Santa Cristina, 720; and lastly, the city of Messina, where the protopapa, or head of the Greek clergy, resides, subject however to the jurisdiction of the archbishop of Messina.

At the head of the political administration of Sicily is a lieutenant-general, who represents the king's person, and is often a member of the royal family. His salary is 36,000 ducats, or about 6000*l.* sterling. He has under him a secretary of state; but all important matters are referred to a section of the council of state sitting at Naples, which section is especially concerned with the affairs of Sicily. The finances and treasury of Sicily are kept distinct from those of the continental dominions. The revenue of Sicily amounts to 1,900,000 'onze,' of three Neapolitan ducats each, of which about 670,000 onze are employed for the expenses of the administration of the island, and the remainder is remitted to Naples for the general expenditure of the united kingdom. The communes are also taxed for their own local expenditure, to the aggregate amount of 700,000 onze.

Sicily, not having been visited by the storm of the French revolution, has not been burthened with the oppressive system of the conscription. Recruits for the army are obtained by voluntary enlistment. Sicily furnishes to the army of the united kingdom 10,000 infantry and 2000 cavalry. The permanent force kept in the island consists in ordinary times of 6000 men. The principal garrisons are those of Palermo, Messina, Syracuse, Trapani, Agosta, and Melazzo. There is a rural police, called 'armigeri,' charged with the care of keeping the roads clear from outlaws; but of late years it has been in great measure superseded by a body of gendarmes sent from Naples, who, not being acquainted with the localities and the people, have not proved so effective, and the consequence is that the country has again become insecure. The present king, Ferdinand II., during his residence in the island in the latter part of 1838 issued strict orders for the extirpation of the 'masnadieri,' or banditti: he also ordered several carriage-roads to be opened throughout the island, and allotted one million of ducats for the purpose. Several new roads are now in progress. The king also ordered a catasto, or re-valuation of landed property, to be made: he took off several taxes which weighed heavily upon agriculture, and ordered the final abolition of every remnant of feudality. He set the example himself by renouncing several feudal duties and fees. He also ordered the demesne lands to be distributed among the poor rural population.

The manufactories of Sicily are neither numerous nor on a large scale. Cotton-cloth is manufactured at Messina, Catania, Palermo, and Caltagirone; silks at Palermo, Catania, and Nicolosi; leather at Messina; gloves, soap, artificial flowers, and paper, at Palermo; coral from the coast of Africa is wrought at Trapani.

The merchant vessels of Sicily, most of which are coasting vessels, amount to about 1400, besides fishing-boats. The maritime trade of Sicily is carried on chiefly in Genoese, Austrian, French, Spanish, and other foreign ships.

The principal towns of Sicily are:—PALERMO, MESSINA, CATANIA, SYRACUSE, AGOSTA, TRAPANI, GIRGENTI. Among the inferior towns, the following deserve notice:—Melazzo, Patti, Taormina, Castro Reale, and Randazzo, noticed under MESSINA (INTENDENZA); Termini, Cefalù, Corleone, Monreale, and Carini, noticed under PALERMO (INTENDENZA); Caltagirone, Nicosia, Aci Reale, Paternò, Aderno, and S. Filippo d'Argiro, noticed under CATANIA; Sciacca, Castronovo, Bivona, and Aragona, noticed under GIRGENTI; and MARSALA, ALCAMO, and ALICATA, noticed under their respective heads.

The other towns which deserve notice are:—1, Castelvetrano, near the site of the antient Entella, a town of 12,000 inhabitants, in a romantic situation on a hill in the province of Trapani: the ruins of the antient Selinus are a few miles south of Castelvetrano, near the sea-coast. 2, Mazzara, a bishop's see, and a town of 10,000 inhabitants. 3, Caltanisetta, a considerable town in the interior of the island, with above 20,000 inhabitants, and numerous churches and convents. 4, Caltabellotta, a town of 7000 inhabitants, on a hill north of Sciacca. 5, Castrogiovanni, near the site of the antient Enna, a town of 12,000 inhabitants. 6, Calataxibet, or Calascibetta, a town of 6000 inhabitants, in the centre of the island, near Castrogiovanni. 7, Terranova, near the site of the antient Gela, on the south coast of the island, with about 9000 inhabitants, carries on a considerable trade by sea. 8, Modica, the capital of one of the finest and best-cultivated districts in all Sicily, has numerous churches and convents, and about 24,000 inhabitants. The finest cattle in Sicily, the finest wool, and the best cheese and butter, belong to the district of Modica. 9, Piazza, with 18,000 inhabitants and a bishop's see, situated on a hill halfway between Castrogiovanni and Caltagirone. 10, Noto, in the south part of the island, a considerable town, with numerous convents and churches, and 18,000 inhabitants. 11, Castellamare, on a gulf on the northern coast, between Palermo and Trapani, has a strong castle, 4000 inhabitants, and large granaries: it carries on a considerable trade by sea. 12, Palma, a well-built town, on a hill not far from Alicata. 13, Salemi, a town in the west part of the island, built by the Saracens, near the site of the antient Alicia, has about 12,000 inhabitants. 14, Lentini, the antient Leontini, has 6000 inhabitants and some good buildings; but the air is considered unhealthy in summer. 15, Carlentini, with 4000 inhabitants. 16, Geraci, north-west of Nicosia, with 4000 inhabitants. Besides these, there are many other towns of less note, such as Calatafimi, Partanna, Leonforte, Ragusa, Naro, &c. Sicily has many towns containing above three thousand inhabitants, as the country population live chiefly in towns, and not in cottages dispersed about the country.

The small islands belonging to Sicily are—I. The group of the Lipari Islands. [LIPARI.] II. The group of the Trapani Islands—1, Favignana, the antient Ægusa, about sixteen miles from the mainland of Sicily, is eighteen miles in circumference: it has good anchorage-ground for large vessels, and a strong castle. It is used as a place of banishment for criminals. Favignana has good pastures and copious springs. A number of sheep are reared on this island, and the surrounding sea abounds with fish. The woods contain hares and deer. 2, Maretimo, the antient Hiera, west of Favignana, and farther out at sea, is eleven miles in circuit; it is rocky and naked, and the coast is bold and steep: wild thyme grows in abundance, and supplies nourishment for swarms of bees. It has a strong castle with dungeons for state-prisoners. 3, Levanzo, the antient Buccina, north of Favignana, and about ten miles distant from the point of Trapani, is eight miles in circuit, and has some good pastures. 4, The group of small rocky islands, dangerous to navigators, called antiently Ægades, and now Formica and Scoglio di Mezzo, are between Levanzo, Favignana, and the mainland, near which the consul Lutatius defeated the Carthaginian fleet at the end of the first Punic war. 5, The group of small islands south-east of Favignana, and near Cape Lilybæum, one of which is the antient Motya, once a settlement of the Phœnicians, and afterwards a stronghold of the Carthaginians, which was destroyed by Dionysius the elder. A Punic inscription, found on the island in 1779, was transferred to the town-house of Marsala, where it probably still remains. III. The island of Ustica, forty miles north by west of Palermo, is about eleven miles in circumference; the surface is hilly; it contains many olive and other trees, and large cisterns cut in the rock, as well as sepulchres and other traces of antient colonization. Ustica was for centuries deserted, owing to the island being exposed to the depredations of the Barbary pirates, until the year 1759, when a fresh colony was sent to it, with a garrison, and several small forts were built: the population is now in a thriving condition. IV. The island of Pantellaria, the antient Cossyra, is situated between the south-west coast of Sicily and the coast of Tunis east of Cape Bon, from which it is about forty miles distant. It is sixty miles from the nearest point of Sicily south of Mazzara. Pantellaria is about thirty-six miles in circumference; the ground is in great part of volcanic formation, and produces vine and olive trees, cotton, pulse, and pasture, but little corn. The inhabitants, to the number of 3500, are remarkably industrious. The island has several creeks with good anchorage-ground. An herb called orseglia, which grows on the island, is used for dyeing. There is a warm soapy spring, which is used for bleaching and scouring linen, and other mineral springs, which are of use in several complaints. A copious spring in the middle of the island furnishes the inhabitants with drinkable water. There is a town, with several churches, and a castle with a garrison sent from Sicily. V. South of Pantellaria, towards the coast of Tripoli, are the two uninhabited islands of Linosa and Lampedosa. Linosa, which is the smaller, is destitute of water, but Lampedosa has a good spring and good anchorage-ground, and a soil capable of cultivation, and it was once inhabited. Lampedosa gives the title of prince to a Sicilian family. During the last war the English from Malta sent a colony of Maltese to Lampedosa, with a detachment of soldiers for their protection, but the island was afterwards abandoned. Lampedosa is about ninety miles west by south of Malta, 130 south-west of the nearest point of Sicily near Alicata, and about 75 miles east of Cape Mahadiah on the coast of Tunis. Linosa is about 30 miles north-east of Lampedosa. The crown of Sicily used to receive feudal homage from the grand-master of the order of Malta, that island, as well as Gozo, having formerly been subject to the king of Sicily.

The best harbours on the coast of Sicily are those of Messina and Syracuse, which are perfectly safe; and the latter particularly is capable of containing a fleet of large ships of war. The ports of Palermo, Agosta, and Trapani are next in importance. But the southern coast is destitute of harbours; that of Girgenti is only fit for small craft, and therefore this large tract, called 'la Costa di Mezzogiorno,' is dreaded by Mediterranean sailors, who consider it a dangerous lee-shore. Until of late years Sicilian vessels seldom ventured beyond the coast of Italy, but they now begin to trade as far as South America.

(Serristori, *Statistica d'Italia; Descrizione Geografica dell' Itala di Sicilia*, anonymous, 2 vols. small 8vo., Palermo, 1806; Paternò, *Viaggi per la Sicilia*, 1817; Ortolani, *Nuovo Dizionario Geografico Statistico della Sicilia*, 1819.)

We shall conclude this sketch of Sicily with a few remarks. The economical condition of Sicily is in a state of transition. Until 1812 the best part of the cultivated land in the island belonged to the barons, the church, and to several corporate bodies, as fidei-commissa, and were incapable of being alienated. This mass of property was consequently unimproved. Most of the estates were also encumbered with mortgages, the interest of which absorbed a great part of the annual rent, but the interest was not regularly paid, owing to the insufficiency of the laws against debtors, and especially noble debtors. Most of the barons lived in the large towns, or at Naples near the court, neglecting their estates, ignorant of their own financial affairs, trusting implicitly to agents and lawyers, squander ing their income, borrowing more and more, and feeding a host of domestics, dependents, and parasites. The eldest son alone was allowed to marry; the younger had only a small annual allowance, and the daughters generally passed their life within the walls of some convent. The wants of the crown during the war, and the influence and example of England, which by its land and sea forces defended Sicily from invasion, brought about the convocation of the national parliament, which undertook a revision of the constitution.

In the night sitting of the 18th of July, 1812, the barons, greatly to their honour, voluntarily gave up their own feudal privileges, which constituted a large part of their revenue. It was a burst of enthusiasm for the public benefit, and no compulsion of despotism or of foreign invasion, as at Naples, which effected the abolition of feudalism in Sicily. The circumstances of the time, the continental system of Napoleon, the supply of provisions required for the English armies and fleets in Sicily and Spain, the annual subsidy paid by England to Sicily, and the expenditure of the English army stationed in the island, produced an extraordinary rise in prices, which compensated the barons for the loss of their feudal rights. After the peace of 1814, the opening of the continental ports, and the departure of the English forces, prices fell suddenly and rapidly. At last, in 1820, prices fell to one-tenth of what they were in 1810. The landed proprietors found their income dwindling away, but the institution of the fidei-commissa remained, and prevented them from alienating their property. A royal decree of 1818 abolished the fidei-commissa, and introduced better laws for the protection of creditors. The consequence was that a vast mass of property was at once brought into the market, and produced a general depreciation. Many families, supposed to be rich, found themselves all at once poor. A law of 1824 enabled debtors to assign their land for the liquidation of their debts. Many of the barons, learning wisdom from necessity, reduced their establishments, left their town residences at Palermo and Naples, and retired to their remaining estates, or to the provincial towns near their estates; others sought for employment under government, and other means of subsistence. From this temporary derangement of the old economical system has resulted the good effect of putting into circulation a vast mass of property, which, being divided into smaller portions, will be improved. But the change has remained imperfect, inasmuch as a large amount of property still belongs to the church and monasteries, whilst government interference in the sale of agricultural products, restrictions upon importation and exportation, vexatious local duties, and the want of roads in a country of mountainous surface, tend to depress rural industry, especially in the interior districts. Agricultural instruments are still extremely imperfect; a rotation of crops is unknown; there is no manuring of the land, no shelter for cattle; the mountains are generally stripped of their trees; and popular education is so neglected that not above one-tenth of the people can write. An impulse however has been given, and it depends greatly on the Sicilian landholders to continue it by improving the agriculture of their estates. The government on its part is not altogether idle; the carriage-roads in progress, the sale of communal lands, the abolition of several injudicious duties, are evidence of the administration being alive to the interests of the Sicilian population. The custom-house tariff is still, as in most continental states, established on a prohibitory system, with a view of encouraging national industry; and this supposed encouragement, especially in a country essentially agricultural, like Sicily, is the main obstacle to the development of its industry. Our authorities for the present state of Sicily are—

Serristori. *Statistica d'Italia*, 1836; De Welz, *Saggio su i Mezzi di moltiplicare prontamente le Ricchezze della Sicilia*, 1822; Afan di Rivera, *Considerazioni su i Mezzi da restituire il Valor proprio ai Doni che ha la Natura conceduto al Regno delle Due Sicilie*, 1833.

Those who wish to know the state of Sicily at the beginning of the present century may consult Balsamo, *Present State of Sicily*, translated by Vaughan, 1811; Rehfues, *Neues Zustand der Insel Sicilien*, 1807; and an anonymous book, entitled *De la Sicile et de ses Rapports avec l'Angleterre à l'Epoque de la Constitution de* 1812, *par un Membre des différens Parlemens de Sicile*, Paris and London, 1827.

The antient Sicilian population was formed out of a mixture of various nations, Sicani, Siceli, and Greek colonist There was also an admixture of Punic blood, and afterwards of Roman and Campanian. After the fall of the Western Empire, the Byzantine Greeks remained masters of the island, till the Saracens came, and the Arab and Moorish race remained in Sicily for more than two centuries. Then came the Normans, and after them the Aragonese or Spaniards, who gained a lasting footing in the country. From all these races the actual Sicilians are derived, but it may be presumed that the indigenous Sicilian and the Greek and Punic blood are the three preponderating elements. Accordingly there is considerable difference of complexion and appearance among the inhabitants. The Sicilians are generally dark, and yet we sometimes see complexions as fair as in the north of Italy. Unless bent down by poverty or disease, the Sicilian exhibits a spare but muscular and erect form, lively dark eyes, great elasticity of limb, and quickness of motion. He is shrewd, quick-sighted, and very imitative. Although the climate and the state of society incline him to indolence, he is more easily roused into activity than the Neapolitan, and is more capable of perseverance. It has been remarked that of all the countries of Europe which were partially occupied by the English during the last war, Sicily was that in which they found most sympathy, and that sympathy is not yet obliterated. The Sicilian is naturally impassioned and amorous, fond of music and of song; he is prone to revenge, but is susceptible of a high degree of social refinement. He is generally temperate and frugal, and has naturally a strong feeling of dignity and independence, unless debased by an abject social condition, when at times he sinks into the extreme of degradation. Considerable corruption of morals prevails in the large towns. The Sicilians had formerly the reputation of being jealous, like the Sardinians, Corsicans, and Calabrians, but the progress of civilization, or corruption, has nearly obliterated that feeling, and intrigue especially with married women, is carried on in the towns with as much impunity as in the cities of continental Italy. Still, taken as a nation, there are elements in the Sicilian mind superior to those of most other parts of Southern Italy. The Sicilian women are handsome, fascinating, and amorous; and their countenances often exhibit a strong admixture of Greek features. The Sicilian oral language is a dialect of the Italian, and as such is noticed under the head ITALY—*Language and Literature of*. The modern Sicilian dialect can boast of Meli, a lyric poet equal if not superior to his Græco-Sicilian countryman Theocritus. [MELI, GIOVANNI.] All educated persons speak the pure Italian with more or less of an accent. The Sicilians exhibit a considerable facility for acquiring foreign languages, and greater facility than their neighbours the Neapolitans. Sicily has produced in all ages a number of men of learning, and the literary history of Sicily has been illustrated by Mongitore, 'Bibliotheca Sicula;' Ragusa, 'Elogia Siculorum qui Literis floruerunt;' and Scinà, 'Prospetto della Storia Letteraria di Sicilia,' 3 vols. 8vo., Palermo, 1827.

Antient History of Sicily.—The legends of the Greeks speak of the giants, Cyclops, and Læstrygonians who inhabited Sicily previous to the epoch of the Trojan war. The Sicani are next mentioned, who are said by some to have been Iberians (Thucyd., vi. 2), from the river Sicanus in Iberia. Other writers consider the Sicani to be aborigines of Sicily. (Diodorus, v. 2.) The island is sometimes called Sicania, from the Sicani. According to tradition, Ceres taught the Sicani to plough the ground and sow corn; Aristæus taught them to cultivate the olive-tree and rear bees; Dædalus the art of building, and his nephew is said to have invented the saw and other mechanical instruments. Hercules next visited Sicily, built Soloeis and Motya and other towns, established laws, and repressed and punished robbers. Through the veil of these legends it is easy to perceive the history of the transition of Sicily from a savage to a civilised state. The Siculi (Σικελοί) next came from Italy, and occupied the eastern part of Sicily about three hundred years before the Greeks made any settlement in the island. The Siculi drove the Sicani to the southern and western parts of the island, to which they gave the name Sicelia. (Thucyd., vi. 2.) They built Zancle, Agyra, Enna, Erbessus, and Hybla. The Phœnicians are said to have colonised Panormus, Soloeis, and Motya. Then came the Elymæi, who are said to have built Elyma, Entella, and Egesta. In the year 750

B.C., a colony of Chalcidians from Eubœa, and Megarians, led by the Athenian Thucles, landed on the eastern coast of Sicily, where they found the country deserted, the Siculi having withdrawn to the interior in consequence of the irruptions of the Etruscans or Tyrrhenians. These Greek colonists built the town of Naxos. In the following year a party of Corinthians and other Dorians, led by Archias, landed in the island of Ortygia, defeated the Siculi who inhabited it, and laid the foundation of the great city of Syracuse. Four years later, the Greeks of Naxos drove the Siculi out of Leontini and Catana, and occupied those towns. About 712 B.C. a party of Rhodians and Cretans built Gela on the southern coast. In course of time, both Syracuse and Gela sent colonies to other parts of the island; a colony from Gela built Agrigentum (Girgenti), or, as the Greeks called it, Acragas, and the Syracusans colonised Camarina. A colony of Megarians settled at Hybla, and afterwards built Selinus, 651 B.C. Colonies from Zancle founded Mylæ and Himera. The interior of the country remained in possession of the Siculi, under their respective princes. The Greek towns governed themselves at first as republics, mostly aristocratic, as Dorian towns generally were; afterwards some citizens rose to be tyrants or permanent chief magistrates. Hippocrates, tyrant of Gela, was one of the oldest and most distinguished among these. He flourished about 495 B.C. He defeated the Siculi, took Naxos and Leontini, and obliged the Syracusans to give up Camarina. Having joined Anaxilas, tyrant of Rhegium, they surprised Zancle, and shared the plunder between them. Anaxilas then invited a party of Messenians to colonise Zancle. Phalaris was tyrant of Agrigentum about B.C. 565 to 550. Many stories, probably exaggerated, are told of his cruelty. He however extended and consolidated the power of Agrigentum. Phalaris was killed in a popular insurrection, and about sixty years later Theron was tyrant of Agrigentum. He raised most of the splendid buildings of Agrigentum, and he conquered Himera, thus extending the dominion of Agrigentum from the southern to the northern coast of the island. His daughter Demarata married Gelon, tyrant of Syracuse, who was the most illustrious of the early Sicilian princes. Gelon and Theron together defeated the first invasion of the Carthaginians, 480 B.C., called in by the people of Selinus, and also by Therillus, tyrant of Himera, who had been driven away by Theron, and had taken refuge at Carthage. The history of that period is briefly narrated under GELON. Syracuse and Agrigentum were now the preponderating states in Sicily. Gelon was succeeded in Syracuse by his brother Theron, tyrant of Gela, who died 467 B.C. [HIERON I.] His successor Thrasybulus being driven away by a popular insurrection, Syracuse adopted a democratic form of government.

The people of Agrigentum about the same time expelled their tyrant Thrasydæus, and restored the democracy. Empedocles is said to have framed a new constitution for Agrigentum; and Charondas did the same for Tauromenium, Catana, Himera, and the other cities of Chalcidic origin. Between 452 and 440 B.C., Sicily was distracted by an internal war between the Siculi, led by their king or chief Deucetius, and the states of Agrigentum and Syracuse. It terminated with the destruction of Trinacria, a stronghold of the Siculi, after a desperate resistance of the inhabitants. The site of Trinacria is not ascertained, but it is supposed to have been near Palica, east of Caltagirone, and on the western border of the great plain of Catania. The Syracusans next attacked Leontini. This was a war of races; the Doric cities taking part with Syracuse, and the Chalcidic cities with the Leontini. The latter, being the weakest, applied to the Athenians for assistance. The first Athenian expedition to Sicily took place 427 B.C., but it led to no decisive result. A truce was concluded between the Sicilian towns, and the Athenians withdrew their fleet B.C. 425. A new quarrel between Egesta and Selinus led to the second Athenian expedition to Sicily, 415 B.C., which terminated fatally for the Athenians. [ALCIBIADES; SYRACUSE.] The Egestans, being left at the mercy of their enemies of Selinus, applied to Carthage, and this led to the second invasion of Sicily by the Carthaginians (409 B.C.), who, under the command of Hannibal, son of Giscon, took and plundered Selinus and destroyed its splendid temples. Selinus, though it continued to exist afterwards for a time, never recovered from that blow. The Siculi of the interior having joined the Carthaginians, their united forces attacked Himera, which stood on the north coast, on the site of the modern Termini, took it and destroyed it completely, 240 years after its foundation. The Carthaginians next attacked the powerful city of Agrigentum, and after a long siege took and destroyed it, 406 B.C. [AGRIGENTUM.]

The Carthaginians now settled in Sicily, where they remained for about a century and a half, till the first Punic war. Syracuse was the only city that effectually opposed Carthage and prevented its dominion extending over the whole island. After a succession of wars between Carthage and Syracuse, a brief summary of which is given under DIONYSIUS the elder and TIMOLEON, a treaty was concluded about 340 B.C., by which the Carthaginians retained possession of the western part of the island, the river Halycus near Mazzara forming the boundary of their dominions on that side. Lilybæum in the south, Eryx in the west, and Panormus in the north, were the principal settlements of the Carthaginians, and they flourished by commerce. The other towns formed a league, of which Syracuse was the head. Timoleon invited fresh Greek colonies to repeople Agrigentum, Agyra, Gela, and other places which had been devastated during the war. The history of Sicily from the time of Dionysius the elder becomes in great measure identical with that of SYRACUSE.

The Carthaginians availed themselves of the civil dissensions of Syracuse, and of a war between Agathocles, tyrant of that city, and the people of Agrigentum, to interfere as mediators, when in reward for their mediation they secured an extension of territory, by which Selinus, Heraclea, and the Thermæ Himerenses (hot-springs of Himera) were included within the Carthaginian possessions, which now extended eastward to the river Himera. A war broke out between Syracuse and Carthage about 310 B.C., the particulars of which are related under AGATHOCLES. Peace was concluded after his death, but fresh civil dissensions within Syracuse encouraged the Carthaginians again to attack that city, which then called Pyrrhus to its assistance. Pyrrhus came and drove the Carthaginians out of the island, with the exception of the strong town of Lilybæum, which he could not take, and he suddenly abandoned Sicily to its own dissensions and the mercy of the Carthaginians. [PYRRHUS.] It was lucky for Syracuse in this emergency that it found a citizen equal to the task of saving his country. The sequel is narrated under HIERON II.

The following struggle in Sicily between Rome and Carthage is found under the head of PUNIC WARS (the first). At the end of that war the Romans succeeded the Carthaginians in the possession of the western part of Sicily; Hieron II., king of Syracuse, retaining possession of the eastern part as ally of Rome. His son Hieronymus imprudently quarrelled with Rome during the second Punic war, and the result was the conquest of Syracuse by the Romans after his death [SYRACUSE], and thus the Romans became possessed of the whole island, which they administered as a province under a prætor. The character of that administration has been transmitted to us through Cicero, in his 'Orations against Verres.' Although all Roman governors of Sicily were probably not so bad as Verres, there is evidence enough to show that the fearful decay into which that fertile and once wealthy country was reduced in the time of Cicero, had been the gradual work of long years of misgovernment, which made the Sicilians regret the former dominion of Carthage. 'All our provinces are in tears,' exclaims Cicero, 'all free people have complaints against us, and lastly all kings remonstrate against our rapacity and our injustice. There is no place, however remote or concealed within the expanse of the ocean, whither the report of the iniquity and licentiousness of our men has not extended. In these times the Roman people can no longer bear the burthen, not of the violence or war of other nations, but of their wretchedness, their tears, their complaints and execrations.' (Cicero *in Verrem*, iv. 89.)

The consequences of Roman misgovernment are exhibited in striking language by the same orator:—'Those very fields and hills which I had once seen in all their verdant pride and beauty, look now squalid and forsaken, and appear as if mourning for the absence of the husbandman. The fields of Herbita, of Enna, of Murgantium, of Machara, of Assorium, of Agyra, are mostly deserted, and we looked in vain for the masters of so many fertile jugera of land. The vast fields round Ætna, once the best cultivated, and those of Leontini, the pride of corn countries, which when sown seemed to defy scarcity, have become so degenerated and wasted, that we in vain looked for Sicily in the most fertile part of Sicily.' (*In Verrem*, iii. 18.)

About the year 134 B.C. the first servile war broke out in Sicily, caused by the ill treatment of the numerous slaves who had become almost the only cultivators of the soil. The insurrection began at Enna, among the slaves of Damophilus, a wealthy proprietor noted for his inhumanity. The insurgents killed him; and his wife Megallida, who was as cruel as himself, was given up to be tortured to death by her female slaves. Her daughter, who had always shown herself compassionate and kind, was sent safe to some of her relatives at Catana. The insurgents, under the leadership of a Syrian named Eunos, being joined by thousands of their fellow-slaves, took possession of Enna, ravaged the country around, defeated four Roman prætors, and surprised Tauromenium. At last the consul Rupilius, being sent against them with a powerful army, retook Tauromenium by famine, and Enna after a desperate resistance. The recaptured slaves were put to death. (132 B.C.)

About 102 B.C. another and more formidable insurrection broke out in Sicily, among a class of men born free, who had been brought thither from other Roman provinces, to be engaged as hired labourers, and were afterwards put in chains and confounded with the common slaves. A party of them gathered on a mountain near Bivona, defeated the Roman troops, and being joined by another host of slaves under a certain Athenion, a native of Cilicia, repulsed the Roman commander L. Licinius Lucullus near Triocala. The proconsul M. Aquilius, being sent to Sicily with a fresh army, defeated Athenion, who was killed in the fight, and destroyed most of the insurgents. He took prisoners one thousand of them, who were sent to Rome to die in the amphitheatre, fighting against one another for the entertainment of the Roman people. [ATHENION.]

During the war between Marius and Sulla, Pompeius was sent by the latter to drive away the partisans of Marius from Sicily. He conducted himself with comparative moderation; but on one occasion, the citizens of Messina remonstrating to him about some arbitrary acts, which were infractions of their acknowledged liberties, Pompeius exclaimed: 'Will you never cease holding forth your privileges to us who carry swords by our sides?'

Then came the prætorship of Verres and his wholesale spoliations of Sicily. During the wars of the Triumvirate Sicily was for a time in possession of Sextus Pompeius, who was at last defeated and driven away by Octavian. After his assumption of supreme power, Augustus restored many towns of Sicily which had been devastated during the late wars; he sent colonies to Tauromenium, Catana, Thermae Himerenses, the Centuripini, Panormus, Thermæ Selinuntiæ, Heraclea, and Syracuse. Finding the extent of this last city too large to be filled again, he contented himself with colonizing the island Ortygia, which has constituted ever since the modern town of Syracuse.

Little is known of the history of Sicily under the empire, except that Christianity spread early into the island, and that a persecution of the Christians took place under Nero. In the third century of our æra we find registered the names of bishops of Panormus.

About A.D. 440 the Vandals under Genseric landed from Africa on the western coast of Sicily and took Lilybæum. Theodoric, the Gothic king of Italy, added Sicily to his continental dominions. In the year 534 Belisarius reconquered Sicily for the emperor Justinian; and the island continued to be a dependence of the Eastern empire, and was administered by a governor styled 'Patrician,' who was sent from Constantinople.

About the year 826, under the reign of the Eastern emperor Michael the Stammerer, a certain Euphemius, a Byzantine officer who commanded the imperial troops in Sicily, fell in love with a Sicilian maid of noble birth who was a nun, and took her by force from her convent. Complaints having been laid before the emperor, Euphemius was outlawed. He then revolted, and defeated the Patrician Photinus, but not being strong enough to withstand the imperial forces, he sailed over to Africa and invited the Aglabide Emir of Kairwan to effect the conquest of the island. In June, 827, the first Saracen expedition landed in Sicily, took Agrigentum and Minoa, and, after several years' fighting, took Messina in 831, and Panormus in 835. It was not till 878 that the Saracens took Syracuse by storm. Soon after the Saracens of Sicily threw off their dependence on the Emirs of Kairwan, and several battles took place between the African and the Sicilian Saracens. The great Mohammedan schism at the beginning of the tenth century having raised to the Caliphate of Africa the Fatimide El Mehad, Sicily, after some resistance on the part of the Sicilian Saracens, became subject to his power, A.D. 910. In 945 the Fatimide Caliph Al Mansur appointed an emir as permanent and hereditary governor of Sicily, who fixed his residence at Panormus. Under the rule of the emirs Sicily enjoyed a more orderly government and comparative tranquillity. Tauromenium, the last hold of the Byzantines, was taken by the Saracens in 962. In 964 Nicephorus Phocas sent a strong armament to recover Sicily. A battle took place near Rometta, in which the Saracens totally defeated the Byzantine army, with the loss of 10,000 men. After this Sicily was governed by a succession of emirs, nominally dependent on the Fatimide caliphs, who had themselves degenerated from the vigour and activity of the founders of their dynasty. In 1035 a revolt broke out among the Sicilian Saracens against the Emir El-Achal, who was killed, and his brother El Hassan was driven away. In every town the leading Saracens assumed the local power, and thus Sicily became a prey to anarchy, which favoured the invasion by the Normans. The sequel of the history of the island is given under SICILIES, TWO—*History of*.

The Saracens never formed the bulk of the population in Sicily. There are sufficient grounds to believe that they did not muster at any time more than between 200,000 and 300,000, or about one-sixth of the actual population. The Christians enjoyed the free exercise of their religion, paying a tribute like other conquered subjects in Mohammedan states. They had their bishops and their convents. But they had no political rights, and were subjects of the conquering race. The Arabian historians Nuweiri and Sheabodin, and the geographer Edrisi, afford information concerning the condition of Sicily during the Saracen period. Rosario da Gregorio published in 1790 an important collection: 'Rerum Arabicarum quæ ad Historiam Siculam spectant ampla Collectio,' in Arabic and Latin.

Of the numerous remains of antiquity existing in Sicily the most important are noticed under SYRACUSE and AGRIGENTUM. Taormina has an antient theatre in tolerable preservation. The remains of the once splendid temple of Selinus, consisting of a mass of broken columns, cornice, triglyphs, and metopes, were examined, in 1823, by two English artists, Angell and Harris, of whom Harris died of the malaria on the spot. Three of the metopes have been restored, and are now in the Museum of the University of Palermo. (*Memoria sulle Opere di Scultura in Selinunte ultimamente scoperte*, by Pietro Pisani, Palermo, 1823. Thiersh, *Epochen der Bildenden Kunst*, p. 404, &c.) On the site of Segesta, or Egesta, not far from Trapani, is the portico of a temple consisting of 36 Doric columns standing, with frieze and cornice. Other remains of antiquity are seen at Catania, Lentini, Alicata, Messina, Mordica, Paterno, and other places. The antiquities of Sicily have been described by Swinburne; St. Non, *Voyage Pittoresque;* Biscari (Principe di), *Viaggi per le Antichità della Sicilia;* and many others.

SI'CYON (*Σικυών*) and **SICYONIA** (*Σικυωνία*), the territory of Sicyon. Sicyonia was situated on the south coast of the Corinthian Gulf, and near the eastern extremity of the gulf. In the time of Strabo (p. 382, Casaub.) the river Nemea was the boundary on the east between Corinthia and Sicyonia. On the west it was bounded by the territory of Pallene (Herod., i. 145), and on the south by the territory of Phlius. Sicyonia consisted of a plain country along the coast and a higher tract extending a few miles inland. The area cannot be ascertained; it perhaps fell short of 100 square miles. The Asopus, a small stream, rose in the Carneates Mountain, which was a portion of the mountain of Coclossa, and passing through a part of Sicyonia, gave its name to a district called Asopia. In proceeding along the coast from the harbour of Sicyon to Aristonautae, the naval station of the Pellenaeans, that is, westward, the small streams Helisson and Sythas were crossed. The Sythas was the boundary between Sicyonia and Pellene. In going from Corinthia to Sicyonia, the Nemea was first crossed and then the Asopus. The old name of Sicyon was Aegiale, or Aegiali, which was afterwards changed into Mecone, and still later into Sicyon, from Sicyon, an Athenian, who came to the aid of Lamedon, king of Sicyon, against Archander and Architeles, the sons of Achaeus.

Sicyon, the chief town, was, according to some accounts, twenty, and, according to others, twelve stadia from the sea. The old town was on the coast, and it became the port when the new town was built. (Strabo., p. 382.) Pausanias (ii. 6) says that Demetrius the son of Antigonus pulled down the city in the plain and built the then city close to the antient Acropolis, which is the same event that is referred to by Strabo (p. 382), where the name of Demetrius is corrupted into Demeter. (Compare Diodorus, xx. 102.) The summit of the Acropolis was flat and of some extent; it was surrounded by steep precipices, and was well supplied with water. This was the city which Pausanias visited, and which he has described. In his time many of the public buildings were in a ruinous state; but it still contained works of some of the great sculptors of Greece, as Canachus, Scopas, and Lysippus. Between Sicyon and Phlius, sixty stadia from the former and forty from the latter, was Titane, situated in a mountainous country. A road led direct from Sicyon through Titane to Phlius.

Aegialeus, according to tradition, was the founder of Sicyon, and he gave his name to all that part of Peloponnesus which was called Aegialos. The mythical history of Sicyon is given at some length by Pausanias (ii., 5, 6). Temenus, the son of Phalces, surprised Sicyon and took possession of it with his Dorians, and from that time the Sicyonians became Dorians and a part of the Argeia.

Contemporary with Megacles, the son of the Athenian Alcmaeon, was Cleisthenes, tyrant of Sicyon, whose daughter Agariste was given by her father in marriage to Megacles (Herod., vi. 126, &c.), an event which greatly increased the consideration of the Alcmaeonidae. The Sicyonians sent 3000 hoplites to the battle of Platæa; and they had 15 ships at the battle of Salamis. In the interval between the Persian and the Peloponnesian war, the territory of Sicyonia was ravaged by the Athenian Tolmides, who defeated the army that was opposed to him; and the Sicyonians were again defeated by Pericles (B.C. 454), who landed in their country. In the Peloponnesian war the Sicyonians joined the Spartan confederation. (Thuyd., ii. 9.) The subsequent political history of Sicyon is little known, until the Macedonian period and the wars of the Achaean league, when it was raised to importance by Aratus. [ARATUS.]

As a school of art, Sicyon holds a distinguished rank; and one of the great styles of painting took its name from this little state. This school was founded by Eupompus, and it produced Pamphilus and Apelles. [PAMPHILUS.] Sicyon was also one of the most antient seats of the plastic art. Pliny says (*Nat. Hist.*, xxxvi., c. 3) that Sicyon was long the parent country of all works in metal. Dipoenus and Scyllis carried their art to Sicyon, probably about B.C. 570, but the earliest native artists of note were Canachus and his brother Aristocles, who were probably contemporary with the Pisistratidae. Lysippus was also a native of Sicyon. [SCULPTURE, p. 126.]

SIDA, a genus of the natural family of Malvaceæ, containing nearly two hundred species, which are very extensively distributed throughout the warm parts of the world, and abound in the peninsula and plains of India. The name was originally applied by Theophrastus to a plant growing in moist situations, which is believed to have been an Althæa, also belonging to the family of Malvaceæ, and was adopted by Linnæus for this genus. Sida is characterised by having a naked quinquifid calyx with valvate segments. Corol with five petals, which are obovate, with the claws often united into a tube, and joined to the bottom of the stamen tube. The stamens numerous, with their filaments connected into a columnar tube at their base, and free at the apex, bearing the reniform anthers. The styles are numerous, but more or less united at the base. Capsule five or many celled. Cocci single-seeded; seeds suspended, roundish, and flattened.

The species of this genus vary much in habit, as well as in the structure of their fruit and seeds, but they resemble each other, as indeed do all Malvaceous plants, in abounding in mucilage, and in some of them having tough ligneous fibres, which are employed for the purposes of cordage in different countries. From their mucilaginous nature several are employed as demulcents in India, such as *Sida Indica, Asiatica*, and *populifolia*, in the same way that the mallow and the marshmallow are in Europe. The leaves of *S. carpinifolia* (a native of Brazil and the Canary Islands) are chewed by the Brazilians, and applied with success to the stings of wasps and bees. *Sida rhomboidea* and *S. rhombifolia* abound in very delicate flax-like fibres, which may be used for many of the same purposes as hemp and flax; but when the plants are grown for the sake of their fibres, they ought to be sown thick, under which circumstances, like other plants similarly sown, they grow tall and slender without branches. So *S. periplocifolia*, a native of the Malay islands, which succeeds well in India, may be cultivated for the same object, especially as when cut near the earth it quickly shoots into long simple twigs which abound in flax-like fibres. A species, *Sida tiliæfolia*, is actually cultivated for this purpose in China. Seeds of this species were received at the Calcutta botanic garden under the name of *King-ma* from Pekin, in the neighbourhood of which the plant was said to be cultivated as a substitute for hemp and flax. At Rio Janeiro the straight shoots of *S. macrantha* are employed as rocket-sticks.

SIDE. In modern mathematics this term means nothing but one of the lines which bound a figure, extending from one angle or corner to the next. The Latin word *latus*, of the same signification, is preserved in composition: thus a figure of three sides is trilateral; of four, quadrilateral; of five, quinquilateral; and so on. At the introduction of algebra, the same geometrical analogies by which a number multiplied by itself was called a *square*, procured for the number itself the name of *side;* thus 7 being the side, 49 was the square; and the same of the cube, triangular polygonal, and pyramidal numbers. [NUMBERS, APPELLATIONS OF.]

In common language the side is a vague term, implying only 'part, with a notion of relative position:' it is also differently used in and out of composition. First we have the *in*side and *out*side; then, with reference to either of these, we have sides before and behind, above and below, right and left. The first pair is defined by reference to the spectator, the second by the direction of gravitation; but the third, with reference to which the term side is most frequently used, cannot be defined by the mathematician. The anatomist will say, that in the human body, the right side is that on which the heart is not, and the left side that on which it is, and there is no other definition. In every case in which the terms right and left are applied, there is a reference to the position of the human body. Thus the right wing of an army means that which is towards the right hands of those in the centre; as soon as a retreat commences, the names of the right and left wings are changed. The right bank of a river is by convention named on the supposition that the person who names it is looking down the stream, or seeing the water flow from him. Perhaps some may doubt whether the superior and inferior parts, or the anterior and posterior, are in our language properly called sides; these we must remind that the words fore-side and back-side are very good English; and that in the phrase *upside-down* we see the remains of the corresponding phrases up-side and down-side.

SIDEREAL (*sidus*, a constellation; *sideral* would be more correct), applied in astronomy to distinguish that which has reference to the fixed stars, from that which relates to the sun, moon, planets, or comets. See STAR as to general considerations, and TIME as to the distinction between solar and sidereal time.

SIDERI'TIS (from σίδηρος, iron), the name of a genus of plants belonging to the natural order Lamiaceæ. The species of this genus are numerous, and are inhabitants of Europe and the northern parts of Asia. Dioscorides mentions three species of Sideritis, which were celebrated for stanching blood and healing wounds.

The genus consists of herbs and shrubs, with small yellowish flowers arranged in whorls; a tubular 5-cleft calyx; a ringent corolla, with upper lip 2-parted, the lower lip spreading, and deeply 3-cleft; four didynamous stamens, the upper short, bearing 2-celled anthers, the lower ones longer, and bearing irregular empty anthers; an inclosed style, biped at the top, with one of the stigmas shorter and embracing the other.

S. Romana, Roman iron-wort, is an annual, clothed with soft rather wooly hairs, with oblong-ovate leaves; a nearly glabrous calyx, with long mucronate teeth, the upper tooth large and ovate, the lower teeth lanceolate. This plant is a native of the Mediterranean. It was found by Dr. Sibthorp in Greece and the isles of the Archipelago; and Sir J. E. Smith believes it to be identical with the Sideritis of Dioscorides. It flowers from June to August, and attains a height of about six inches.

S. canariensis, Canary Island iron-wort, is a shrub clothed with villous wool; it has ovate, crenate, thick wrinkled leaves, veiny beneath, and clothed with a villous wool on both surfaces; flowers arranged in whorls. This, with many other of the species, is a native of the Canary Islands. It attains a height of from 3 to 6 feet, and is often cultivated in our gardens. Another species frequently grown in gardens is the Syrian or sage-leafed iron-wort (*S. syriaca*): it is an under-shrub, and clothed with white wool like the last; its leaves are thick, of an oblong lanceolate shape, and narrow at the base. It is a native of Candia and Palestine, and grows to the height of from 1 foot to 1½. All the shrubby species of this genus are adapted for growing on rock-work, or on dry gravelly chalky soils. They are readily increased by seeds, cuttings, or layers. The seeds of annual kinds may be sown in spring, in dry light soils; and the cuttings or layers may be planted out or laid down in the summer, and when rooted may be removed to pots. Most of those from the Canary Islands are greenhouse plants, and afford a variety in collections.

SIDEROLI'NA. [FORAMINIFERA, vol. x., p. 348.]

SIDERO'XYLON (from σίδηρος and ξύλον), a genus of plants belonging to the natural order Sapotaceæ. The species of this genus are natives of Africa, America, the East Indies, and New Holland. They are evergreen trees with axillary and lateral fascicles of flowers. They are remarkable for the hardness and weight of their wood, which sinks in water, and the genus has hence derived the name of iron-wood. The *S. inerme* (smooth iron-wood) is a native of the Cape of Good Hope, and has long been cultivated in the greenhouses of Europe. None of the species however are at all remarkable for beauty.

SIDLAW HILLS. [GREAT BRITAIN, p. 403.]

SIDMOUTH. [DEVONSHIRE.]

SIDNEY, SIR PHILIP, was born Nov. 29, 1554, at Penshurst in Kent. He was the son of Sir Henry Sidney, the favourite of Edward VI., by whom Sir Henry was knighted and sent as ambassador to France. This gentleman is described by Sir R. Naunton, in his 'Fragmenta Regalia,' as 'a man of great parts,' and certainly the favour which he enjoyed in the reign of Mary, and which was continued to him by Elizabeth, who made him lord-deputy of Ireland and president of Wales, is strong evidence of the truth of this assertion. Abundant testimony to his wise government of Ireland is borne by Spenser and Sir John Davies, in their treatises on the state of that country. Sir Philip's mother was Mary, eldest daughter of John, duke of Northumberland, and sister to Robert Dudley, the favourite of Queen Elizabeth.

Young Sidney was placed at school at Shrewsbury. While there his father addressed a letter to him in the year 1566, full of sterling advice. This letter was published in 1591, by one Griffiths, a person formerly in Sir Henry's household. At this time Sidney was only twelve years old, but even at that early age his biographer and companion Lord Brooke states that he was distinguished for intelligence and for a gravity beyond his years.

In 1569 he was entered at Christ Church, Oxford, and is reported to have held a public disputation with Carew, the author of the 'Survey of Cornwall.' During his residence at Oxford, negotiations between his father and Sir William Cecil, as to a marriage between Sidney and Anne Cecil, were entered into, but from some unexplained cause never were matured.

In 1572 Sidney proceeded on his travels. Paris was his first halting-place; but on the occasion of the Massacre of St. Bartholomew he was obliged to shelter himself at the house of Sir Francis Walsingham, the English ambassador, to whom he had been introduced by his uncle, the earl of Leicester. After quitting that city, he visited Belgium, Germany, Hungary, and Italy. At Frankfort he first became acquainted with Hubert Languet, who addressed a volume of letters to him. He arrived at Vienna in 1573, where he appears to have devoted considerable time to perfecting himself in horsemanship and other exercises peculiar to those times. At Venice he became acquainted with Edward Wotton, brother of Sir Henry Wotton, who is the *E. W.* referred to in the first lines of the 'Defence of Poesie.' He is stated also to have enjoyed the friendship of Tasso, but this statement cannot be verified. He returned to England in May, 1575.

On his return home Sidney at once became a courtier, and a very successful one. This is ascribed by Sir Robert Naunton to the influence of his uncle, the earl of Leicester. Naunton says he came 'famed aforehand by a noble report of his accomplishments, which, together with the state of his person, framed by a natural propension to arms, he soon attracted the good opinion of all men, and was so highly prized in the good opinion of the queen, that she thought the court deficient without him.' Connected with this success, is his first literary attempt, a masque, entitled the 'Lady of May,' which was performed before queen Elizabeth at Wanstead House in Essex.

Sidney rose in favour. In 1576 he was appointed ambassador to the court of Vienna on a message of condolation, the MS. 'instructions' of which are still extant in the Harleian Collection. Part of his mission was to condole with the two Counts Palatine, and in the execution of this duty he obtained the strong regard and friendship of Prince Casimir. He returned home in 1577.

About this time great excitement prevailed throughout England, owing to a negotiation for the marriage of the queen with Henry, duke of Anjou. The queen appearing at one time to lean somewhat favourably to this project, Sidney addressed to her the celebrated 'Remonstrance.' The very boldness of this famous letter seemed to preserve the author from any of the usual consequences of interference with the will of princes, for we find him in as high favour as ever; while inferior people who took the same views suffered mutilation and imprisonment. Soon afterwards a quarrel at tennis between the Earl of Oxford and Sidney, in which the latter behaved with great spirit, occasioned his retirement from court. Wilton, the seat of his brother-in-law the earl of Pembroke, was his retreat, and during this retirement the 'Arcadia' was written. He never completed it, nor was it even printed in his life-time. After his death, his sister collected the MS., and a continuation of it was written by Gervase Markham. It was published in 1590, under the title of the 'Countess of Pembroke's Arcadia.' Of this work the 'Retrospective Review' observes: 'Against the criticisms of its detractors (Lord Orford and Mr. Hazlitt) the best defence will be found in the work itself, to which we confidently refer our readers. That it has many faults, we will not deny. . . . . . The feeling which the perusal of the "Arcadia" excites is a calm and pensive pleasure, at once full, tranquil, and exquisite.'

The 'Arcadia' was universally read and admired at the time of its publication, and gave perhaps a greater impulse to the national taste for the romantic style of fiction than any single work before or after it. It is now, like most of its class, almost forgotten. Admired and read by Cowley and Waller, it was also the companion of the prison-hours of Charles I. Milton says that the prayer of Pamela in the 'Ikon Basilike' is stolen from it. In 1581, the 'Defence of Poesie,' the great work of Sidney, and upon which his fame as an author rests, was composed, but did not appear until 1595. Nothing more can be said upon the cause which it advocates, and what is said is placed in such a point of view, and expressed in so happy a manner, as to leave nothing to desire. The names of Wither, Ben Jonson, and Warton are sufficient evidence of the high favour with which it has been received.

After sustaining a severe disappointment from the marriage of the Lady Penelope Devereux, whom he celebrated under the names of Philoclea in the 'Arcadia,' and Stella in his poems, and to whom he was most deeply attached, he married in 1583, Frances, only daughter of his old friend Sir Francis Walsingham. Shortly after he stood proxy for Prince Casimir at an installation of Knights of the Garter at Windsor, and received the honour of knighthood from the queen. In the ensuing year he took up the defence of his uncle, the earl of Leicester, who had been attacked by Parsons, the Jesuit, in a tract called 'Leicester's Commonwealth.' Sidney's answer is entitled a 'Discourse in Defence of the Earl of Leicester.' Early in the year 1585 he seems to have meditated joining Sir Francis Drake's second expedition against the Spaniards in the West Indies. The queen however, taking fright 'least she should lose the jewel of her dominions,' peremptorily forbade his embarkation. Fuller asserts that at this time also the crown of Poland was offered to him and declined.

The war between the Spaniards and the Hollanders was being carried on at this time. In order to mark her sense of his merits, the queen, in 1585, appointed him governor of Flushing. After some considerable successes against the enemy, the troops under his command accidentally met and encountered a force of about 3000 men who were marching to relieve Zutphen, a town of Guelderland. The engagement took place almost under the walls of the town. After having had a horse shot under him, and in his third charge, Sidney received a wound from a musket-bullet in the left thigh, a little above the knee. The anecdote related by Lord Brooke of his conduct on leaving the battle-field illustrates his character. Lord Brooke's words are—'In which sad progress, passing along by the rest of the army, where his uncle the general was, and being thirsty with excess of bleeding, he called for some drink, which was presently brought him; but as he was putting the bottle to his mouth he saw a poor soldier carried along, who had eaten his last at the same feast, ghastly casting up his eyes at the bottle. Which Sir Philip perceiving, took it from his head before he drank, and delivered it to the poor man with these words: "Thy necessity is yet greater than mine."' The wound was mortal, and after many days of severe suffering he died at Arnheim, in the arms of Lady Sidney and of his faithful secretary William Temple, on the 7th October, 1586, in the thirty-third year of his age.

The body of Sidney was conveyed to England, and interred in Old St. Paul's Cathedral, on the 16th February, 1587, after lying many days in state. A general mourning, the first, it is believed, of the kind, was observed throughout the country. The funeral was attended by seven deputies, one for each of the Seven United Provinces, and by a great number of peers, his friends, and others.

The universities published three volumes of Elegies on his death. Spenser composed one on him under the title of 'Astrophel.' Constable contributed sonnets.

'Sir Philip Sidney was,' says the writer in the 'Retrospective Review' before quoted, 'a gentleman finished and complete, in whom mildness was associated with courage, erudition mollified by refinement, and courtliness dignified by truth. He is a specimen of what the English character was capable of producing, when foreign admixtures had not destroyed its simplicity or politeness debased its honour. Of such a stamp was Sir Philip Sidney, and as such every Englishman has reason to be proud of him.' His character has been a favourite theme. Near his own times, Nash, in his 'Pierce Penniless,' Lord Brooke, Camden, Ben Jonson, Sir Robert Naunton, and John Aubrey have all contributed to fill the ranks of his panegyrists. Sir Walter Raleigh called him the 'English Petrarch.' The chivalry of his character, his learning, generous patronage of talent, and his untimely fate combine to make him an object of great interest. 'He trod,' says the author of the 'Effigies Poeticæ,' 'from his cradle to his grave amid incense and flowers, and died in a dream of glory.'

Upon the whole, it may be said of Sidney's writings, that they display great brilliancy of imagination, with a chasteness of sentiment well calculated to refine the taste of the times. Their chief faults are chargeable on the strained and artificial style, the excess of which in all its absurdity may be found in that very curious work Lilly's 'Euphues.'

His 'Stella' afterwards caused great scandal by her unfortunate connection with Mountjoy, earl of Devonshire. Mrs. Jameson, in her 'Romance of Biography,' gives an interesting account of this lady. Sidney left one child, Elizabeth, countess of Rutland.

Besides the works before enumerated, he contributed poems to 'England's Helicon,' 'England's Parnassus,' and 'Davison's Rhapsody.' An English version of the 'Psalms' and 'Valour Anatomised into a Fancy,' published in 1581, attributed by some to Sir Thomas Overbury, are his other remains. For the modern reader, Gray's edition of his miscellaneous works, published at Oxford in 1829, leaves little to be desired.

(Wood's *Athenæ;* Fuller's *Worthies*; *Sidney Papers;* Sir R. Naunton's *Fragmenta Regalia; British Bibliographer;* Dr. Zouch's *Life*.)

SIDNEY or SYDNEY, ALGERNON or ALGERNOON, was the second surviving son of Robert, second earl of Leicester of that creation, and of his wife Dorothy, eldest daughter of Henry, earl of Northumberland. He is supposed to have been born in 1621 or 1622. When his father went as ambassador to Denmark in 1632, he took his son Algernon with him; and four years after he likewise accompanied his father on his embassy to France. His first entrance upon public life was in 1641, when, upon the breaking out of the rebellion in Ireland, he went over to that country, of which his father was then lord lieutenant, and commanded a troop of horse in the earl's regiment. Both he and his elder brother the Lord Viscount Lisle distinguished themselves by their gallantry in the campaigns of that and the following year.

Returning to England in August, 1643, the two brothers, who professed to be on their way to the king at Oxford, were seized as they landed in Lancashire, by order of the parliament; an incident which lost them the favour of Charles, who believed that their capture was of their own contrivance. On this they both joined the parliamentary party; and Algernon received a commission as captain of a troop of horse in the regiment of the earl of Manchester. In April, 1645, Fairfax raised him to the rank of colonel, and gave him a regiment; and in 1646, his brother Lord Lisle having become lieutenant-general of Ireland, he was made lieutenant-general of the horse in that kingdom, and governor of Dublin. In the beginning of the same year he had been returned member for Cardiff, in the room of William Herbert, Esq., who two years before had been disabled from sitting, for siding with the king, and who had in the interim been killed at the battle of Edgehill. In May, 1647, having come over to his native country, he received the thanks of the House of Commons for his services in Ireland; and was appointed governor of Dover. In 1648 he acted as one of the judges at the trial of the king, although he was not present when the sentence was passed, nor did he sign the warrant for the execution. On the establishment of the protectorate however he retired from public affairs, and he appears to have continued to reside at the family seat of Penshurst in Kent, and at other places in the country, during the government of Cromwell and his son.

But on the restoration of the long parliament in May, 1659, Sidney again came forward, and on the 13th of that month was nominated one of the council of state. On the 5th of June following he was sent, along with Sir Robert Honeywood and Mr. Borne, to Denmark, to negotiate a peace between that country and Sweden; and he was absent upon this mission when the king returned. In a letter written to him by his father shortly after the Restoration, and published in 'Familiar Letters, written by John, late Earl of Rochester, and several other persons of honour,' 8vo., Lond., 1697, the Earl mentions a report which he had heard, that when the university of Copenhagen brought Sidney their album, and desired him to write something in it, he wrote,—

'... Manus hæc inimica tyrannis
Ense petit placidam sub libertate quietem.'

and signed the verses with his name. This anecdote is confirmed by Lord Molesworth, who, in the Preface to his 'Account of Denmark' (first published in 1694), tells us, that even while Sidney was still at the Danish court, 'M. Terlon, the French ambassador, had the confidence to tear out of the Book of Mottoes in the king's library' the above lines, 'which Mr. Sidney, according to the liberty allowed to all noble strangers, had written in it.' 'Though M. Terlon,' adds Lord Molesworth, 'understood not a word of Latin, he was told by others the meaning of that sentence, which he considered as a libel upon the French government, and upon such as was then setting up in Denmark by French assistance or example.' His father intimates, that this and some other things he had heard of him made him hesitate about speaking to the king in his behalf, as he had intended to do. 'It is also said,' continues the Earl, 'that a minister who hath married a Lady Laurence here at Chelsea, but now dwelling at Copenhagen, being there in company with you, said, "I think you were none of the late king's judges, nor guilty of his death," meaning our king. "Guilty!" said you. "Do you call that a fault? Why, it was the justest and bravest action that ever was done in England, or anywhere else;" with other words to the same effect. It is said also that, you having heard of a design to seize upon you, or to cause you to be taken prisoner, you took notice of it to the king of Denmark himself, and said, "I hear there is a design to seize upon me; but who is it that hath that design? *Est ce nôtre bandit?*" by which you are understood to mean the king. Besides this, it is reported that you have been heard to say many scornful and contemptuous things of the king's person and family, which, unless you can justify yourself, will hardly be forgiven or forgotten; for such personal offences make deeper impressions than public actions, either of war or treaty.'

The reports were probably not to be gainsayed. Indeed

Google

Sidney, in his answer to his father, says, 'That which I am reported to have written in the book at Copenhagen is true; and, never having heard that any sort of men were so worthily the objects of enmity as those I mentioned, I did never in the least scruple avowing myself to be an enemy unto them.' Accordingly, instead of coming home, he proceeded first to Hamburg, whence he went to Frankfort, and from thence to Rome, where he proposed to take up his residence. About the middle of the year 1661, however, he was forced to remove to Frascati; and he is afterwards traced to various places in Germany, France, and the Low Countries. In 1665 he was at the Hague, actively employed, along with other English exiles of the same principles, in urging the states of Holland to invade this country; and the next year he is found at Paris, impressing upon Louis XIV. the advantage France would derive from the establishment of a republic in England: a project in favour of which he engaged, in a memorial to the king, to procure a rising, if he were allowed a grant of 100,000 crowns. From this time he appears to have resided in Gascony, till at last, in 1677, a pardon and permission for him to return home were obtained from Charles II., on the plea that he was anxiously desirous to see his aged father once more before he died. The Earl died that same year, and, although he had never approved of the course his son had taken, left him a legacy of 5100*l.*, with which, he says, in his 'Apology,' dated on the day of his death, he would have immediately returned to Gascony, if he had not been detained by a long and tedious suit in Chancery, in which he was involved by his elder brother, now earl of Leicester, choosing to dispute his father's will. Before this, Sidney appears to have been only assisted by his father with irregular and scanty remittances; and during his wanderings on the Continent he was often in great straits.

It is commonly stated that Sidney's pardon was obtained through the interest of the earl of Sunderland, who was the son of his sister Dorothy (Waller's 'Sacharissa'); but he himself, in a letter to the Hon. Henry Savile, then the English ambassador at the court of France, appears to attribute it to that gentleman's exertions. 'My obligation unto you,' he says, 'I so far acknowledge . . . to be the greatest that I have in a long time received from any man, as not to value the leave you have obtained for me to return into my country, after so long an absence, at a lower rate than the saving of my life.'

We are indebted for the strongest light that has been cast upon the conduct of Sidney after his return, to the despatches of the French minister Barillon, published from the originals, in the foreign office at Versailles, by Sir John Dalrymple, in his 'Memoirs of Great Britain and Ireland,' 4to. Lond., 1773. In a despatch dated 5th Dec. 1680, Barillon writes, 'The Sieur Algernoon Sydney is a man of great views and very high designs, which tend to the establishment of a republic. He is in the party of the Independents and other sectaries; and this party were masters during the last troubles. They are not at present very powerful in parliament, but they are strong in London; and it is through the intrigues of the Sieur Algernoon Sidney that one of the two sheriffs, named Bethal, has been elected. The duke of Buckingham is of the same party, and believes himself at the head, &c. . . . The service which I may draw from Mr. Sidney does not appear, for his connections are with obscure and concealed persons; but he is intimate with the Sieur Jones [Sir William Jones, lately attorney-general], who is a man of the greatest knowledge in the laws of England, and will be chancellor, if the party opposed to the court shall gain the superiority, and the earl of Shaftesbury be contented with any other employment.' And in the account of his disbursements among the patriots, from the 22nd December, 1678, to the 14th December, 1679, Barillon sets down 'To Mr. Sidney 500 guineas, which makes 543*l.* 15*s.* sterling.' See also the despatch of Sept. 30th, 1680, for an account of the arguments Sidney was accustomed to use with Barillon to show that it was for the interest of France that England should be converted into a republic. Mr. Hallam has some remarks which will be found worth attention upon the conduct imputed to Sidney as to this matter, in his 'Constitutional History,' ii. 274 (4to. edition of 1827).

Sydney was a candidate for the representation of Guildford, at the general election in 1678, and for Bramber at that in 1679; but was defeated both times, although on the first occasion he petitioned against the return of his opponent, and on the second he was only unseated after a double return. He had thus openly taken his stand as the opponent of the court; and he was looked upon as leagued with Monmouth, Shaftesbury, Russell, Essex, and the other popular leaders, who may have differed among themselves in their principles and views, but the designs of the most moderate of whom certainly extended to such a change of government as would have amounted to a revolution. When the Rye-House Plot was announced [RUSSELL, WILLIAM, LORD], in June 1683, Sidney was immediately arrested, along with his friend Lord Russell, and committed to the Tower on a charge of high treason. He was brought up to the bar of the King's Bench to plead, on the 7th of November, and his trial took place on the 21st, before Sir George Jefferies, lately promoted to the place of Lord Chief Justice. Jefferies exhibited little of his wonted coarseness and passion on this occasion; but his demeanour was very determined and inflexible, and he bore down every objection of the prisoner with an authority that nothing could shake or impress. The only evidence in support of the principal facts charged was Lord Howard of Escrick, who had, according to his own account, been a party to the plot, and now came to swear away the lives of his associates in order to save his own; and as the law of high treason required two witnesses to prove the crime, the other was supplied by bringing forward a manuscript found among Sidney's papers, and asserted, no doubt with truth, to be his handwriting, which, it was pretended, contained an avowal and defence of principles the same, or of the same nature, with those involved in the alleged plot. He was found guilty; and being again brought up on the 26th, was sentenced to be put to death after the manner of execution then enjoined by law in cases of high treason. He twice petitioned the king for pardon; but all that could be obtained for him was the remission of the degrading and brutal parts of his sentence; and on Friday, the 7th of December, he was beheaded on Tower Hill. No one ever suffered with more firmness or with less parade. He did not even address the people; but when asked to speak, replied that he had made his peace with God, and had nothing to say to man. A paper which he delivered to the sheriff, and which was afterwards printed, concluded as follows:—'The Lord sanctify these my sufferings unto me; and though I fall as a sacrifice unto idols, suffer not idolatry to be established in this land. . . . Grant that I may die glorifying thee for all thy mercies, and that at the last thou hast permitted me to be singled out as a witness of thy truth, and, even by the confession of my very opposers, for that old cause, in which I was from my youth engaged, and for which thou hast often and wonderfully declared thyself.'

The trial and condemnation of Algernon Sidney seem to have shocked the public feeling of the time in no ordinary degree. Even the cautious Evelyn, after stating that he was executed 'on the single witness of that monster of a man, Lord Howard of Escrick, and some sheets of paper taken in Mr. Sidney's study, pretended to be written by him, but not fully proved, nor the time when, but appearing to have been written before his majesty's restoration, and then pardoned by the Act of Oblivion,' adds, that 'though Mr. Sidney was known to be a person obstinately averse to government by a monarch (the subject of the paper was in answer to one of Sir E. [R.?] Filmer), yet it was thought he had very hard measure.' He describes Sidney as 'a man of great courage, great sense, great parts, which he showed both at his trial and death;' and he appears to have been looked upon universally in the same light—by his friends as one of the ablest, by his enemies as one of the most dangerous of his party. While he was yet in exile, Charles himself, in 1670, described him to Colbert, the French minister, as one who could not be too far from England, where his pernicious sentiments, supported with so great parts and courage, might do much hurt. Indeed, with the exception of Shaftesbury, he was the only person of eminent ability in the particular knot of patriots to which he belonged. Yet he must not be confounded in intellectual, any more than in moral character, with that brilliant and versatile politician. A man of talent and accomplishments he was, but narrow minded, opinionative, and egotistical, to the point of utter impracticability. Burnet describes him 'as a man of most extraordinary courage, a steady man, even to obstinacy, sincere, but of a rough and boisterous temper, that could not bear contradiction, but would give foul language upon it.' 'He seemed to be a Christian,' adds the bishop, 'but in a particular form of his own: he thought it was to be like a divine philosophy in the mind; but he was against all public worship, and everything that looked like a church. He was stiff to all republican principles, and such an enemy to everything that looked like monarchy, that he set himself in a high opposition against Cromwell when he was made Protector. He had studied the history of government in all its branches beyond any man I ever knew.'

Sidney's 'Discourses concerning Government' were first published in 1698, with a short preface by John Toland; again in 1704, and a third time in 1751, at the expense of Mr. Thomas Hollis, who prefixed a Life of the Author, and also printed for the first time his 'Apology' already mentioned. This edition of the works of Algernon Sidney was reproduced in 1772 by Mr. Brand Hollis, to whom Mr. Thomas Hollis left his property, with notes and corrections by Mr. J. Robertson, and the addition of some letters and other short pieces of Sidney's, all previously published, together with a tract entitled 'A General View of Government in Europe,' first printed in James Ralph's anonymous publication entitled 'Of the Use and Abuse of Parliaments,' 2 vols. 8vo., Lond., 1744, and there attributed to Sidney, but which Robertson says he is convinced 'is the production of a different hand.' In fact there is no doubt that it is spurious. The two editions of 1751 and 1772 both contain 'Letters of the Honourable Algernon Sydney to the Honourable Henry Savile, Ambassador in France, in the year 1679, &c., now first printed from the Originals in Mr. Sidney's own Hand,' which originally appeared in an octavo volume at London in 1742. See also Arthur Collins's 'Memoirs of the Lives and Actions of the Sydneys,' prefixed to his 'Letters and Memorials of State,' &c., 2 vols. fol., London, 1746; and Blencowe's 'Sidney Papers,' 8vo., London, 1825. Collins states that several treatises by Sidney in Latin and Italian, and also an 'Essay on Virtuous Love,' in English, remain in his own handwriting at Penshurst. There is a Life of Algernon Sydney, by George Wilson Meadley, 8vo., Lond., 1813.

Sidney's trial was printed in 1684, but is said to have first passed through the hands of Jefferies, who struck out whatever he pleased. It is given, along with the other trials connected with the Rye-house Plot, in Howel's 'State Trials,' vol. ix., pp. 357-1000. See also the 'True Account and Declaration of the Horrid Conspiracy against the late King,' &c., written by Bishop Sprat, and published by order of James II. in 1685; and 'The Secret History of the Rye-house Plot, by Ford, lord Grey,' first printed in 1754.

The attainder of Algernon Sydney was reversed after the Revolution by the 7th Private Act of the first session of the first parliament of William and Mary, the preamble of which declared that Sidney had been most unjustly and wrongfully convicted and attainted 'by means of an illegal return of jurors, and by denial of his lawful challenges to divers of them for want of freehold, and without sufficient legal evidence of any treasons committed by him; there being at that time produced a paper found in the closet of the said Algernon, supposed to be his handwriting, which was not proved by the testimony of any one witness to be written by him, but the jury was directed to believe it by comparing it with other papers of the said Algernon; besides that paper so produced, there was but one witness to prove any matter against the said Algernon; and by a partial and unjust construction of the statute declaring what was his treason.' It is observable, that neither in this Act nor in that passed in the same session reversing the attainder of Lord Russell is there any assertion of the innocence of the convicted party. And Mr. Hallam observes (*Constitutional History*. ii. 329) that the common accusation against the court in Sidney's trial, 'of having admitted insufficient proof by the mere comparison of handwriting, though alledged not only in most of our historians, but in the act of parliament reversing Sidney's attainder, does not appear to be well-founded: the testimony to that fact, unless the printed trial is extraordinarily falsified, being such as would be received at present.'

SIDNEY-SUSSEX COLLEGE, Cambridge, was founded in 1596, on the site of a monastery of Grey Friars, pursuant to the will of Frances Sidney, countess of Sussex, who died in 1589. It was intended to support a master, ten fellows, and twenty scholars; but the estates being found inadequate, after defraying the building expenses, the number of fellows was reduced by the executors to seven. Two were however afterwards added by Sir John Hart, citizen of London. Besides these nine foundation fellowships (which are open to the natives of any part of her Majesty's dominions), two were founded by Mr. Peter Blundell, for the benefit of his scholars in this college; and one by Mr. Leonard Smith, the nomination to which is vested in the Fishmongers' Company of London. The Blundell fellowships are tenable for only ten years after the degree of M.A., and the Smith fellowship for only six. A mathematical lectureship, of the present value of 140*l.* per annum, was founded by Mr. Dudley Taylor: it is not tenable with a fellowship, but may be held by a layman. As this is a divinity college, all the fellows are obliged to take orders within three years after their election, and the degree of B.D. at the regular time prescribed by the University statutes. The college has 20 foundation scholarships, perfectly open, value 7*s.* per week during residence. Two other scholarships were founded by Mr. Blundell, and appropriated to scholars from Tiverton school. Archdeacon Johnson left two exhibitions, now 20*l.* per annum each, with preference to those educated at the schools of Oakham or Uppingham, in Rutland. Mr. Lovett founded two (now 45*l.* each per annum) for clergymen's sons, with a preference to those who have been three years at Grantham or Oakham school: there are also two by Mr. Bearcroft for clergymen's sons, now worth 12*l.* per annum each. The College has also two exhibitions, of 12*l.* each, from the Haberdashers' Company; and one of 6*l.* from the Fishmongers' Company. Six mathematical exhibitions have been lately established on the foundation of Mr. Taylor; the yearly value of each is at least 50*l.*, with rooms rent-free. These exhibitions, as they become vacant, are given to those undergraduates of the College who distinguish themselves in mathematics at the Midsummer examination. There are various annual prizes (the highest 10*l.*) enumerated in the University Calendar. There are six church livings in the gift of the College. The visitor is Sir John Shelley Sidney, Bart., as the representative of the foundress.

Among the eminent men who have been members of Sidney-Sussex College, may be named Oliver Cromwell, Archbishop Bramhall, Bishops Seth Ward, Reynolds, and Wilson (Sodor and Man), Lord Chief Baron Atkyns, Sir Roger L'Estrange, Dr. Comber, Thomas Woolston, William Wollaston, &c.

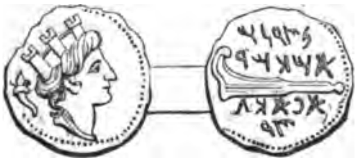
The College is situated on the east side of Bridge Street. It is entered by a neat portico, and consists of two courts built of brick, and completed in 1598. The chapel and library were rebuilt in 1780.

In 1840, Sidney-Sussex College had 92 members on the boards. (Dyer's *Hist. of the University of Cambridge*; Lysons' *Magna Britannia*, 'Cambridgeshire;' *Cambridge University Calendar* for 1840.)

SIDON, or ZIDON (צִידוֹן, Σιδών), the most antient, and for a long time the chief city of Phœnice, and probably the mother city of Tyre, which is called in the Bible 'the daughter of Sidon' (*Is.*, xxiii. 12), and of the other towns on the Phœnician coast (*Gen.*, x. 15, 18; *Ptol.*, v. 15; *Mela*, i. 12). It lay on the coast of the Mediterranean, in a plain about a mile broad, 200 stadia from Tyre, 400 from Berytus, a day's journey from Paneas, and 66 miles from Damascus (Strabo, 756; Joseph., *Antiq.*, v. 3, 1; Abulfeda). It possessed a good harbour (Strabo; Joseph., *Ant.*, xiv. 10, 6; *Acts*. xxvii. 3), and at a very early period became a great maritime and commercial city (Diod. Sic., xvi. 41, 45; *Is.*, xxiii. 2; *Ezek.*, xxvii. 8). As early as the time of Joshua (B.C. 1444) it is called 'Great Zidon' (*Josh.*, xi. 8; xix. 28). The Sidonians are thought to have been the first manufacturers of glass (Plin., v. 17), and their skill in arts and manufactures is frequently referred to by Homer, as well as by later writers (*Il.*, vi. 289; xxiii. 743; *Od.*, xv. 415; xvii. 424; Virg., *Aen.* iv. 75; Strabo, 41, 757; Plin., xxxvi. 66; Dion. Perieg., 913). They are often mentioned in the Bible as skilful builders (1 *Kings*, v. 6; 1 *Chron.*, xxii. 4; *Ezra*, iii. 7). They were worshippers of the goddess Ashtoreth, whose head is commonly found upon their coins.

At the division of Canaan among the tribes of Israel, Sidon, with the adjacent country, fell to the lot of Asher, who were never able to conquer it. Indeed the Sidonians are mentioned among the nations which successively ruled over Israel in the time of the Judges (*Judges*, x. 12); but generally the Israelites and Phœnicians seem to have been on terms of close friendship. The importance of Sidon was gradually eclipsed by that of Tyre, which then became the chief city of Phœnicia. In the time of David and Solomon, Sidon appears to have been under the dominion of the king of Tyre (2 *Sam.*, v. 11; 1 *Kings*, v.). It still however continued to be a place of great importance. Its position placed it at the mercy of every invader. When the Assyrian conqueror Shalmanezer invaded Syria, Sidon separated itself from Tyre, and surrendered to him (Joseph., *Antiq.*, ix. 14, 2). It had a king of its own under the Assyrians and also under the Babylonians and Persians, to whom it became successively subject. The Sidonians furnished the best ships in the fleet which Xerxes collected for the invasion of Greece (Herod., vii. 96, 99, 100); and the king of Sidon is mentioned as receiving from Xerxes the first seat of honour among the kings and commanders at the conference which preceded the battle of Salamis; and next to him on that occasion sat the king of Tyre (Herod., viii. 67). Under Artaxerxes Ochus the Sidonians revolted, together with the other Phœnicians and the Cyprians. After a short siege Sidon was betrayed to Ochus by its king Tennes, upon which the Sidonians burnt themselves with their city and treasures (Diod. Sic., xvi. 41-45). The city was rebuilt. It submitted to Alexander the Great without resistance. After his death it was subject alternately to the kings of Egypt and Syria, till it fell under the power of the Romans. It is now called Saida, and still has a considerable commerce, and about 8000 or 9000 inhabitants. It suffered a bombardment during the recent operations on the coast of Syria, by the allied fleets of England, Austria, and Turkey, against Mohammed Ali (1840).

(Winer's *Biblisches Realwörterbuch;* Calmet's *Dictionary; Pictorial Bible*, Note on *Josh.* xix. 28; Georgii's *Alte Geographie.*)



Coin of Sidon.
The inscription is in the old Phœnician character.

SIDO'NIUS APOLLINA'RIS, a Latin writer, or with his full name, C. SOLLIUS APOLLINARIS MODESTUS SIDONIUS, was born in the province of Gallia Lugdunensis. A.D 428. His works consist of several poems, chiefly panegyrics and epithalamia, and nine books of epistles, which possess some historical value; but the style and language of his prose, as well as poetry, bear evident traces of the downfall of the Latin language and literature. Sidonius was a person of high rank. He lived, as appears from his epistles, on intimate terms with Theodoric, king of the Visigoths. He was the son-in-law of the emperor Avitus, whom he praises in a panegyric of 600 verses, for which he was rewarded with a bronze statue placed in one of the porticoes belonging to Trajan's library; and on the inauguration of the emperor Anthemius at Rome, he obtained the office of præfect of the city, as a reward for the panegyric which he pronounced upon the occasion. Sidonius was made bishop of Arverni (Clermont) in A.D. 473, and died in 484.

The first edition of Sidonius was printed at Lyon in 1552. The best editions are, by Sirmondus, Paris, 1614, 4to., and Labbeus, Paris, 1652, 4to. (Germain, *Essai Littéraire et Historique sur Apollinaris Sidonius*, Montpellier, 1840, 8vo.)

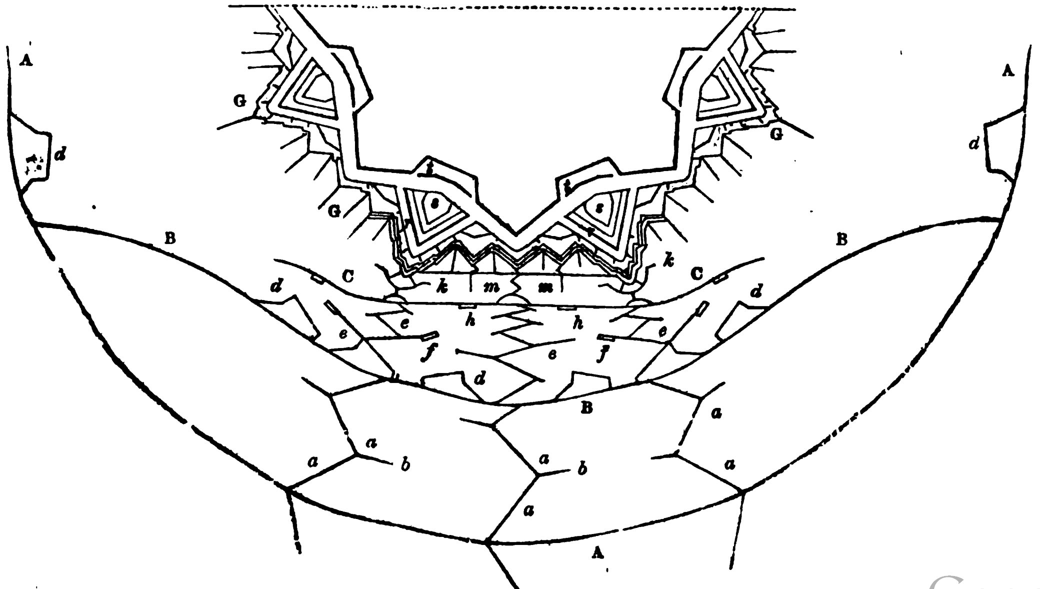
SIEBENKEES, J. P. [STRABO.]

SIEGE is the process of advancing towards a fortress under the cover of earth thrown up from trenches excavated in the ground; silencing its fire by a superior fire of artillery and musketry; and finally, by breaching the ramparts, either obliging the defenders to surrender, or forcing an entrance into the place.

A fortress is invested previously to the commencement of the siege by posting troops about it, so as suddenly to occupy all the avenues to the place, and prevent the garrison from receiving succours. The besieging army, on its arrival, establishes itself in the environs of the place at a distance equal to about two miles, so that it may not be annoyed by the fire of the artillery of the defenders; protecting itself generally by redoubts raised at intervals, both on the side nearest to the fortress, and on that which is towards the country. [COUNTERVALLATION.]

The operations of a regular siege, when conducted against places fortified according to any of the modern systems, are nearly the same till the approaches (the oblique lines of trenches) arrive at the foot of the glacis; and when, as in the first system of Vauban, the flanked, or most advanced, angles of the bastions and ravelins are nearly at equal distances from the centre of the place, those approaches may be directed along the produced capitals (lines imagined to bisect the angles) of a ravelin, and of the nearest bastion on each side of it; since then, when the glacis before those works is crowned by batteries, the rampart of the enceinte may be breached in two places at once. But in systems which, like that of Cormontaingne, have great ravelins, the approaches should be directed along the produced capitals of a bastion, and of the nearest ravelin on each side, because the glacis of the bastion cannot be crowned till the two collateral ravelins are taken; and if the lines of approach were directed as in the former case, it would be necessary to take three ravelins before either bastion could be breached. The lines of approach are carried on nearly in the direction of the produced capitals of the bastions and ravelins, because there the ground is less subject to the direct fires from the fortress.

In commencing operations, the engineers, having ascertained on the ground the prolongations of those capitals, trace, by means of pickets driven in the ground and connected by tapes, the direction of the first parallel trench, A A A, which is generally everywhere about 600 yards from the advanced parts, G G G, of the covered-way. This pa-



rallel usually extends along the fronts attacked, and so far beyond as to embrace the prolongations of all the ramparts, a fire from which might be directed against the works of the besiegers: it should terminate at each extremity, if possible, in some natural obstacle, as a morass or a river; and if no such obstacle exists, a redoubt may be raised there, in order, by its fire, to oppose any attempt of the enemy to turn the parallel. The trench is executed by numerous working-parties of men, who, being provided with spades and pick-axes, are marched up to the ground after sunset, and are disposed along the line at intervals of four feet from each other. The earth obtained from the trench is thrown towards the fortress, in order to form a breastwork; and in the morning the men are relieved by others, who complete the parallel where it may have been left unfinished, and dig trenches obliquely towards the rear, for the purpose of having secure communications to and from the depôts of materials. All the trenches are sunk three feet below the surface of the ground; and the earth thrown out forming a mass about three feet high, the troops in them are effectually covered from the view of the besieged. The general breadth is 10 or 12 feet, but greater width is given in places at intervals from each other.

The first operations of the working-parties take place during the night, in order that some progress may be made before they are discovered by the defenders; but should the latter suspect that the ground is being broken, they frequently discharge fire-balls, by the light of which they may discover the places where the men are at work. These places being ascertained, it may be expected that the ground will be cannonaded, or that troops will make a sortie from the fortress, for the purpose of interrupting or driving off the workmen; and in order that this intention may be frustrated, the parties are accompanied by a guard of infantry, which is placed at about 50 yards in front of the tracing-line. These troops obtain cover if possible, or lie down on the ground, that they may not be exposed to the defenders' fire; and in the event of a sortie being made, they are to repel it by force: squadrons of cavalry are also stationed near the extremity of the parallel, that by a rapid movement they may cut off the retreat of the sortie.

The general uses of the parallel trenches are to connect the lines of approach by a covered line of communication, to allow the trenches to be kept clear of troops and free for the workmen, and to serve as lines of countervallation in confining the garrison of the place. As soon as the first parallel is finished, the guard of the trenches is moved into it, for the purpose of protecting the succeeding operations.

Since the trenches leading from the first parallel towards the place ought not to be enfiladed from thence, it is evident that they must be formed in zig-zag or oblique directions, *a a a*, &c., crossing and recrossing the produced capitals of the bastions or ravelins; and that the several branches, if produced, should fall on the exterior of all the works of the place. The first oblique *boyeau* (branch) of the trench may be defended by the fire of the parallel; but the second, being beyond the effective range of musketry from thence, is to be protected by the fire of troops stationed in a small trench, *a b*, called a parallel boyeau, at the angle between the first and second branches; and a short branch for the like purpose is generally formed, when necessary, at the angles of all the zig-zag trenches. If the directions of the several oblique branches are not laid down on the ground, from a plan of the intended operations previously made on paper, the engineer endeavours, during the daylight, to observe, in the direction of the most advanced part of the glacis towards his right or left hand, some object towards which the tracing-line may be stretched and the trench carried on. These trenches are then executed by the working-parties, in the same manner as the great parallel was formed. At the siege of Badajos, in 1812, a French corporal, in the dusk of an evening, dexterously displaced a tracing-line which had been stretched by the British engineers, and directed it so that the trench executed along it might have been enfiladed by three guns on the ramparts of the castle. If the derangement had not been discovered before darkness came on, the labour of the whole night would have been lost, and casualties might have occurred from the fire which the garrison might have directed along the trench. The workmen are usually relieved after it is dark, in order that the change may not be observed from the fortress; but the officers should be relieved earlier, that those who come on duty may have light enough to examine the actual state of the works, and to take measures for directing the operations of the men during the night.

When the heads of the trenches have arrived within 300 yards of the covered-way, which is usually about the fourth night from the time of opening the trenches, a second parallel trench, B B B, is formed, in order to facilitate the communication between the several lines of approach. This trench may be extended along the particular points attacked, and its extremities may be terminated by redoubts, or continued till they fall into the first parallel. It is executed by flying sap [Sap], that the men may be quickly protected from the fire of musketry in the covered-way, which might now begin to take effect. One of the principal means of accelerating the surrender of the fortress is that of enfilading the ramparts, in order to dismount the guns and drive the defenders from the parapets: for these purposes batteries, *d d d*, &c., are raised in the directions of the produced faces of the works, and in or near the first or second parallel, which thus may form a secure communication between them. [Battery; Ricochet.] From the same batteries also an oblique fire may sometimes be directed against the interior of the flanks and curtains, and a plunging fire into the ditches, in order to impede the communication between the place and the outworks. All the different ricochet batteries commence firing at the same time, that the attention of the defenders may be divided, and that they may be prevented from concentrating all their fire upon one battery; the guns also should be fired singly, and at intervals so regulated that there may be always some shot or shells in the air, for thus the enemy will have little time to repair the damage done to his artillery or to the parapets. The firing should be commenced during daylight, in order that the artillerymen may be able to determine by trial the charge of powder and the degree of elevation for each piece, so that the shot may just clear the parapet of the work to be enfiladed; this being obtained, the direction of the piece may be preserved by means of timbers nailed to the platform, and thus the fire may be kept up with equal accuracy by night and by day.

After the fire from the ricochet batteries has partly silenced that of the place, the trenches of communication are continued in zig-zag directions as before, and with the like precautions against being enfiladed from the fortress and its covered-way. These and all the succeeding trenches may be executed by full sap [Sap], while the fire of the besieged continues in activity; but if that fire should become at any time relaxed, the opportunity may be seized of carrying on some part of the approaches in a more expeditious manner. When the heads of the oblique trenches are about half-way between the second parallel and the foot of the glacis, a semi-parallel, *e e*, &c., is carried out on each side of the produced capitals of the works attacked, till it meets the prolongation of the crest of the covered-way: its use is to protect the works which are to be executed in its front by a fire of musketry, which, being nearer, is more effectual than that of the second parallel. Howitzer batteries, *f f*, &c., are formed at the extremities of these parallels for the purpose of enfilading the covered-way with shells, and thus destroying the palisades and traverses: their interiors are sunk below the level of the ground, in order that their epaulemens may not mask the fires from the ricocheting batteries in their rear. As soon as the fires from the howitzers have produced some effect, the oblique trenches may be continued till they arrive at the foot of the glacis, on the capital of each of the works attacked, the branches being directed, as before, towards the exterior of any part of the covered-way from whence the enemy might enfilade them; and each being prolonged towards the rear about 10 or 12 yards, in order to form places where tools and materials may be deposited out of the line of passage along the trenches. If the defenders should have established redans or redoubts at the foot of the glacis, or should have carried out counter-approaches from any of the collateral works, in order to enfilade the trenches of attack, they must be assaulted and destroyed as soon as it is found that the fire from thence impedes the operations of the besiegers.

A third parallel trench C C may now be executed to connect the points of attack at the foot of the glacis; for this purpose the squads of sappers turn to the right and left from the head of each line of approach, and meet each other, forming as they proceed a trench which is either rectilinear or curved towards the re-entering parts of the fortress, in order to enable the troops in it to fire less obliquely on the branches of the covered-way. This parallel should be made broader than the others, because considerable bodies of troops are occasionally collected in it, and at intervals steps should be made in it long enough to allow a company of men to mount in line over the parapet. For the protection of the troops, the crest of its parapet should be furnished with sand-bags disposed so as to leave between them small intervals (loop-holes) to fire through; and in this parallel, batteries, *h h*, &c., for small mortars may be formed, in order that shells may be thrown from thence into the principal works. It is estimated that the third parallel may be finished by about the tenth night from the time of opening the trenches.

At this period, should any great necessity exist for hastening the surrender of the place, should also the garrison be weak, and should there be no retrenchments in the covered-way, it may be thought proper by main force to assault the latter, and immediately crown the glacis with batteries for breaching the works. In this case, the defenders should be driven as much as possible from the covered-way by a heavy fire from the mortar and howitzer batteries; then the troops who are to make the assault, having been assembled in the third parallel, mount, at a signal a little before sun-set, over its parapet, and proceed rapidly up the glacis. A party of men then extend themselves along its crest, and by their fire keep down that of the defenders on the parapets; in the meantime the sappers commence forming with gabions a lodgment on the crest, and the rest of the storming party endeavour to force an entrance through breaches made by artillery in the palisades. When the defenders have thus been compelled to retire behind the traverses in the covered-way, the assailants, who then become exposed to the fire from the parapets of the bastions or ravelins, retire into the lodgment which by this time may be finished on the crest of the glacis; and during the night there may be executed trenches of communication from the lodgments to the third parallel. The lodgments thus formed may be afterwards connected together, and extended to the right and left if necessary; and in these the breaching batteries may be formed.

Should the fortress have small ravelins, like those of Vauban, the assault may take place at once on the salients of a ravelin and of the two collateral bastions; but if the ravelins advance far towards the country, as in the method of Cormontaingne, it can take place only at the salients of the ravelin on each side of one bastion; since if it were attempted to carry on the approaches between the two ravelins, the troops and sappers would become exposed to fires on their flanks and in rear as well as in front.

An assault by main force is always attended with considerable loss, and therefore, if time permits, it is preferred to continue carrying on the approaches by sap. For this purpose, supposing the place to be fortified with large ravelins (as in the cut), a trench is begun at about thirty yards on each side of the ridge between the two faces of the glacis before the ravelins only, and carried in a curvilinear direction till the two squads of sappers meet on the ridge about eight or nine yards in advance of the third parallel. From hence the trench is continued by double and direct sap along the ridge till it arrives at between thirty and forty yards from the crest at the angle of the glacis; and at this spot, formerly, high breastworks, called trench cavaliers, *k k*, &c., about the thirteenth night from the time of opening the trenches, were raised on the prolongations of the branches of the covered-way, in order to allow a plunging fire of musketry to be directed into those branches. But as the fire of the defenders' artillery may prevent the construction of such works, instead of them there are now formed batteries armed with small mortars from which balls or stones may be projected into the covered-way in order to compel the defenders to retire from thence. (Mortars for throwing stones are called by the French engineers *pierriers*.)

After the fire from the cavaliers or mortar-batteries has obliged the enemy to abandon the advanced parts of the covered-way, double saps are carried on towards the salient angle of the glacis, and when they have arrived at about twenty-four feet from that angle, the crowning of the glacis commences. This is performed by extending the sap along the crest on each side of the angle, and throwing up the earth towards the place in order to form epaulemens for batteries. That the crowning trenches may be secured against the enfilading fires from the collateral works of the besieged, traverses are formed across them at intervals in situations where they may not interfere with the guns to be placed in the batteries; and, on account of the fire which the enemy may still keep up from the branches of the covered-way and the retrenchments in the re-entering places of arms (see the figure in art. FORTIFICATION), a portion of a fourth parallel, *m m*, should now be carried out in order that troops placed there may protect the sappers during the formation of the batteries, and the artillerymen during the operation of breaching the ravelins. The crowning of the glacis is sometimes extended along the faces of the re-entering places of arms; and in this case the trenches on those faces are connected with the fourth parallel by lines of communication formed in serpentine directions.

The epaulemens raised by the besiegers between the salient angle of the glacis and the first traverses on each side are to serve as counter-batteries, whose use is to ruin the parapet and dismount the guns in the faces or flanks of the collateral works, in order as much as possible to prevent the enemy from opposing by musketry or artillery the passage which is to be effected across the ditch; and the epaulemens between the first traverses and the re-entering places of arms serve for the breaching batteries. [BREACH.] The crowning batteries on the glacis of the two ravelins *r r* are supposed to be finished about the sixteenth night from the time of opening the trenches.

While the breaches are being formed, the passages by which the descents into the ditches of the ravelins are to take place are commenced. These are either open trenches or subterranean galleries cut in inclined planes through or under the covered-way opposite the breaches; each passage thus terminates at a perforation in the counterscarp about three feet above the bottom of the ditch if dry, or at the level of the water if it contain any. The sappers throw fascines into the ditch if dry, till the heap is sufficiently high and thick to secure them from the fire of the defenders, and then getting in, they form by sap a trench and parapet extending some way up the breach itself. Preparations are afterwards made for the assault.

For this purpose the interiors of the batteries and the passages leading to the ditches are during the night filled with troops, in whose rear are bodies of sappers with their materials; and early in the morning, after a heavy fire has been for some time kept up from the batteries in order to drive off the defenders, the troops charge up, and endeavour to keep the enemy engaged while the sappers execute lodgments on the breaches by filling their gabions with the loose earth; as soon as these are finished, the storming parties retire behind them, and from thence keep up a fire upon the enemy. These lodgments should if possible be on the tops of the breaches, but if the interior of the ravelin is retrenched by a reduit, as *s s*, whose fire commands those spots, the lodgments must be formed on the ascent, that they may not be immediately destroyed. It is estimated that the two ravelins may be taken about the eighteenth night.

If the ditches contain water which cannot be made to flow off, there may be formed across them solid causeways consisting of fascines laden with stones to make them sink, or of casks or gabions having their axes in horizontal positions; or floating-bridges of timber-logs, casks, or pontoons may be constructed; and by any of these means the troops may pass over to the assault. From the lodgements just mentioned trenches are carried on by sap directly to the top of the breach, and from thence turning to the right and left they are continued about half-way down the faces of the ravelins: their extremities being made to join the parapets of those works.

The reduits in the two ravelins are next to be taken: and to effect this object, it being supposed that the faces of the ravelins are too narrow to allow room for forming batteries on them, either a portion of the ravelin must be blown up in order to allow the fire of the breaching-batteries on the glacis to act against the reduits through the apertures, or else the reduits must be breached by undermining them. Should the latter method be preferred, a trench or gallery is cut through the mass of each ravelin, and a sap is carried across the ditch of the reduit; the miner then, being secured against the effect of the enemy's grenades by timbers placed in inclined positions leaning against the scarp of the reduit, cuts through that scarp and forms chambers for the reception of gunpowder. This being fired, a part of the rampart will be destroyed and a breach formed. An assault is then made by troops, and the defenders being supposed to be driven out of the works, a battery may be raised along the gorge of each reduit in order to compel them to quit the tenailles, *t t*, in the main ditch. The reduits of the ravelins being taken (probably about the twenty-first night), the defenders will also be obliged to retire from the rear extremities of the latter works; and the besiegers occupying those extremities, their fire from thence commanding the interiors of the reduits in the re-entering places of arms, these last must also be abandoned.

The approaches towards the bastions may now be recommenced, as the fires from the ravelins are no longer to be apprehended; therefore a double sap is carried on from the curved trench in the third parallel directly along the ridge of the glacis, till it begins to be plunged into by the fire from the bastion; it then proceeds in a serpentine direction till its head arrives between the portions of the fourth parallel already formed. This parallel is then completed, and under the protection of the fire from the troops stationed in it, the counter and breaching batteries before the bastion are formed. By the former the fire from the guns in the flanks of the collateral bastions is partly silenced, and by the latter the breach in the faces of the opposite bastion is effected. The passage through the counterscarp and a trench across the main ditch are then executed, and an assault may be made up the breach of the bastion, similar to those which had been made up breaches of the ravelins; the defenders being repelled, a lodgment may be formed, and unless the bastion is strongly retrenched, it may be expected that the place will now be surrendered. It is estimated that the assault of the bastion may take place about the twenty-sixth night from the time of opening the trenches; but a good retrenchment [RETRENCHMENT] in a bastion may enable the defenders to hold out ten or twelve days longer.

A fortress is said to be countermined when subterraneous galleries are formed under the ramparts of the bastions and ravelins; under the covered-way, and under the ground at the foot of the glacis, with galleries of communication from one of these to another. And as the defenders can form chambers and place powder in or near any convenient parts of these galleries to destroy the works of the besiegers aboveground, the besiegers find themselves under the necessity of sinking shafts and forming galleries for the purpose of finding out and destroying those of the defenders, or of blowing up any of their advanced works. [MINES, MILITARY.]

A siege conducted according to the rules of art will be attended with comparatively small loss to the besiegers or besieged, the troops of both parties being but little exposed to each other's fire except at the times when the assaults are made on the ravelins or bastions. And if circumstances, such as the prospect of the place being relieved, did not compel the besiegers to expedite the surrender, the assaults by main force might be avoided; for after a breach has been formed, and the parapets of the place have been in a great measure ruined by the artillery of the besiegers, a sapper might be sent across the ditch by night with instructions to commence a trench under cover of one extremity of the broken wall; then, if he succeed in getting cover for himself, others may follow, and gradually there may be formed on the breach a lodgment sufficiently large to contain troops, whose fire would protect the succeeding operations: it being understood that a firing party in the batteries on the glacis force the defenders to retire as often as they endeavour to disturb the sappers while at work.

The want of time and means to carry on the approaches as far as the covered-ways was the cause of the great losses sustained in getting possession of the fortresses garrisoned by the French in Spain during the Peninsular war. The breaches in the walls of Badajos (1812) were made by guns in batteries at the distance of 500 yards; and when the assailing troops had descended into the ditch, being ignorant of the positions of the breaches, and confused by the darkness of the night, which was relieved only by the appalling and destructive blaze of live shells and other combustibles thrown upon them from the parapets, they took a wrong direction, or remained patiently to be slaughtered till the order was given to retire. The effort would have entirely failed, but for the success of Major-General Picton in escalading the walls of the castle, and of General Walker in escalading the bastion of S. Vincente.

SIENA, *the Province of*, one of the great divisions of Tuscany, which till lately comprehended the whole southern part of that duchy, corresponding to the territory of the former republic of Siena, is bounded by Florence on the north, Pisa and the Mediterranean on the west, Arezzo on the east, and the Papal State on the south, from which it is partly divided by the river Fiora. The territory of Siena is now divided for administrative purposes into two provinces, styled Compartimento di Siena, and Compartimento di Grosseto. The Compartimento of Siena Proper comprehends the highlands, or northern and eastern parts of the country; that of Grosseto comprehends the western and southern lowlands, or the extensive maremma known geographically by the name of Maremma Sinese, to distinguish it from the Pisan Maremma. The province of Siena Proper lies in the upper basin of the Ombrone, and its affluents the Arbia, the Mersa, and the Orcia. The Ombrone, called Umbro Major by the Romans, to distinguish it from the Umbro Minor of Pistoia, is the largest river of Tuscany next to the Arno: it rises from a copious source near Ceta Mura, or Civita Mura, in the Monti di Chianti, a Subapennine ridge which divides the valley of the Ombrone from that of the Upper Arno, and flows southwards by Berardenga and Asciano, skirting the western base of Monte San Savino, which divides it from the valley of the Chiana; it then passes by the town of Buonconvento, below which it receives the Arbia from the north, which passes near the city of Siena. The Ombrone then inclines to the south-west, flowing along the western base of the hills of Montalcino, and receives the river Mersa from the north-west, a tortuous stream which has a course of above fifty miles. It then flows direct south, through a narrow and deep defile between the hills of Montalcino on the east, and a hilly tract on the west that divides the waters of the Ombrone from those of the Bruna, which flows into the lake of Castiglione. Issuing from the narrow gorge beyond Monte Antico, the Ombrone receives from the eastward the Orcia, a mountain torrent which drains the northern side of the volcanic group of the mountains of Radicofani and Montamiata, and also the hilly region of Montepulciano. The Orcia has a course of about thirty miles. Passing by Paganico, the Ombrone forms a bend to the south-east, and passing through a low ridge, it enters the wide plain of the Maremma, through which it flows in a south-west direction, passing near Grosseto and the lake of Castiglione, into which part of its water is conducted by a canal lately constructed in order to fill up by its alluvium that pestilential swamp; the main body of the river enters the sea at Torre della Trappola, after a course of about eighty miles. The whole area of the basin of the Ombrone and its affluents is estimated at 2660 square miles, and it is the most extensive in Tuscany next to the basin of the Arno.

The compartimento or province of Siena Proper consists of highlands and valleys, being crossed by various ranges of hills, composed mostly of marls covered by yellow sand, and abounding with organic remains, which are called by Brocchi and other geologists 'Subapennine.' [APENNINES.] Few summits exceed one thousand feet, except the Montagna di Cetona, or Monte Pisi, on the borders of the Val di Chiana, which is above 2500 feet high; the volcanic cone of Radicofani, which is above 3000 feet; and the partly volcanic group of Montamiata, or Mount Santa Fiora, which rises to about 5000 feet above the sea.

The area of the province of Siena is reckoned at about 1250 square miles; and the population in 1836 was 139,650, distributed among thirty-four communes. (Repetti, *Dizionario Geografico della Toscana*, art. 'Gran Ducato.')

The following are the principal towns:—1, SIENA. 2, Montalcino, a walled town and bishop's see, situated on a lofty hill 20 miles south-east of Siena, and six miles out of the high road from Florence to Rome: it has a cathedral, lately rebuilt, with a few good paintings; a clerical seminary; a convent of Austin friars; several other churches and convents; an hospital, and orphan asylum; a small theatre; some manufactories of coarse linen, hats, pottery, and leather; and about 3800 inhabitants. 3, Colle, in Val d'Elsa, on the slope of a hill near the sources of the river Elsa, an affluent of the Arno, twelve miles north-west of Siena, is a thriving town and a bishop's see, in a territory which produces abundance of wine, oil, and silk: it has a fine cathedral, several other churches, a large hospital, and other charitable institutions; a clerical seminary, three schools for boys, a conservatory for the education of young girls, several paper-mills, manufactories of woollens and hats, of glass, pottery, and leather and about 2500 inhabitants. The smaller towns of the province are Pienza, Buonconvento, San Quirico, &c.

The compartimento or province of Grosseto comprehends the southern and lower part of the former territory of Siena, consisting chiefly of a vast tract of maremma along the coast of the Mediterranean from the valley of the Cornia on the borders of the province of Pisa, to the Lake of Burano and the river Fiora, which form the boundary of the Papal State, being a length of about 70 miles, whilst its breadth from the sea-coast inland is from 15 to 20 miles. [MAREMMA.] The surface of the province is 1893 square miles, with a population of about 72,000, exclusive of the island of Giglio, which lies off the coast and belongs to the province, and has an area of about eight or ten square miles, and a population of 1500 inhabitants. Besides the Ombrone, several rivers flow from the hills, which form a belt along the inland side of the Maremma, and crossing the plain, run into the sea after a short course. These streams are,—1, the Cornia, which after a course of 24 miles enters the lagoon of Piombino, which communicates with the sea; 2, the Pecora, a small river near Massa, which enters the lagoon of Scarlino; 3, the Bruna, already mentioned, enters the lake or lagoon of Castiglione, which likewise communicates with the sea; 4, the Albegna, which rises in the Monte Labro, a summit about 3600 feet high, forming part of the group of Montamiata, flows rapidly southwards, passing by the ruins of the Etruscan city of Saturnia, receives several mountain-torrents, and then crossing the Maremma enters the sea north of Mont Argentaro, after a course of 34 miles.

The Maremma of Siena is not a uniform level, for at several points, as at Campiglia, Massa, Magliano, and Capalbio, the hills approach near to the sea, dividing the maritime plain into several basins, distinguished by the names of Maremma of Massa, Maremma of Grosseto, &c. There is a succession of shallow lagoons along the sea-coast, which by their mephitic exhalations in summer occasion the malaria and the fevers resulting from it. The largest are the lagoon of Castiglione della Pescaia, and the lake of Orbetello, which is salt, and occupies an area of about ten square miles. Between the lake of Orbetello and the sea rises the rocky and lofty promontory of Monte Argentaro, a conspicuous object from the sea, which, like Monte Circello, on the coast of the Pomptine marshes, appears to have been once an island. Monte Argentaro is of calcareous formation; it occupies an area of about 22 miles in circumference, and the summit is about 1700 feet high. It is joined to the mainland by two very narrow and low isthmuses which run between the lake of Orbetello and the sea-coast, the northernmost of which is intersected by a narrow canal called Della Peschiera, which communicates between the lake and the sea. The sea at the base of Monte Argentaro is very deep, and forms two good harbours, Santo Stefano on the north and Port Ercole on the east, besides several other creeks with good anchorage. Port Ercole has a strong fort, and several towers defend the coast on the foot of the mount, which, owing to its situation, might be made a second Gibraltar. The mountain is covered with forests which abound in game: it has copious springs and excellent pastures, and the air is perfectly healthy.

The air of the Maremma is very unwholesome, and the towns situated in it, with the exception of Orbetello, are thinly inhabited, and subject to the malaria fever. The principal branch of industry is the rearing of cattle, which feed in the wide solitary plains, and the cutting of timber in the extensive forests. Corn is sown, but not to a great extent. The wine made in the Maremma is not in much esteem. However the great hydraulic works undertaken and partly effected by the present grand-duke Leopold II., which are designed to fill up the pestilential lagoons and marshes, have already produced a considerable improvement in the atmosphere of the Maremma. The lagoon of Castiglione, which in 1829 covered 33 square miles, has been reduced to about one-half the size; other lagoons have been entirely drained, and become cultivable land; the rivers have been embanked; a fine road has been opened along the length of the province, parallel to the line of the antient Via Aurelia; handsome bridges have been thrown across the rivers; Artesian wells have been made to provide the inhabitants of Grosseto and other places with wholesome water: and the consequence is that the population is increasing as the malaria decreases, fresh ground is broken up, and cultivation and life spread along the once desolate wastes.

The following are the towns of the province of Grosseto:—1, Grosseto, the head town, built in the middle ages from the ruins of the Etruscan town of Rusellæ, which was a few miles distant, lies in the midst of a wide plain between the Ombrone, the lagoon of Castiglione, and the sea-coast, from which it is distant six miles, and about 45 miles south of Siena. Grosseto is surrounded by walls and bastions, and contains about 2400 inhabitants. About a century ago it contained only 700 inhabitants. It is a bishop's see, has a clerical seminary, an elementary-school and a grammar-school, and a civil and criminal tribunal for the whole province. Grosseto was subject to the republic of Siena till the fall of that state, when it came with it into the possession of the grand-dukes of Tuscany. 2, Massa Maritima, a bishop's see and a town with some fine buildings, is situated on a hill a few miles from the sea-coast, north-east of Piombino. The malaria had reduced its population in the last century to about 400 inhabitants, but the draining of the neighbouring lowlands and the fresh stimulus given to industry have effected considerable improvement, and it has now a population of nearly 3000. At Follonica, on the sea-coast, 10 miles south of Massa, are extensive furnaces and iron-works, in which the iron from the mines of Elba is smelted and cast or wrought. 3, Piombino is a small town on the sea-coast facing the island of Elba, from which it is divided by a channel about five miles wide. Piombino was a principality belonging to the family Ludovisi, from whom it was taken by Napoleon, and given to his brother-in-law Bacciocchi. On the fall of Napoleon it was united with Tuscany, and the former prince received an indemnity. Piombino is fortified, has a small harbour, and about 1500 inhabitants. It lies about 40 miles south of Leghorn. The neighbouring lagoon is now in progress of being drained. 4, Campiglia, a thriving town in the valley of the Cornia, 10 miles north of Piombino, in a healthy situation on a hill, with a handsome church built in the twelfth century, an hospital, and a population of 2200. The surrounding territory is well cultivated, and produces corn, wine and oil, timber and potash. The inhabitants carry on some trade by sea by the neighbouring port of Baratti. The remains of the Etruscan town of Populonia are on the coast seven miles south-west of Campiglia. 5, Orbetello is a considerable town, built on a promontory which projects into the salt lake of the same name, which is situated at the inland base of Monte Argentaro. The walls of Orbetello are formed of large stones without cement, and the town is strongly fortified on the side of the isthmus which unites it and the mainland. It is supposed by some that the antient Subcosa stood on the spot where Orbetello is now, and many remains seem to confirm the supposition. Orbetello was until the beginning of the present century the capital of a small state, called 'Stato dei Presidj,' which embraced a tract of coast from Talamone on the north to the confines of the Papal State on the south, including Monte Argentaro, and also Porto Longone and the southern part of the island of Elba. This territory belonged for centuries to Spain, and was ceded in the last century to the king of the Two Sicilies; but by the last treaty of Vienna it has been annexed to Tuscany, of which it naturally forms a part. The town of Orbetello has about 3000 inhabitants, and enjoys a healthy climate, though the surrounding country is affected by the malaria. The lake abounds with fish. 6, Pitigliano, an inland town in a fine situation in the valley of the Fiora at the foot of the lofty group of Montamiata, near the borders of the Papal State, has about 2000 inhabitants. The Fiora, which has its source in the mountain of the same name, runs southwards, and after a course of about 30 miles in the Tuscan territory enters the Papal State, and passes near Montalto, after which it enters the sea.

The island of Giglio, the antient Igilium, which belongs to the province of Grosseto, is 11 miles west by south of Monte Argentaro: it has a harbour on its eastern coast, and a castle with a village on the hill above it. The surface is mountainous, and the rocks are of granitic formation, except in the western part, which is calcareous. Brocchi visited Giglio in 1818, and gave a geological account of the island in vol. xi. of the 'Biblioteca Italiana.' Professor Giulj afterwards visited Giglio, and his statistical account of the island is contained in the 79th vol. of the 'Biblioteca Italiana,' published in 1835. The inhabitants, both men and women, are very industrious, and cultivate corn and the vine. They export annually 12,000 barrels of wine to the Continent. They have a few sheep and pigs, and many goats and abundance of poultry. A number of them are fishermen and sailors. Almost all the families are possessed of some landed property. Beggars and robbers are unknown on the island. A considerable part of the island is covered with timber trees.

The neighbouring island of Gianutri is about five miles in circuit: it is destitute of springs, and uninhabited. Some Roman remains have been found upon it, which show that the island was once inhabited.

SIENA, *the City of*, one of the principal towns of Tuscany, is situated on a hill with a very uneven surface, surrounded by other hills belonging to the range which runs across the centre of Tuscany from north-east to south-west, and divides the waters that flow northwards into the Arno from those which run southwards into the Ombrone. The Arbia, an affluent of the latter, flows through a deep valley about four miles east of Siena. The air of Siena, on account of its elevation, is keen, and the winter rather severe. The town has the form of a polygon, and is about five miles in circumference. It is 24 miles south of Florence, and 45 miles east-south-east of Leghorn, and on the high road from Florence to Rome. Siena is an archbishop's see; it has a university frequented by about 300 students, a town library of 50,000 volumes, a college or gymnasium kept by the brothers Scolarum Piarum, a clerical seminary, an elementary school for boys in each parish, and several establishments for female education. It has also an academy of the fine arts, and school of equitation, a deaf and dumb institution, a large hospital, an orphan asylum, a workhouse for the destitute, a savings' bank, and an asylum for poor children. The population of Siena is about 19,000, of whom about 240 belong to the clergy, and 300 are nuns. The principal manufactures of the town of Siena consist of silks and woollens.

Siena abounds with fine churches. The cathedral, one of the oldest in Italy, is rich in marbles, sculptures, and paintings. The exterior is cased with marble, black and white. The pavement is of white marble, on which numerous figures have been engraved or cut in, representing biblical subjects. In the annexed hall, called the Bibliotheca, are ten frescoes by Pinturicchio, representing the principal events of the life of Pope Pius II. (Æneas Sylvius Piccolomini of Siena). The splendid chapel of the Chigi family, constructed by Pope Alexander VII., is rich in lapis-lazuli and green marble, bronzes and statues. The baptistery, which is a separate church detached from the cathedral, as at Pisa and Florence, is an octagon, and entirely cased with marble inside and out, and adorned with sculptures by the earliest Tuscan artists. In the church of S. Dominic is a good painting on wood, the colours of which are well preserved, representing the Virgin and Child by Guido di Ghezzo of Siena, of the date 1221, long before the birth of Cimabue, who has been generally considered as the restorer of Italian painting. Gilio di Pietro, a painter of Siena, was also anterior to Cimabue. The Abbé Richard, in his 'Travels in Italy,' observes on this subject that there is in the Vatican a portrait of St. Francis, by a painter from Lucca, of the beginning of the thirteenth century. In the academy of the fine arts of Siena there is a painting of St. Peter and St. John by Pierrolino of Siena, who flourished about 1100. Siena abounds with productions of the earlier artists, both of its own school and of the Florentine school. Among the numerous churches, those of S. Martino, S. Agostino, S. Spirito, La Concezione, and others are rich in paintings by good masters. In the street dell' Oca is the house, now converted into an oratory, in which Santa Caterina of Siena, a remarkable character of the middle ages, was born in 1347. She became a nun, but acted a considerable part in the political affairs of her age. She mediated a reconciliation between the pope and the Florentines; she repaired to Avignon, where she induced Gregory XI. to restore the papal see to Rome; and she wrote and spoke warmly in support of the claims of Urban VI. to the papacy against the antipope Clement. She died at Rome in 1380. Her letters have been published.

The Piazza del Campo is concave, in the form of a shell, and surrounded by arcades, and adorned with a fountain: it was once the forum of the republic of Siena. Eleven streets branch out of it. The streets of Siena are generally narrow, crooked, and uneven. The general appearance is that of an old decayed city. In the fourteenth century, before the great plague of 1348, the population of Siena and its suburbs amounted to 180,000 The people of Siena are noted for their sociability and good temper, and for the purity and melody of their speech. The females are considered handsome.

Among the palaces the most remarkable is the Palazzo del Publico, or town-house, a massive structure of the middle ages, which is adorned with frescoes of the thirteenth and fourteenth centuries, commemorating events of the national history. The archives of the old republic, which had been removed to Paris by Napoleon, have been restored. The palaces Petrucci, Piccolomini, Saracini, Bandinelli, and Buonsignori contain some good paintings. The town gate, called Porta Camollia, is remarkable for its architecture. Siena is well supplied with good water by aqueducts from the neighbouring hills, and is adorned with several handsome fountains.

In the town library there are several curious MSS., among others a Greek Evangeliarium of the ninth century from the chapel of the imperial palace of Constantinople, a translation of the '*Æneid*' into Italian prose made in the thirteenth century, the letters of Santa Caterina, and several autograph letters of Faustus Socinus, who was a native of Siena. (Valéry, *Voyages en Italie*; Faluschi, *Relazione delle Cose più Notabili di Siena*, 1817; Fratini e Bruni, *Il Duomo di Siena*, 1818.)

Siena is said to have been built by the Senones, a tribe of Gauls which migrated into Italy, but of this there is no evidence. It is not reckoned among the towns of antient Etruria. It is mentioned in later times among the Roman colonies by the name of Sena Julia or Sena. (Plin., iii., c. 5.) During the dark ages which followed the downfall of the Western Empire, little is known of Siena, as the invading armies which marched to Rome and South Italy generally passed along the Adriatic coast, avoiding the mountains of Tuscany. Siena is mentioned however as a bishop's see as early as the sixth century. A council was held at Siena in 1058, wherein Pope Nicholas II. was elected. In the subsequent struggle between Gregory VII. and Henry IV. of Germany, Siena, which like the other towns of Tuscany governed itself as a republic, received and assisted the emperor, whilst Florence shut its gates in his face. From that time Siena belonged, generally speaking, to the imperial party, and Florence to the papal side, two opposite factions which afterwards assumed the names of Guibelines and Guelphs, and the two neighbouring republics were therefore frequently at war. The government of Siena was first in the hands of the nobles; afterwards the people obtained a share in it, but the nobles were not totally excluded as at Florence. In 1258 Farinata degli Uberti and the other Guibelines of Florence, being exiled by the Guelph party, retired to Siena, when, having received reinforcements from Manfred of Sicily and from Pisa, he marched with the militia of Siena to meet the Guelphs at Monte Aperto near the banks of the Arbia, where the Guelphs were completely defeated, with the loss of 10,000 men killed, and as many prisoners. The carroccio of Florence was dragged in triumph to Siena. After the establishment of Charles of Anjou at Naples, and the downfall of the house of Suabia, the Guelphs obtained for a time the preponderance at Siena, and the Guibelines were banished. In the mean time Siena extended its dominion over the lowlands of the Maremma as far as the sea, but it never became a naval power like Pisa. About 1368 the popular party, led by the Salimbeni, who, though a noble family, had espoused the cause of the people, drove away the party of the nobles and appointed a council of 'riformatori' to remodel the government. The exiled nobles, being numerous and warlike, ravaged the surrounding country to the walls of the town. At last, in 1369, through the mediation of the Florentines, many of the nobles were recalled, and peace was restored for a time. Fresh troubles however soon broke out; the popular party split into factions, and the whole ended with the council of reformers being abrogated in 1384, and the reformers and their party being driven away to the number of 4000; the whole of the nobles returned into the town.

In 1399 Siena, still distracted by factions, and alarmed at the overgrown power of Giovan Galeazzo Visconti, duke of Milan, who had obtained possession of Pisa, Genoa, and Perugia, thought to avoid greater evils by paying voluntary allegiance to him as its lord, retaining however its own administration. In the convention which was made on that occasion, we find that the territory of Siena extended along the coast of the Maremma from Massa to Telamone, whilst inland it included Montalcino and part of the valley of the Chiana. But the death of Giovan Galeazzo, in September, 1402, dissolved the agreement, and Siena recovered its independence. Some years after Siena was threatened by king Ladislaus of Naples, who came to Tuscany with an army. His death in 1414 put an end to the danger. The republic of Siena next came into possession of Sovana, Pitigliano, and other places in the valley of the Fiora, as far as the borders of the Papal State, as well as of the strong place of Orbetello. In 1432 the emperor Sigismund came to Siena, when he was received with great honour. Alfonso of Naples and his general Piccinino gave much annoyance to Siena, and a conspiracy being discovered in 1456, for the purpose of introducing the king's troops into the town, many of the conspirators were put to death, and the rest banished. In 1460 Pope Pius II. came to Siena, his native town, and strove, but with little success, to put an end to the civil discord which ever lurked in the bosom of that republic. In 1482 a new tumult broke out; many persons were arrested, some thrown out of the windows of the town-house, others beheaded in various prisons, and the rest banished, fined, and excluded for ever from civil offices. The old party of the reformers was then recalled, and the government became more democratic, but not more orderly; for factions continued to rage among the people—individuals were beheaded, and others exiled, until 1487, when the exiles of the party of the 'Nine,' as they were called, entered the city by stratagem, and took possession of the state. A council of 720 citizens was then appointed from out the various 'monti,' or parties, which appointed a 'balia,' or executive council of 24 individuals, for five years, which was afterwards confirmed in 1491, but on the condition that the public offices should be no longer given by favour, but drawn for by lot. In this business Pandolfo Petrucci, a citizen of an old family of Siena, a clever ambitious man, began to act a considerable part, being the most able, active, and influential member of the balia. Petrucci contrived to make himself still more powerful in the subsequent general disturbances of Italy, through the march of Charles VIII. of France for the conquest of Naples, and the wars that followed, until, being supported by Louis XII. of France, he became in reality the dictator of Siena. Machiavelli has described Petrucci as one of the most able and successful usurpers, who managed to support himself by those very men who had once been his enemies. He was however unscrupulous towards those whom he could not win over, as he showed by ordering the murder, in July, 1500, of his own son-in-law Niccolo Borghesi, who constantly opposed his usurpation. Petrucci died in 1512, and was buried with great splendour. His sons, not having the capacity of their father, did not long retain power, and were obliged to emigrate. Fresh civil tumults broke out, and this at a time when every state of Italy was threatened with destruction from the contending armies of Charles V. and Francis I. After the fall of Florence in 1530, Siena retained for many years its republican government, under the protection of Charles V.; but civil dissensions continuing, the emperor sent thither a Spanish garrison to enforce order, in 1547, and began building a castle to overawe the town.

In 1552 the citizens, weary of Spanish interference, rose in arms and drove the Spaniards away, and applied for assistance to Henry II. of France, who sent them a small garrison. They also made common cause with the Florentine exiles led by Pietro Strozzi, which gave to Duke Cosmo of Florence the wished-for opportunity of interfering in the affairs of Siena. His troops, united to those of the emperor, commanded by the Duke of Marignano, ravaged the country, and destroyed the towns and villages which remained faithful to Siena. It was then that the Maremma was reduced to a wilderness. At last, in April, 1555, Siena capitulated through famine. In 1557 it was given up by Spain to Duke Cosmo, who reunited it with the rest of Tuscany, of which it has ever since formed a part. (Malavolti, *Historia de' Fatti e Guerre dei Sanesi*; Pecci, *Memorie Historico Critiche della Citta di Siena.*) A number of the citizens of Siena, after the surrender of that city, took refuge at Montalcino, where the French garrison under Monluc had also withdrawn itself, and there organized the semblance of a republic. But the peace of 1558 between France and Spain having obliged the French to withdraw from Montalcino, the citizens came to terms with Duke Cosmo, and swore allegiance to him in August, 1559, and thus terminated the last trace of the independence of Siena. (Botta, *Storia d'Italia*, b. x.)

SIENITE. A compound of quartz, felspar, and mica, being called granite, we find in many instances hornblende instead of mica, and the rock is then called sienite or syenite (from Syene in Egypt, where such a rock is well known). If we imagine (what is of common occurrence) the diminution of the quartz, and the partial obscuration of the crystalline structure, the rock becomes greenstone. If in place of hornblende we find hypersthene or epidote, the rock may be called hypersthenic or epidotic sienite, as in the Val di Fassa and Shetland. Definition fails in respect of sienite, as it does in regard to other rocks of igneous origin.

Dr. M'Culloch ('Treatise on Rocks') ranks two rocks usually called sienite (one composed of quartz, felspar, and hornblende, and the other of quartz, felspar, hornblende, and mica) as granite. Mount Sorrel in Leicestershire, the Malvern Hills, and Criffel in Galloway, afford abundant and characteristic sienites.

SIERRA LEONE (properly Leona) is the name of a cape situated on the west coast of Africa, near 8° 30′; but when the English established a colony in the vicinity of this cape, the name was extended to the colony, and to that tract of country which was annexed to it. At present the term is generally used in this sense. Geographers frequently use the term in a still more extensive signification. As the countries of Western Africa south of the Sahara are divided into many small states which are very imperfectly known, in order to promote perspicuity geographers have found it necessary to introduce an arbitrary division, arbitrary as far as regards the political state, but founded on the physical geography of the country. Thus the term 'Coast of Sierra Leone' is applied to those parts of Western Africa which are drained by the rivers that fall into the Atlantic between Cape Verga (10° 12′ N. lat.) and the Island of Sherboro (7° 30′). At Cape Verga, which is moderately elevated, a tract of high ground begins, which extends first north by east, and afterwards east, until it reaches the ranges which surround the table-land of Foota Jallon (near 11° W. long.). This range of high land does not appear to rise more than 1000 feet above the sea, but it is much broken by ravines and narrow valleys, especially on the west, and consequently is very rugged. East of 11° W. long. a continuous range appears to extend west and east until it meets another range running north and south, between 10° and 9° N. lat. and 10° and 9° W. long., which extends to the sources of the Joliba. These two last-mentioned ranges have only been seen from a distance by Europeans. So far the boundary-lines of Sierra Leone are tolerably well known, but we are entirely unacquainted with its southern limits, between the mountains at the source of the Joliba and the coast opposite the island of Sherboro, as our knowledge of this part of Africa extends only about 10 or 12 miles inland, where the country is uniformly low, and generally subject to inundations during the rains. North of Sierra Leone is that part of Senegambia which is subject to the king of Foota Jallon, comprehending the table-land of Foota Jallon, and the countries on the upper course of the Rio Grande and on the Nuñez river. East of Sierra Leone is Sangara, a part of Soodan; but the nations or countries which border on it on the south are unknown even by name. Sierra Leone, according to a rough estimate, covers about 25,000 square miles, being nearly equal to Scotland.

Coast.—From Cape Verga the coast runs south-east to Alligator Point, and is uniformly flat and low, and thickly clothed with mangroves. It is divided into numerous islands by the several arms into which the river Pongas divides before it reaches the sea. South of Alligator Point is Tumbo Point, a long rocky flat, from which the land rises gradually until it attains a great elevation in Mount Kakulimah, 2910 feet above the sea-level, and Mount Soomba, 1705 feet. From this tract the coast extends nearly due south for about 100 miles to the peninsula of Sierra Leone; and this part of it, which is very low and flat, consists of numerous islands. The coast on the peninsula of Sierra Leone which lies between the æstuary called the Sierra Leone river and Yawry Bay, is rather elevated and generally rocky; and its western beach, from Cape Sierra Leone to Cape Shillen, is beaten by a tremendous surf, which can only be passed by the canoes of the country, and not at all times by them. The eastern shores of Yawry Bay, and those extending thence to the island of Sherboro, are low, flat, and subject to change.

Surface, Soil, and Agricultural Productions.—The peninsula of Sierra Leone, which constitutes the territory of the colony, is surrounded on the north, west, and south by water: on the east it is connected with the mainland of Africa by a low tract, intersected by numerous creeks and rivers, which overflow during the rainy season and form extensive swamps. The peninsula extends from north to south about 18 miles, and from west to east 12 miles: the surface is about 220 square miles, or a little more than the smallest county of England, Rutlandshire. The interior of the peninsula is an elevated region of uneven surface, which rises from 400 to 1000 feet above the sea, and is overtopped by conical peaks, which attain an elevation of between 2000 and 3000 feet. In some places the declivities of this region extend to the shores, but they are usually divided from the sea by a belt of low ground from one to three miles in width: the whole region is covered with a good soil, which, on the arrival of the British colony, was entirely, and is still for the most part, covered with large forest-trees, among which is the silk-cotton tree, the trunks of which are made into canoes, which are often large enough to contain a hundred men. The British have introduced the products of the West Indies, coffee, sugar, indigo, ginger, and cotton, which generally succeed well, especially the coffee. Some European fruits are cultivated on the higher parts, and the vine flourishes in the gardens of Freetown. Yams, mandioc, pumpkins, plantains, and Indian corn constitute the principal food of the inhabitants. Nearly all our garden vegetables are raised in this tract.

If this peninsula, and the mountain-tract of the Kakulimah and Soomba Mountains above mentioned, whose extent is not known, are excepted, the western portion of Sierra Leone is a low plain; but the northern part of it, north of 10° N. lat., has not been explored. This plain, so far as is known, extends about 100 miles inland. Laing observes, that east of the town of Seemera a mountain-range about 60 miles in length extends from south to north, and this chain forms the boundary between the plain and the hilly region. The surface of the plain is level, except in a few places where rocky tracts are traversed by ravines. During the rains many parts of the plain are converted into swamps, which, when dry, are covered with grass nine or ten feet high: in other places there are extensive meadows intersected with thickets, and some portions are overgrown with trees, among which the teak-tree is frequent. Only a small part of this region is under cultivation, though the soil is fertile, consisting mostly of a rich black loam mixed with a little clay and fine sand. In approaching the mountains on the east, the surface of the country is undulating and the rivers run in deep beds: this tract is better cultivated and more populous than the level portion of the plain. The agricultural productions consist of the Carolina or white rice, which attains great perfection; red rice, which the natives prefer for their own consumption, on account of the length of time which it will keep; yams, ground-nuts, mandioc, plantains and bananas, and several roots which grow spontaneously. Cattle are rare, except in the vicinity of the mountains; and horses are not reared. Goats are common, but there are few sheep.

Though the mountains which exist east of Seemera, between 11° and 12° W. long., appear to constitute a range running south and north across the country, they are broken at several places by the rivers which originate farther east, and traverse them in a direction east and west, forming large and wide valleys. Between these valleys there are ridges running in the same direction, and occupying a width from 30 to 40 miles. These ridges do not appear to rise to a great elevation. The highest summit which has been measured is Sa Wollé, near 11° W. long. and 9° N. lat., which attains about 1900 feet; and the town of Semba is built on a mountain 1490 feet high. The base of these hills is clothed with camwood-trees, which supply an article of export. The higher part of the hills up to the summit is overgrown with a grass which remains green all the year round, and is interspersed with single palm-trees. In a few places the hills are bare, owing to their steepness. The valleys are extremely fertile, and watered by numerous rivulets which descend from the adjacent hills. Rice, ground-nuts, yams, plantains, and mandioc are grown to a great extent, especially mandioc, for which this tract is noted. Pine-apples are the most common fruit: clusters of palm-trees are interspersed between the cultivated fields. In this hilly region domestic animals, especially cattle and goats, are numerous.

The most eastern part of Sierra Leone, which extends about 80 or 90 miles east and west, is much more level. In many parts the surface extends in gentle and wide undulations; in others it is broken by deep ravines and furrowed by numerous rivulets, which are sunk deep below it. The general elevation of this region does not exceed 300 feet above the sea. The face of the country is diversified with hills, extensive vales, and fertile meadows, belted with strips of wood, and decorated with clumps of trees of the densest foliage. The valleys and lower depressions contain a rich vegetable soil mixed with iron-clay and sand. This soil is remarkable for its fertility, and requires little labour; but some of these depressions are converted into swamps during the rains. The larger plantations are those of rice and ground-nuts. Indian corn, yams, and mandioc are also extensively grown. Large flocks of sheep and numerous herds of cattle graze in the pastures. Horses do not succeed, and are imported from Sangara, which lies farther east.

Climate.—There are two seasons, the wet and the dry. The former lasts from May to November, and is always ushered in and terminated by tornados. Nothing can exceed the gloominess of the weather during this period: The hills are wrapped in impenetrable fogs, and the rain falls in such torrents as to prevent any one from leaving his house. At this period the diseases which prove so fatal to the coast have generally made their appearance, though they can scarcely be said to belong peculiarly to any season. The extreme humidity of the climate may be conceived, when it is stated that, in 1828, during the most rainy months (June, July, and August), the quantity of rain amounted to 292 inches; and that in two days (22nd and 23rd of August) there fell 26 inches, which is more than falls at London in a year. The average quantity however does not seem to exceed 160 inches, of which one-half falls in July and August. The air is then loaded with vapours, the destructive effects of which are observed in many objects. Iron is covered with rust; furniture falls to pieces, the glue losing its tenacious qualities; paper though well sized, becomes unfit for use; woollens, unless frequently dried, become rotten; and shoes and boots are covered with mould in one night. The rapid putrefaction of animal substances and the rapid fermentation of vegetables can hardly be conceived.

Being at no great distance from the equator, a high degree of heat is experienced all the year round. It is even probable that the mean heat of this country exceeds that of the equator, being between 81° and 82°. The greatest heat is experienced in the months preceding the rainy season, in which the mean temperature may be about 83°. The diurnal changes of the thermometer at Freetown rarely exceed 10°; but in the low country the thermometer, in October, November, and December, sometimes varies 15° between sunrise and noon. Sierra Leone does not enjoy the advantages arising from the trade-winds, which in the West Indies operate so powerfully in reducing the temperature and rendering the climate more tolerable to Europeans. There is however a pretty regular succession of sea and land breezes. The sea-breeze usually sets in at ten o'clock, but sometimes two or three hours later, and blows from the west-north-west. It is always cool and pleasant, but varies greatly in strength. The land-breezes set in about nine o'clock in the evening, and are in general heated, and loaded with humid exhalations from the low and swampy grounds over which they pass.

Sierra Leone is noted for the unhealthiness of its climate, but there is great variation in this point in different years. Between 1830 and 1836 the colony enjoyed a succession of healthy years; and it was supposed that the causes which had rendered it so long a terror to Europeans were not likely to recur, but the fatal epidemics of 1837 and 1838 dispelled this delusion. In 1825 and 1826 the mortality was also very great.

These observations refer to the Peninsula, and to the low country along the coast. In the interior the rains are much less abundant, and the heat is much less. According to the observations of Laing, which extend from April to October, it would appear that the heat of the hilly region is at least four or five degrees less, and that even in summer the rains are often interrupted by several fine days in succession.

Rivers.—There are several rivers in Sierra Leone which run from 200 to 300 miles, but the course of nearly all of them is very imperfectly known. The most northern is the Pongas, which reaches the sea, on both sides of 10° N. lat.

by three or four arms. The most northern of these arms, called the Mud Bar, may be entered easily and safely at high-water by vessels not drawing more than 12 or 14 feet, and they may sail up a few miles to the commercial settlements; but farther inland the course of this river is not known. Several rivers fall into the sea between Cape Tumbo and the æstuary called the River of Sierra Leone; but none of them are visited by vessels, though the Scarcies, also called Kaba and Mungo, runs more than 300 miles. The most important river is the Rokelle, which is navigable at certain seasons for a great part of its course. It rises in the mountains which separate Sierra Leone from Soodan, at an elevation of 1417 feet above the sea-level, and runs first south, and afterwards either west or south-west, until it approaches the sea within 30 miles, when it spreads out in a wide æstuary, called the River of Sierra Leone, which is seven miles wide opposite Freetown, and constitutes the harbour of the colony. At the close of the dry season the Rokelle is navigable for boats only to Rokon, a distance of 50 miles from its æstuary; but in all other seasons, to a much greater distance. The course of the Karamanka river, which falls into Yawry Bay, is generally parallel to that of the Rokelle, and sometimes only ten miles from it.

Productions.—Poultry is abundant, but of a very diminutive kind. The wild animals are the elephant, buffalo, a species of antelope, monkeys, leopards, and wolves. The leopards are so dreaded by the natives, that, in those parts where these animals are numerous, they will not travel unless in company and well armed. The hippopotamus is found in the lower parts of the river, and several kinds of snakes are numerous. The guinea-fowls, which are plentiful, are much larger than those in England. Fish abound in the rivers and along the shores. Wild bees are very numerous, and honey and wax constitute articles of export. Iron is worked in the most hilly part of the country. The natives have much gold, but it is brought from the countries on the upper part of the Joliba. Salt is made along the low shores.

Inhabitants.—Five different tribes inhabit this country, all of whom belong to the negro race, but they have attained different degrees of civilization. The country north of the river Kaba is occupied by the Mandingoes. Between this river and the Rokelle are the Timannees, near the sea, and the Limba farther inland. South of the Rokelle are the Kooranko, and the most eastern portion is occupied by the Soolima. It is probable that there are other tribes in those parts of the country which have not yet been visited by Europeans. The Mandingoes, who are Mohammedans, and have made some progress in civilization, have been noticed before. [Mandingoes.] This nation, which is distinguished by its activity and restlessness, is still penetrating farther south, and some of them have even settled in the vicinity of the American colony of Liberia. The Timannees occupy a country extending 90 miles from east to west, and 55 from north to south. Their country is divided into four nominal districts governed by headmen, who always assume the title of king. They cultivate the ground, though with less skill and industry than their neighbours. The men do not wear much dress, and the women still less. They dress with less decency than the tribes farther east: the art of making cotton-cloth is far from being general among them. The Timannees are very docile, and they soon accommodate themselves to European habits, and are in general much attached to their employers. They have their fetishes and greegrees, and none of them have embraced Christianity or the Mohammedan faith. The country of the Limba has not been visited by Europeans. The Kooranko occupy a country extending east to the banks of the Joliba. In language and costume they closely resemble the Mandingoes, but they are by no means so handsome, nor so intelligent. The language, excepting a few words which have suffered a little from corruption, is the same as that spoken by the Mandingoes, but their manners bear a stronger affinity to those of the Timannees. They dress however, like the Mandingoes, with great decency, and the manufacture of cotton-cloth is general among them. Kooranko is the first country eastward of Sierra Leone where the manufacture of cloth is common, but it is in general of a coarse quality. Farther east it improves in texture. In Sangara, in Soodan, very fine large cloths are manufactured, which are highly prized, and form an important article of trade among the interior nations. The Soolima, who occupy the country between the Kooranko on the south and Foota Jallon on the north, are described as short and muscular in stature, averaging in height from five feet six inches to five feet eight. They are subject to one sovereign, which circumstance, added to their warlike character, gives them an ascendency in this part of Africa. In their domestic occupations the men and women appear in many respects to have changed sexes. With the exception of sowing and reaping, the cares of husbandry are entirely left to the females, while the men look after the dairy and milk the cows; the women build houses, plaster walls, act as barbers and surgeons; while the men are employed in sewing, and not unfrequently in washing clothes. They dress very decently, and their costume resembles that of the Mandingoes. They have public meetings, or *palavers*, as they are called. Laing observed that persons accused of murder are tried before a jury, which is at great pains to arrive at the true facts of the case, and to give a just verdict. The king has the power of exercising mercy, when solicited by the jury. Mohammedanism has made some progress among them, but even the king, though he has embraced it, does not venture to profess it publicly.

The British Colony of Sierra Leone was established in 1787, by some philanthropists, who intended to show that colonial productions could be obtained without the labour of slaves. In that year 470 negroes, then living in a state of destitution in London, were removed to it, and in 1790 their number was increased by 1196 individuals of the same race, who had been settled in Nova Scotia, but could not bear the severity of that climate. Ten years later, 550 Maroons were transported from Jamaica to Sierra Leone; and in 1819, when a black regiment in the West Indies was disbanded, 1222 black soldiers and their families were settled there likewise. In 1820 the population amounted to 12,000 individuals. Since the abolition of the slave-trade (1807), the slaves captured by the British cruisers have been settled in the colony, and the population has thus been so much increased, that in 1839, including a few European merchants, it amounted to about 42,000 souls. This population is settled in villages and small towns all over the peninsula. They vary in population from 300 to 2000 inhabitants, and most of them have churches and schools.

Freetown, the capital, stands on the north side of the peninsula, and on the south bank of the Sierra Leone river, about five miles from the sea, in 8° 29′ 30″ N. lat. and 13° 9′ 27″ W. long., on an inclined plain at the foot of some hills, on which are the fort, the barracks, and some other public buildings. It is fifty feet above the sea-level at high-water mark, and regularly laid out into fine wide streets, intersected at right angles by others parallel to the river. Many of the houses are commodious and substantial stone buildings. The population exceeds 6000, among which are about 120 Europeans. Though the river is seven miles wide, the navigable entrance is narrow, there being an extensive shoal with steep sides in the middle of the river, called the Bulam shoals. The river can only be entered with a sea-breeze, which, though tolerably regular, is not always certain either in strength or duration. Regent's town, in a depression between the mountains, contains above 1500 inhabitants.

To the colony are annexed the islands called Ilhos dos Idolos, commonly called the Isles de Loss, which were purchased in 1818. They consist of three principal islands, Factory, Crawfurd, and Tamara, and several small islets and reefs, inclosing a convenient and safe anchorage for shipping. They are of volcanic origin, being formed chiefly of hard blue- and iron-coloured lava. Crawfurd's Island, on which a settlement has been formed, is about 250 feet above the sea-level, but has no water. These islands are about sixty miles north-west of Sierra Leone, in 9° 0′ 22″ N. lat. and 13° 32′ W. long. The government has lately purchased the Banana Islands, which lie opposite Cape Shillen, the south-western extremity of the peninsula. They resemble the Isles de Loss, but the land is more elevated. They are very fertile, and have plenty of water, but no running streams. Wild cattle are abundant upon the Great Banana.

We have obtained some information about several small towns in the interior. The largest town in the country of the Mandingoes is Fouricaria; in the country of the Timannees are Kambia, Porto Logo, Macabele, and Ma Yosso; in the country of the Kooranko are the towns of Seemera, Kolakonka, and Kamato. The capital of the Soolima is Falaba, which consists of about 4000 huts, and contains 10,000 inhabitants. The towns of Sangoora, Semba, Mou saiah, and Konkodoogore have altogether about 15,000 inhabitants.

Commerce.—The commerce of this colony is not active or important. The principal articles of import are arms, ammunition, flints, tobacco, beads, and handkerchiefs, which are paid for by gold, rice, skins, bees'-wax, cola-nuts, and ivory.

(Laing's *Travels in the Timannee, Kooranko, and Soolima Countries in Western Africa;* Winterbottom's *Account of the Native Africans in the Neighbourhood of Sierra Leone;* Gray's and Dochard's *Travels in Western Africa;* Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar;* Captain Belcher's *Observations on Various Points on the West Coast of Africa,* in 'Lond. Geograph. Journal,' vol. ii.; *West African Sketches;* and *Parliamentary Reports.*)

SIERRA MADRE. [Mexican States.]

SIERRA MORE'NA. [Spain.]

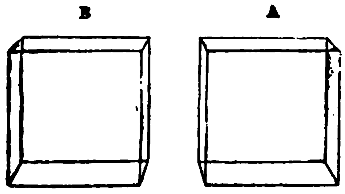
SIERRA NEVA'DA. [Spain.]

SIGÆUM [Troad.]

SIGARE'TUS. [Chismobranchiata, vol. vii., p. 93.]

SIGHT (vision, the faculty of seeing). The structure and uses of the several component parts which enter into the formation of the organ of vision have been already described in the article Eye. We have now to inquire by what means the images of objects which are depicted on the retina become converted into ideas of the objects themselves; of their proximity and distance; of their solidity and size. In other words, is the interpretation of the sensations of the retina a vital property of the structure itself, or is it in part derived from other sources? The following case, which is recorded by Cheselden, affords us important data on this head. A young man, who was born blind, was suddenly restored to sight by the operation of couching. 'When he first saw,' observes Cheselden, 'he was so far from making any judgment about distances, that he thought all objects whatever touched his eye (as he expressed it), as what he felt touched his skin. He knew not one thing from another, however different in shape and magnitude; but upon being told what things were whose form he before knew from feeling, he would carefully observe, that he might know them again. Two months after being couched, his attention seems to have been drawn to the effects of painting, which he then first and at once comprehended; but even then he was no less surprised, expecting the pictures would feel like the things they represented, and was amazed when he found those parts which by their light and shadow appeared round and uneven, felt only flat like the rest, and asked which was the lying sense, feeling or seeing? Being shown a small miniature of his father, and told what it was, he acknowledged a likeness, but was vastly surprised, asking how it could be that a large face could be expressed in so little room, saying it should have seemed as impossible to him as to put a bushel into a pint. At first he could bear but very little light, and the things he saw he thought extremely large, but upon seeing things larger, those first seen he conceived less, never being able to imagine any lines beyond the bounds he saw. The room he was in, he said he knew to be but part of the house, yet he could not conceive that the whole house could look bigger.' From the details of this interesting case, it would appear that the sense of sight (so far as we can judge of it when performed with one eye, for only one had been operated on when the above phenomena were observed) originally gives us no information respecting the solidity, the distance, or the real magnitude of objects; but that they all seem as if painted on one surface. If this then is the sum of the information which is conveyed to us by the retina; if it is limited to the mere perceptions of the images of objects, and conveys to us ideas relative to superficial extent only, it is clear that our estimation of the true position, the magnitude, and solid forms of bodies must be due to some other sense than that of sight, or rather, to a comparison of some other sense with it; in short, to an act of our comparing and reasoning faculties.

We have seen by the details of the above-quoted case, that there is no essential resemblance between the ideas which are derived from vision and those communicated by touch; and it is no doubt partly owing to this circumstance that we obtain a correct knowledge of external objects through our visual organs. The lad couched by Cheselden could not recognise by sight the things whose form he before knew from feeling; but upon being told what they were, he would carefully observe, that he might know them again. The infant, in like manner, stretches out its little hands to grasp and examine each object in succession which attracts its sight, and the greater part of its waking hours is employed in thus comparing the sensations obtained through these two different channels. That we do acquire important information respecting the size and forms of bodies through the sense of touch there can be no doubt; that the knowledge obtained through our visual organs would be imperfect without it, and that it may in some measure be a corrective of those optical illusions which are so frequent when we attempt to judge of things by sight alone, is equally probable; but in admitting this, we must not underrate the original powers of the eye and the quantity of knowledge which we primarily derive from it. From some facts we are about to notice, it would appear that much of the information which we derive from our visual organs only, has hitherto been attributed to extraneous sources. Physiologists have been too much swayed by the opinion of Gassendus, Haller, Gall, and others, that we see with only one eye at a time, and those even who disputed this have been more anxious to explain why objects are seen single with both eyes than to inquire into the uses of our possessing two. These defects, which are more or less common to all writers on optics, have been lately remedied by some very interesting observations of Professor Wheatstone on Binocular Vision. He has shown that the simultaneous affection of the two retinæ, provided the optic axes are not parallel, excites a different idea in the mind from that consequent on either of the single impressions; the latter giving rise to a representation on a plane surface, the former to that of an object in relief. This is owing to a different perspective projection of the object being seen by each eye; thus, if any figure of three dimensions, an outline cube for example, is held at the distance of about seven inches before the eyes, and viewed with each eye successively while the head is kept perfectly steady, A will be the picture presented to the right eye, and B that seen by the left. Now if these two pictures are made to fall on corresponding parts of the retinæ, by placing them one in the direction of each optic axis at equal distances before or behind their intersection, the mind will perceive not merely a single representation of the object, but a body projecting in relief the exact counterpart of that from which the drawings were made.

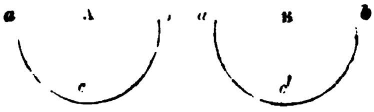


But a better method is to employ the stereoscope, an instrument invented for the purpose by Mr. Wheatstone, the essential parts of which are two plain mirrors inclined with their backs towards each other at an angle of 90°. The two pictures A and B are placed in the same horizontal line, and parallel to each other at the sides of these mirrors, and at equal distances from them. The observer then placing his eyes as near as possible to the two mirrors, their angle coinciding with the middle line of his forehead and face, sees the solid body represented by the perspective drawings standing forward in relief, provided the two drawings are so situated that their images reflected by the mirrors coincide with the lines of the convergent optic axes. When similar images, differing to a certain extent in magnitude, are presented, by means of the stereoscope, to corresponding parts of the two retinæ, a single object, intermediate in size between the two monocular pictures, is seen. Were it not for this, objects would be seen single only when the optic axes converge directly forwards; that is to say, when the object is equally distant from the two eyes; for it is only then that the images on the retinæ can be of equal size, the size of the image being dependent on the angle under which the object is seen, and this being less as the object is more distant. As our conviction then of the solidity and projection in relief of bodies depends upon a different perspective image of them being presented to each retina, and as this can only take place when the axes of the eyes are made to converge to them, it follows that when objects are at such a distance that in regarding them the optic axes are parallel, their images on the retinæ will be exactly similar, and the idea conveyed to the mind will be the same as if they were seen with one eye only. Hence, when two perfectly similar pictures of an object are viewed in the stereoscope, although they coalesce, they appear but as painted on a flat surface. With a knowledge of these facts, it becomes easy to explain why the artist is unable to give a faithful representation of any near solid object, that is, to produce a painting which shall not be distinguished in the mind from the object itself. When the painting and the object are seen with both eyes, in the case of the painting two similar pictures are projected on the retinæ; in the case of the solid object the pictures are dissimilar: there is therefore an essential difference between the impressions on the organ of sensation in the two cases, and consequently between the perceptions formed in the mind; the painting therefore cannot be confounded with the solid object. As our belief then in the solidity of a near object is owing to our taking cognizance of the impressions on both retinæ, it is interesting to inquire whether any other kind of information is imparted to us by the possession of two eyes, which we should not obtain by one only. It is well known that if we close one eye, and attempt to judge of distances with the eye that remains open, our conjectures are wide of the mark, and the rationale of this has been explained by Le Cat, in his 'Traité des Sensations,' in the following words:—'The concurrence of the optic axes, and the length of the angle they form, are the fundamental principles for estimating the distance of objects: hence it is that when we look with one eye only, we are unable to distinguish distances, and cannot place the end of the finger directly upon an object indicated to us, though it be very near, for the finger hides the object, and appears to correspond to it as exactly when it is at the distance of a foot, as if it were only a line removed from it. But if our other eye be open, it will see the finger and the object from the side, and will therefore discover a considerable interval between them if they are a foot distant from each other, but only a very small interval if they are very near; and thus we are enabled to place our finger with certainty upon the desired object.'

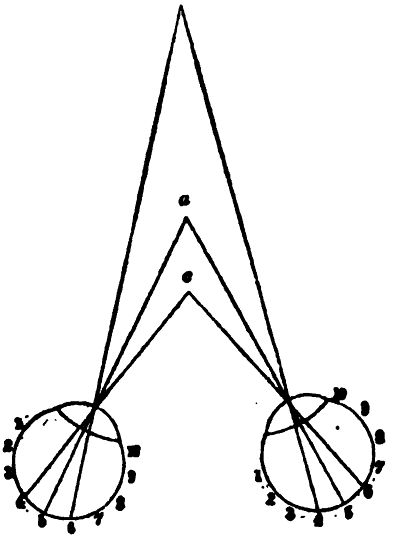
The convergence of the optic axes which takes place when we regard objects within a short distance of us, is supposed by many to assist us in our judgment of the magnitude of bodies, and if this is admitted, it is another proof of the variety and extent of information conveyed to the mind by the possession of two eyes, which a monocular organ could only have afforded with the aid of the movements of the head and of the sense of touch. The confusion of vision and the indetermination of judgment which follow the loss of an eye, often continue for many months, and strikingly illustrate the truth of the foregoing remarks. Our estimation of the distance and size of remote objects is purely a matter of experience: an object appears distant in proportion to its indistinctness of colour and outline, to the number of intermediate bodies seen between it and the observer, and to its appearing relatively smaller than these. We judge of the magnitude of objects by a calculation founded on their apparent size and probable distance: hence we are liable to continual mistakes on these points. An Englishman in the clear atmosphere of Italy supposes distant objects to be nearer to him than they are. A mountain which we see at a distance for the first time appears generally much less than it really is, and we think it near us when it very far away. From these remarks it is evident that the mind is constantly co-operating in the acts of vision, so that it becomes difficult to say what belongs to mere sensation, and what to the influence of the mind: that the latter must take an active part in the conceptions of vision, is evident from the great difference in the extent of the actual and the mental field of vision. The one is dependent on the extent of the retina; the other has no determinate limits: in one, all objects are of equal magnitude that are seen under the same angle, and therefore produce an image of the same size upon the retina; in the other, the images of these objects, though viewed under the same angle, are of various sizes and placed at very different distances.

It is scarcely necessary to say much in reference to the movement of bodies: we judge of their motion partly from the movement of their images over the surface of the retina, and partly from the movement of our eyes following them. If the image upon the retina moves while our eyes and body are at rest, we conclude that the object is changing its relative position with regard to ourselves. In such a case the movement of the object may be apparent only, as when we are fixed upon a body which is in motion, such as a ship. On the other hand, the image may remain fixed on the same spot of the retina, while our eyes follow the moving body; we then judge of its motion by the sensations in the muscles which move the eyes. If the image moves only in correspondence with the actions of the muscles, as in reading, we infer that the object is stationary. The sensations of rotatory movements of objects, produced by turning the body on its axis, are quite independent of any impressions on the retina, and their consideration is therefore foreign to the subject we are treating of. The apparent movement of objects after looking at those really moving, arises from the successive disappearance of spectra left by the moving bodies. From the fact that artificial excitement of the retina, either by pressure, electricity, or any other cause, gives rise to the perception of colour as well as light, we infer that the retina is the seat of these sensations. The colour of luminous bodies depends upon the quality of the light they emit; the colour of bodies that are not luminous is due to the light which falls upon them, and is reflected by them towards our eyes. When a body absorbs all the rays of light which fall upon it, its colour is black; when it reflects them all, it is white; and when it absorbs some and reflects others, it is coloured. In ignorance of the cause of some bodies reflecting certain rays, and others different ones, we express the fact by saying such a body has an affinity for such coloured rays. The question has often been raised, why is it that we see objects erect, while their images on the retina are inverted? According to most physiologists, it is by virtue of a certain property of the retina by which each point of an object is seen in the direction of a line perpendicular to its surface now since this surface is concave, the rays proceeding from an object which fall on the lower part of its concavity will incline upwards, while those which impinge on its upper part will incline downwards; and thus the object presented to the mind will be the reverse of that which is depicted on the retina. Many physiologists reject this theory, on the ground that it involves an impossibility, since each point of the image is not formed by rays having one determinate direction, but by an entire cone of rays; they affirm moreover that vision can consist only in the perception of the state of the retina itself, and not of anything lying in front of it in the external world. They argue further, that no explanation of erect vision is required, as long as all things equally, and not some objects only, appeared to the eye inverted; for nothing can be inverted where nothing is erect, each idea existing only in antithesis to the other. A question not less agitated than the one we have just discussed, is that of single vision with both eyes. We shall not inquire into the merits of the various theories that have been invented in order to account for this phenomenon; but shall merely advert to the principal conditions which are essential to single vision, in order that we may explain under what circumstances double vision results.

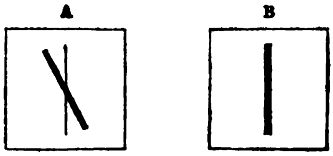
If two fingers are held up before the eyes, one in front of the other, and vision is directed to the more distant, the nearer will appear double, while if the nearer one is regarded more particularly, so as to appear single, the more distant will be seen double, and one of the double images in each case will be found to belong to one eye, and the other to the other eye. This phenomenon has given rise to the hypothesis that there are certain corresponding or identical points on the two retinæ, and that when these are effected simultaneously, single vision results; while if the image of an object falls on parts which are not identical, it is seen double. A knowledge of these facts is obtained in the following manner:—If in a dark room with our eyes closed we make pressure with the finger upon any part of the ball of the eye, so as to affect the retina, a luminous circle will be seen in the field of vision at the opposite side to that on which the pressure is made. If we press on both eyes simultaneously, *one* luminous ring is seen when 'identical' parts are pressed on, and *two* rings when 'non-identical' parts receive the pressure. By this means it has been ascertained that the upper and lower portions of the two retinæ are identical with each other, and that the outer lateral portion of one eye is identical with the inner portion of the other, and so of the intermediate parts. Now whenever the axes

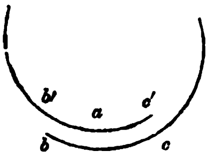


of our eyes converge to an object, its image falls on corresponding portions of the two retinæ, and it is seen single; when we regard it without making our optic axes meet in it, as in the experiment of holding up two fingers, non-identical parts of the retinæ are affected, and it is seen double. To illustrate this, let *a* be a point towards which the axes of the eyes are directed, and *b* an object more distant from the eyes. An image of *a* will fall upon identical points of the two retinæ, namely, upon the central points 5, 5; *a* will consequently be seen single. The image of *b* will fall in the left eye at 6, and in the right eye at 4. The points 4 and 6 of the two eyes being non-identical (since the identical parts are marked with corresponding figures), *b* will be seen double; and the distance between the two images of *b*, in proportion to the extent of the whole field of vision, will be the same as that between 4 and 6, in comparison with the distance between 1 and 10 in each retina. The centre of the retina furnishes the most distinct vision, therefore double images, which generally fall on the lateral parts, are indistinct.



The position of double images depends upon the point at which the axes of the eyes decussate; if in front of the object, the left hand image belongs to the left eye, and the right hand image to the right eye; while if the axes converge to a point beyond it, the converse of this is observed. That objects will not in general be seen single, unless their images fall on corresponding portions of the two retinæ, is further confirmed by the phenomena which are observed in strabismus, and by the experiment of displacing the axis of one eye by pressing on it with the finger; but that exactly identical points of the retinæ must be effected by similar points of the two images, is sufficiently refuted by Mr. Wheatstone's discovery of different perspective projections being presented to each eye. Mr. Wheatstone has also shown that under some circumstances similar pictures falling on corresponding points of the retinæ may appear double and in different places. If to one eye we present in the stereoscope a vertical line B, to the other eye a line inclined some degrees from the perpendicular, we shall see a line the extremities of which appear at different distances before the eyes. If now we draw a faint vertical line, intersecting the inclined line at its centre, as at A, and present the two drawings to the eyes as before; the two strong lines will still coincide, and the resultant perspective line will occupy the same place, while the faint line, though it occupies the same part of the retina as the vertical line B, appears in a different place, namely, at the intersection of the planes of visual direction of the two eyes. In quadrupeds the relation between the identical and non-identical parts of the retinæ cannot be the same as in man, for the axes of their eyes generally diverge and cannot be made to meet in one point of an object. Müller therefore supposes that there are parts of their retina which are identical, and parts which are not identical, which have no corresponding parts in the other eye, and the relation of the two retinæ to each other in the field of vision may be represented as below





Although the theory of corresponding points is the most perfect that has yet been offered in explanation of the phenomena of single and double vision, yet the facts which have been advanced against it by Mr. Wheatstone are sufficient to show that it cannot be adopted without some limitation. Were it even not liable to these objections, it would still only express the *conditions* required for single and double vision, and would leave unexplained the *cause* of two impressions giving rise to one sensation.

There are several curious phenomena connected with the subject we are treating of, some of which we will briefly allude to. If a piece of white paper is viewed through two different coloured glasses, held one to each eye (for instance, though a blue and a yellow glass), the paper is not seen of a green colour, but in part blue and in part yellow. Sometimes one colour predominates, sometimes the other; and if the experiment is long continued, the mingling of the colours, to which there was at first no tendency, becomes more evident. Similar phenomena are observed when two dissimilar pictures are viewed in the stereoscope, and it does not appear to be in the power of the will to determine the appearance of either picture or either colour. These facts seem to show that the two eyes are not always in action together; but that at one time the sensations of one eye predominate, and at another those of the other. If the eyes are closed after being fixed for some time on an object, we still continue to see its image, and the duration of this image, or 'spectrum,' as it is called, is in a direct ratio with the impression which caused it.

Spectra left by the images of white or luminous objects are ordinarily white or luminous, and those left by dark objects dark; but if, instead of closing the eyes, they are directed upon some white surface, as a sheet of paper, the colours of the spectra are reversed, those which were white when the eyes were closed becoming black when directed to the white surface, and *vice versâ*. These phenomena are easily explained. The part of the retina which has received the luminous image remains for some time afterwards in an excited state, while that which has received a dark image is in an unexcited and therefore much more excitable condition. When the eye in this condition is directed towards a white surface, the luminous rays from this surface produce upon the excited parts of the retina a much more feeble impression than upon the unexcited, and the latter consequently appear more illuminated. Spectra are sometimes coloured, although the objects which excited them are colourless; such is the case if the impressions on the retina are very intense, as when produced by the sun's image. But the most curious phenomena relative to ocular spectra arise from the impression of coloured objects on the retina the spectra consequent on these, although coloured, are not of the same colour as the object, but the opposite or complimentary colour. Thus the spectrum of a red object is green, that of a green object red, that of a violet yellow, &c. There are two modes of explaining these phenomena, the least objectionable of which is the following, offered by Müller: 'The perception of any one of the three simple colours consists merely in the retina being in one of those conditions to which it has a tendency when in a state of excitement; if this condition be artificially excited in an intense degree, the retina acquires an extreme tendency to that of the complementary colour, which consequently is perceived as the ocular spectrum.'

The disappearance of images which fall on the retina at the entrance of the optic nerve, the luminous circles seen on making pressure with the finger on the globe of the eye, and the vascular network which under certain circumstances we perceive in our own retina, have already been alluded to and their causes explained in the article **EYE**.

Defects of Sight.—Under this head will be comprehended short-sight, long-sight, double vision, and the defective perception of colours.

Myopia, or Near-sightedness (from μύω, 'I shut,' and ὤψ, 'the eye,' a short-sighted person being in the habit of winking, or half shutting his eyelids when he endeavours to see objects distinctly).

When the images of surrounding objects are brought to a focus in the eye before they reach the retina, such an eye is myopic; when, on the contrary, their foci would fall behind the retina, it is presbyopic. Individuals thus affected see all objects indistinctly that are viewed at the ordinary distance of distinct vision; therefore, to remedy this defect, they bring them within such a distance of the eye as will ensure their images being brought to an exact focus upon the retina. The point of distinct vision (that is, the distance from the eye at which objects are perceived most clearly) of a perfect eye averages from 15 to 20 inches: an eye which cannot discern objects distinctly beyond 10 inches may be considered myopic; but persons affected with a high degree of myopia have their point of distinct vision as near as two or three inches, or even one inch, to the eye. To short-sighted persons all objects appear magnified; they prefer to read a small type, and see better through a pinhole in a card than with the naked eye: on the same principle, when they endeavour to see any distant object distinctly, they almost close their eyelids. The explanation of these phenomena is to be sought for in the condition of the eyes themselves: they are generally firmer than usual, their corneæ are preternaturally convex, and their pupils large; hence by diminishing the aperture through which the light is admitted, all but the more direct rays are excluded, and the images on the retina will be more defined. Myopia is seldom observed before puberty, and is much less common in the lower ranks of life than in the higher, but it occurs most frequently in those who occupy themselves much in the examination of minute objects. It is sometimes met with as a temporary affection, subsequent to a long-continued exertion of the eyes in viewing small objects, as after the use of the microscope. These facts point to the propriety of desisting from such occupations as soon as any fatigue is experienced. From the well-known fact of persons becoming long-sighted as they get old, it has been supposed that the vision of short-sighted persons must improve as they advance in years; but this is not found to be the case, the myopia rather tending to increase than to diminish.

The cause of myopia is an over-refractive condition of the eye; either the cornea or the crystalline lens is too convex, or the humours of the eye generally are too dense or too abundant.

Treatment.—Although it is said that short-sightedness rarely comes on before puberty, our own observations lead us to believe that it is more frequently a congenital defect than is generally imagined. If however an incipient case were brought under the notice of the practitioner which could be shown to have followed too great an exercise of the eyes upon minute objects, the cure would probably be found in abstaining entirely for a time from such occupations, refraining also from the use of concave glasses, and employing the eyes chiefly upon large and distant objects. But this defect is one that is so little thought of, and is so easily remedied by the use of glasses, that a medical man is seldom called upon to attempt its cure: the only plausible means that have been recommended with this view are, practising the eyes in reading at gradually increasing distances, and a renunciation of such pursuits as require the concentration of vision upon near objects. The manner in which concave glasses improve the vision of near-sighted persons, is by causing a divergence of the rays of light before they enter the eye, thus counteracting the over-refractive condition of that organ. The glasses that are most commonly used are double concaves, of equal concavity on each side; they are numbered 1, 2, 3, 4, &c., beginning with the longest focus or shallowest concavity. Unfortunately there is no uniform standard adopted in the manufacture of these glasses, so that what one optician calls No. 1, another rates as No. 2, and so on; it is therefore advisable that those who wish to fit themselves with spectacles should try a series of them at an optician's shop, and they should be content with the lowest number with which they can see objects clearly across the street: if it diminishes them much, or gives them a dazzling appearance, or if the eyes feel strained after looking through them for a short time, they are too concave. Spectacles are always preferable to a single eyeglass; and when the individual has met with a pair which suit him, they should not be heedlessly changed for any of deeper concavity. It is also advisable not to wear them constantly, but only on occasions when their assistance is absolutely required.

Presbyopia, or Far-sightedness (from πρέσβυς, 'old, and ὤψ, 'eye;' this being a state of vision to which old age is almost invariably subject).

Long-sightedness, as the name sufficiently indicates, is an affection the reverse of the one just described, and depends upon opposite causes. Either the refractive powers of the eye are too feeble, or its axis is shorter than is natural; the result is an imperfectly formed image on the retina, from the rays of light not converging sufficiently soon to be brought to a focus. Hence the far-sighted person removes the object he is examining farther from him, or he makes use of glasses whose effect is to increase the refraction of the rays of light before they enter his eye. Far-sightedness is sometimes met with in the young; but it is rare that an individual lives to be old without becoming presbyopic: indeed the sinking of the eyeballs, the flattening of the corneæ, and the smallness of the pupils, all which contribute to this effect, are among the series of changes which every part of our body undergoes as we advance in age. The time of life at which presbyopia first shows itself is generally about forty-five; but there are great differences in this respect, some persons requiring the use of convex glasses at thirty as much as others at fifty. Among the earliest symptoms observed, are a difficulty in reading small print, in nibbing a pen, or in examining small objects; the letters of a book appear misty, and run one into another; and if the effort is long continued, the eyes become fatigued and the head aches. Notwithstanding this difficulty of distinguishing near objects, distant ones continue to be seen as clearly as before.

Presbyopia, after it has once appeared, generally goes on increasing, so that an individual thus affected requires to change his glasses from time to time for those of a higher power: instances however are recorded of old persons long accustomed to the use of convex glasses recovering their former sight at the advanced age of 80 or 90 years.

Treatment.—The same principles that we have laid down for the treatment of myopia, and for the use of concave glasses, are applicable, regard being had to the opposite condition of the eye, to the present affection. Convex glasses should not be had recourse to too soon, nor should too high a power be used, but the lowest that answers the purpose is to be chosen. When presbyopia occurs suddenly, and in an individual much below the age at which it ordinarily occurs, there is some mischief to be suspected either in the eye or in the brain, which will require an antiphlogistic treatment and a total suspension of the use of the eyes in regarding near or small objects.

Double Vision.—Visus duplicatus, or diplopia, may arise either from a want of correspondence in the movements or position of the two eyes, the vision of each eye singly being perfect; or there may be double vision with one eye only, while the harmony in the movements of the two is not disturbed. The most common example of the first form of the affection is afforded by cases of squinting; but as this defect will be treated of in a separate article, we merely allude to it in this place. More serious and less common is the loss of harmony in the movements of the eyes which results from paralysis of one or more of the orbital muscles. If one muscle only is affected, the eye will move in harmony with its fellow in every direction but the one towards which its paralysed muscle should draw it, consequently in this direction objects will be seen double; but if several are affected, as is not unfrequently the case, then the movements of the eye will be still more restricted, and there will be single vision only when the axis of the sound eye is parallel with that of the paralysed one. These affections appear sometimes to arise from cold; at other times they are dependent upon disease about the base of the brain, as some tumour pressing on the motor oculi nerve, or there may be an inflammatory condition of the brain and its membranes, or a sanguineous or serous effusion involving the origin of the third pair of nerves. Whichever of these may be the cause, our treatment must be directed to remove it, while the state of the eye will be an index of the success or failure of the remedies we make use of. The reason why double vision occurs when the two eyes are not parallel, has been already pointed out in a former part of this article.

Double vision with a single eye is a more rare affection than the one just described, and depends upon some irregular refraction of the cornea or lens.

M. Prévost, who published an account of his own case in the 'Annales de Chimie et de Physique,' 1832, thought it might arise from a fracture, bruise, or partial flattening of the lens, or separation of its laminæ. Professor Airy and Mr. Babbage are troubled with this defect, the latter gentleman with both eyes, but he is able to remedy it by looking through a small hole in a card, or through a concave lens. Professor Airy finds that his eye refracts the rays to a nearer focus in the vertical than in the horizontal plane, and he has ingeniously contrived to remedy it by the use of a double concave lens, one surface of which is spherical and the other cylindrical. The spherical surface is to correct the general defect of a too convex cornea; the cylindrical is to converge or diverge those rays at right angles to the axis, while the parallelism of those which impinge upon it in the plane of its axis is unaffected. Thus the focus of the spherical surface will remain unaltered in one plane, but in the other it will be changed to that of a lens formed by it and a spherical surface of equal curvature with the cylinder. With the aid of a glass of this description Professor Airy could read the smallest print at a considerable distance equally well with the defective as with the sound eye. He found that vision was most distinct when the glass was pretty close to the eye and the cylindrical surface turned from it. 'With these precautions,' he observes, 'I find that the eye which I once feared would become quite useless, can be used in almost every respect as well as the other.'

Defect of the Sense of Colours.—There are some individuals whose eyes present no apparent defect, and who can distinguish clearly the size and form of objects, yet are unable to perceive a difference between certain colours. These persons differ much in the degree of their defect, as well as in respect of the colours which they confound together. Seebeck has divided them into two classes. Individuals of the first class have a very imperfect power of distinguishing the impressions of colours generally; but the defect is greatest with regard to red and the complimentary colour green; these colours being not distinguishable from grey; blue is imperfectly distinguished, and yellow most perfectly. Individuals belonging to the second class likewise recognise yellow best, and err most with respect to the distinction of red from blue. The cause of this defect certainly does not reside in the eye itself, as has been generally supposed, but has its seat in the brain. Sir J. Herschel examined the eyes of an individual affected with this peculiarity, and satisfied himself that all the prismatic rays had the power of affecting them with the sensation of light, and producing distinct vision; 'so that the defect,' observes Herschel, 'arises from no insensibility of the retina to rays of any particular refrangibility, nor to any colouring matter in the humours of the eye preventing certain rays from reaching the retina (as has been ingeniously supposed), but from a defect in the sensorium, by which it is rendered incapable of appreciating exactly those differences between rays on which their colour depends.' It is scarcely necessary to observe that this defect is irremediable.

SIGILLARIA, the name of an extinct genus of plants. It is known by possessing a conical stem deeply furrowed but not jointed; with oblong discoid or nearly round cicatrices or scars, not arranged in a distinctly spiral manner, with frequently three smaller vascular cicatrices in the centre of the larger scars. This genus includes the Rhytidolepis, Alveolaria, Syringodendron, Catenaria, and the Lepidodendron punctatum and appendiculatum of various authors. The largest specimens of these plants occur in the coal-formation and in beds of the mountain-limestone series.

A variety of opinions have been entertained by geological botanists as to the affinities of these plants. Artis thinks them related to Euphorbiaceæ; Schlothein refers them to Palms, and Von Martius to Cactaceæ. Brongniart at one time thought them a family *sui generis*, but has since referred them, with Count Sternberg, to the family of arborescent ferns. Lindley and Hutton think that 'the weight of evidence seems to incline in favour of both Sigillaria and Stigmaria having been Dicotyledonous plants, and of the highest degree of organization, such as Cactaceæ or Euphorbiaceæ, or even Asclepiadaceæ.' To these families they seem to approach, particularly in their soft texture, in their deeply channelled stems, and especially in their scars being placed in perpendicular rows between the furrows. These writers however add that 'in the total absence of all knowledge of the leaves and flowers of these antient trees, we think it better to place the genus among other species the affinity of which is altogether doubtful.'

Brongniart, in his 'Histoire des Vegetaux Fossiles,' enumerates fifty-nine species of Sigillaria, and Lindley and Hutton, in the 'Fossil Flora,' have figured eight species found in Great Britain. [Coal-Plants.]

The circumstamces under which Sigillariæ occur in the strata associated with coal are remarkable, and probably may be interpreted so as to reveal some of the conditions which were necessary for the production of the vegetable mass of coal. The first thing which strikes us is the hitherto almost universal absence of leaves, top, roots, and interior structure; we generally find large fragments, or perhaps almost the whole of the stems, furrowed, and marked by the bases of leaves, but in other respects deficient, truncate at top, and abruptly ending toward the bottom. If the plant lies in laminated shale above a bed of coal, it is generally compressed flat, having the exterior converted to coal, and the opposite sides nearly or quite in contact, to the exclusion of the central (perhaps cellular) portions. If in gritstone above a bed of coal, we find it more or less transverse to the strata, as if in attitude of growth, its top broken off, its lower part enlarged and tumid, and nearly touching the coal-bed, but apparently rootless; the interior full of sandy laminæ or irregular accumulations of sand, fragments of other plants, lumps of ironstone, &c. The tree was certainly hollow when the sandstone was formed; but whether through decay of the internal cellular substance, or a general wasting and consumption of vascular and cellular structure, as suggested by Mr. Hawkshaw from observations of hollowed dicotyledonous trees in South America, is still doubtful. Whether the leafless and apparently rootless trees, which in other respects are in the attitude and have the aspect of growth, did really grow where they appear, and have lost their roots by absorption and conversion into the coaly mass below, or were deposited by drifting with their roots more or less deficient, is a question of great importance, on which some recent excavations on the line of the Bolton railway, a few miles north of Manchester, have thrown much light. Here, above a thin (6-inch) coal-bed, in shaly strata much inclined, are seen several furrowed stems of trees, also inclined so as to stand at right angles to the stratification, most of them evidently rooted, by dichotomizing root-branches, in the clay over the coal. The extremities of the roots are not seen; perhaps they entered the vegetable mass which is now coal, and were carbonised with the other plants. The stems are furrowed, but less regularly than is usual in Sigillaria, and marked less plainly than is usual with the cicatrices of leaves. The 'bark,' as it is called, is coal, showing vegetable structure; the interior is sedimentary rock. These plants are commonly imagined to be Sigillariæ; at all events some of them are likely to prove so (those in which the roots are least obvious, and the base is tumid); others appear to us to be as much allied to Lepidodendron. We have seen specimens, in different coal-districts, certainly congeneric, and presenting the same intermediate characters between Sigillaria and Lepidodendron. Around the bases Mr. Bowman collected abundance of Lepidostrobi, which are usually referred to Lepidodendron.

Upon the whole it is clear that here trees analogous to Sigillaria and Lepidodendron remain in the place, attitude, and circumstances of growth; their roots entered a sort of vegetable magma, partly the fallen accumulation of leaves and fruits of the forests; over this mass and around these stems water left its sediments horizontally; these horizontal strata have been upheaved, and the once vertical stems made to slope in accordance with the movement. These interesting trees have been carefully preserved *in situ*, by the care of Mr. Hawkshaw, and models have also been made of them.

SIGISMUND. [Poland—*History.*]

SIGN (Astronomy), a constellation; but in modern times a constellation of the Zodiac only. For the distinction of the sidereal and astronomical zodiac, see Precession (p. 495).

SIGN (Mathematics). Every symbol is a sign of something or other, the original meaning of the word sign applying to any mark of distinction or designation. The general consideration of the subject of signs comes under the word SYMBOL; for this term sign is exclusively applied in mathematical analysis to the signs of addition and subtraction ($+$ and $-$). A positive quantity, as $+3$, is said to have the positive sign; a negative quantity, as -3, the negative sign.

The theory of these signs is the peculiar feature of algebra, as distinguished from arithmetic [NEGATIVE AND IMPOSSIBLE QUANTITIES]; and it is difficult to place it on any satisfactory basis except that of distinct definitions not wholly derived from arithmetic. On this point however it is not our present purpose to enter further; the object of this article being the application of the signs, and in particular those details of interpretation which are necessary in the application of ordinary algebra to geometry. By ordinary algebra we mean that system in which the positive and negative quantities are fully capable of interpretation, but in which $\sqrt{-1}$ is considered as incapable of interpretation.

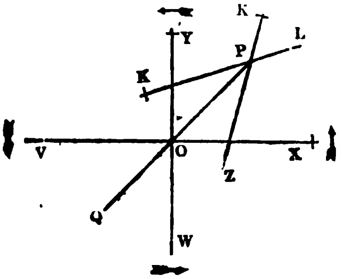
The relative meaning of $+$ and $-$ is direct opposition of properties; and it is only where direct opposition is possible that complete interpretation can exist. The symbol $+a$ means not only a units of its kind, but a units directed to be considered in a specific one of two (the only possible) lights, or used in a specific one of two (the only possible) manners; the first generally implying the second. Thus let a inches be measured from a given point; the superposition of $+$ or $-$ tells nothing, for the measurement may be made in an infinite number of different directions. Choose one of these directions, or rather one line of direction, and the indeterminate character of the proposal (to measure a inches from the given point) is almost gone: there are but two directions in which to do it; if one of them (no matter which) be signified by $+a$, the other (no matter which, except with reference to the first) must be denoted by $-a$.

A problem may present different sets of oppositions of very different kinds. Thus we might have a problem in which there are concerned together—1, time before or time after a certain epoch; 2, height above or height below a certain level; 3, the debtor or creditor side of certain books. To give a more precise idea (it is hardly worth while to frame a specific problem), a man might engage to build a wall on different terms as to the foundation and what is above the ground; for which he might have to borrow money and pay interest up to a certain time, when by receiving the whole amount due to him he might repay and invest besides; and the whole transaction might have to be properly entered in his books. The young student might suppose that if $+1$ and -1 represent a foot of the wall above and a foot below the ground, it will not necessarily follow that $+1$ and -1 (undistinguishable from the former) will do to represent one pound of interest due to and from the contractor; and still less that the same $+1$ and -1 will also do to direct 1*l.* to be carried to the debtor or creditor side of his books. But what he will learn from a properly established algebra (and until he has learnt it, he is not in possession of any part of the difference between algebra and arithmetic) is this—that he would gain absolutely nothing by inventing such distinctive symbols as would remove his doubt of their applicability. Let $(+)\,1$ and $(-)\,1$ represent feet of wall, $[+]\,1$ and $[-]\,1$ pounds sterling of interest, $\{+\}\,1$ and $\{-1\}\,1$ pounds sterling carried to one side or the other of the books; while $+1$ and -1 represent simple addition or subtraction. Let the problem be fairly translated into algebraical language, and an equation formed in which all the distinctive symbols are seen: algebra teaches that the rules to be applied to that equation differ in no respect whatever from those which would have been applicable if all the signs had come from the same source of meaning. Perhaps it would be better if the student were not allowed to come so easily by this result as he usually does, but should be made to learn by his trouble how unnecessary the distinctions really are, as to operations, and allowed in due time to feel the relief afforded by dropping them.

When a problem admits of but one opposition (say it simply refers to time measured future or past from a given epoch), there is no difficulty about the interpretation of any result. If this result be positive, it must be such time as was called positive when the operation was put into shape; and the contrary. But in the application to geometry, an extension of the interpretation of signs enables us to remove some difficulties in the proper expression of angles, which we proceed to describe.

In the rectilinear figures considered by Euclid, the sum of the external angles is always equal to four right angles. In these figures there are no re-entering angles. [SALIENT.] The proposition remains true when there are re-entering angles, provided that the angles which then take the place of what were called *external* angles be counted as negative. In algebraic geometry it is usual to refer all points and lines to two straight lines at right angles to one another. [ABSCISSA; CO-ORDINATES.] The following conventions must now be employed:—

1. Let VX and WY be the axes of co-ordinates, meeting at O, the origin. Let OX and OY be positive directions:



OV and OW, negative directions.

2. A line drawn from O to any point P is in itself (for the present) neither positive nor negative; either sign may be given to OP, but the contrary one must be given to OQ.

3. The line OP may, keeping its sign, revolve round O; nor, if negative, is it to be counted positive when it comes into momentary coincidence with OX; nor, if positive, is it to be counted negative when in coincidence with OV. And generally, a straight line revolving round any point does not take the signs of lines which receive signs on account of the fixed directions in which they are drawn.

4. The angle made by two lines A and B is to have a distinction of sign drawn, according as it is called the angle made by A with B, or the angle made by B with A (the angles made by A *from* B, and by B *from* A, would be better). If the angle of A with B (say $A^{\wedge}B$) be positive, then the angle made by B with A ($B^{\wedge}A$) is negative, and *vice versâ*.

5. The positive direction of revolution is that in which a line moves from the positive part of the axis of x to the positive part of the axis of y (as marked by the arrows).

6. The sign of any line drawn through P is thus determined. If OP be *positive*, that direction is positive in which the point P must move so as to revolve *positively;* thus, OP being positive, PK is positive and PL negative. But if OP be negative, the reverse is the case; but the rules need only be remembered which suppose OP positive.

7. When an angle amounts to more than four right angles, the four right angles may be thrown away; and generally, four right angles, or any multiple of them, may be added to or subtracted from any angle.

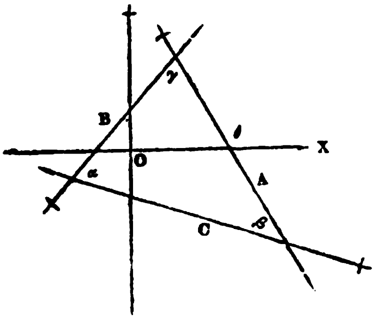
8. In measuring the angles made by two lines passing through P (OP being positive), the positive directions on those lines (found as in 6) must be used: and by $A^{\wedge}B$, the angular departure of A from B, is understood the amount of positive revolution which will bring B into the position A.

9. Hence it follows that $A^{\wedge}B$ is either equal to $A^{\wedge}X-B^{\wedge}X$, or differs from it by four right angles, X standing for the axis of x.

10. Hence also it follows that in every closed figure, whether such as those admitted by Euclid or not, some of the angles are negative, if every angle $A^{\wedge}B$ be interpreted as $A^{\wedge}X-B^{\wedge}X$. And in every such measurement, the sum of all the angles, with their proper signs, is equal to nothing. But, measured as in (8), the sum of all the angles is nothing, or a multiple of four right angles positive or negative. This ambiguity is wholly indifferent in trigonometrical operations.

To prove the last, let us consider a four-sided figure, of which the sides are A, B, C, D. The angles of the figure, taken in order, are $A^{\wedge}B$, $B^{\wedge}C$, $C^{\wedge}D$, $D^{\wedge}A$, which, measured as in 9, are $A^{\wedge}X-B^{\wedge}X$, $B^{\wedge}X-C^{\wedge}X$, $C^{\wedge}X-D^{\wedge}X$, $D^{\wedge}X-A^{\wedge}X$, the sum of which is obviously nothing. But if any one of these angles should differ from the preceding, it can be only by a multiple of four right angles, whence the sum must be a multiple of four right angles.

We shall now take as an example, the three angles of a triangle, estimating them first by each side with reference to the next, and then by comparing each of the sides with the axis of x. The sides are marked A, B, C; the angles of



Euclid, without reference to sign, are α, β, γ: and the positive and negative directions are marked. Four right angles are denoted as usual by 2π. Required $A^{\wedge}B+B^{\wedge}C+C^{\wedge}A$.

In $A^{\wedge}B$, the amount of positive revolution by which the positive part of B turns round into that of A is $\gamma+\pi$. Similarly for $B^{\wedge}C$, we have $\alpha+\pi$, and for $C^{\wedge}A$, $\beta+\pi$. The sum of these, $\alpha+\beta+\gamma$ being π, is 4π, a multiple of 2π. Now let the angle $A^{\wedge}X$ be θ. Then $B^{\wedge}X$ will be seen to be an angle in this figure greater than two right angles, and will be found to be $\pi+\theta-\gamma$, while $C^{\wedge}X$ is greater than three right angles, and is $2\pi-\alpha+\theta-\gamma$. Hence we have

$$\begin{aligned} A^{\wedge}B &= \theta-(\pi+\theta-\gamma) = \gamma-\pi \\ B^{\wedge}C &= \pi+\theta-\gamma-(2\pi-\alpha+\theta-\gamma) = \alpha-\pi \\ C^{\wedge}A &= (2\pi-\alpha+\theta-\gamma)-\theta \qquad = \beta+\pi. \end{aligned}$$

Only the third angle gives precisely the same in both; in the other two, the second determination gives in each case four right angles less than the first. The sum of the three angles is now O.

The use of this system lies in enabling us to give in a general form propositions which would otherwise require a large examination of particular cases. This examination is not usually made in elementary works; but instead of it, the true result, derived from the superior knowledge of the writer, is made to the reader the consequence of a particular case. In the consideration of curves, for instance, there are to be considered, perhaps at the same time, the co-ordinates, the radius vector, the tangent, the perpendicular on it, and the radius of curvature. The varieties of figure which arise out of these lines are very numerous, and nothing but generalised suppositions, competent to assign definite angles in all cases, can legitimately bring out general propositions. For instances, see TANGENT, SPIRAL; and for further developement, see *Library of Useful Knowledge*, 'Differential Calculus,' pp. 341-345.

SIGN-MANUAL means, in its widest sense, the signature or mark made by a person upon any legal instrument to show his concurrence in it. Before the art of writing was so universally practised as it now is, the sign-manual or signature was usually a cross, attested either by the seal of the party containing his armorial bearings, or by the signature of another person declaring to whom the mark belonged. The latter indeed is still the practice with persons who cannot write. Spelman ('Sigillum') quotes from 'Histoire de Bretaigne,' liv. i., c. 28, a charter of Alan 'le longe,' king of Brittany, dated in 689: 'Under our great seal and sign-manual, and also under the signs-manual comitum Cornubiensis and Leoniensis, in the presence of the archbishop of Dôle, of the chancellor, and of twelve other witnesses ("consenting") whose seals are affixed.'

Sign-manual now however is used to denote the signature of a reigning prince. It is usually in this country the prince's name, or its initial letter, with the initial of his style or title in Latin. Thus the sign-manual of George IV., when prince regent, was George P. R., or G. P. R.; that of the present queen is Victoria R., or V. R.

The royal sign-manual is usually placed at the top left-hand corner of the instrument, together with the privy seal; and it is requisite in all cases where the privy seal and afterwards the great seal are used. The sign-manual must be countersigned by a principal secretary of state, or by the lords of the treasury, when attached to a grant or warrant, it being then the principal act, and it must also be accompanied by the signet or privy seal. But where the sign-manual only directs that another act shall be done, as for letters-patent to be made, it must be countersigned by some person, though not necessarily by these great officers of state. The authenticity of the sign-manual is admitted in courts of law upon production of the instrument to which it is attached. (Comyns's *Digest*.)

SIGNATURE, in Music, is the term by which the clefs and sharps or flats placed at the beginning of each staff are, collectively, known, and by which the key is partly shown. See KEY, where the *Signature* in every key is given.

SIGNATURE, in Printing, is the name given to the letters or figures which are placed at the bottom of certain pages in each sheet of a book, to facilitate the gathering, folding, collating, and binding of it. The French printers generally use figures, but English printers for the most part use small capital letters. The bookbinders' alphabet, as it is called, contains only 23 letters (*j*, *v*, and *w* being omitted); and as the title-sheet, which contains the dedication, preface, &c., is generally printed last, the signatures of the work itself commence with B, leaving A for the title-sheet. If there be other introductory matter besides the title-sheet, small letters, as a, b, &c., are used till the work itself is reached. If the work contains more than 23 sheets, the second set of signatures are AA, BB, or more commonly 2 A, 2 B, &c.; and the third set 3 A, 3 B, and so on. If the work is in folio it requires only one signature; if in 4to. or 8vo., it requires tow, as, for instance, B on the first page and B 2 on the third; if in 12mo., it requires three, as B on the first page, B 2 on the third page, and B 3 on the ninth page; and so on for printed works of other forms.

SIGNET, SEAL. The impression of a seal has been used from the earliest times to prove the authenticity of the documents to which it is attached, Amongst Eastern nations seals were, and still are, rings engraved usually with the name of the owner, and, among the Mohammedans, with some devout aspiration. The delivery of such a seal by the sovereign was a warrant to the holder to exercise the royal functions, or at least served as a credential: of this we find frequent instances in the Scriptures. Sir Edward Coke asserts that seals were used in England a century before the Conquest; and he quotes a charter of King Edwin, dated in 956, and sealed not only with his own seal, but with that of the bishop of Winchester. He also states that the charter of Offa, king of Mercia (755-794), whereby he gave the Peter Pence, 'doth yet remain under seal.' Richard I. was the first king of England who used a seal of arms; theretofore the royal seal had been an effigy of the king armed and on horseback. The seals of the conveying parties are now essential to all legal instruments whereby real estate is conveyed. [DEEDS.]

The law recognises three royal seals:—1, The great seal, which is in the custody of the lord chancellor: this is appended to all letters-patent, and contains two impressions, the one being usually the sovereign on horseback, the other the sovereign seated, supported by emblematical figures, and with the coat of arms somewhere in the field. The great seal is essential to all royal grants of inheritances or chattels real, to grants of an office in fee, and to all writs at common law. Where the king's seal is mentioned, it is understood to be the great seal. 2, The privy seal, which is in the custody of the lord keeper of the privy seal. This seal is valid for the issuing of the royal treasure, or for disposing of chattels, or the contracting or discharging of a debt. It is used as a warrant for letters-patent before they pass the great seal. The privy seal consists of the arms of the sovereign. 3, The signet, or privy signet, which is in the custody of the principal secretaries of state. Excepting that it authenticates the sign manual, this seal seems to have no validity, although it is alleged to be sufficient to give validity to the writ *ne exeat regno*, whereby a subject is prohibited from going out of the realm. For the use all the seals the countersignature of a principal secretary state is required by statute. [SECRETARY OF STATE.]

(Comyn's *Digest*, article 'Patent;' *Coke upon Littleton*, Hargrave and Thomas's edition, vol. ii., p. 233.)

END OF VOLUME THE TWENTY-FIRST.

Printed by WILLIAM CLOWES and SONS, Stamford-street.

THE

PENNY CYCLOPÆDIA

OF

THE SOCIETY

FOR THE

DIFFUSION OF USEFUL KNOWLEDGE.

VOLUME XXII.

SIGONIO——STEAM-VESSEL.

LONDON:
CHARLES KNIGHT AND Co., 22, LUDGATE STREET.
MDCCCXLII.

Price Seven Shillings and Sixpence, bound in cloth.

COMMITTEE.

Chairman—The Right Hon. LORD BROUGHAM, F.R.S., Member of the National Institute of France.
Vice-Chairman—The Right Hon. EARL SPENCER.
Treasurer—JOHN WOOD, Esq.

William Allen, Esq., F.R. and R.A.S
Captain Beaufort, R.N., F.R. and R.A.S.
George Birkbeck, M.D.
George Burrows, M.D.
Peter Stafford Carey, Esq., A.M.
John Conolly, M.D.
William Coulson, Esq.
R. D. Craig, Esq.
J. F. Davis, Esq., F.R.S.
H. T. Dela Beche, Esq., F.R.S.
The Right Hon. Lord Denman.
Samuel Duckworth, Esq.
The Right Rev. the Bishop of Durham, D.D.
Sir Henry Ellis, Prin. Lib. Brit. Mus.
T. F. Ellis, Esq., A.M., F.R.A.S.
John Elliotson, M.D., F.R.S.
George Evans, Esq., M.P.
Thomas Falconer, Esq.
I. L. Goldsmid, Esq., F.R. and R.A.S.
Francis Henry Goldsmid, Esq.
B. Gompertz, Esq., F.R. and R.A.S.
J. T. Graves, Esq. A.M., F.R.S.
G. B. Greenough, Esq., F.R. and L.S.
Sir Edmund Head, Bart., A.M.
M. D. Hill, Esq., Q.C.
Rowland Hill, Esq., F.R.A.S.
Right Hon. Sir J. C. Hobhouse, Bart., M.P.
Thos. Hodgkin, M.D.
David Jardine, Esq., A.M.
Henry B. Ker, Esq.
Thomas Hewett Key, Esq., A.M.
Sir Charles Lemon, Bart., M.P.
George C. Lewis, Esq., A.M.
Thomas Henry Lister, Esq.
James Loch, Esq., M.P., F.G.S.
George Long, Esq., A.M.
H. Malden, Esq. A.M.
A. T. Malkin, Esq., A.M.
Mr. Sergeant Manning.
R. I. Murchison, Esq., F.R.S., F.G.S.
The Right Hon. Lord Nugent.
W. S. O'Brien, Esq., M.P.
The Right Hon. Sir Henry Parnell, Bt., M.P.
Richard Quain, Esq.
P. M. Roget, M.D. Sec. R.S., F.R.A.S.
R. W. Rothman, Esq., A.M.
Sir Martin Archer Shee, P.R.A., F.R.S.
Sir George T. Staunton, Bart., M.P.
John Taylor, Esq. F.R.S.
A. T. Thomson, M.D. F.L.S.
Thomas Vardon, Esq.
Jas. Walker, Esq., F.R.S., Pr. Inst., Civ. Eng.
H. Waymouth, Esq.
Thos. Webster, Esq., A.M.
Right Hon. Lord Wrottesley, A.M., F.R.A.S.
J. A. Yates, Esq., M.P.

LOCAL COMMITTEES.

Alton, Staffordshire—Rev. J. P. Jones.
Anglesea—Rev. E. Williams.
Rev. W. Johnson.
— Miller, Esq.
Barnstaple.— — Bencraft, Esq.
William Gribble, Esq.
Belfast—M. D. Drummond, Esq.
Birmingham—Paul Moon James, Esq., *Treasurer*.
Bridport—James Williams, Esq.
Bristol—J.N. Sanders, Esq., F.G.S. *Chairman*.
J. Reynolds, Esq., *Treasurer*.
J. B. Estlin, Esq., F.L.S., *Secretary*.
Calcutta—James Young, Esq.
C. H. Cameron, Esq.
Cambridge—Rev. Professor Henslow, M.A., F.L.S. & G.S.
Rev. Leonard Jenyns, M.A., F.L.S.
Rev. John Lodge, M.A.
Rev. Prof. Sedgwick, M.A., F.R.S. & G.S.
Canterbury—John Brent, Esq., Alderman.
William Masters, Esq.
Canton—Wm. Jardine, Esq., *President*.
Robert Inglis, Esq., *Treasurer*.
Rev. C. Bridgman, }
Rev. C. Gutzlaff, } *Secretaries*.
J. R. Morrison, Esq., }
Carlisle—Thomas Barnes, M.D., F.R.S.E.
Carnarvon—R. A. Poole, Esq.
William Roberts, Esq.
Chester—Henry Potts, Esq.
Chichester—C. C. Dendy, Esq.
Cockermouth—Rev. J. Whitridge.
Corfu—John Crawford, Esq.
Plato Petrides
Coventry—C. Bray, Esq.
Denbigh—Thomas Evans, Esq.
Derby—Joseph Strutt, Esq.
Edward Strutt, Esq., M.P.
Devonport and Stonehouse—John Cole, Esq.
John Norman, Esq.
Lt. Col. C. Hamilton Smith, F.R.S.
Durham—The Very Rev. the Dean.
Edinburgh—Sir C. Bell, F.R.S.L. and E.
J. S. Traill, M.D.
Etruria—Josiah Wedgwood, Esq.
Exeter—J. Tyrrell, Esq.
John Milford, Esq. (*Coaver*.)
Glamorganshire—Dr. Malkin, Cowbridge.
W. Williams, Esq., Aberpergwm.
Glasgow—K. Finlay, Esq.
Alexander McGrigor, Esq.
James Couper, Esq.
A. J. D. D'Orsey, Esq.
Guernsey—F. C. Lukis, Esq.
Hull— — Bowden, Esq.
Leeds—J. Marshall, Esq.
Lewes—J. W. Woollgar, Esq.
Henry Browne, Esq.
Liverpool Loc. As.—J. Mulleneux, Esq.
Rev. Wm. Shepherd, L.L.D.
Maidenhead—R. Goolden, Esq., F.L.S.
Maidstone—Clement T. Smyth, Esq.
John Case, Esq.
Manchester Loc. As.—G. W. Wood, Esq., M.P., *Ch.*
Sir Benjamin Heywood, Bt., *Treasurer*.
Sir George Philips, Bart., M.P.
T. N. Winstanley, Esq., *Hon. Sec.*
Merthyr Tydvil—Sir J. J. Guest, Bart., M.P.
Minchinhampton—John G. Ball, Esq.
Monmouth—Matthew Moggridge, Esq.
Neath—John Rowland, Esq.
Newcastle—Rev. W. Turner.
T. Sopwith, Esq., F.G.S.
Newport, Isle of Wight—Ab. Clarke, Esq.
T. Cooke, Jun., Esq.
R. G. Kirkpatrick, Esq.
Newport Pagnell—J. Millar, Esq.
Newtown, Montgomeryshire—W. Pugh, Esq.
Norwich—Richard Bacon, Esq.
Wm. Forster, Esq.
Orsett, Essex—Corbett, M.D.
Oxford—Ch. Daubeny, M.D. F.R.S. Prof. Chem.
Rev. Baden Powell, Sav. Prof.
Rev. John Jordan, B.A.
Pesth, Hungary—Count Szechenyi.
Plymouth—H. Woollcombe, Esq., F.A.S., *Ch.*
Wm. Snow Harris, Esq., F.R.S.
E. Moore, M.D., F.L.S., *Secretary*.
G. Wightwick, Esq.
Dr. Traill.
Presteign—Rt. Hon. Sir H. Brydges, Bart.
A. W. Davis, M.D.
Ripon—Rev. H.P. Hamilton, M.A., F.R.S., G.S
Rev. P. Ewart, M.A.
Ruthin—Rev. the Warden of
Humphreys Jones, Esq.
Ryde, I. of Wight—Sir Rd. Simeon, Bt.
Salisbury—Rev. J. Barfitt.
Sheffield—J. H. Abraham, Esq.
Shepton Mallet—G. F. Burroughs, Esq.
Shrewsbury—R. A. Slaney, Esq., M.P.
South Petherton—John Nicholetts, Esq.
Stockport—H. Marsland, Esq., *Treasurer*.
Henry Coppock, Esq., *Secretary*.
Sydney, New S. Wales—W. M. Manning, Esq.
Tavistock—Rev. W. Evans.
John Rundle, Esq., M.P.
Truro—Henry Sewell Stokes, Esq.
Tunbridge Wells—Yeats, M.D.
Uttoxeter—Robert Blurton, Esq.
Virginia, U. S.—Professor Tucker.
Worcester—Chas. Hastings, M.D.
C. H. Hebb, Esq.
Wrexham—Thomas Edgworth, Esq.
Major Sir William Lloyd.
Yarmouth—C. E. Rumbold, Esq.
Dawson Turner, Esq.
York—Rev. J. Kenrick, M.A.
John Phillips, Esq., F.R.S., F.G.S.

THOMAS COATES, Esq., Secretary, No. 59, Lincoln's Inn Fields.

THE PENNY CYCLOPÆDIA

OF

THE SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE.

SIGO'NIO CA'ROLO was born at Modena, about the year 1520. He was a pupil of Franciscus Portus, who taught him Greek. He afterwards studied medicine and philosophy at Bologna, and he also visited the university of Pavia. In 1546 he was invited back to Modena to fill the chair of Greek literature, which had become vacant by the departure of Portus. In 1552 he accepted the chair of belles-lettres at Venice, where he became acquainted with Panvinio, who, like himself, was a diligent student of antiquity. His reputation having become widely spread by various works on classical antiquity, he had invitations both to Rome and Padua, at which latter place he accepted the chair of eloquence in 1560. At Padua he again met with Robortello, with whom he had already had a dispute on the names of the Romans, and the disputes between these two scholars, being renewed, were carried to such a pitch that the senate of Venice found it prudent to silence the combatants. [ROBORTELLO.]

Sigonio left Padua in the year 1563 for a place in the university of Bologna, where he received a handsome salary, and was made a citizen. His reputation attracted numerous students to Bologna. Roman antiquity was his special subject, and his instruction was characterised both by comprehensiveness and accuracy. He also occupied himself with middle-age history, and with this object he visited the great libraries and collections of Italy. It was at the request of Pope Gregory XIII., in 1578, that he commenced the ecclesiastical history, of which his friend Panvinio had formed the plan. Sigonio having discovered some fragments of Cicero's treatise 'De Consolatione,' undertook to restore the work, which he completed and published as a genuine work of Cicero. The fraud was detected and exposed by Riccoboni, one of his pupils; but Sigonio, instead of confessing the fact, endeavoured to reply to the arguments of his opponent; and so well has he succeeded in imitating the expression and manner of Cicero, that the work 'De Consolatione' long passed for genuine, notwithstanding the criticism of Riccoboni; and Tiraboschi, who maintained this side of the question, was only convinced by seeing some unpublished letters of Sigonio, in which he acknowledges himself to be the author. Sigonio retired to the neighbourhood of Modena, where he died in 1584. His numerous writings were collected by Argellati, Milan, 1732-1737, in 6 vols. folio, to which is prefixed a Life by Muratori. All his works on matters of antiquity are also contained in the 'Thesaurus Antiquitatum Græcarum et Romanarum' of Graevius and Gronovius.

The following, which are among the principal works of Sigonio, will indicate the general character of his labours: 'Regum, Consulum, Dictatorum ac Censorum Romanorum Fasti, una cum Actis Triumphorum à Romulo rege usque ad Tiberium Cæsarem; in fastos et acta triumphorum explicationes,' Modena, 1550, fol.: there is also a second edition of this work, Venice, 1556; 'De Antiquo Jure Civium Romanorum Libri Duo; de Antiquo Jure Italiae Libri Tres; de Antiquo Jure Provinciarum Libri Tres,' Venice, 1560, fol.; 'De Republica Atheniensium Libri Quinque; de Atheniensium et Lacedæmoniorum Temporibus Liber Unus,' Bologna, 1564, 4to.; 'De Judiciis Romanorum Libri Tres,' Bologna, 1574, 4to.; 'De Occidentali Imperio Libri xx., ab anno 281 ad 575,' Bologna, 1577, fol.; 'Historiae Ecclesiasticae Libri xiv.;' this work comes down to the year 311, but it was the intention of the author to continue it to 1580.

Sigonio was one of the great scholars to whom we owe much of our knowledge of antiquity, and particularly of Roman history. His industry was unwearied, and his learning was sound and comprehensive. He wrote the Latin language with ease and correctness, and his style is simple and perspicuous. Modern scholars have often been more indebted to Sigonio than they have been willing to allow, and the results of his labours have been used by one person after another, and sometimes without making any discrimination between what is right and what is wrong. Heineccius was largely indebted to him, as will appear from examining his 'Syntagma.' If we consider what was done before his time, and what he accomplished towards the illustration of Roman antiquity, we shall find few scholars who have so well deserved a lasting reputation. It would require a minute investigation to ascertain how far some of the more recent views of the Roman polity have been suggested by the writings of Sigonio. His remarks on the Agrarian laws, though far from being marked by sufficient clearness and precision, are still worth reading. (*De Antiquo Jure Italiae.*)

SIGUENZA, a large town of the province of Guadalaxara in Spain, situated on the declivity of a hill near the source of the river Henares, in 40° 58′ N. lat. and 2° 57′ W. long. It is the see of a bishop, suffragan of Toledo, and has a university, which was founded in the year 1441. The town is badly built; the streets are narrow and crooked, but clean. Of the numerous ecclesiastical buildings which this town contains, the cathedral is the only one worthy of mention. It was built at the beginning of the fourteenth century, in the pure Gothic style; it contains one nave and three aisles, and measures 330 feet by 112. One of its chapels, that of Santa Catalina, is greatly admired for its large dimensions and the beautiful marble tombs which it contains. Siguenza is the antient Saguntia, mentioned by Pliny (iii. 4) as one of the six towns among the Arevaci in Hispania Tarraconensis. Livy (xxxiv., 19) calls it Seguntia; and in the 'Itinerary' of Antoninus it is mentioned as Segontia. Inscriptions bearing the latter name have been found in the neighbourhood. It was the seat of a contested battle between Pompey and Sertorius. In 1106 Alfonso VI., king of Leon and Castile, wrested it from the Moors, who had occupied it since the beginning of the eighth century. An antient castle which commands the town is the only remain of Mohammedan architecture. The population, according to Miñano (*Diccionario Geográfico, &c.*), was about 30,000 in 1832. The only trade of the place consists in coarse flannels, blankets, and hats, which are exported to Toledo and Guadalaxara.

SIKE or **SIECKE, HENRY**, an Oriental scholar of some repute, who lived in the latter half of the seventeenth and the beginning of the eighteenth centuries. He was a native of Bremen, and a professor of Oriental languages at Utrecht, and afterwards at Cambridge. It appears that owing to some misdemeanor he was to be subjected to punishment; and in order to escape from this disgrace, he put an end to his life by hanging himself in 1712. The only work of any note which he published is the 'Evangelium Infantiæ Christi, adscriptum Thomæ,' 1697, 8vo., a very curious apocryphal gospel. It is reprinted in Fabricius's 'Codex Apocryphus Novi Testamenti,' tom. i., pp. 127-212 Sike also founded with L. Küster, at Utrecht, the literary periodical called 'Bibliotheca Novorum Librorum,' to which he contributed several papers.

(Saxii *Onomasticon Literarium*, v., 490, &c.)

SIKHS. [HINDUSTAN, p. 233.]

SILBURY HILL. [WILTSHIRE.]

SILCHESTER. [HAMPSHIRE.]

SILENA'CEÆ, a natural order of plants, belonging to the syncarpous group of the Polypetalous subclass of Exogens. This order is a part of the larger order Caryophylleæ [CARYOPHYLLEÆ] of Jussieu, and was originally separated by De Candolle. It has since been adopted by Bartling and Lindley in their systematic works. It differs from the remaining portion of the order Caryophylleæ, which are now called Alsinaceæ, in the possession of a tubular calyx, and petals with claws.

SILE'NE, the name of an extensive genus of plants belonging to the natural order Caryophyllaceæ. It is known by its having a tubular, naked, 5-toothed calyx; 5 bifid unguiculate petals, which are usually crowned in the throat with 5 bifid scales; 10 stamens; 3 styles; capsules 3-celled at the base, ending in 6 teeth at the apex. The species are in general herbaceous, many of them are annual, very few shrubby. Their stems are leafy, jointed, branched, and frequently glutinous below each joint. The calyx and leafstalks are also frequently viscous. The leaves are opposite, simple, and entire. The petals are mostly red and white, sometimes greenish or yellowish. Some of them give off a delicious perfume, especially at night. The extent of this genus is very great, and constant additions are being made to it by the collections of travellers. The greatest proportion are inhabitants of the South of Europe and North of Africa. Don, in Miller's Dictionary, enumerates 256 species of this genus; of these we shall give a few examples of the more common and interesting forms.

S. acaulis, stemless Catchfly, or Moss Campion whole plant glabrous, cespitose; leaves linear, ciliated at the base; peduncles solitary, 1-flowered; petals crowned, slightly notched. It is a native of Europe, and is found abundantly on the Alps. It is found on nearly all the Scottish mountains, and also on Snowdon, and the highest hills of Devonshire. Chamisso also gathered it on the islands of the western coast of North America. The flowers are of a beautiful purple colour, and it forms one of the greatest ornaments of our Alpine flora. Several varieties of this plant have been recorded, varying chiefly in the form and existence of parts of the flower.

S. inflata, bladder Campion or Catchfly: stems branched; flowers numerous, panicled; calyx inflated, netted; petals deeply cloven, scarcely any crown; leaves ovato-lanceolate. This is a very common plant throughout Europe, and is met with in almost every field and wayside in Great Britain. Like most plants that are widely and largely diffused, many varieties of it have been recorded. This plant has been recommended to be cultivated in the garden on account of its edible properties. The shoots gathered young, when about two inches high, and boiled, are a good substitute for green peas or asparagus. They are thus eaten by the natives of Zante, and in 1685 the inhabitants of Minorca are said to have been saved from famine, occasioned by a swarm of locusts, by using this plant as food.

S. noctiflora, night-flowering Catchfly: panicles forked; petals bifid; calyx with long teeth, oblong in fruit, with ten connected ribs; leaves lanceolate, lower ones spathulate; whole plant clammy, pubescent. It is a native of Sweden, Germany, and Great Britain; it resembles very much the common red and white campion (*Lychnis dioica*). It is not a common plant, and is remarkable for opening its flowers at night only, and in warm weather, when they exhale a powerful and delicious scent.

S. quinquevulnerata, five-wounded Catchfly. stems branched; leaves lanceolate, lower ones obtuse; calyx very villous, with short teeth; petals roundish, entire, with toothed appendages. The petals of this plant are of a deep crimson with pale edges, giving them the appearance of having been stained with blood in the centre; hence their specific name. It is a native of Spain, France, and Italy, and has been found in the county of Kent in Great Britain. It is frequent in gardens, but loses by cultivation much of the colour of its flowers.

S. muscipula, Spanish or Fly-trap Catchfly: plant smoothish, clammy; stem erect; branches alternate, long; lower leaves lanceolate, upper ones linear; flowers panicled; calyx clavate, netted; petals bifid. It is a native of Spain, with intensely red petals. It is exceedingly clammy, so that when flies alight on it they are caught; and hence the name Catchfly, which is given to the whole genus, though few of the species possess the property.

S. fruticosa, shrubby Catchfly: stem shrubby at the base, much branched, tufted; flowering stems simple; leaves obovate, dark-green, permanent, ciliated, particularly towards the base; flowers crowded; calyx clavate; petals deeply emarginate, obtuse, with 4-parted appendages. This plant is a native of Sicily and of the island of Cyprus, and grows among rocks. It is frequently cultivated in gardens, and makes a handsome ornament.

S. compacta, close-flowered Catchfly plant glabrous-glaucous; stem erect, branched; leaves ovate-cordate, sessile; flowers crowded into dense corymbs; calyx very long; petals entire, obovate, crowned. It is a native of Russia, and very nearly resembles the *S. armeria*, but is distinguished by its entire petals. It is one of the most beautiful of the genus, and deserves a place in every collection of flowers.

In the cultivation of the species of Silene no great art is required. The hardy kinds may be planted in the open border, and the smaller species are well adapted for rock work. The seeds of the hardy annual kinds may be sown in the beginning of the spring, where they are to remain The perennial kinds are best increased by dividing them at the roots in the spring. The greenhouse kinds thrive best in a rich light soil; the cuttings of shrubby species should be placed under a hand-glass.

SILE'NUS (Σειληνός), a Greek deity. The traditions of his birth are various he is said to be son of Pan, of a nymph, of the earth, and to have sprung from the blood of Uranus. He was the instructor of Bacchus, a lawgiver and prophet, sometimes confounded with Bacchus himself, of the family of Satyrs, whom he resembled very much in appearance and habits. He is represented as an old man, bald, with a beard, and depressed nose, sometimes with a tail, at times holding the infant Bacchus in his arms, or with a wine-skin on his shoulders. He has a conspicuous place in the Bacchic chorus, and occurs in various combination with fauns and nymphs. Though endowed with supernatural wisdom, he is of a comic disposition; his whole character is a mixture of jest and earnest; he is harmless, sportive, fond of children, addicted to wine; sometimes he rides on his ass reeling and supported by a satyr; is said to have conducted Bacchus from Thrace to Phrygia; and to have been ensnared by Midas in a garden, and compelled to exert his marvellous power of speech. His discourse was of the second world, of the land of Meropis, and of its strange men, beasts, and plants, of the origin of things and birth of the gods, and he showed the miserable condition of this present life. In all that he uttered was an irony consistent with his motley character. The ass by which he is accompanied has given rise to many conjectures; the Bacchic myths and those of Apollo speak of this animal as sacred to both deities. It may therefore be considered as the link uniting the two worships, and we find accordingly Apollo called the son of Silenus. (Porphyry, *Vit. Pythag.*, p. 10, ed. Rome, 1630.) Attempts have been made by Bochart and others to connect Silenus with the name Shiloh in Scripture, and his ass with that of Balaam. Other imaginary resemblances are noticed by Creuzer (*Symbolik*), founded on the theory that the ass is the symbol of prophecy in the East. The myth of Silenus has been further thought by Creuzer to have reference to cosmogony. He quotes Porphyry (Euseb., *Pr. Ev.*, iii., p. 110, Cologne, 1687) in support of this opinion, and considers Silenus as 'the half-embodied soul of the universe, the struggle of the shapeless into shape, or, to speak physically, the moist breath which, according to the Egyptian and old Ionian philosophies, nourishes the stars.'

This theory is made still further to interpret the connection between Silenus and Bacchus, and the various modes in which he is represented on antient monuments: the arguments on which it rests are however too numerous and intricate to be here entered upon.

The distinction between Sileni and Satyrs does not appear very clearly made out. According to authorities quoted by Creuser, the Sileni are the older of the two. The terms were certainly not co-extensive; that of Satyr may be considered as the genus. They were mostly represented in the same manner, with beards, tails, and pricked ears like beasts. In the procession of Ptolemy Philadelphus (*Athen.*, v. 197) they were dressed differently from each other, and the Sileni have sometimes a more human form. See Creuzer's 'Symbolik,' and Grüber's 'Worterbuch der Mythologie,' for representations of Silenus; Millin's 'Galérie Mythologique,' and the various works on gems, sculpture, vases, and other monuments of classical antiquity.

SILESIA. This country, which is now divided between Prussia and Austria, was once inhabited by the Lygii and Quadi, who, in the sixth century, were forced to yield to the pressure of a Slavonian tribe from Poland, by which event Silesia became subject to that country. Under the dominion of Poland, the Polish language and manners, which still remain in the eastern parts of the province, and the Christian religion, were introduced. To promote the latter a bishopric was founded in 906, at Schmogor, which was afterwards transferred to Breslau. The country being in course of time divided and subdivided among the descendants of Boleslaus III., king of Poland, numerous small principalities arose. Being weakened by these divisions, and by the dissensions between the princes, it was subdued by the king of Bohemia in the fourteenth century. Under the dominion of Bohemia the doctrines of Huss, Luther, and Calvin gained ground, and their adherents obtained the partial exercise of their religion. With the Polish princes Polish manners and customs disappeared; everything was placed on the same footing as in Germany; trade, manufactures, arts, and sciences flourished. The prosperity of the country would have been greater in former times, had not the Protestants been so much oppressed under the Austrian government. Austria, which obtained possession of Silesia, together with Bohemia, in the early part of the sixteenth century, retained it undisturbed till the death of the emperor Charles VI. in 1740, on which Frederic II. of Prussia revived a dormant claim to the western part of Silesia, which he immediately invaded; and the greater part was ceded to him in 1742, and confirmed to him by the treaties of Dresden, in 1745, and of Hubertsburg, in 1763. Austria retained the smaller portion.

SILESIA (in German, *Schlesien*), the Prussian Province of, is situated between 49° 40′ and 52° 8′ N. lat., and between 14° 25′ and 19° 15′ E. long. It is bounded on the north-west by Brandenburg; on the north-east by Posen; on the east by Poland; on the south-east by Cracow and Galicia; on the south by Austrian Silesia; and on the south-west by Bohemia. Including the county of Glatz, and the Prussian part of Upper Lusatia, its area is 15,600 square miles. The province is 210 miles in length from north-east to south-west, and from 70 to 80 miles in breadth from east to west. The river Oder, which becomes navigable soon after entering the Prussian boundary, divides the province in its whole length into two nearly equal parts, which are very different from each other. That on the left bank, which is called the German side, is mountainous, but has a very fertile soil, which amply rewards the labour of the husbandman, and supplies almost the whole province. That on the right bank, called the Polish side, is very different; it consists chiefly of a sandy and not very fruitful soil. There are however some sandy tracts on the German side, and some rich and productive spots on the Polish side. The country is highest on the south-eastern frontier, and declines more towards the north-western frontier, where it is the lowest.

Where the frontiers of Silesia and Bohemia meet, a mountain-chain rises, which extends southwards to the sources of the Breswa and the Ostrawitza, where it joins the Carpathians, divides the basin of the Oder on the one side from those of the Elbe and Danube on the other, and forms the natural boundary between Silesia and Bohemia and Moravia. This chain, called by the general name of the Sudetic chain, is divided into different parts, bearing different names, as the Isergebirge, the Riesengebirge, the loftiest and wildest part of the whole chain, the Schneekoppe, which is 4950 feet above the level of the sea, the Glatz Mountains, &c. In the interior there are some ranges unconnected with the great chain—the principal of which is the Zobtengebirge, 2318 feet above the level of the sea. On the right side of the Oder, from the part where its course is to the northward, the high land disappears, and those immense plains begin which characterise this part of Europe. The Oder, called by the common people the Ader, that is, 'the vein,' comes from Moravia, and receives all its rivers, with the exception of some on the frontiers. The principal are the Elsa, the Klodnitz, the Slober, and the Bartsch, on the right side; the Oppa, the Neisse, the Ohlau, and the Katzbach, on the left. There are few lakes, and those which are so called are rather large ponds. The largest are the Koschnitz, Moswitz, and Schlawer lakes. The last is however four miles in length, but nowhere above a mile in breadth. The climate varies very much in the different parts of the province. The air on the whole is very mild, except in the mountainous tracts; but in proportion as we approach the southern frontier, the temperature becomes lower, and the winter longer and more severe, which is owing to the elevation of the country, to the extensive forests, and partly to the lofty Carpathian and the winds that come from them.

Natural Productions.—The animals are—horses, horned cattle, sheep, goats, swine, game, fish, bees, and domestic poultry. Wolves are found on the Zobtengebirge, otters in the Bober, and sometimes beavers in the Oder. The vegetable products are—corn, pulse, garden vegetables, fruit, flax, tobacco, hops, madder, woad, teazle, and timber. The minerals are copper, lead, cobalt, arsenic, iron, and zinc. This last metal is found in Silesia and in the adjoining republic of Cracow in far greater quantities than in any other country in Europe. Other mineral products are sulphur, marble, alum, lime, and, above all, coal, of which from two millions to two millions and a half tons are annually obtained, which are worth from 100,000*l.* to 130,000*l.* sterling.

Though Silesia is on the whole one of the most fertile and best-cultivated provinces of the Prussian monarchy, and produces much corn, so that in good years it can export a portion to Bohemia, yet, as it is very densely populated, it has not sufficient in unfavourable years for its own consumption, and is obliged to import. The cultivation of potatoes has become much more general of late years.

The manufactures of Silesia are of the greatest importance and that of linen has existed from a very remote time. It is carried on with little aid from machinery, and chiefly by the country-people, though this branch of industry affords them but a scanty subsistence; it is however their chief occupation. Dieterici says:—'A third part of all the looms at work in the Prussian dominions, viz. 12,799 out of 36,879, is in Silesia. The linen annually manufactured in Silesia is estimated at between eight and nine millions of dollars (1,333,000*l.* to 1,500,000*l.*).' Uncertain as such estimates are, the quantity exported may be assumed to be worth between three and four millions of dollars. Woollen cloths are manufactured in some towns, and cottons at Reichenbach. There are sugar-houses in several places; tanneries at Breslau and Schweidnitz, and breweries and brandy-distilleries in most of the towns. With respect to spinning and weaving, we may observe that machinery is beginning to be introduced into some larger manufactories. The population of the province, which at the end of 1837 was stated at 2,679,473, had increased, at the end of 1840, to 2,868,820. They are mostly Germans, and some Slavonians of Polish origin. About half the inhabitants are Protestants, and the remainder Roman Catholics, besides about 18,000 Jews: all have the free exercise of their religion. The province is divided into the three governments of Breslau, Oppeln, and Liegnitz; and has twenty towns with above 5000 inhabitants, as noted in the statistical table in the article PRUSSIA. All the most important of these towns are described under their respective heads.

AUSTRIAN SILESIA is that part of the province which was retained by Austria in the treaty of Hubertsburg in 1763. It is united with Moravia, with which it forms one province. It is bounded on the north-west, north, and north-east by Prussian Silesia, on the east by Galicia, on the south by Hungary and Moravia, and on the south-west by Moravia. The area is about 1750 square miles, with 430,000 inhabitants, who are partly of German and partly of Slavonian origin. Next to the kingdoms of Lombardy and Venice, it is the most densely peopled part of the Austrian dominions

The country is mountainous, and on the south-east are the Carpathians (of which the Sigula is 4300 feet high), and on the north-west the Moravian-Silesian chain, a branch of the Sudetes. Near the Carpathians, and about the source of the Oppa and the Mohra, the climate is cold, and the mountains are partly covered with snow till the middle of June. The southern part of the circle of Teschen is not fruitful, the soil being stony; in other parts it is better. The principal rivers are the Oder, with its tributaries the Oelsa and the Oppa; the Vistula (in German, the Weichsel) rises on the north side of the Carpathians from three sources, called the Little, the White, and the Black Vistula; this last rises in the village of Weichsel, at the foot of the Tankowberg, which village gives its name (Weichsel) to the whole river.

The inhabitants have a very good breed of horses, and of oxen, and especially a very improved breed of sheep. They are very skilful and industrious farmers. The manufactures, especially those of linen and woollen cloth, are very important. The exports are linen, thread, woollen cloth, wire, paper, earthenware, cheese, flax, rosoglio, &c. The transit trade is very profitable: the chief articles are Hungarian and Austrian wines, Russia leather, tallow, linseed, and furs; Galician rock-salt, Moldavian oxen, Vienna fancy-goods, &c. [MORAVIA; TESCHEN; TROPPAU.]

SILEX. [SILICIUM.]

SILHET, or SYLHET, is a district of Bengal, lying along its eastern border, on the east side of the Megna, as the lower course of the Brahmapootra is called. Up to the year 1830 it consisted only of what must now be called Silhet Proper, or a country situated between 24° and 25° N. lat., and 91° and 92° 30′ E. long., which, according to the most recent information, contained about 4500 square miles, and a population of 1,083,120, which gives 241 to the square mile. It is about 1300 square miles less than Yorkshire, but more populous, as Yorkshire, in 1831, did not contain more than 235 persons to the square mile. In 1830 the royal family of Kashar, a country east of Silhet, became extinct; and a few years later the raja or sovereign of Jyntea, a country north of Silhet, was obliged to give up his territory to the British, and both countries were annexed to Silhet. These two countries taken together are at least three times as large as Silhet Proper, and the district at present contains about 18,000 square miles, or two-thirds of the area of Ireland. Silhet, in this extent, lies between 24° 10′ and 26° 20′ N. lat., and between 90° and 94° E. long. On the west it borders on Bengal, on the district of Mymansing, and on the mountain-region of the Garrows; on the north on Asam, on the east on Muneepoor, and on the south it is bounded by the unknown region called the Tiperah Mountains or Wilderness. It is only towards Muneepoor that it has a natural boundary, which is formed by the course of the river Barak, where it runs from south to north, east of 93° E. long., and by two of its confluents, the Jeeree, which joins it from the north, and the Tooyaee, or Chikoo, which falls into it from the south.

Surface and Soil.—Silhet is naturally divided into two regions. The northern part is a mountain region, which extends along the southern boundary of Asam, and divides that large vale from the valley of the Barak, which river, as far as it drains Silhet, runs through a wide valley that constitutes the low and level portion of Silhet. The mountain region comprehends about two-thirds of the country, or 12,000 square miles, and the plain about one-third.

The *Mountain Region*, of which Silhet now comprehends nearly one-half, extends along the southern border of Asam, and at its most eastern extremity, near 97° E. long. and 28° 40′ N. lat., at the sources of the Lohit river, or Brahmapootra, it is united to the high table-land of Central Asia. Its western extremity comes close to the Brahmapootra, where this river, after leaving Asam, forms its great bend to the south (90° E. long.). The western portion of this extensive mountain region is called the Garrow Mountains, which are considered to extend eastward to the river Patli, which, traversing the mountain region in a southern direction, joins the Soorma near the town of Laour (91° 10′ E. lat.). The most western offset of the Garrow Mountains skirts the banks of the Brahmapootra, between the mouth of the river Lalu and the village of Mahendragandj, a distance of about twelve miles. Along the banks of the river the mountains are merely rocks, from 150 to 200 feet above the level of the river, rising with a steep ascent. They are called the Caribari Rocks, from a small town situated somewhat to the south of their southern termination. But in proceeding farther east, the mountain-mass rises gradually in elevation, and occupies a greater breadth. In 90° 20′ E. long. it has attained a general elevation of more than 2000 feet above the sea-level, and occupies a width of about 50 miles. We are only acquainted with the outer border of this mountain-mass, where it consists of ridges broken by numerous watercourses, and is entirely covered with trees and dense underwood. Some isolated peaks rise 2000 feet above the general level of the mass. According to information collected from the natives, the interior of this elevated region is nearly a level table-land, destitute of trees, and covered only with grass; and this is probable, as it corresponds to the characteristic features of the mountain region farther east. Only the lower portion of the Garrow Mountains is subject to the British, and united to the three divisions of Bengal, Rangpoor, Mymansing, and Silhet. The interior, called Gonaser, or Ganeswara, is occupied by the Garrows, a mountain-tribe which has never been subjected by the princes of Bengal, as the country is only accessible by long and winding mountain-passes, which are so narrow as to be impracticable for horses or other beasts of burden: they are properly only paths over rugged crags, and along steep precipices, and through extremely narrow gorges. From these fastnesses the Garrows make incursions into the adjacent countries, and hence several tracts of some extent along the boundary of their country have been entirely abandoned. They cultivate rice, millet, and cotton, and use as food several plants which grow wild in the forests, as different kinds of arum, caladium, and dioscurias. They cultivate capsicum, onions, and garlic. They keep cows, goats, hogs, and eat cats, dogs, foxes, and snakes. Different kinds of deer are said to be common in Gonaser.

Adjacent to Gonaser on the east, and only separated from it by the river Patli, is the mountain region of the Kasias (Cossyas), which extends eastward to the river Kopili, an affluent of the Deyung, which falls into the Brahmapootra. This mountain region runs above 100 miles east and west, between 91° 10′ and 93° E. long.; and in proceeding eastward it gradually enlarges in breadth from 50 miles to about 70 miles. This portion of the mountain region is much better known than Gonaser, being subject to the British, who have traversed it at two places in passing from Silhet to Asam, and who have erected on it several sanatory stations, among which that of Chirra Punji is very much frequented. The western road leads from Pondua in Silhet, through Chirra Punji, Moiplong, Lombray, and Nungklao, to the banks of the river Kailasi, an affluent of the Brahmapootra, and to the low land of Asam. The traveller, passing by a steep ascent over four ridges, arrives at Chirra Punji, which is 5000 feet above the sea-level. Here begins a table-land, the surface of which is often level, but generally exhibits very gentle slopes, which continues to Nungklao. The most elevated points are at Moiplong (5942 feet) and Lombray (5914 feet). At Nungklao it is only 4550 feet. North of the last-mentioned place it sinks by three wide terraces with steep descents to the plain of Asam. The table-land is entirely destitute of trees and bushes, especially in the southern parts. This sterility, as Fisher thinks, is closely connected with the character of the sandstone-rocks of which the mountain-mass is composed, and with the disturbance of the strata, but more especially the latter; for where the strata are horizontal, there is an absence of vegetation, and where the strata are inclined, symptoms of fertility begin to show themselves. Throughout the ascent from the plains of Silhet to Chirra Punji, the vegetation is only dense on the slopes; and where ledges or steppes occur, it is comparatively barren. The table-land itself is covered with a short turf, and there occur only a few bushes, as raspberries; stunted fir-trees only occur in the glens which are formed by the river-courses—as, for instance, in that of the Bogapani. To the north of this river the aspect of the country changes gradually; and though the elevation is greater, the vegetation increases, and continues to increase, until in the vicinity of Nungklao it becomes abundant, though it does not exhibit that excess which prevails farther to the north, on the lower descent of the table-land towards Asam. This change is attributed to the numerous large granite boulders which are scattered in great abundance over the country. The disintegration of these boulders has largely contributed to the formation of the soil, especially where it has been favoured by the configuration of the surface. But in those tracts where there are no boulders, and the strata preserve their horizontal position, vegetation is deficient. The climate at Chirra Punji is very temperate and pleasant, especially between November and March. Neither snow nor frost occurs; but in December and January hoar-frost is very common. The sky is generally clear, but violent showers frequently occur. The almost continual coolness of the air, and the absence of frost, has pointed out this place as a convalescent station. Near Moiplong however frost occurs even in November, as the thermometer then descends to 21°. Nungklao has a more pleasant climate. The earlier part of the summer is not much warmer at that place than in London, as the thermometer ranges between 65° and 74°.

Cultivation appears only on the southern declivity, and in the neighbourhood of Nungklao, where rice is grown in considerable quantity. On the southern declivity of the mountain-mass many fruits are cultivated, as oranges, plantains, and the areca palm; and much honey and wax is collected. On the northern declivity, where fir-trees cover large tracts of land; European fruit-trees grow, especially apples, pears, and plums, and also strawberries and raspberries. The eastern road traverses the Kasia Mountains, between 92° and 92° 20′ E. long., from the town of Jynteapoor, the capital of the former kingdom of Jyntea, to Raha Choky in Asam, situated where the Deyung unites with the river Kulung. The southern edge of the mountain region, which is only a few miles distant from Jynteapoor, seems to be formed by a ridge which is considerably elevated above the table-land farther north, and which is traversed by the mountain-pass of Mutagul. North of this ridge lies a plain, about 2000 feet above the sea-level, whose surface is undulating, and in some parts hilly, but it is covered only with thick grass, without bushes or trees, except that in a few places, and at great distances from one another, small groves of firs or other trees are met with. It certainly might be used as pasture-ground, especially as the climate is very mild; but the few inhabitants say that they are prevented from keeping cattle by their neighbours, who frequently make predatory incursions into their country. This table-land occupies a width of 50 miles along the road. The northern edge is less distinctly marked, and the descent occupies about twelve miles. The nature of the table-land precludes agriculture; but in the northern districts rice is raised in considerable quantity, particularly in the small glens and on the sides of the valleys, where irrigation is practised, water being brought to the fields through narrow canals, and conveyed over hollows and up heights for short distances by means of trunks of trees and bamboos. Rice and yams are cultivated, and a kind of coarse silk called *mong* is collected on the trees.

That portion of the mountain region which lies east of the Kopili and Deyung rivers, and extends eastward to the river Dooyong and the boundary of Muneepoor, comprehends Upper Kachar, and is called the Kachar Mountains. It is likewise a table-land, the southern edge of which is marked by an elevated range, which continues to run east to 93° 12′ E. long., when it turns north-east and continues in that direction till it approaches 94° E. long., where it again runs east and stretches into an unknown country. Where this range runs north-east it is called the Bura Ail Mountains, and attains a mean elevation of 6000 feet above the sea-level. It is covered with large trees and light underwood. The southern declivity of the Bura Ail Mountains is very little known, but it seems to be certain that this side of the range is intimately connected with the three ridges which traverse the western portion of Muneepoor, and by running north and south unite the mountain region which we are now noticing with the extensive mountain-system of Tiperah. The ridges are called, from west to east, the Keibunda, Kubitshing, and Muneepoor Mountains. These chains and their numerous short offsets render the western portion of Muneepoor a rapid succession of elevated ridges and deep and narrow valleys. The country which lies north of the Bura Ail Mountains, both near the range and to the distance of 10 or 12 miles, is covered with the high offsets of the range, and has an entirely mountainous character. North of this comparatively narrow mountain-tract the surface of the country is hilly. Most of the hills are isolated, but in some places they form ridges. This hilly tract occupies a width of about 20 miles, and it is followed by a plain. Both the hilly and level country are almost entirely covered with forests. The northern edge of the table-land is marked by a range of low hills, and a gentle descent, the greater part of which seems to skirt the southern banks of the Sumoona, an affluent of the Deyung, the country north of that river constituting a portion of the plain of Asam. It is much more thickly inhabited than the table-land of the Kasia Mountains. A very large portion of it is fit for agriculture, and the small progress that both agriculture and population have made is mainly if not exclusively to be attributed to the unsettled state in which the country has been for a long time, under the sway of petty sovereigns, who were never able to defend their subjects against the incursions of the bold tribes who inhabit the mountains, especially the Angamee Nagas. Some large tracts are quite uninhabited, though the vigorous growth of the trees shows the excellent quality of the soil. But along the large rivers and in their neighbourhood cultivated tracts and villages are numerous, and will increase, since the British have compelled the Angamee Nagas to keep quiet. The inhabitants cultivate rice, and in the valleys of the hilly and mountainous part of the country several kinds of coarser grain are grown; there is also a very fine-flavoured kind of purple vetch. About the villages of the more elevated region there are groves of peach-trees in the most luxuriant state, and the apple-tree grows wild and produces a well-tasted fruit. The bay-leaf and a very small kind of orange are also natives of these mountains. Cloth is made of a nettle, which is procurable in great abundance. On the lower hills cotton and chillies are grown as articles of commerce, and in these parts also much wax and honey is collected. The cultivation of the lower and level country resembles that of Asam, being similar in climate and soil, but no part of it is subject to annual inundations.

The Plain.—Along the southern base of the mountain region hitherto noticed there is a plain, or rather a vale, for along its southern side the mountain-system of Tiperah rises to a great height. The length of this vale may be about 120 miles, and the width in the western half about 50 miles on an average, but towards the east it narrows to 30 and even 20 miles, until it is shut up by the Keibunda range, which lies near the boundary and within the territories of Muneepoor. As to the configuration of its surface and the capacities of the soil, it may be divided into two portions. A line drawn from Chattac on the Soorma, south-west of Pondua (91° 40′ E. long.), passing in a south by west direction west of Tajpur, through Nubigunj and thence to the hills south-east of Turruf near the Tiperah Mountains, very nearly separates these two tracts. The country west of this line is very low and level, and constitutes properly a portion of the lower portion of the plain of Bengal. It is in most parts marshy, and the whole is subject, like the greater part of Lower Bengal, to periodical inundations of long duration, being in general under water from April to the middle of November. These inundations are partly the effect of the heavy rains which fall during the south-west monsoon, and partly of the immense volume of water which is brought down by the rivers during that season, especially by those which drain the mountain-system of Tiperah, the Manu, Khwa-hi, and Cognati. This lower tract is called Bhatta. The towns and villages, which in some parts, especially to the south, are numerous, are built on mounds of earth; huts, temples, mosques, and sheds for cattle are huddled together. When the inundations are at their height, there are from 8 to 12 feet water on the lower grounds. As soon as they have sufficiently subsided, or in the beginning of November, such lands as are high enough for the purpose are sown with rice and millet; the crop is cut in April. The lands yield only one crop. There appear occasionally a little sursoo and hemp, with some gourds and cucumbers about the huts. The marshes are however filled with cattle, from which profit is derived sufficient to make the occupation of these desolate tracts desirable. Ghee and cheese are made from the milk of buffaloes and cows, and the upper country, which lies farther east, is furnished with young bullocks for the plough. During the inundations the cattle are confined to the sheds and feed on green fodder brought in boats from the jhils or marshy tracts.

From this low country a few tracts of low and level land extend eastward of the line above indicated. They run up for several miles, more especially between the courses of the great rivers, where they form jhils of great depth, which are uncultivable. The remainder of the eastern division has a higher level, and rises gradually towards the mountains on both sides. This country is in general dry, though there are some marshes of small extent. The surface of this division presents great irregularities. It is crossed by several ranges of alluvial formation, which run up into ridges from one to three hundred feet high, and the valleys between rise gently towards each side. The banks of the Soorma and all the mountain rivers are also considerably elevated above the general level; the tracts which lie near the swampy places, and are not much elevated above their level, are under water for some weeks, and yield only one crop. They are sown in January, and the short inundation does not damage the grain. The crops are much more abundant than in the Bhatta. The more elevated parts, which are never inundated, and especially the slopes of the ridges, yield two crops of grain, which are generally good. Some experiments which have been made show that wheat, barley, oats, and potatoes might be raised. All the grains found in the plains of the Ganges are cultivated. Indigo is not cultivated, but an excellent dye very similar to it is obtained from a plant which grows wild on the hills. Poppy, sugar-cane, safflower, sursoo and other plants yielding oil, and also hemp and flax are grown. Orange-trees and the areca are cultivated on the declivities of the Kasia Mountains, and large quantities of the produce are annually sent to Calcutta and other places in Bengal. Areca of inferior quality is found all over Silhet, but it deteriorates in quality towards the east, and in Kachar it wholly disappears. Among other fruits the plantain is particularly fine, the lemon grows wild in the Kasia Mountains, and the apricot and lichi in those of Kachar. It is thought that the tea-plant would succeed in some of the alluvial soils of Kachar or Tiperah.

The Tiperah Mountains, which lie to the south of the plain hitherto noticed, belong to Silhet only so far as a portion of their lower declivities is included within the boundary of the district. We are not acquainted with the interior of this extensive mountain-system. The central parts, between 23° and 24° N. lat. and 91° and 94° E. long., probably attain a great elevation, which may be inferred from the great volume of water brought down by the rivers which fall from the south into the Soorma and Kusiara, as the Delaseri, the Sungai, the Munu, the Khwa-hi, and the Cognati; and from their rapid course. During the rains each of these rivers discharges on an average a volume of about 25,000 cubic feet per second, though none of them are more than 50 yards wide. It is certain that they have a long course, and descend from a very elevated country. The northern portion of this mountain-region, towards Silhet, as well as that which towards the south enters the district of Chittagong, consists of ranges running south and north, divided by wide valleys. Some of these ranges enter the northern plain, as the Banca Mountains, which extend along the western banks of the Delaseri, and the Bokman range in Kachar, which compels the river Barak to change its southern course into a northern one. Immense masses of lava occur even on the northern ranges of the Tiperah Mountains, and it is supposed that this is the termination of the long series of volcanoes which stretch from the island of Java northward through Sumatra, Barren Island, the island of Narcondam, and those of Chedubа and Ramri on the coast of Arracan, where the traces of volcanic agency are lost: they appear again in the Mountains of Tiperah. The southern declivities of the Tiperah Mountains are noted for immense forests of bamboo and large herds of elephants. The northern declivities are also covered with forests of trees and bamboos, from which the inhabitants of the plain derive great profit, but they resort also to these hills to cultivate cotton, which does not grow in the plain. The quantity of cotton which is raised is barely sufficient for domestic consumption. It is short in staple, but the cloths made from it combine warmth with lightness.

Rivers.—The largest of the rivers of Silhet is called in the upper part of its course Barak, and in the lower part Soorma. The Barak originates in the mountain region north of the plain of Muneepoor [MUNEEPOOR], near 25° 30′ N. lat. and 94° 20′ E. long., and traverses in a south-west and south by west direction the mountain region which connects the Tiperah Mountains with the Bura Ail range. After a course exceeding a hundred miles, it meets with the Bokman ridge of the Tiperah Mountains, which compels the river to change its southern into a northern course. Flowing in that direction 30 miles, it turns round the northern extremity of the Bokman ridge westward, and thus enters the plain, where it begins to be navigable, a few miles above Lukipoor. It runs westward with numerous windings through the upper plain in one channel for 40 miles, but having passed the northern extremity of the Banca ridge, it begins to divide at Banga. In these parts the name of Soorma begins to prevail. The northern arm, or the Soorma, flows along the southern base of the Kasia Mountains with numerous windings, sometimes approaching the hills and sometimes receding from them, until it reaches the town of Sonamgunj after a course of 90 miles, when it turns southward, and in that direction traversing the lower plain, joins the southern arm after having run 70 miles. The southern arm of the river branching off at Banga bears different names, but in its upper course it is generally known by that of Kusiara, and in the lower by that of Barak or Brak. Its direction through the plain is west-south-west for about 100 miles, when it joins the Soorma, and the united river joins the Megna near Sunerampoor by a more southern course of about 20 miles. These appear to be the principal branches of the river, but both of them divide and subdivide again so frequently, that the whole of the lower plain is traversed by numerous watercourses, all of which join, either singly or united, the Megna between the town of Caribari and that of Sunerampoor, which are more than 100 miles from one another. Nearly all these watercourses are navigable for boats, and greatly facilitate the transport of grain from the upper plain of Silhet to other districts of Bengal. It is observed that these rivers are subject to change their beds in the districts which approach the Megna, which is the case with the Soorma itself below Azmerigunj.

Of the rivers which join the Brahmapootra or Lohit, we shall only mention the Dooyung and the Deyung. The first-mentioned river, which falls into the Brahmapootra west of 94° E. long., probably rises north east of the source of the Barak, but its source has not been ascertained. Its course is nearly due north, and about 30 miles from its mouth it is joined on the left by the river Dhunsiri, which rises in the Bura Ail Mountains, and skirts their northern declivity for more than 30 miles. The Dooyung, as well as the Dhunsiri, is navigable. The Deyung rises in the Bura Ail Mountains near 93° E. long., and after having been joined by some small rivers it becomes navigable about 20 miles below its source at Aloogong (25° 25′ N. lat.), and continues to be navigable to its mouth, with the exception of one place, where a ledge of rocks traverses the bed of the river. The Deyung is joined from the left by the Kopili, and from the east by the Soomoona river, of which the latter is navigable about 30 miles above its mouth. It is not known how far the Kopili is navigable, but this important point will soon be ascertained, as it is supposed that a good road, made between the places where the Kopili and the Jatinga, an affluent of the Barak, become navigable, will establish an easy communication between Asam and the plain of Silhet.

Climate.—The climate of the lower plain does not appear to differ in any respect from that of Bengal [BENGAL, vol. iv., p. 230]; but the upper plain has the advantage of earlier rains, which begin to fall in February, and become more abundant in the following months. Owing probably to these rains, the lower plain of Silhet is under water earlier than that of Lower Bengal.

Productions.—In the forests of the Tiperah Mountains there are herds of elephants, many of which are annually sent to Calcutta, where however they are reckoned inferior in size and quality to those brought from Chittagong. Among the minerals the chunam, or lime, perhaps is still the most important, as large quantities of it are taken from the lime-hills which skirt the Garrow and Kasia Mountains at Pondua and farther west, whence it is conveyed by water to Calcutta and other places in Bengal. Many years ago coal was discovered in the Garrow and Kasia Mountains, but it was not turned to any profit until the introduction of steam-navigation. It is now known that coal is found on the table-land of the Kasia Mountains at Chirra-Punji and Serarim, and at the base of these mountains near Silhet and Laour. But none of these coal-deposits seem to be extensive. It is however stated that those which occur in the Caribari Hills and along the southern boundaries of Asam, both which localities are within the Garrow Mountains, are not inferior in extent to any in England. Iron-ore is abundant in the Kasia Mountains north of Chirra-Punji, where it is worked, and whence iron is sent to Bengal.

Inhabitants.—The inhabitants of Silhet Proper are Bengalis, and hardly distinguishable from that race in the districts farther west. But among them there are also many families of Hindustani and Persian origin, who are distinguished by their features and the stronger make of the body.

The Kacharis form the bulk of the population in Kachar, but they are also found in Asam and Tiperah. They constitute a distinct people, differing in appearance, religion, and customs from the other inhabitants. The antient religion of Kachar is different from Brahmanism. It acknowledges a Supreme Being, or first principle, from which the world and all that it contains is derived. The manifest powers of nature are worshipped, or rather, certain spirits who have authority over them and influence the changes of the seasons. But in modern times Brahmanism has gained footing, and is spreading. The Kacharis have a distinct language, but as it is unwritten, it has been superseded for all purposes of business by the Bengali for many centuries, so that at present the language is not known by many of the Kacharis themselves. The Kacharis are industrious agriculturists.

The Kasias, commonly called Cossyas, call themselves Khyee, and inhabit the mountains, which have obtained their name from this nation. They are an athletic race of mountaineers, fond of martial appearance, and their reputation as warriors is hardly extinct, for their extensive predatory inroads are still remembered in Silhet and Asam. Their religion is limited to certain superstitious practices, and to reverencing and sacrificing to the presiding deities of villages, hills, and similar localities, without the knowledge of a universal and all-pervading intelligence. Brahmanism has made some progress among the Kasias, especially those of Jyntea, but it has not led to the entire abolition of their national superstitions, connected with which was the practice of human sacrifice. The Khyee language is unwritten, and exhibits no affinity to any of the neighbouring languages, some of which, numerous and diversified as they are, contain various indications of a common origin. No great respect is paid by the Kasias to hereditary chiefs, though their rank is readily admitted, but their influence depends more on their personal character and their power to direct the public assemblies without which nothing is determined either in the community collectively or in the several villages. It was reserved to the British government to subdue the martial disposition of this people, and to compel them to discontinue their predatory incursions into Silhet and Asam. Polyandry is said to exist among the Kasias, but if it is still in use, it is far from being general.

The Nagas are another race of mountaineers, consisting of numerous small tribes, which extend from the southern border of the vale of Asam, east of the Kopili river, to the eastern portion of the Tiperah Mountains. On the north-east they appear to be neighbours of the Khamtis. They are generally associated with the Kukis, from whom however they differ essentially in language, customs, and appearance. Though in general tall, well made, and often powerful men, the limbs of the Nagas have not the massive configuration of those of the Kukis and other hill-men. It appears from the features of their face that they belong to the Mongolic race. The Nagas are not a migratory or wandering people, like the hill Kacharis and Kukis, who continually change their locality, and seldom keep their villages more than three years in one spot, whilst the Nagas remain fixed. All their villages are built on the tops of the mountains, and fortified with stockades and a ditch. Like the nations that inhabit the peninsula beyond the Ganges, they eat all kinds of animals, tigers, elephants, hogs, dogs, cats, monkeys, and even serpents. It is certain that the different dialects which are spoken by them differ so much that several tribes living not far from one another can have no intercourse without an interpreter. Several of their tribes are much addicted to plundering. In 1839 some troops were sent by the British against the Angamee Nagas, who inhabit the mountainous country north of the Bura Ail range, and had become very troublesome to the Kacharis who inhabit Upper Kachar.

The Kukis inhabit the Tiperah Mountains. A few families of this race, which are found in Upper Kachar, have been transplanted to that country in modern times. Though short of stature, they seem to be the most powerful of all the mountaineers in that part of the world, and have long been notorious for their attacks on the peaceful inhabitants of the plain, not for the purpose of plundering them, but in order to kill them and carry off their heads. These heads are used in certain ceremonies which are performed at the funerals of their chiefs. In this particular, and also in their features, which approach those of the Chinese and other nations of the Mongol race, they resemble the Garrows, who also, like the Kukis, eat all kinds of animals. But both nations, as well as the Nagas, and the Mugs in Arracan, cannot be induced to take milk or anything made of it. This similarity in customs, and also in their physical character, leads to the conclusion that all these nations belong to the same race of which the Chinese constitute a branch. It is however remarkable that the Garrows are separated from those nations by the Kasias and Kacharis, who differ in the conformation of their bodies, and among whom all the customs just enumerated are unknown. It is nearly certain that the Kukis are cannibals.

Political Divisions and Towns.—That portion of Silhet which forms a part of the British possessions contains the district of Silhet, and the two countries of Jyntea and Káchar, which have lately been annexed to it.

1. Silhet comprehends the whole of the lower and a part of the upper plain as far east as the Banca Mountains or the Delaseri river. It seems to contain many small towns, and some of considerable extent. The largest is probably Baniachung, situated in the low plain between the Soorma and Brak rivers. It is the residence of the raja of Baniachung, the greatest land proprietor in Silhet, and is a large place, containing a great population. The town of Azmerigunj, west of Baniachung, on the banks of the Soorma, is a place of considerable inland traffic, with a boat-building establishment for the construction of native craft. The town of Silhet is built on the upper plain, on the banks of the Soorma, and is the seat of the local government. Laour, farther west, at the foot of the Garrows Mountains, carries on a considerable commerce with the Garrows, who bring cotton, wax, and honey, which they exchange for salt and some cotton-cloth and brass ornaments. Lime is sent from this place to Calcutta. Pondua, a small fortress, at the base of the Kasia Mountains north-north-west of Calcutta, is the market for the Kasias, who inhabit the western part of the mountain region. They exchange wax, honey, oranges, areca nuts, cassia, and other products of their country, for cotton stuffs, salt, rice, and other provisions.

2. Jyntea lies north of the upper plain of Silhet, of which a small portion also belongs to it, and it extends northward to the boundary of Asam, where also a part of the low and flat country was subject to its raja, but the greater portion of this country was in the Kasia Mountains, and the Kasias constituted the principal population of the raja's territory. Eastward it extended to the Kopili, or the boundary of Kachar; and on the west it was separated from the mountains inhabited by the Garrows by two smaller countries, called Koiram and Dulla, whose sovereigns however seem to have been dependent in some degree on the raja of Jyntea, as they now are on the British. Jynteapoor, the capital, is built not far from the southern declivity of the Kasia Mountains in the plain, about 20 miles to the north of the town of Silhet. The convalescent station of Chirra Punji is in the territories of the raja of Koiram, and that of Nungklao is in those of the raja of Dulla.

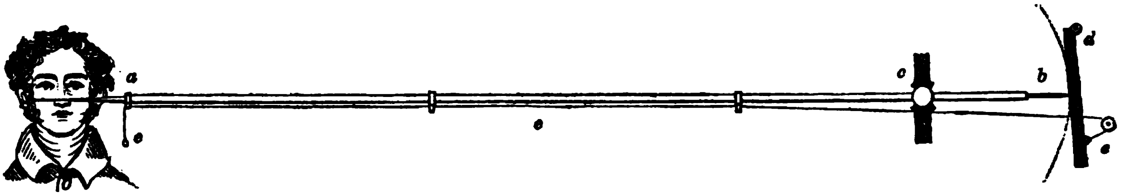
3. Kachar, or Kirumbha, extends over the larger part of the upper plain, and the whole of the mountain region which is east of the Kopili and west of the Dooyong. But within these boundaries are the territories of the Tooleram raja, and the country inhabited by the Angamee Naga tribe, which is quite independent, whilst the Tooleram raja is dependent on the British. The country is chiefly inhabited by Kacharis, among whom many Naga tribes are dispersed, and also a number of Kukis, Bengalis, and fugitives from Muneepoor. Kachpoor, the capital, is on the plain between the banks of the Barak river and the base of the Bura Ail range: it is a poor place. East of it, and south of the pass of Haflong, is the village of Oodarbund, which is much resorted to by the Naga tribes, who exchange cotton, ivory, wax, and chillies, for salt, dried fish, conch shells, beads, and brass ornaments. But the chief part of the cotton collected in these parts is brought in boats to Raha Chocky in Asam.

History.—Silhet Proper seems always to have been subject to the sovereign of Bengal, and it passed with that province under the dominion of the British: but it does not appear that any portion of the mountain region, or even Lower Kachar, has ever belonged to any sovereign of Hin dustan. Some centuries ago however the greater part of these countries was included in the empire of Kamroop, which also extended over the greater part of Asam. This empire fell to pieces, and then the kingdoms of Muneepoor, Kachar, and Jyntea were formed. Continual disputes in the reigning families rendered them weak, but the difficulties of entering their country with an army secured them against foreign invasion. The English, after taking possession of Bengal, did not pay attention to these countries, considering this frontier sufficiently defended by the weakness of their neighbours. In 1774 they punished the Kasias of Jyntea for their predatory incursions by taking possession of that country, but restored it to the raja on payment of a fine. The Burmese, taking advantage of disputes in the royal family of Muneepoor, possessed themselves of that country, and at last (1820) declared it to be a part of their empire, and they soon after sent an army from Birma, and another from Asam, to the conquest of Kachar. Upon this the sovereign of that country and the raja of Jyntea placed themselves under the protection of the British. During the war with the Burmese, the possession of these countries was obstinately disputed, but by the peace of Yandaboo (1825) they were given up to the British, who restored them to their legitimate sovereigns. In 1830 the raja of Kachar, Govind Chandra, died, without leaving any issue, and the East India Company took possession of Kachar. A few years afterwards the raja of Jyntea was deprived of his country on account of his crimes and his cruelty, and since that time both countries have been united to Silhet.

(Walter's *Journey across the Pundoa Hills*, in *Asiatic Researches*, vol. xvii.; Pemberton's *Report on the Eastern Frontier of British India;* MacClelland, *On the Difference of Level in Indian Coal-fields*, in *Journal of the Asiatic Society of Bengal*, 1838; Grange's *Narrative of an Expedition into the Naga Territory of Asam*, in *Journal of Asiat. Society of Bengal*, 1839; Fisher's *Memoir of Sylhet, Kachar, and the adjacent Districts*, in *Journal of the Asiatic Soc. of Bengal*, 1840; Wilson's *History of the Burmese War.*)

SILHOUETTE, a name frequently applied to the black profile portraits commonly known simply as *profiles* or *shades*. The latter name indicates the origin of this simple class of pictorial representations, they having been probably suggested by the shadow thrown upon a wall. Beckmann, in his paper on 'Plant Impressions' (*Hist. of Inventions*, English edit. of 1814, vol. iv., p. 621), observes, in reference to such productions and profile portraits, 'If it be true that the extreme boundaries of all things approach or touch each other, one might almost believe that the arts of drawing and engraving on copper must have attained nearly to the highest degree of perfection.' 'At present,' he continues, 'while we have among us a Tischbein, a Haid, and other great artists, whose portraits of the persons whom they honour with their pencil or graver are such striking likenesses that they appear to live, we return again to the commencement of the art of drawing, the paltry outline of a shadow, like the love-sick daughter of Dibutades, and think we ornament our apartments and books with these dark and dismal profiles, and that we can discover by them the talents and disposition of the persons they are supposed to represent.' The name *silhouette* has been said to be derived from Etienne de Silhouette, French minister of finance in 1759. It appears that several parsimonious fashions introduced during his administration, in order, by severe economy, to remedy the evils of a war that had just terminated, were called, after this minister, *à la Silhouette;* and that the name has continued to be applied to one of them,—the use of profiles in shade.

Silhouettes are executed in various ways. One of the simplest is that of tracing the outlines of a shadow thrown on a sheet of paper, and then reducing them to the required size, either by the eye or by means of a pantograph. [PANTOGRAPH, vol. xvii., p. 192.] Another mode is tracing the outline upon a glass supported in a suitable position, and either coated with a solution of gum-arabic in water, in order to enable a lead pencil to mark upon it, or covered with a sheet of very thin tracing-paper. The camera-obscura and camera-lucida are also occasionally used for the purpose. A more certain mode of obtaining an accurate outline is by the use of the machine invented for the purpose by Mr. Schmalcalder, and patented by him in 1806. The principle of this machine is very simple, and may be readily understood by the aid of the annexed diagram. *a b* is an inflexible rod, usually about nine or ten feet long, supported by a ball-and-socket joint at *c*, in such a manner as to leave the ends free to move in any direction. At the end *a*, a *tracer*, which is tapered off to a fine point, is attached to the rod, so as to form a continuation of it; while at the opposite end, *b*, a steel point is similarly fixed. The person whose profile is required is seated, in the position indicated in the cut, in a chair having a rest for the back of the head, in order that he may sit perfectly still, while the operator gently passes the side of the tracer, *a*, over his features. By the intervention of the universal joint at *c*, a perfectly similar motion is communicated to the steel point at *b*, although, owing to the pivot being placed nearer to it than to the other end of the rod, it moves in a path smaller than that of the tracer *a*. The pivot *c* being stationary, the steel point at *b* moves in the arc of a circle of which it (the pivot) is the centre, as indicated by the dotted line in the diagram; and therefore, in order to keep the paper always in contact with it, it is fixed on a swinging board, pivoted at *d*, and constantly pressed against the steel point by means of a weight or spring, with a sufficient degree of force to make it act efficiently. The steel point does not come into immediate contact with the white paper, but with a piece of blacked paper placed over it, the pressure of the point transferring a sufficient quantity of the colour to form a distinct line. This part of the operation resembles that of a manifold-writer; and, as in that instrument, several copies may be produced simultaneously, by using a number of pieces of white and blacked paper, laid alternately upon the swinging board. The size of the reduced outline drawn on the paper may be regulated by varying the relative proportions of *a c* and *c b*; this and several other adjustments being effected by apparatus which it is unnecessary here to detail. By means of a cord *e e e*, held in the hand of the operator, the swinging board *d* may be drawn back from the steel point when it is required to move the rod without making a mark upon the paper. As it is desirable to have the tracer *a* of small diameter, it is usually formed of steel, and carefully tempered, to avoid the risk of breakage. Greater accuracy may be attained by substituting for the tracer a thin wire, tightly stretched in a bow, and adjusted so as to coincide perfectly with the axis of the rod. Some friction may be avoided by using a double-swivel joint, instead of the ball-and-socket, at *c;* but whatever kind of pivot be adopted, great care should be taken to have it perfectly accurate, as any defect in it will produce a distorted drawing. When the outline of a profile is obtained by any of the means just described, it requires to be carefully filled in with colour by hand. In some cases, in the use of Schmalcalder's machine, a kind of knife is substituted for the steel point at *b*, and the profile is thus cut out of a piece of thin black paper placed on the swinging board. This machine may also be used for making reduced copies of drawings or prints, by attaching a suitable tracing-point at *a*, and fixing the original drawing on a second swinging board in contact with it; the operator guiding the tracing-point over all the outlines that he wishes to copy. Some profilists display considerable talent in cutting silhouettes by hand, with a pair of scissors, out of pieces of black paper, without the assistance of an outline.



Although silhouettes have no claim to the character of works of art, they frequently convey a very good idea of the person represented; and they may be made even elegant in appearance. Some of the best profilists greatly improve the appearance of their silhouettes by adding the principal markings of the hair and drapery, which, if judiciously done, has a very good effect. Of the great extent to which this kind of portrait has been patronised, some idea may be formed from the fact that Mr. Schmalcalder has made and sold nearly a hundred of his machines.

SILI'CIUM, or **SI'LICON**, the base of the well-known earth Silica or Flint. By some chemists it is regarded as a metal, and hence the termination of its name in *um*, while others consider it as non-metallic, but more allied to boron, and these adopt the term *Silicon*.

Sir H. Davy, by acting upon Silica with potassium, arrived at the conclusion that it was an oxide, containing a peculiar inflammable base, to which he gave the name of Silicium; the accuracy of this determination has since been demonstrated by Berzelius.

In Davy's experiments the silica yielded its oxygen directly to the potassium. The process of Berzelius was different: he prepared it more advantageously by passing fluosilicic acid into a solution of potash, evaporating the solution to dryness, and heating the residue nearly to redness; this being then heated with about an equal weight of potassium in a green glass tube, the potassium combines with the oxygen of the silica; the resulting mass is of a brown colour, and is to be washed at first with cold water, and afterwards with hot; then heated to redness; and, lastly, digested in dilute hydrofluoric acid, to separate any adhering silica: the silicon then remains nearly pure.

The properties of silicon are, that it has a dark-brown colour, no lustre, and is a non-conductor of electricity: it is this latter circumstance which has induced many chemists to question or deny the propriety of classing it with the metals. It is insoluble in water, and incombustible in air or in oxygen gas; it neither fuses nor undergoes any other change when heated in the flame of the blow-pipe. Neither the nitric, hydrochloric, sulphuric, nor hydrofluoric acid oxidizes or dissolves it; but a mixture of nitric and hydrofluoric acid dissolves it readily, even cold. When ignited with chlorate of potash, silicon is not acted upon; but if deflagrated with nitrate of potash, the silicon combines with the oxygen of the decomposed acid, and is converted into silica, or silicic acid; and this uniting with the potash of the decomposed nitrate, silicate of potash is formed.

Oxygen and Silicon form only one compound, namely, silica, or silicic acid. It may be obtained artificially, but very inconveniently, in the mode just mentioned, of deflagrating silicon with nitrate of potash. Silica exists very largely in nature; it is indeed probably the most abundant of all substances whatever. Many of the forms under which it occurs are described elsewhere. [QUARTZ.] Rock crystal is silica, nearly or quite pure, and flints or white sand are but slightly intermixed with other bodies. It is artificially obtained in a pure form by fusing crystal, sand, or flints, with about four times their weight of carbonate of soda or carbonate of potash; the resulting fused mass is either silicate of soda or silicate of potash; the latter is a deliquescent substance, and when it has become fluid by exposure to the air, has been long known by the name of liquor of flints; when either of these silicates is treated with hydrochloric acid diluted with water, it combines with the alkali, and with any impurity which the sand or flint might contain, such as lime, alumina, or oxide of iron, and precipitates the silica as a hydrate in the state of a colourless gelatinous mass. It possesses the following properties:—

When recently precipitated, and while it retains the state of moist hydrate, it is to a certain extent soluble in water, and still more so in acids, and also in solution of potash or soda. When it has been dried, it is an opaque white powder, inodorous, insipid, and gritty, and then with more difficulty soluble in the alkaline solutions, and scarcely at all so in any other acid than the hydrofluoric. It is infusible by the heat of ordinary furnaces, but by the oxy-hydrogen blow-pipe it is more readily fused than lime or magnesia. Its specific gravity is about 2·7.

It consists of

1 Equivalent of Oxygen . .	8
1 Equivalent of Silicon . .	8
Equivalent . .	16

Although this substance is tasteless, and does not change vegetable blue colours red, and is insoluble in water, except under the peculiar circumstances mentioned, it is nevertheless by many chemists considered as and classed with acids, under the name of *Silicic acid;* and the various compounds which it makes with alkalis and earths, to form glass, are considered as salts. Thus with potash it forms silicate of potash; with soda, silicate of soda; and with oxide of lead, silicate of lead; and these are all constituents of glass. China and porcelain, on the other hand, may be regarded as silicates of alumina and magnesia, and mortar is probably a silicate of lime.

It must be evident from what has been stated, that silica is a substance of the utmost importance in many respects; it enters largely into the constitution of minerals, rocks, and fossils, and is employed in the manufacture of glass, porcelain, pottery, bricks, tiles, and mortar.

The compounds which silicon forms with other elements are comparatively unimportant: we shall mention only a few of them, and those but briefly.

Chlorine and Silicon may be made to combine by heating the silicon in chlorine gas, or by passing the gas over silicon heated to redness in a porcelain tube; or, according to Oersted, by passing chlorine gas over a red-hot mixture of finely powdered silica and charcoal.

Chloride of Silicon is composed of

1 Equivalent of Chlorine . .	36
1 Equivalent of Silicon . .	8
Equivalent . .	44

It is a volatile liquid which emits acid fumes; when exposed to moist air, or mixed with water, both are decomposed, and the results are hydrochloric acid and silica.

Fluorine and Silicon. [FLUOSILICIC ACID.]

Metals with Silicon.—Some of the metals may be combined with silicon: these compounds, which are not important, are termed *Siliciurets*. Some varieties of cast-iron contain nearly 8 per cent. of the siliciuret of that metal.

SILI'CULA (in Botany), a kind of fruit. In its structure it resembles the Siliqua [SILIQUA], and differs in nothing but its figure, which is rounded and much shorter, and in the number of its seeds. It is never more than four times as long as broad, and often much shorter. Examples of it may be seen in the whitlow-grass (*Draba*), in the shepherd's-purse (*Capsella*), and in the horse-radish.

SI'LIQUA (in Botany), a kind of fruit. It is characterised by having one or two cells, with many seeds, dehiscing by two valves, which separate from a central portion called the replum. It is linear in form and is always superior to the calyx and corolla. The seeds are attached to two placentæ, which adhere to the replum, and are *opposite* to the lobes of the stigma. This position of the seeds, being abnormal, can only be explained in two ways: either this fruit is in reality composed of four carpels, two of which have, during the growth of the pistil, become abortive; or the stigmas must be looked upon as the fusion of two halves, one from each side. The dissepiment of the fruit in this case is most probably a spurious one formed by the projecting placentæ. It is sometimes found incomplete, from the edges of the placentæ not meeting; it is then said to be *fenestrate*. This kind of seed-vessel is possessed by a large number of plants belonging to the order Cruciferæ, and examples may be seen in the stock or wall-flower (*Cheiranthus*), in the ladies' smock (*Cardamine*), and in the cabbage, turnip, and mustard. The Linnæan class *Tetradynamia* is divided into two orders, according to the form of its fruit: those plants of the class having a silique are comprised under the order Siliquosa; those having a silicle [SILICULA], under the order Siliculosa.

SI'LIQUA (Megerle), a genus belonging to the *Leguminaria*, Schum., and consisting of those species of *Solen*, Auct., which are furnished with an internal rib—*Solen radiatus* for example. [PYLORIDIANS.]

SILIQUA'RIA. [VERMETUS.]

SILI'STRIA, a sandjak (district) of Bulgaria, in European Turkey, situated between 42° 12′ and 45° 22′ N. lat., and 26° 11′ and 29° 3′ E. long., is one of the most fertile parts of Turkey. This sandjak is bounded on the north by the Danube and Sireth, which separate it from Moldavia and Bessarabia; on the east by the Black Sea; on the south by the sandjaks of Kirk-kilissia and Tchirmen; and it has on the west Rustchuk and Lower Wallachia. It is crossed in the south by the Balkan, which forms Cape Emineh, at the termination of the mountain-range: and by a ramification of less height in a northern direction which terminates on the Black Sea in Cape Calaghriah. From these heights descend the numerous rivers which fertilise the province; the Pravadi, the Buyuk-Campt-

Chik, the Nadir, and the Aidos flow into the Black Sea, into which the Danube empties itself on the northern extremity of the province, after receiving the Dristra, the Taban, and the Karasu. It is chiefly an agricultural country.

SILISTRIA, or *Drystra*, the antient name of which is Dorostero or Durosterum, in 44° 7′ N. lat. and 27° 12′ E. long., 155 miles north-north-east of Constantinople, is the capital of the sandjak which bears the same name. The town is large, and defended by a citadel, which is kept in good order, and surrounded by double walls and ditches. The city itself is surrounded by ditches from twelve to fifteen feet deep, and defended by strong palisades. The fort is situated on the extreme west of the town, which, upon the whole, is ill built: the streets are narrow and crooked, the houses low and dull; even the five mosques and the two public baths partake of the general ugliness. There is however at the eastern extremity of the town a custom-house in a better style of architecture. The large magazines which surround it contain chiefly corn and flour. As it is a fortress built on the northern frontier, in the neighbourhood of the Danube, and is principally of a military character, the commerce has never been flourishing; and although many merchants have lately settled in Silistria, it is not likely that any greater commercial activity will be the consequence. The population amounts to 20,000, the greater part of whom are Greeks.

The environs of the town are rather pleasant, and the numerous vineyards which border the Danube give them a cheering aspect. There are also ruins, which are said to have formed part of the wall raised by the Greek emperors against the incursions of the barbarians.

Silistria has frequently been the theatre of sharp actions between the Russians and the Turks. It was unsuccessfully besieged by the Russians in 1773, and was again attacked by them in 1779, on which latter occasion they suffered a considerable loss. In 1828 General Rosh was obliged to retreat after besieging the town for some months; but it fell into the hands of the Russians in 1829, when Generals Diebitch and Krassowski took it by assault on the 30th of June.

SI'LIUS ITA'LICUS, CAIUS. The place of this poet's birth is unknown. It has sometimes been stated that the name is derived from Italica (near Seville) in Spain, and that this was the birth-place of himself or of his ancestors. But to this conjecture we must oppose the silence of Martial, who frequently mentions Silius without speaking of his Spanish origin. The name also ought in that case, according to analogy, to be Italicensis. Silius was of an illustrious plebeian family. He studied oratory, in which Cicero was his pattern; and he also aspired to make himself a poet on the model of Virgil. He is said to have possessed himself of a country-house that had belonged to Cicero, and of one that had belonged to Virgil. (Martial, *Epig.*, xi. 48.) In the year A.D. 68, in the last year of the reign of Nero, he was consul with M. Valerius Trachalus Turpilianus; and some time after he was governor of the province of Asia, which he is said to have administered in a creditable manner. He was a friend of Vitellius, and appears to be the Silius Italicus who is mentioned by Tacitus (*Hist.*, iii. 65). There was, says Pliny (*Ep.*, iii. 7), a rumour that he had acted the part of an accuser or informer under the reign of Nero; but while he enjoyed the friendship of Vitellius, he conducted himself with prudence. He finally retired to his estate in Campania, where he devoted himself to poetry and philosophy. Silius was fond of objects of art, and he enriched his residence with statues, paintings, and books. When his old age became troubled with infirmities, he hastened his death by starvation, in which he followed the fashion of those times, when suicide was not uncommon. Silius was a Stoic. The time of his death is fixed at A.D. 100, when he is said to have completed his seventy-fifth year. He was married, and had two children. He enjoyed, says Pliny, unmingled happiness to the day of his death, with the exception of the loss of his younger child.

The only extant work of Silius Italicus is an epic poem on the second Punic war, in seventeen books, entitled 'Punica.' This poem, which may be called an historical epic, comprises the chief events of the war from the commencement of the siege of Saguntum (i. 268), to the defeat of Hannibal in Africa and the triumph of Scipio Africanus. [SCIPIO.] The materials of Silius seem to be chiefly taken from Polybius and Livy, and the poem has consequently a kind of historical value. As a work of art, it has been variously estimated, but the judgment of the younger Pliny (*Ep.*, iii. 7) seems to us to be correct: 'Silius wrote with more industry than genius.' His poem is in fact a very laboured composition, and the labour is apparent. Numerous episodes interrupt the continuity of the narrative. Silius falls short of his model, Virgil, in simplicity and clearness; and he endeavours to make up for force and precision by rhetorical ornament and long-drawn description. Instead of making a picture by a few striking touches, he fills it with detail till the whole is trivial. His invention is poor. There are few passages which excite our sympathies. In short, the poem is a rhetorical history in verse. All his contemporaries however did not judge so unfavourably of him. Martial on several occasions speaks very highly of him, and compares him with Virgil (*Ep.*, iv. 14; vi. 64; vii. 63; 'perpetui nunquam moritura volumina Sili;' viii. 66; ix. 86; xi. 49, 51): he also celebrates his eminence as an orator. According to Martial, in an epigram written after Silius had enjoyed the consulate, he did not attempt to imitate Virgil till he had acquired distinction as an advocate. Martial mentions the court of the Centumviri as one of the places in which he practised: Pliny the younger also practised in this court. [PLINY.]

The poems of Silius seem to have been forgotten after his death, if we may judge from the silence of subsequent writers as to them. Sidonius Apollinaris is the only writer who mentions them. Poggio is said to have discovered a MS. of Silius in the library of the convent of St. Gallen, in Switzerland, which was printed at Rome, 1471, folio. Another MS. was afterwards found at Cologne by Ludwig Carrio, from which the text of Silius was improved. It was to supply the loss of the 'Punica' that Petrarca, as it is said, wrote his 'Africa.' It has been conjectured that Petrarca had a copy of Silius, which he made use of, and carefully suppressed. Such conduct would be quite inconsistent with the character of Petrarca, and one would suppose that a comparison of the two poems would soon determine whether there is any foundation for such a statement.

There are numerous editions of Silius. The editio princeps is that of Rome already mentioned. There is an edition by Drakenborch, Utrecht, 1717, and Mitau, 1775; by Ernesti, Leipzig, 1791-2; and by Ruperti, with a preface by Heyne, Göttingen, 1795-98.

There is an English translation by Thomas Ross, London, 1661, 1672, folio; and a French translation by Le Febvre de Villebrune, Paris, 1781, 3 vols. 12mo.

SILIVRI, a seaport of Romania, in European Turkey, in 41° 4′ N. lat. and 28° 13′ E. long., thirty-two miles west of Constantinople, is built in the form of an amphitheatre, on the declivity of a small hill facing the Sea of Marmara. It forms a beautiful object when seen from the sea, and commands a fine prospect of the Sea of Marmara. The top of the hill is crowned by the ruins of a fort, which was built under the Greek empire. The population is 1500 Greeks and 200 Jews. The part of the town below the fort is solely occupied by Turks, who are about 4500. The Turks have several mosques, and a market-place, which is much admired. The harbour admits only small vessels, and is generally filled with fishing-boats, which furnish the inhabitants with a plentiful supply of food. The environs of the town are covered with vineyards and corn-fields. The antient name is Selybria, often written Selymbria. (Steph. Byzant., *Σηλυμβρία*; Strabo, p. 319, Casaub., *Σηλυβρία*.) It was a colony of the Megarians.

SILK. The manner in which raw silk is produced has already been described [BOMBYCIDÆ], and its value when wrought and manufactured has also been noticed. [RIBAND.] China was undoubtedly the country in which men first availed themselves of the labours of the silk-worm. Serica (the country of the Seres) was a name by which the Macedonian Greeks designated the country which produced the silk that came overland from the north of China. The author of the 'Periplus of the Erythræan Sea' speaks of silk in Malabar as an article imported from countries farther to the east; from which it may be inferred that the culture of the silk-worm and the manufacture of silk had not been introduced even into India four hundred years after silk was known in Europe. In speaking of the country of the Thinæ, the same author observes that both the raw material and manufactured article were obtained there. The 'Median robes,' spoken of by the Greek writers of the period of the Persian empire, and extolled for their lustrous beauty and brilliancy, were no doubt silken vestments, as Procopius, long afterwards, when silk had been introduced into Europe, states that 'the robes which were formerly called

Median by the Greeks are now called silken.' Aristotle is the first Greek author who mentions the silk-worm (*Nat. Hist.*, v. 19); and he states that silk was first spun in the island of Cos, but the raw material was still an oriental product; and Pliny (xi. 22), in commenting on this passage, states that the silk came from Assyria, and was worked up by the Greek women: it may be remarked that Assyria was, like Media, frequently used in an indefinite sense by antient writers. The probability is that silk was used in Western Asia before it was known to the Greeks; and that it was in use among the Greeks long before they knew whence the substance came or how it was produced. Thus Virgil (*Georg.*, ii. 121) supposes that the Seres carded the silk from leaves; and Dionysius Periegetes also supposed it to be a vegetable product; thus he says,—

> 'Nor flocks nor herds the distant Seres tend;
> But from the flow'rs that in the desert bloom
> Tinctur'd with every varying hue, they cull
> The glossy down, and card it for the loom.'

Pausanias gives more precise information respecting the substance from which the Seres formed their cloths. 'They have,' he says, 'a spinning insect, which is kept in buildings, and produces a fine-spun thread, which is wrapped about its feet' (vi. 26). It was not until the sixth century that the obscurity which enveloped this subject was cleared up. At this time silk was an article of general use among the Romans, and was manufactured for them by the inhabitants of Tyre and Berytus in Phœnicia. The Persians monopolised the supply of the raw material, and guarded their trade with so much jealousy, both by land and sea, that travellers from or to China were not allowed to traverse the Persian dominions; and in the time of Justinian, in consequence of some interference with the trade, they had entirely stopped the importation of silk. The trade in silk was in this unsatisfactory state, when two Nestorian monks of Persia, who had travelled to China, acquainted Justinian with the mode of producing silk, and undertook to return and bring back with them some of the eggs of the silk-worm. They were perfectly successful in their expedition, and a quantity of eggs, secured in a hollow cane, were brought in safety to Constantinople, hatched by the heat of a dunghill, and fed with mulberry-leaves. The monks also taught the subjects of Justinian the art of manufacturing silk.

The breeding of silk-worms in Europe was for six centuries confined to the Greeks of the Lower Empire. In the twelfth century the art was transferred to Sicily; in the thirteenth century the rearing of silk-worms and the manufacture of silk were introduced into Italy, from whence it was successively introduced into Spain and France, and in the fifteenth century the manufacture was established in England.

James I. was extremely solicitous to promote the breeding and rearing of silk-worms in England; and in 1608 issued circular letters, which were addressed to persons of influence throughout the country, recommending the subject to them, and arrangements were made for the distribution of the mulberry in the different counties. Most of the old mulberry-trees found in the neighbourhood of antient mansions at the present day were planted at the above period. The experiment was not successful, in consequence of our climate being unsuited to the silk-worm. James also encouraged the introduction of the silk-worm into the English settlements in America. About a century afterwards (1718) a company was incorporated, which obtained a lease for one hundred and twenty-two years of Chelsea park, where mulberry-trees were extensively planted, and large buildings erected for managing the business of breeding silk-worms. This scheme also failed. An attempt was next made to introduce the silk-worm in the settlements of Georgia and Carolina; the importation of raw silk from these colonies was permitted free of duty, and its production was further encouraged by direct bounties; but the quality of the silk proved indifferent, and after the trade had languished for some time, the hope of deriving any large supply from this quarter was abandoned. About the year 1789 nurseries of mulberry-trees were planted in several states of the American Union: but though the climate is not unfavourable to the rearing of silk-worms, which are found in their natural state in the forests, the high rate of wages is an obstacle to this sort of employment, which is better adapted to the social condition of China, Italy, the South of France, and Malta, where the wages of labour have nearly reached their minimum. The subject however has again recently attracted attention in the American Union; and in 1831 a small quantity of raw silk was exported. The production of raw silk is fast extending in British India, and the quality has been for some years gradually improving. There is every prospect of the English market being in time almost exclusively supplied with silk from our Indian possessions; as labour is not only cheaper than in any part of Europe, but three 'crops' of silk may be taken in the year, while from countries west of India, including Turkey, only one can be obtained. In Graham's 'India,' it is said that in the Deccan the mulberry-trees may be deprived of their leaves six times a year, and that six crops of worms may be obtained with ease in the same period. The Chinese method of rearing silk-worms, and their mode of treating the mulberry-tree (described in Davis's *China*, p. 280), were introduced at St. Helena, under the auspices of the East India Company, but on the expiration of their charter the establishment was given up. Some of the silk produced in France is believed to be better than that of any country in the world. The average price is twenty francs per lb., and the quantity produced exceeds three million lbs. The Italian silk is also highly esteemed; the quantity produced is estimated at from six to seven million lbs. In Russia Peter the Great formed mulberry plantations, and the rearing of silk-worms was strongly encouraged by the Empress Catharine, and at present those who engage in this business obtain many important privileges. In Bavaria and other parts of Germany, with the exception of Saxony, the silk-worm is successfully reared as a commercial object; also in Sweden, where the silk is said to possess some valuable properties not found in that produced in a warmer latitude. The last attempt to introduce the silk-worm in the United Kingdom on a large scale was made in 1835, by a company which commenced its operations by planting 80 acres in the county of Cork with 4000 mulberry-trees; but the design has been abandoned as far as relates to the United Kingdom, and the company has transferred its operations to Malta.

There are several works devoted to details of the management of silk-worms, one of the best of which is that of Count Dandolo, an Italian nobleman: it has been translated into French. There are also works on the same subject in our own language.

It is said that sixteen yards of gros-de-Naples of ordinary quality, or fourteen yards of a superior description, are manufactured out of 1 lb. of reeled silk, to produce which twelve lbs. of cocoons are required. The average weight of a cocoon is from three grains to three grains and a quarter; its average length when reeled off, about three hundred yards. Taking the silk consumed in the United Kingdom in a single year at 5,000,000 lbs. the following are the statistics of production:—

Raw silk	5,000,000	lbs.
12 lbs. of cocoons to 1 lb. of raw silk .	60,000,000	lbs.
30,000 worms to 1 lb. of cocoons,	18,000,000,000	worms.
1 oz. of eggs to 100 lbs. of cocoons .	600,000	oz. of eggs.
16 lbs. of leaves to 1 lb. of cocoons	96,000,000	lbs. of leaves.
100 lbs. of leaves from each tree .	9,600,000	trees.

Silk is obtained from the spider, not the cobweb, but the silky thread which the female spins round her eggs has been woven; the silken fibres of the pinna form a strong and beautiful fabric [MYTILIDÆ]; and some species of moths form cocoons which may be spun as a matter of experiment and curiosity, but not with a view to commercial profit.

The quantities of raw, waste, and thrown silk taken for consumption in the United Kingdom in the following periods was as under:—

		Annual average. lbs.
1765 to 1767	(inclusive) . . .	715,000
1785 to 1787	„ . . .	881,000
1801 to 1812	„ . . .	1,110,000
1814 to 1822	„ . . .	1,940,902
1824 to 1835	„ . . .	4,164,444
1836 to 1840	„ . . .	4,999,791

The countries from which we imported raw, waste, and thrown silk, in 1839, were as follows:—

	Raw Silk. lbs.	Waste, Knubs, and Husks. lbs.	Thrown Silk. lbs.
India . . .	1,385,932	2,012	. .
China . . .	349,549	10,951	. .
Turkey, Syria, and Egypt .	731,121	. .	. .
Italy . . .	181,743	436,819	755
France . .	1,018,901	568,754	213,991
Other countries	79,002	23,954	10,522
Total . .	3,746,248	1,042,490	225,268

The duty on raw silk is 1*d*. per lb.; on waste, knubs, and husks, 1*s*. per cwt.; and on thrown silk the following duties are imposed:—5*s*. 2*d*. per lb. on organzine and crape, and 3*s* on tram and singles, dyed; 3*s*. 6*d*. on organzine and crapes, 2*s*. on tram, and 1*s*. 6*d*. on singles, not dyed. It is objected to this duty on foreign-thrown silk that it raises unnecessarily the price of all silk thrown at home. A drawback is allowed on the exportation of foreign-thrown silk: no British-thrown silk is exported. The first silk-throwing mill erected in England was at Derby, in 1718. [DERBY.]

Reeling from the cocoons is only performed in countries where the silk is produced. Silk reaches the weaver in three different states, in which it is called singles, tram, and organzine [RIBAND], the preparation of which is the business of the throwster. In plain silk-weaving the process is much the same as in weaving woollen or linen; but the weaver is assisted by a machine for the even distribution of the warp, which frequently consists of eight thousand separate threads in a breadth of twenty inches. The Jacquard loom, invented by a weaver of Lyon, has been the means of facilitating and cheapening the production of fancy or figured silks to an extraordinary extent. Patterns which required the greatest degree of skill and the most painful labour are produced by this machine by weavers of ordinary skill, and with but little more labour than that required in weaving plain silks. The Jacquard loom has been improved by Mr. Hughes and Mr. Jennings, but at Lyon it has undergone no alteration. The power-loom has been only partially employed in the silk manufacture; and excepting for the commonest goods, it does not possess any great advantage over the hand-loom, as the delicacy of the material to be worked, and the attention which must be given to the process of the weft, frequently render it necessary to stop the machine.

Brocade and damask, the most sumptuous articles of silk manufacture a century ago, are now comparatively unknown. Persian, sarsnet, gros-de-Naples, ducapes, satin, and levantines, are the names given to plain silks, which vary from one another only in texture, quality, or softness. Satin derives its lustre from the great proportion of the threads of the warp being left visible, and the piece being afterwards passed over heated cylinders. Other varieties of silk goods are produced by mechanical arrangements in the loom, such as using different shuttles with threads of various substances, &c. The pile which constitutes the peculiarity of velvet is produced by the insertion of short pieces of silk thread, which cover the surface so entirely as to conceal the interlacings of the warp and woof. The process of weaving velvet is slow, and it is paid for at five times the rate of plain silks. There are several sorts of goods in which silk is employed with woollen materials, as poplins and bombazines. The Chinese, says Mr. Davis (p. 286), make a species of washing silk, called at Canton 'ponge,' which becomes more soft as it is longer used. Their crapes have never yet been perfectly imitated; and they particularly excel in the production of damasks and flowered satins.

The silk manufacture, after its introduction into England in the fifteenth century, remained for a long period one of the least important branches of the national industry. After the revocation of the Edict of Nantes, in 1685, about 50,000 refugees fled to England, a large proportion of whom settled in Spitalfields, and carried on the silk manufacture. At this period foreign silks were freely admitted; and from 1685 to 1692, silks to the value of from 600,000*l*. to 700,000*l*. were annually imported. In 1692 the refugees obtained an exclusive patent for certain articles; and in 1697 parliament prohibited the importation of French and other silk goods; and in 1701 the silk goods of India and China were included in the prohibition. Some inconsiderable relaxation was made in this policy in 1713, but in 1765 the system of prohibition was again fully adopted, and continued in operation until 1824. During this period the state of the manufacture was anything but satisfactory; the manufacturers complaining of the smuggling of foreign silks, parliament vainly endeavouring to exclude them, with constant disputes about wages on the part of the weavers. In 1773 they obtained an act, called the Spitalfields Act, which entitled the Middlesex weavers to demand fixed wages, to be settled by the magistrates. To this act may be attributed the establishment of the silk manufacture in various parts of the country; and having done great mischief, it was repealed in 1824. The changes introduced in 1824 (some of which only came into operation July 5th, 1826), with a view of stimulating the silk manufacture, have been most successful, as the table of the consumption of silk, before and after the duties were reduced, sufficiently proves. Now that silk has become cheaper, and consequently a commoner article of dress, it is less dependent on the caprice of fashion than when it was an expensive luxury. The declared value of silk goods exported since 1820 is shown in the following table:—

	Annual average. £.
1820 to 1823 (inclusive) . . .	369,835
1824 to 1827 " . . .	286,119
1828 to 1831 " . . .	405,961
1832 to 1835 " . . .	693,961
1836 to 1840 " . . .	771,479

The declared value of silk manufactures exported in 1839 was 868,118*l*.: of which the United States of America took 410,093*l*.; British North America, 136,750*l*.; Australian settlements, 46,724*l*.; France, 44,628*l*.; British West Indies, 38,467*l*.; Chili, 44,733*l*.; Brazil, 23,117*l*.; other states of Central and Southern America, 49,060*l*.; Germany, 17,135*l*.; East Indies and Ceylon, 14,713*l*.; Holland, 14,306*l*.; Belgium, 10,316*l*.; all other parts, 18,136*l*.

The value of the silk manufactures of Great Britain is estimated at between 6,000,000*l*. and 7,000,000*l*. One-half of the silk factories are in Cheshire, next to which stand Lancashire, Somerset, Derbyshire, and Staffordshire. There are one or more factories in above one-half of the counties of England; one or two factories have been established in Ireland, and a few more in Scotland. They employ altogether in these factories above 30,000 persons, of whom two-thirds are females.

The duty on silk manufactured goods imported from European countries is equivalent to 30 per cent. ad valorem. In 1839 this duty produced 227,438*l*., and the value of the goods was therefore about 700,000*l*., nine-tenths of which were from France. The exportation of silk goods from France to England was 3,589,594 lbs. from 1827 to 1838; but the quantity entered at the English customhouse was only 1,875,708 lbs., and there were therefore 1,713,886 lbs. introduced by smuggling, or 48 per cent. of the total quantity entered at the French custom-house for exportation to England. The duty on the legally imported goods averaged 20*s*. 4*d*. per lb.; but if the illegal imports could have been charged also, a duty of 10*s*. 11*d*. would have produced the same revenue. (Table by G. R. Porter, Esq., of the Board of Trade, in the *Report of Committee on Import Duties*.)

The silk manufactures of India are subject to an ad valorem duty of 20 per cent., which, in 1839, produced 19,867*l*. The imports consisted in that year of 503,182 pieces of bandannoes, romals, and silk handkerchiefs, of which only 112,280 paid duty for consumption in this country; and of other articles the greater part were re-exported.

(*Treatise on the Silk Manufacture*, in Lardner's 'Cyclopædia;' Ure's *Philosophy of Manufactures*; *Manual for the Culture of Silk*, prepared by order of the Massachusetts Legislature, Boston, 1832; *Essays on American Silk, with Directions for raising Silk-worms*, Philadelphia, 1830; *Second Report on Commercial Relations between Great Britain and France* (Silk), 1835.)

SILK-WORM. [BOMBYCIDÆ.]

SILLIMANITE, a crystallized *silicate of alumina*. It occurs in rhombic prisms imbedded in quartz. Cleavage parallel to the long diagonal. Colour dark brownish-grey or clove-brown. Fracture uneven, splintery. Specific gravity 3·41. Lustre vitreous, nearly adamantine on the face of cleavage. Nearly opaque. Hardness 8·0 to 8·5. Brittle and easily reduced to powder.

It is met with at Saybrook, Connecticut, North America. It was at one time considered to be a variety of anthophyllite, but it is much harder than this mineral, and contains more alumina and less silica and oxide of iron. It more nearly resembles sienite both in form and composition.

It yielded by the analysis of Bowen—

Silica	42·67
Alumina . . .	54·11
Oxide of Iron . .	2·00
Water	0·51—99·29

SI'LPHIUM (σίλφιον). Antient authors mention this plant and its juice. In the article on Laser, it has been stated that two kinds are described of this substance, which is also called juice of silphium. One kind, from Cyrene, was probably yielded by Thapsia Silphium [Laser], and the other was most likely assafœtida, which has been employed medicinally by Asiatics from very early times, though it has been known by this name in comparative modern times.

Silphium was however remarkable for other properties, and hence has attracted the attention of modern travellers who have recently visited the countries where the silphium is described as growing by the antients. The army of Alexander, in crossing the mountain-range which Arrian calls Caucasus (iii. 28, 10), and which is the same range that he afterwards mentions under the name of Paropamisus (v. 5, 3), met with the Silphium. Arrian says, on the authority of Aristobulus, 'In this part of the Caucasus nothing grows except pines and Silphium, but the country was populous, and fed many sheep and cattle, for the sheep are very fond of the silphium. If a sheep should perceive the silphium from a distance, it runs to it, and feeds on the flower, and digs up the root and eats that also. For this reason in Cyrene they drive the sheep as far as possible from the spots where the silphium grows, and some even fence in such places to prevent the sheep from entering them, if they should approach; for the silphium is worth a good deal to the Cyrenæans.' Burnes, in crossing the Hindu Koosh, and seeing both the men and cattle eating the young parts of the assafœtida plant, supposed that it must be the silphium of Arrian. But as this author describes the country where the silphium grows as abounding in cattle, Dr. Royle had concluded that the Prangos of Mr. Moorcroft was the silphium alluded to, and which is much fed on by sheep and cattle in the present day in Tibet. Mr. Vigne, when travelling in these regions, came to the same conclusion. It is probable therefore that both plants, being umbelliferous, and employed for the same purposes in nearly the same regions, may have contributed to form the accounts which are so brief in antient authors. [Laser; Prangos.]

SI'LURES. [Britannia.]

SILURIAN SYSTEM. One considerable group of the fossiliferous primary strata, occurring in remarkable perfection in Wales, especially in the eastern and some of the southern districts, and in some of the adjoining English counties, is thus named by Mr. Murchison in a very splendid work, the fruit of his long investigation of this part of the series of British strata. Under this title we propose to arrange some general views of the present state of our knowledge regarding the history of the lower Palæozoic strata. [Geology; Primary Strata; Palæozoic Rocks; Saliferous System.]

When Mr. Murchison commenced his researches in Shropshire and Wales (1831), the principal knowledge we possessed of the succession of the older stratified rocks of Britain, then commonly called grauwacké and transition formations, was based on the still incompletely published labours of Sedgwick in Wales and the district of the English lakes; and so little was known of their fossil contents, that it is believed the first definite notice of this kind was contained in Mr. Phillips's description of a group of slate-rocks in the vicinity of Kirby Lonsdale. (*Geol. Trans.*, 1827.) Now, in consequence principally of the development given to this subject by the appearance of the Silurian researches of Mr. Murchison, and other works to which it has led, we are able to trace in one consecutive history nearly the whole series of mineral depositions and organic combinations of which the ocean was antiently the theatre, from the period of the mica schists to the termination of the carboniferous æra.

In this survey, the Silurian strata form a very conspicuous and interesting portion, and in the district from which the type was originally drawn they appear within distinct and definite limits which seem to insulate them from the older and new rocks, and to justify their claim to the rank of a peculiar system; but in other districts phenomena appear which show that the order of physical changes and organic combinations which characterise the Silurian System, was in operation both before and after the period included in the ages of the four Silurian groups of 'Llandeilo,' 'Caradoc,' 'Wenlock,' and 'Ludlow;' while in other districts these characteristic assemblages do not all clearly appear; and thus we are naturally conducted to a more comprehensive view of the whole of the antient (Palæozoic) formations.

Whatever be the true theory of the origin of the *Granitoid Strata* of gneiss and mica schist (with their many and various quartzose, chloritic, and calcareous accompaniments), it is at least certain, as a general rule, that rocks of this general type are prevalent among the very deepest and oldest deposits from water which retain proof of their watery aggregation, and that they are in this position devoid of the traces of antient life.

Equally certain is the character of the great series of Neptunian rocks which lies upon the mica schist; it is a vast and various mass of strata (principally argillaceous, locally arenaceous or conglomeritic, rarely yielding limestone), in which, though unequally, and in degrees varying with locality, *slaty cleavage* tends to be developed. Organic life has left traces in this series of muddy sediments both of vegetable and animal origin; in the lower and older parts very sparingly, in the upper parts abundantly. If, with Professor Sedgwick and Mr. Murchison, we take the series of these rocks as they appear in Wales and Cumberland, namely—

Silurian, or upper group;
Cambrian, or middle group;
Cumbrian, or lower group;

we shall find in the mineral characters of these groups in the countries named, some diagnostic marks of importance, but they vanish or become equivocal in other regions. In like manner the organic contents seem, in the countries named, to be definitely arranged in zones, so as to mark successive periods there: no organic remains are known in the Cumbrian rocks; they are rare, and confined to a few layers, in the Cambrian deposits; and are very plentiful and general in the Silurian group. The districts in which these peculiarities occur are probably more wide and scattered farther asunder than those in which the original types of mineral structure prevail; but yet it is evident that they are limited in respect of geographical area, and variable in regard to the distinctness and completeness of the terms, even in districts not far removed from the centre of investigation. Let any one who may desire proof of this compare the argillaceous series of Ayrshire, Westmoreland, Pembrokeshire, Tyrone, or Waterford, in which Silurian fossils occur, with the full and varied series of Shropshire, the Berwyn, and Snowdon.

Under these circumstances of difficulty in regard to the right general view of the antient fossiliferous strata, we must consider the series of Silurian rocks and fossils not as the type of this enormous sequence of mineral and organic phenomena, but as one, and perhaps the richest of all the local physical combinations of that antient period, and employ it as a general term of comparison for reducing to order and place many detached and difficult districts in which the strata have local, peculiar, and perhaps exceptional aspects.

Mr. Murchison arranges the Silurian strata in groups, as follows; in a descending order:—

	Formations.	Divisions.	Thickness in feet.
Upper Silurians	Ludlow rocks .	Upper Ludlow rocks Aymestry limestone Lower Ludlow rocks	1500
	Wenlock rocks	Wenlock limestone Wenlock shale .	1000
Lower Silurians	Caradoc rocks		very variable.
	Llandeilo rocks		

We shall present a very brief analysis of some of their characters.

Upper Ludlow Rocks.

Mineral Character.—Greyish, argillaceous, or calcareous sandstones, very slightly micaceous, decomposing to ashen or rusty-brown colour.

Structure.—Mostly laminated, parallel to the stratification, with joints considerably symmetrical, nearly rectangular to the plane of the beds, as near Ludlow.

Aspect of the Country.—A region rising from beneath the old red-sandstone, often to a considerable and rather continuous escarpment, as near Usk and Ludlow.

Organic Contents.—Polypiaria, 2; Crinoidea rare; Conchifera Plagimyona rather plentiful, 10; Conchifera Mesomyona, 1; Conchifera Brachiopoda, 15; Gasteropoda, 6; Cephalopoda Monothalamacea, 3; Cephalopoda Polythalamacea, 6; Crustacea, 5; Annelida?, 1; Fishes, 7; Doubtful, 3 (in all about 58 species).

Localities.—Ludlow; vicinity of Usk.

Aymestry Limestone.

Mineral Character.—Subcrystalline, argillaceous limestone, bluish-grey, or mottled, as near Aymestry.

Structure.—Irregularly laminated, or nodular; with cross joints nearly rectangulated to the plane of stratification.

Aspect of the Country.—Often a slightly prominent terrace on the woody steep escarpment of a hill, capped with Upper Ludlow rocks, as near Ludlow.

Organic Contents.—Polypiaria, 12; Crinoidea rare; Plagimyona, 6; Mesomyona, 2; Brachiopoda, 12; Gasteropoda, 9; Monothalamacea, 1; Polythalamacea, 4; Crustacea, 3 (in all about 49 species).

Localities.—Aymestry; Sedgeley near Dudley, &c.

Lower Ludlow Rocks.

Mineral Character.—Argillaceous (called 'Mudstone'), light-grey, dark-grey, or black, but weathering to ashen hues, as in the Wigmore Valley.

Structure.—Partially flaggy, in places the lamination is uneven and nodular. In the lower parts, nodules of black limestone in lines of stratification.

Aspect of the Country.—Toward the base of the steep escarpment of a hill, which may contain the whole Ludlow formation, as in the Wigmore Valley.

Organic Contents.—Polypiaria, 9; Crinoidea rare; Plagimyona, 8; Mesomyona, 2; Brachiopoda, 19; Gasteropoda, 7; Monothalamacea?; Polythalamacea, 27; Crustacea, 3; Annelida, 1; Fishes, 1; Doubtful, 2 (in all about 79 species).

Localities.—Ludlow; Usk.

Wenlock Limestone.

Mineral Character.—Grey, bluish, or pinkish crystalline and subcrystalline limestone, arranged in strata of concretionary aspect, separated by much argillaceous matter.

Structure.—As above stated, concretionary in detail, but stratified on a large scale with considerable persistence of the parts. The concretionary structure most remarkable at top and bottom.

Aspect of the Country.—Usually a prominent or terrace-like escarpment, where the beds dip moderately; rising to insulated hills, where contortions prevail, as near Ludlow, Wenlock, Malvern Hills.

Organic Contents.—Polypiaria, 53; Crinoidea, 14; Plagimyona?; Mesomyona, 1; Brachiopoda, 28; Gasteropoda, 8; Monothalamacea, 2; Polythalamacea, 9; Crustacea, 14; Annelida, 1; Doubtful, 2 (in all about 139 species).

Localities.—Dudley; Wenlock; near Usk.

Wenlock Shale.

Mineral Character.—Dull argillaceous shale, with concretions of impure argillaceous limestone, much analogous to the argillaceous Ludlow rocks.

Structure.—Laminated, with spheroidal calcareous concretions, especially toward the base.

Aspect of the Country.—Owing to the wasting of the middle beds, this shaly mass is often the line of a valley.

Organic Contents.—Polypiaria, 18; Crinoidea rare; Plagimyona, 1; Mesomyona?; Brachiopoda, 33; Gasteropoda, 4; Monothalamacea?; Polythalamacea, 5; Crustacea, 2; Annelida?; Doubtful, 2 (in all about 65 species). There are marine plants in this deposit, and we have seen them of a vermilion colour.

Locality.—Wigmore Valley.

Caradoc Sandstone.

Mineral Character.—Sandstones of various colours, more or less micaceous, sometimes quartzose or conglomeritic, with thin courses of impure limestone, especially in the upper part. (Where altered by igneous action, this sandstone becomes a sort of quartz rock.)

Structure.—Usually laminated. Where altered by heat, the stratification is nearly or quite lost.

Aspect of the Country.—Very characteristic where the strata are indurated by vicinity of trap-rocks: the quartzose masses then assuming very picturesque forms.

Organic Contents.—Polypiaria, 12; Crinoidea rare; Plagimyona, 1; Mesomyona, 3; Brachiopoda, 53; Gasteropoda, 7; Monothalamacea, 3; Polythalamacea, 6; Crustacea, 8; Doubtful, 2 (in all about 95 species).

Mineral Veins.—Green copper-ore (Malachite); thin strings of galena; and in the vicinity of trap true mineral veins occur.

Localities.—Caer Caradoc; May Hill; near Llandeilo.

Llandeilo Flags.

Mineral Character.—Hard dark-coloured flags, sometimes slightly micaceous, frequently calcareous.

Structure.—Thinly laminated, parallel to the stratification, with some internal oblique cleavage.

Aspect of the Country.—Not characteristic, the stratification being commonly very highly inclined and the masses very thick.

Organic Contents.—Polypiaria, 4; Crinoidea rare; Plagimyona, 1; Mesomyona?; Brachiopoda, 26; Gasteropoda, 8; Monothalamacea, 1; Polythalamacea, 1; Crustacea, 11 (in all about 47 species).

Mineral Veins.—Occur in the vicinity of trap, as in the Shelve and Corndon district.

Localities.—Near Built; Llandeilo; Pembrokeshire.

Pyrogenous rocks are associated with the Silurian strata in many situations—as the Caradoc Hills, where compact felspar predominates—the Wrekin and Lilleshall Hill, characterised by sienitic rocks—Corndon, full of greenstone. Alterations of stratified rocks by the contact of igneous rocks are common in the Caradoc, Stiperstones, &c. The trap rocks near Welshpool are in places columnar; the Breiddyn Hills are mostly greenstone, and yield elongated dykes in a north-east direction, which traverse the new red-sandstone. Mineral veins (yielding lead-ore) are plentiful in Lower Silurian rocks, in the Shelve district, adjacent to the trap rocks of Corndon, and the altered sandstones of the Stiperstones. 'In a plan of Mr. More's of Linley Hall, the chief proprietor of this district, upwards of 24 are laid down in the district of Shelve alone, excluding the tracts around the Bog and Penally: so that, comprehending the principal portion of the mining-ground, we may say that it contains upwards of 30 metalliferous veins which have been profitably worked.' (Murchison, *Sil. Syst.*, p. 282.)

Volcanic grits, composed of materials derived from igneous action, and subsequently arranged in water, are mentioned by M. Murchison rather frequently. In the Shelve district they are traversed by lead veins; in the Caradoc Hills, they abound, and were noticed as 'allied to greenstone' in the Wrekin by Mr. A. Aikin. They contain organic remains in several places, as near the Corndon Hills.

On reviewing the series of strata comprised in the Silurian System, in the vicinity of Ludlow, Usk, Llandeilo, or Denbighshire, we see them to form in reality one closely associated sequence of oceanic deposits—apparently accumulated with little local disturbance and very slight admixture of organic exuviæ from the land. Volcanic eruptions appear to have rather varied than greatly disturbed this system of operations, though it is evident they contributed no small part of the granular materials of the principally sedimentary strata. The formation of limestone is local:—where coral prevailed, we find the Aymestry and Wenlock limestones, and even the calcareous parts of the Landeilo rocks, to be in a great degree filled with coral. The Brachiopod shell 'Pentamerus' fills some whole beds of limestone (near Aymestry), and where it is deficient the limestone also fails, as in the district of Usk. In their course from Shropshire, northward to Denbighshire, Mr. Bowman (*Reports of the British Association for* 1840-41) has found the general type of the Silurian rocks to vary, and the line of distinction between it and the slaty strata below to be extremely obscure; and similar observations are recorded by M. Murchison in the account which he gives of these rocks in Caermarthenshire and Pembrokeshire.

Mineral character alone will scarcely suffice, anywhere, for any but an arbitrary (and therefore unsatisfactory) boundary-line between the Silurian and Cambrian deposits. It is extremely probable, perhaps we may say it is already proved, that no distinction of higher value can be found on comparing the organic remains of these groups. In Snowdon (supposed to be very low in the Cambrian series of rocks) are shells and corals, which are perhaps the same, but certainly are congeneric with and very similar to 'Silurian' fossils; and there is really as great (if not greater) difference between the Llandeilo and Wenlock rocks, in regard to fossils, than between the Silurian and Cambrian strata.

If we turn to other districts where Silurian fossils occur plentifully (North America, Ireland, Norway), the result appears the same. There is apparently only one great series of organic combinations distinguishable among the fossiliferous strata anterior to the old red-sandstone æra, and it was with a perception of this important truth that Mr. Murchison once proposed for the Silurian strata the title of Protozoic. If instead of this we employ Palæozoic (as suggested by Sedgwick), and adopt the general view advocated in this work [PALÆOZOIC; SALIFEROUS SYSTEM], we shall rank all the fossiliferous strata of the Cumbrian, Cambrian, and Silurian groups as *Lower Palæozoic Strata*.

The lower arbitrary boundary of the Silurian strata being thus softened or erased, we may regard its upper surface as only locally more definite. Certainly in all the region around Wales the separation of the Silurian and old red deposits is somewhat sudden; the colour changes from grey to red; the dull mudstones become micaceous sandstones; the richly fossiliferous Upper Ludlow loses its character in unprolific red marls and grits. What few fossils do occur in these overlaid strata (except near the very bottom) are of quite other types of organization. But these are local truths, depending mainly on the introduction of new sediments *poisonous to marine invertebral life*; and as these sediments are very local, we may find in other countries groups of strata newer than the Silurian, older than the Carboniferous, with fossils intermediate in character and combination to both.

This expectation is in course of fulfilment, but it is not yet fully satisfied. In Devonshire, the Rhine Valley, the Eifel, we find numerous assemblages of such *Middle Palæozoic* fossils, but they do not by any means fill the whole interval between the Silurian and Carboniferous types; nor have we seen in collections from North America, Australia, the Hartz, Brittany, or Russia, all that is desired to fill the void. Ever alive to this most interesting inquiry, the author of the 'Silurian System' is perhaps at this moment adding valuable facts concerning it, the fruit of his continued researches in Russia; and we believe that by further examination of the *lower strata* of the Rhine Valley, and the Harz, some additional data may be gathered.

At present the most important of the discoveries which (however incompletely) represent a *Middle Palæozoic Period*, have been in Devonshire and Cornwall, in the Fichtelgebirge, and in the Eifel and Rhine Valley. The principal of these, at least in regard to the analogies which it offers to the strata of earlier and more recent date, is the district of Devon and Cornwall; from which ten years ago only a small number of fossil species was known, but which has now yielded to numerous inquirers fully 300 distinct and recognisable forms. Of these, according to Mr. Lonsdale, who gives (*Geol. Trans.* 1840) a table of the species which he examined, and to Mr. Murchison and Professor Sedgwick, who enumerate 128 species, a few of these species are found in the Silurian and a few in the Carboniferous rocks. Professor Phillips, in his recent work (*Palæozoic Fossils of Devon and Cornwall*), discusses the relations of 275 species, and arrives at the conclusion that both by numerical valuations of the general combinations of groups of invertebrata, and by specific analogies, the conclusion of the intermediate age of the Devon and Cornwall strata is confirmed. As the differences of the Devonian and Silurian fossils are very much greater than those between the Silurian and Cambrian fossils, it appears probable that the boundary assumed by Mr. Murchison for the upper termination of the Silurian group may remain with but slight alteration. One change contemplated by the author himself we should be glad to see adopted:—there are some fossiliferous bands placed by Mr. Murchison near the base of the old red system, which would better go to the Silurian ranks, since, in respect of the shells which they contain and their mineral composition, they are scarcely distinguishable from Silurian strata.

On considering the distribution of organic remains in the successive stages of the Silurian rocks, it is evident that the greatest variety of species occurs in the lower part of the upper and towards the upper part of the lower Silurian rocks. In other words, the conditions favourable to organic life in the sea were in the earliest period considerable; they arrived at a maximum in the middle part of the period, in the Caradoc sandstone, the Wenlock shale and the Wenlock limestone, and still continued considerable till the Silurian depositions ceased, and were replaced by old red-sandstone nearly devoid of organic remains. Polypiaria, Crinoidea, and Crustacea are most numerous in the principal calcareous rock, Wenlock limestone; Brachiopoda are most plentiful in Caradoc sandstone; Cephalopoda, in the Wenlock shale; fishes, in the upper Ludlow rock.

Mr. Murchison gives the following general recapitulation of organic remains in these strata:—

	Genera.	Species.
Pisces	15	24
Crustacea . . . ,	10	37
Annelida . . .	5	6
Mollusca (Heteropoda[*]) .	1	11
(Cephalopoda) .	6	41
(Gasteropoda) .	13	34
Conchifera (Brachiopoda) .	8	107
(Monomyaria) .	1	6
(Dimyaria) .	10	21
Crinoidea . . .	5	14
Polypiaria . . .	35	65
Doubtful . . .	6	9
	115	375

SILU'RIDÆ, a family of fishes of the order Malacopterygii, placed by Cuvier, in his 'Règne Animal,' between the *Esocidæ*, or Pike tribe, and the *Salmonidæ*, or family of the Salmons; but in the 'Histoire Naturelle des Poissons,' the present group commences the Malacopterygii. The family *Siluridæ* constitutes a very extensive section of fishes, the species of which are for the most part confined to the fresh waters of warm climates. No group perhaps presents greater diversity of form than the Silurians, and their habits are equally interesting. Their most obvious external characters are, the want of true scales; the skin is generally naked, but in parts protected by large bony plates; the foremost ray of the dorsal and pectoral fins almost always consists of a strong bony ray, often serrated either in front or behind, or on both sides. These fishes moreover frequently are furnished with a small adipose fin on the hinder part of the back, as in the *Salmonidæ*. The mouth is almost always provided with barbules.

The genus *Silurus*, as now restricted, is distinguished by the dorsal fin being very small, without any distinct spine, and situated on the fore part of the back; the anal fin is of great length, extending along the whole belly of the fish, and sometimes joining the tail-fin; the maxillaries and intermaxillaries are furnished with small thick-set curved teeth, and there is a band of similar teeth on the vomer.

The species of this genus are confined to the old world; the only known European species is the *Silurus glanis* (Linn.), a fish of very large size, which is found in the lakes of Switzerland, in the Danube, the Elbe, and all the rivers of Hungary. In Prussia and Sweden it is also found.

The *Silurus glanis* is introduced in several works on the fishes of this country. It has however, says Mr. Yarrell, been suspected that the so-called Silurus, supposed to have been found formerly in some of the Scottish rivers, might have been the burbot.

Cuvier states that this fish is sometimes upwards of six feet in length, and is said to weigh three hundred pounds (French). The body is elongated, and has the hinder part compressed, but towards the head its width gradually increases, and the head itself is depressed and large; its colour is dark-green above, of a pale-green below the lateral line, and yellowish on the belly, and the whole body is covered with dark spots; six barbules surround the mouth, and two of these, which have their origin (one on each side) just above the angle of the mouth, are very long.

Mr. Yarrell observes, 'The Silurus is represented as sluggish in its habits, and a slow swimmer, taking its prey by lying in wait for it, in a manner somewhat similar to the Angler, *Lophius*; hiding itself in holes or soft mud, and apparently depending upon the accidental approach of fishes or other animals, of which its long and numerous barbules may be at the same time the source of attraction to the victims, and the means of warning to the devourer. From its formidable size, it can have but few enemies in the fresh water; and from them, its dark colour, in addition to its habit of secreting itself either in holes or soft mud, would be a sufficient security. In spring, the male and female may be seen together, about the middle of the day, near the banks or edges of the water, but soon return to their usual retreats. The ova, when deposited, are green; and the young are excluded between the sixteenth and nineteenth days.

---

[*] These, in the preceding paragraphs, we have called Monothalamacea.

'The flesh of the Silurus is white, fat, and agreeable to many persons as food, particularly the part of the fish near the tail; but on account of its being luscious, soft, and difficult to digest, it is not recommended to those who have weak stomachs. In the northern countries of Europe the flesh is preserved by drying, and the fat is used as lard.'

It appears by some statements in the 'Histoire Naturelle des Poissons,' that the present fish is so voracious, that it has been known, in several instances, to devour children; and in one instance the body of a woman was found in one of these fishes.

Several examples of the restricted genus Silurus are found in Asia.

Cuvier separates from the typical Siluri, as a genus, the *Silurus mystus* of Linnæus, and some others, on account of the compressed form of the body, and the dorsal fin having a strong bony spine in front, which is denticulated on the hinder margin. The body is deepest near the middle, but tapers somewhat suddenly towards the extremities. The head is small and depressed, and the eyes are placed low down.

The species upon which Cuvier founds this genus—to which he applies the name *Schilbe*—are found in the Nile, but there are others described in this author's great work on fishes, one of which is found at Senegal and another in India.

Genus *Cetopsis*.—This genus is founded by Agassiz on certain species found in Brazil, which in their affinities approach the genus *Silurus*, but are distinguished by the extremely small size of their eyes.*

Genus *Bagrus*, Cuvier.—The species of this genus are distinguished from those of the genus *Silurus*, as restricted, by their possessing an adipose fin on the hinder part of the back. The body is naked—that is, unprovided with bony plates—and the mouth is provided with barbules, the number of which, varying in different species, has been selected for the minor divisions of the group. Numerous species are found in the Indian and African rivers.

Genus *Pimelodus*, Lacép.—Differs from *Bagrus* in having no teeth on the vomer; the palatines however are often provided with teeth. The species vary much in the number of their barbules, and in the form of the head, which is often protected by a bony plate, and a large bony plate is situated between that on the head and the dorsal spine; similar bony plates on the head however are observable in many of the species of the preceding genus. The species of *Pimelodus* are very numerous, and are found both in the Old and New World. Numerous species are described from North America, others are found in South America, and the rivers of India also furnish numerous examples.

Genus *Phructocephalus*, Agassiz.—This genus contains but one species, an inhabitant of the Brazils; its generic distinction consists in its possessing some incomplete osseous rays enchased in the upper margin of the adipose fin. The head is depressed and covered by a deeply sculptured bony plate; a second bony plate, of a transverse oval form, is situated in front of the first dorsal fin. The branchiostegous rays are nine in number, and the mouth is provided with six barbules.

Genus *Platystoma*, Agassiz, is composed of several South American species of *Siluridæ* which have the muzzle depressed, and are remarkable for the great number of their branchiostegous rays, which amount in some to fifteen in number. Some of the species attain a large size, there being specimens in the Paris Museum as much as five feet in length, and they have been seen of still greater bulk.

Genus *Galeichthys*, Cuv. and Val.—This genus is nearly allied to *Bagrus*, but distinguished by the head being round and unprotected by any distinct bony plate: the branchiostegous rays are six in number. Some possess six barbules, and others have four. One species is found at the Cape of Good Hope, a second is said to be found both in North America and at Rio Janeiro; several species occur in Brazil, and the Ganges also furnishes a species of the present genus.

Genus *Silundia*, Cuv. and Val.—This genus is founded upon a fish from the Ganges, which has the head small and smooth, a very small adipose fin, and a long anal fin. It has but two barbules, and they are very small; the branchiostegous rays are twelve in number; the teeth are longer and less abundant than usual in the *Siluridæ*. The only species known (*Silundia Gangetica*, Cuv. and Val.; *Pimelodus Silundia* of Hamilton) is said to be very common at the mouth of the Ganges, and to be much esteemed for food.

Genus *Arius*, Cuv. and Val.—Contains many species of Siluridæ, allied to the *Bagri*, but distinguished by their palatine teeth forming two distinct and widely separated masses. In some species the teeth are minute and dense, like the pile on velvet, or like the teeth of a carding-machine, and in others the palate is furnished with teeth in the rounded form of paving-stones, instead of having them pointed. Species of this genus are found in the tropical portions of both continents, and also in North America.

Genus *Auchenipterus*, Cuv. and Val.—May be distinguished from other genera which possess the adipose fin by the small size of the head, the very minute size of the teeth, and there being five branchiostegous rays. It evinces an affinity with *Pimelodus* in having no palatine teeth, and in the number and form of the maxillary barbules. The first dorsal is situated very forward, a circumstance which suggested the generic name. The bony shield which covers the upper surface of the head is, in the fishes of this genus, united by a suture with the dilated bony nuchal plates. All the known species are from the tropical portions of South America.

Genus *Trachelyopterus*.—The genus is founded by MM. Cuvier and Valenciennes, upon a small Silurian from Cayenne, in which there is no adipose fin; the teeth are fine, like the pile of velvet, and the palate is destitute of teeth; the barbules are six in number. The head is somewhat short, and protected by a stout bony shield, which is united almost immediately with the dorsal on account of the shortness of the interparietal plate, and almost rudimentary state of the *chevron*, placed generally in front of the spiny rays of the dorsal fin; the pectoral fins are inserted as it were under the throat.

Genus *Hypophthalmus* (Spix), Cuv. and Val.—This genus is composed of but few species, and these are from the tropical portions of South America. The principal characters are:—Mouth destitute of teeth; eyes placed very low down near the angle of the mouth; branchiostegous rays fourteen in number; body furnished with an adipose fin.

Genus *Ageneiosus* (Lacépède), Cuv. and Val.—This genus is thus characterised in the 'Règne Animal:'—Characters the same as in *Pimelodus*, excepting that there are no barbules properly so called. In some, the maxillary bone, instead of being prolonged into a fleshy and flexible barbule, assumes the form of a projecting denticulated horn. In others this bone does not project, but is concealed under the skin; the dorsal and pectoral spines are but little apparent. All the species are from South America.

Genus *Synodontis*, Cuv.—This genus is composed of Silurians found in the Nile and Senegal, which have an adipose fin, the muzzle narrow, and terminated by an ethmoid which supports two small intermaxillary bones armed with bristle-like teeth; the lower jaw composed of two short and slender rami, bearing in front a mass of teeth which are in the form of very slender laminæ and closely packed—each of these teeth is attached to the jaw by a flexible and very slender stalk. The stout bony plate which covers the head is joined to the nuchal plate, and this extends to the first spine of the dorsal fin, which is of very large size, and in this respect resembles the first spine of the pectoral fins. The inferior barbules, and sometimes the maxillary barbules, have small lateral branches.

Genus *Doras*, Lacépède.—The species of this genus are distinguished by the lateral line being armed with bony plates, which are carinated, and terminate in a spine. They have a second adipose dorsal fin, and the foremost spine of the pectoral and anterior dorsal fins is very large and deeply serrated. Osseous plates cover the upper surface of the head and extend to the dorsal fin, and the humoral bone is produced backwards and pointed.

These may be regarded, say the authors of the 'Histoire Naturelle des Poissons,' as the most powerfully armed of all the *Siluridæ*; thus the Spanish colonists in South America have given to them the name *Mata-caïman* (or Crocodile-killer), because it often happens that when they are swallowed by these large reptiles, the œsophagus and pharynx of those animals are so lacerated by the spines of the Silurus as to cause death. Strabo also (p. 824, Casaub.

---

* See the part on Ichthyology of the 'Voyage of MM. Spix and Martius.'

attributes similar power to certain fishes of the Nile, which he called *choerus* (χοῖρος), and which are supposed by some naturalists to belong to the modern genus *Synodontis*.

The genus *Doras* is divided into two sections on account of the structure of the mouth. In some it is situated at the end of a depressed muzzle, and is provided with two broad bands of delicate teeth, both in the upper and lower jaws. In others the opening of the mouth is situated on the under side of a conical muzzle, and the opening is of a circular form—here the teeth are either wanting or are hardly visible; the maxillary barbules are sometimes furnished with small lateral branches. To the first of these sections belongs the *Silurus costatus* of Linnæus, a species found in the rivers of Guiana.

A species of *Doras*, described by Dr. Hancock, in the fourth volume of the *Zoological Journal*, p. 241, under the name of *D. costatus*, is a native of Demerara, where it is called the *Flat-head Hassar*: it possesses the singular property, says Dr. Hancock, of deserting the water, and travelling over land. 'In these terrestrial excursions large droves of the species are frequently met with during very dry seasons, for it is only at such periods that they are compelled to this dangerous march, which exposes them as a prey to many and such various enemies. When the water is leaving the pool in which they commonly reside, the *Yarrows* (a species of *Esox*, Linn.), as well as the second species of Hassar, to which I shall presently refer, bury themselves in the mud, while all the other fishes perish for want of their natural element, or are picked up by rapacious birds, &c. The *flat-head Hassars*, on the contrary, simultaneously quit the place, and march over land in search of water, travelling for a whole night, as is asserted by the Indians, in search of their object. I have ascertained by trial that they will live many hours out of water, even when exposed to the sun's rays. Their motion over land is described to be somewhat like that of the two-footed lizard. They project themselves forwards on their bony arms by the elastic spring of the tail exerted sideways. Their progress is nearly as fast as a man will leisurely walk. The strong scuta or bands which envelope their body must greatly facilitate their march, in the manner of the plates under the belly in serpents, which are raised and depressed by a voluntary power, in some measure performing the office of feet. It is said that the other species, the *round-head* (*Callichthys littoralis*, Hancock), has not been known to attempt such excursions, although it is capable of living a long time out of its element; but, as I before observed, it buries itself in the mud in the manner of the *Yarrows*, when the water is drying up.

'The Indians say these fishes carry water within them for a supply on their journey. There appears to be some truth in this statement; for I have observed that the bodies of the *Hassars* do not get dry, like those of other fishes, when taken out of the water; and if the moisture be absorbed, or they are wiped dry with a cloth, they have such a power of secretion that they become instantly moist again. Indeed it is scarcely possible to dry the surface while the fish is living.'

Both the species of *Hassar* here mentioned, it appears, make nests in which they lay their eggs in a flattened cluster, and cover them over most carefully. This care does not end here. They remain by the side of the nest till the spawn is hatched, with as much solicitude as a hen guards her eggs; both the male and female *Hassar*, for they are monogamous, steadily watching the spawn, and courageously attacking any assailant. Hence the negroes frequently take them by putting their hands into the water close to the nest; on agitating which, the male *Hassar* springs furiously at them, and is thus captured.

'The *round-head* forms its nest of grass; the *flat-head*, of leaves; both at certain seasons burrow in the bank; they lay their eggs only in wet weather. I have been surprised to observe the sudden appearance of numerous nests in a morning after rain occurs, the spot being indicated by a bunch of froth, which appears on the surface of the water over the nest; below this are the eggs, placed on a bunch of fallen leaves or grass, if it be the littoral species, which they cut and collect together. By what means this is effected seems rather mysterious, as the species are destitute of cutting teeth. It may possibly be by the use of their serrated arms, which form the first ray of the pectoral fins.'

Genus *Callichthys*, Linn.—The species of this genus have the body almost entirely covered by large bony plates, these forming four longitudinal ranges, two on each side: the head is also protected by bony plates; the mouth is but slightly cleft, and provided with four long barbules; the second dorsal has a bony spine in front; the foremost ray of the pectoral fins is strong, but that of the anterior dorsal is comparatively feeble and short. The species of Callichthys appear to be confined to the tropical portions of South America. [Callichthys.]

Genus *Arges*, Cuv. and Val.—The principal characters of this genus are—teeth bifid at the extremity, and with the points curved inwards; palate destitute of teeth; opening of the mouth large; maxillary barbules two in number; anterior dorsal fin small, and with the front ray feeble; adipose fin long; the other fins with the outer rays prolonged into a filament.

The species which forms the type of this genus (*Arges sabalo*, Cuv. and Val.) is a small fish about eight inches in length, which was brought by Mr. Pentland from Upper Peru, being found in the neighbourhood of the mission of Santa Anna, at a height of from 4500 to 4800 French metres above the level of the sea. The specimen was given to M. Valenciennes, who prized it much, since it threw a light on the affinities of a fish described by Humboldt, under the name *Pimelodus Cyclopum*, relating to which that author has given such an interesting account. The *Pimelodus Cyclopum*, which M. Valenciennes thinks most probably belongs to the present genus, is about four inches in length, and is found in lakes at the height of 3500 metres above the level of the sea. But the most remarkable circumstance relating to these fishes is that they are frequently ejected in the eruptions from the volcanoes of the kingdom of Quito, and in such quantities that the fetid odour arising from their putrefaction was perceived at a great distance, and the putrid fevers which prevailed in those districts were attributed to the miasmata they produce. These fishes sometimes issued from the crater of the volcano, and sometimes from lateral clefts, but constantly at an elevation of from 5000 to 5200 metres above the level of the sea. In a few hours millions are seen to descend from Cotopaxi, with great masses of cold and fresh water.

The genus *Brontes*, Cuv. and Val., is founded upon a fish possessing all the characters of the preceding genus (and which, it appears, like the *Pimelodus*, is thrown out from the volcanoes of Cotopaxi), but which differs in having no adipose fin.

Genus *Astroblepus*, Cuv. and Val., consists of but one species (the *Astroblepus Grixalvii* of Humboldt). This fish possesses all the characters of the genus *Brontes*, having, like it, the head depressed, the eyes directed upwards, a single dorsal fin, the external rays of the fins prolonged into a filament, and four branchiostegous rays, but it possesses no ventral fins. This fish is found at Rio de Palace, near Papayana, where it is known by the name *pescado negro*; it attains about fifteen inches in length.

Genus *Heterobranchus*, Geoff.—Here the head is furnished with a rough bony shield, which is flat and broader than in the other Silurians, on account of the lateral laminæ furnished by the frontals and parietals, which cover the orbital and temporal bones. The operculum is still smaller than in the preceding fishes, and what chiefly distinguishes these fishes from others of the family is, that, besides the ordinary branchiæ, they have an apparatus ramifying like the branches of a tree adhering to the upper branch of the third and fourth branchial rays; the branchiostegous rays vary from eight or nine to fourteen or fifteen in number. The pectoral spine is strong and denticulated, but there is no bony spine to the dorsal fin. The body is elongated and naked, and the dorsal and anal fins are greatly extended in the longitudinal direction. The barbules are eight in number. The species inhabit the rivers of Africa, and some of those of Asia.

In some species the long dorsal fin is supported throughout by rays; these constitute the subgenus *Clarias*, Val.; and in others there is a dorsal fin supported by rays, and a second behind this, which is adipose. To them the term *Heterobranchus* is restricted in the *Histoire Naturelle des Poissons*.

Genus *Saccobranchus*, Cuv. and Val.—This genus is founded upon the *Silurus Singio* of Hamilton's 'Fishes of the Ganges,' which possesses some interesting peculiarities in its internal organization, pointed out by Mr. Wyllie, in the 'Proceedings of the Zoological Society,' for May, 1840.

Genus *Plotosus*, Lacépède, is distinguished by the elongated form of the body and the possession of two dorsal fins, the hindermost being supported by rays as well as the other. The head is protected by a bony plate, the lips are fleshy and pendent, the jaws are furnished with strong and conical teeth, and the vomer with rounded teeth. The species inhabit India.

Genus *Aspredo*, Linn.—The fishes of this genus, says Cuvier, present very singular characters, particularly in the flattening of the head and in the dilatation of the anterior portion of the trunk, which chiefly arises from that of the bones of the shoulder; in the proportionate length of the tail; in the small size of their eyes, which are placed in the upper surface of the head. The intermaxillaries are situated under the ethmoid, directed backwards, and are only furnished with teeth in their hinder margin. But the most striking character consists in there being no power of motion in the operculum, a character which distinguishes the present genus from all other osseous fishes. The branchial opening consists of a simple slit in the skin under the external edge of the head, and the branchiostegous membrane is provided with five rays; the dorsal fin is of moderate size; the anal is long; the tail moderate, and the adipose fin is wanting: the whole of the body is smooth and without bony plates. The species are found in the tropical parts of South America.

Genus *Chaca*, Cuv. and Val., which is the next in succession in the *Histoire des Poissons*, is founded upon the *Platystacus Chaca* of Buchanan Hamilton. It inhabits the rivers of India.

The genus *Sisor* is also founded upon a single species described (under the name *Sisor rhabdophorus*) by the author just mentioned, in his *Fishes of the Ganges*.

Genus *Loricaria*.—Linnæus gave this name to a group of *Siluridæ* distinguished by the head and body being covered throughout by large angular bony plates; they differ moreover from certain other Siluri which have the body protected by plates (such as *Cullichthys* and *Doras*), in having the opening of the mouth on the under side of the muzzle, in this respect approaching the genus *Synodontis*. The intermaxillaries are small and suspended beneath the muzzle, and the mandibles are transverse and not united; they are furnished with long and slender teeth, and these are flexible and terminate in a hook. The mouth is encircled by a large, circular, membranous veil; the pharyngeal bones are furnished with numerous teeth rounded like paving-stones. The true opercula are fixed as in *Aspredo*, but two small external plates, which are movable, appear to take their place. The branchiostegous rays are four in number. The first ray of the dorsal, pectoral, and anal fins is in the form of a strong spine.

This genus is subdivided into two subgenera. In the one (*Hypostomus*, Lacép.), there are two dorsal fins; the hinder one is small and provided with but one ray. The labial veil is covered with papillæ, and provided with a small barbule on each side. The belly is not protected by plates. The species are found in the rivers of South America. In the second subgenus, to which Lacépède restricts the term *Loricaria*, there is but one dorsal fin; the labial veil is furnished with several barbules, and sometimes beset with villosities; the belly is protected by plates. The species of this section are also found in South America.

SILVA Y FIGUERO'A, GARCIA DE, was born of illustrious parents at Badajoz, in 1574. At the age of fifteen his father sent him to court, where he entered the household of Philip II. as page. He then joined the Spanish army in Flanders, where he greatly distinguished himself, and obtained the command of a company. Having subsequently shown some talent for diplomacy, he was despatched by Philip III. on an embassy to Shah Abbás, king of Persia, who was willing to conclude a treaty of commerce with Spain. Silva embarked for Goa, where he arrived in 1614; but the governor of that place, who was a Portuguese, fearing lest Silva's mission should lead to an inquiry into the administration of the Spanish possessions in India, threw every impediment in his way, and refused to provide him with a vessel and money to prosecute his journey, as he was ordered to do. Impatient at the delay, Silva embarked on board a native vessel and sailed for Ormuz, which port he entered on the 12th of October, 1617. Thence he sailed to Bandel (Bender Abassi) in the dominions of the Shah, when he was well received. He reached Ispahán on the 18th of April, 1618, by the then usual route of Lar and Shiráz. After a short residence in the latter place, Silva started for Kazwín, or Casbin, where Shah Abbás was then holding his court, who received him with every mark of distinction, but would not hear his message until he had himself returned to Ispahán, where he directed Silva to wait till his arrival. Accordingly, after a stay of two months at Kazwín, the Spanish envoy returned to Ispahán, where Shah Abbás arrived shortly after, in July, 1619. He granted Silva an audience; but though he manifested a wish to conclude a commercial treaty, and to be upon friendly terms with Spain, the Shah refused to subscribe to two conditions stipulated by the ambassador of Philip III., namely, that he should restore some fortresses belonging to Ormuz, which he had lately seized; and that he should exclude all other European nations from trading with his dominions. The negotiations for the treaty being thus suspended, Silva left Ispahán on the 25th of August, 1619, and returned by the same route to Goa, where he landed in November, 1620. From Goa he sailed to Spain, where he died in 1628.

During his residence in Persia Silva wrote an itinerary of his travels, with an account of such events as came within his observation; and a sketch of the manners and customs of the inhabitants of that empire. This work was never printed in the original Spanish, though a French translation appeared in 1667, under the title of 'L'Ambassade de Don Garcias de Silva Figueroa en Perse, contenant la Politique de ce Grand Empire, les Mœurs du Roi Shah Abbas, et une relation exacte de tous les Lieux de la Perse et des Indes où cet Ambassadeur a été l'espace de huit années qu'il y a demeuré,' par M. Wicqfort, Paris, 1667, 4to. It is one of the best accounts of Persia that we possess, and is much commended by Chardin. During his residence in Goa Silva also made an abridgment of Spanish history, which appeared at Lisbon soon after his death: 'Breviarium Historiæ Hispanicæ,' Lisbon, 1628, 4to. A Latin letter of his, dated Ispahan, 1619, and addressed to the Marquis of Bedmar, in which he gave a short account of his travels, was also published at Antwerp: 'Garciæ Silva Figueroa, Philippi III. Hispaniarum Indiarumque Regis, ad Persarum Regem Legati, de Rebus Persarum Epistola,' Antw., 1620, 8vo.

SILVER, a metal which has been well known and highly valued from the remotest period—circumstances which are readily explained by the facts of its occurring frequently native, and possessing great lustre and fitness for immediate use without being subjected to any metallurgic process.

Ores of Silver.

Native Silver.—This occurs crystallized, arborescent, or dendritic, capillary, reticulated, granular, and massive. The primary form of the crystal is a cube. It has no cleavage Fracture hackly. Colour white, but externally often blackish, owing probably to the presence of a little sulphur. Hardness 2·5 to 3. Lustre metallic. Colour pure white, except when tarnished. Streak shining. Opaque. Specific gravity 10·47. Malleable, but commonly less so than pure silver, probably owing to an admixture of other metals. Soluble in nitric acid, and the solution colourless when pure, but blue if copper be present; and if antimony, a white substance, and if gold, a black one remains undissolved. Fuses into malleable globules before the blowpipe.

Native silver is met with in most parts of the world. in the British Isles, Germany, Hungary, in the north of Europe, but especially, and in largest quantity, in Mexico and South America. Silver occurs in mixture or combination with other metals, as already hinted at. The first compound of this nature we shall describe is

Antimonial Silver. Stibiuret of Silver.—This occurs in crystals, in grains, and massive.

Primary form of the crystal a right rhombic prism. Cleavage parallel to the terminal plane and short diagonal of the prism. Fracture uneven. Colour silver white, or, when tarnished, yellowish white. Streak silver white. Lustre metallic. Opaque. Slightly malleable. Easily frangible. Hardness 3·5. Specific gravity 9·44 to 9·8.

Before the blow-pipe on charcoal readily melts, with the formation of white antimonial vapour, into a greyish globule, which is not malleable, but eventually pure silver is obtained. It is not totally soluble in nitric acid, oxide of antimony remaining undissolved.

The Massive Varieties are amorphous, and have a granular or foliated structure.

Antimonial silver is found in clay-slate at Andreasberg in the Harz; in Baden; near Guadalcanal in Spain; at Salzburg; and at Allemont in France.

The Andreasberg mineral (1), analyzed by Vauquelin, and the Baden (2), by Klaproth, gave the annexed results:—

	(1)	(2)
Silver	78·0	84·76
Antimony	22·0	16·24
	100	100

Telluric Silver occurs in coarse-grained masses. Colour grey. Lustre metallic. Soft. Somewhat malleable. Specific gravity about 8·5. It is dissolved by nitric acid, and when heated, and before the blow-pipe, or charcoal, gives a fused blackish mass, containing specks of metallic silver.

It is found at the silver-mines of Savdinski, in the Altai Mountains, Siberia.

Analysis by Rose—

Silver	62·42
Tellurium	36·96
Iron	·24
	99·62

Native Amalgam is a compound of silver and mercury. [MERCURY.]

Auriferous Native Silver occurs crystallized in cubes, capillary, and disseminated. Colour yellowish white. Specific gravity 14·0 to 17·0. Different varieties gave the annexed results to

	Fordyce.	Klaproth.	Boussingault.			
Silver	72	34	15·5	17·6	26	35·07
Gold	28	64	84·5	82·4	74	64·93
	100	98	100·	100·	100	100·

Arsenical Antimonial Silver, or rather *Arsenio-ferruginous Antimonial Silver.*—This substance occurs mammillated or in small globular and reniform masses, and sometimes investing other substances. When untarnished it is nearly silver white, but is commonly tarnished yellowish or blackish; its lustre is metallic. It is harder than antimonial silver, but is sectile and brittle. Specific gravity 9·4.

Before the blow-pipe antimony and arsenic are volatilized with the alliaceous smell, and a globule of impure silver remains. Its localities are nearly the same as those of antimonial silver. Klaproth obtained from a specimen from Andreasberg—

Silver	12·75
Antimony	4·00
Iron	44·25
Arsenic	35·
	96

The native compounds of silver next to be described are those in which it occurs in combination with the non-metallic elements. It is not found simply combined with oxygen, nor at all with azote, hydrogen, or fluorine.

Chloride of Silver. Horn Silver. Muriate of Silver. Laxmannite.—This ore occurs crystallized and massive. Primary form of the crystal a cube. No cleavage. Fracture uneven. Hardness 1·0 to 1·5. Yields to the pressure of the nail. Streak shining. Specific gravity 4·75 to 5·55. Translucent. Opaque. Lustre resinous. Colour grey, yellowish, greenish, and blue of various shades. Malleable and sectile. Fusible in the flame of a candle. Heated with potash by the blow-pipe, yields a globule of metallic silver. Insoluble in nitric acid, but dissolved by ammonia. When rubbed with a piece of moistened zinc, the surface becomes covered with metallic silver.

This ore occurs in various parts of Europe and America, along with others of the same metal. The largest masses, which are of a greenish colour, are brought from Mexico and Peru. It is found in veins, chiefly in primitive rocks.

Two specimens from Peru (1) and from Saxony (2), analyzed by Klaproth, gave—

	(1)	(2)
Chlorine	24	21·50
Silver	76	67·75
Oxide of Iron	—	6·00
Alumina	—	1·75
Sulphuric acid	—	0·25
	100	97·25

Buttermilk Silver. Earthy Corneous Silver.—This is regarded as a variety of the foregoing. It is described as being of a brownish colour, with occasionally a tinge of green or blue. It is opaque, dull, with an earthy fracture, and is soft, sectile, and heavy. It occurs massive, and also investing other substances. It occurs only at Andreasberg in the Harz.

According to Klaproth, it is composed of—

Chlorine	8·28
Silver	24·64
Alumina	67·08
	100

Iodide of Silver. Herreralite.—Occurs massive in thin plates, which are silver or greyish white, and which become bluish by exposure to the air. Transparent. Translucent. Lustre resinous to adamantine; in thin laminæ flexible and malleable. Melts on charcoal before the blow-pipe, vapour of iodine being evolved, and globules of silver remaining. Found at Abarradon near Mazapil, in the state of Zacatecas, Mexico, in serpentine.

Sulphuret of Silver. Vitreous Silver. Silver Glance. Henkelite.—Occurs crystallized and massive. Primary form a cube. Fracture fine-grained and uneven; sometimes small and flat conchoidal. Colour lead-grey; blackish when tarnished. Lustre metallic. Opaque. Hardness 2·0 to 2·5. Malleable. Sectile. Specific gravity about 7·2.

When heated by the blow-pipe, sulphur is expelled and silver remains. It occurs in Saxony, Bohemia, and in great abundance in Mexico. It has been occasionally found in Cornwall, and in most silver-mines.

Analysis, (1) by Klaproth, of a specimen from Freiberg; (2) by Berzelius:—

	(1)	(2)
Sulphur	15	12·95
Silver	85	87·05
	100	100

Black Sulphuret of Silver. Earthy Silver Glance.—Derived from the decomposition of the last mentioned. Occurs massive and pulverulent. Fracture uneven. Colour dark lead-grey, inclining to black. Devoid of lustre, or only feebly glimmering. Somewhat sectile. Streak shining, metallic. It is found in Norway, Siberia, Hungary, &c., usually investing other silver-ores or filling up cavities in them.

Sulphuret of Silver and Arsenic. Light Red Silver. Proustite.—Primary form a rhomboid. Colour cochineal to aurora red; streak lighter. Lustre adamantine. Translucent to transparent. Specific gravity 5·5 to 5·6.

It is found at Joachimsthal, Johanngeorgenstadt, Annaberg, &c.

Rose's analysis (1) and Proust's (2) give the following as the composition of a specimen from Joachimsthal:—

(1)		(2)	
Sulphur	19·51	Sulphuret of Silver	74·35
Silver	64·67	Sulphuret of Arsenic	25·
Arsenic	15·09		
Antimony	00·69		99·25
	99·96		

Sulphuret of Silver and Antimony. Ruby Silver. Dar Red Silver. Braardite.—Occurs crystallized and massive. Primary form a rhomboid. Cleavage parallel to the primary planes, usually indistinct. Fracture conchoidal. Colour, by reflected light, from lead-grey to iron-black; by transmitted light, from brilliant to dark red. Lustre adamantine. Translucent. Opaque. Hardness 2·0 to 2·5. Extremely brittle. Streak red. Specific gravity 5·8 to 5·9.

Massive Varieties.—Structure granular, compact, lamellar, dendritic, amorphous.

It is found in many parts of Europe and America, as Germany, Norway, Mexico and Peru, and also in Cornwall.

According to Bonsdorff, a specimen from Andreasberg yielded by analysis—

Sulphur	16·609
Silver	58·949
Antimony	22·846
	98·404

Sulphuret of Silver and Antimony. Miargyrite.—Occurs crystallized. Primary form an oblique rhombic prism. Cleavage imperfect. Fracture uneven. Colour iron-black in mass; but in thin fragments deep red by transmitted light. Nearly opaque. Lustre bright metallic. Hardness 2·0 to 2·5. Very sectile. Streak dark red. Surfaces of the crystals usually striated. Specific gravity 5·2 to 5·4.

It is found with argentiferous arsenical pyrites at Braunsdorf, near Freiberg, Saxony

According to Rose, it yielded—

Sulphur	21·95
Silver	36·40
Antimony	39·14
Copper	1·06
Iron	0·62
	99·17

Sulphuret of Silver and a little Iron. Biegsamer Silberglanz.—Occurs crystalline and massive. Crystals small and tabular. Cleavage parallel to the terminal planes. Colour nearly black. Lustre metallic. Very soft. Readily separable into thin flexible laminæ.

Found only in Hungary and at Freiberg.

According to Wollaston, this mineral (which is extremely rare) consists of sulphuret of silver with a little iron.

Sulphuret of Silver and Iron. Sternbergite. Flexible Sulphuret of Silver.—Occurs crystallized. Primary form a right rhombic prism. Cleavage parallel to the terminal plane, distinct. Laminæ very flexible. Colour dark-brown, often with a blue tarnish. Streak black. Lustre metallic. Hardness 1·0 to 1·5. Specific gravity 4·2 to 4·25.

It is found at Johanngeorgenstadt, Schneeberg, and Joachimstahl in Bohemia, with other silver-ores.

A specimen from the last-mentioned locality yielded, according to the analysis of Zippe—

Sulphur	30
Silver	33·2
Iron	36·
	99·2

Brittle Sulphuret of Silver, Antimony, and Iron. Brittle Silver Glance.—Occurs crystallized. Primary form a right rhombic prism. Crystals commonly macled. Fracture usually conchoidal, with a shining metallic lustre. Colour dark grey or iron-grey. Hardness 2·0 to 3. Specific gravity 5·9 to 6·4.

It is found in Saxony, Bohemia, Hungary, Siberia, and Mexico.

Analysis of a specimen from Frieberg by

	Klaproth.	Rose.
Sulphur	12	16·42
Silver	66·5	68·54
Antimony	10·	14·68
Iron	5·	0·00
Copper	0·5	0·64
	98·5	100·28

Sulphuret of Silver and Copper. Silberkupferglanz.—Occurs massive. Compact. Fracture brilliant, granular, flat conchoidal. Colour dark lead-grey. Streak shining. Lustre metallic. Opaque. Soft. Specific gravity 6·25.

Found at Schlangenberg, near Colivan in Siberia.

Analysis by Stromeyer:—

Sulphur	15·96
Silver	52·87
Copper	30·83
Iron	00·34
	100

Sulphuret of Silver, Antimony, and Copper. Romelite. Mine d'Argent grise Antimoniale.—Occurs crystallized. Primary form a right rhombic prism. Cleavage parallel to the lateral planes. Colour nearly silver-white. Lustre shining, metallic. Opaque. Hardness 2 to 2·5. Extremely brittle. Specific gravity 5·5 to 5·6.

It consists principally of sulphur and the metals above named, but in proportions not yet determined.

Sulphuret of Silver, Arsenic, Antimony, and Copper. Polybasite. Brittle Silver.—Occurs crystallized. Primary form a right rhombic prism. Cleavage imperfect. Fracture uneven. Colour iron-black. Lustre metallic. Translucent. Opaque. Hardness 2·0 to 2·5. Specific gravity 6·269.

Occurs in Bohemia, Saxony, and other parts of Europe; and in Mexico and Peru.

Analysis (1) of a specimen from Mexico by Rose, and (2) from Freiberg by Brandes:—

	(1)	(2)
Sulphur	17·04	19·40
Silver	64·29	65·50
Arsenic	3·74	3·30
Antimony	5·09	0·00
Copper	9·93	3·75
Iron	0·06	5·46
	100·15	97·41

Sulphuret of Silver, Iron, Copper, Bismuth, and Lead. Bismuthic Silver.—Occurs in acicular crystals and massive. Fracture uneven. Colour, when first broken, lead-grey, but liable to tarnish.

Massive Varieties disseminated, amorphous. Fracture fine-grained, uneven. Lustre metallic. Opaque. Soft. Sectile and brittle.

It is found accompanying pyrites and galena at Scaappach in the valley of Kinzig, Baden.

Analysis by Klaproth:—

Sulphur	16·3
Silver	15·0
Iron	4·3
Copper	0·9
Bismuth	27·
Lead	33·
	96·5

Seleniuret of Silver. Selensilver.—Occurs crystallized. Primary form a cube. Occurs in thin plates. Hardness between gypsum and calcspar. Flexible. Specific gravity 8·0. Colour iron-black; streak the same, but brighter. Occurs at Tilkerode in the Harz, associated with seleniuret of lead.

Analysis by G. Rose:—

Selenium	24·05
Silver	65·56
Seleniuret of lead, with a little iron	6·79
	96·40

Seleniuret of Silver and Copper. Eukairite.—Occurs massive. Structure granular. Colour grey. Lustre shining. Disposed in films on calcareous spar.

Found in a copper-mine at Skrickerum in Smaland, Sweden.

Analysis by Berzelius:—

Selenium	26·
Silver	38·93
Copper	23·05
Earthy matter	8·90
Carbonic acid and loss	3·12
	100

Carbonate of Silver and Antimony. Selbite.—Occurs massive and disseminated. Fracture uneven. Colour greyish-black. Structure fine granular. Lustre metallic. Opaque. Soft. Brittle. Heavy.

Found at Altwolfach in the Black Forest.

Analysis by Selb:—

Carbonic acid	12
Silver	72·6
Oxide of antimony and a trace of copper	15·5
	100·1

This analysis cannot however be correct, if the ore contain carbonate of silver.

Arseniate of Silver and Iron. Ganseekothig-erz; Goose-dung Silver-ore.—Occurs massive. Mammillated. Fracture conchoidal; sometimes earthy, and mixed with cobaltore. Colour yellow or pale green. Streak white. Lustre resinous.

Found chiefly in the mines of Clausthal in the Harz; and also in Cornwall, and at Allemont in France.

It does not appear to have been accurately analyzed.

Having now mentioned the principal minerals which contain silver, it is to be observed that few of them are largely worked as ores: the principal are native silver, chloride of silver, and sulphuret of silver. The first, when the quantity is considerable, is separable by mere fusion; the chloride and the sulphuret are obtained by amalgamation with mercury; the sulphuret being first converted into a chloride by treatment with common salt, &c. A considerable quantity of silver is also procured from the lead-ore of this country by cupellation.

Properties of Silver.

The properties of silver are, that it has a purer white colour than any other metal; it has great brilliancy, and is susceptible of a very high polish. Its specific gravity is about 10·4 when cast, and 10·5 to 10·6 when stamped or rolled. It is sufficiently soft to be cut with a knife. It is very malleable and ductile, so that it may be beaten into leaves about 1-10,000th of an inch in thickness, and drawn into wire much finer than a human hair. It does not rust or oxidize by exposure to the air, but when the air contains sulphureous vapours it tarnishes, becoming first yellowish and afterwards black. Three metals only, viz. iron, copper, and platinum, exceed silver in tenacity; a wire 0·787 of a line in diameter supports rather more than 187 pounds without breaking. When exposed to a bright red heat silver melts, which, according to Daniell, is equivalent to 1873° of Fahrenheit; on fusion its appearance is extremely brilliant, and during this it absorbs oxygen from the air to the amount of about 22 times its volume, and this it gives out either by cooling or by being poured into water. When leaf-silver or fine silver-wire is heated by voltaic electricity, it burns with a fine green flame; if intensely heated in the open fire, it boils, and a portion is vaporized.

Oxygen and Silver combine to form three compounds, viz. suboxide, protoxide, and peroxide.

Protoxide of Silver is prepared by oxidizing and dissolving the metal in dilute nitric acid; when lime or barytes water, or solution of potash or soda, is added to the solution of nitrate of silver, a precipitate is formed, which is the protoxide of silver, composed of

One equivalent of oxgyen . .	8
One equivalent of silver . .	108
Equivalent .	116

The properties of this oxide are, that it is of a brownish colour, inodorous, tastless, very slightly if at all soluble in water; it is decomposed by the action of light, being reduced to metallic silver and oxygen gas, and the same effect is produced by heat. It is insoluble in the alkalis or alkaline earths in general, but is rapidly and largely dissolved by ammonia. Nitric, acetic, sulphuric, and some other acids combine with it readily, but it is decomposed by hydrochloric acid, the results being chloride of silver and water. It gives a yellow colour to glass and porcelain. This is the oxide which is the basis of all the common salts of silver.

Suboxide of Silver was first procured by Faraday, by the partial decomposition of the protoxide; when the ammoniacal solution of this is exposed to the air, its surface becomes covered with a pellicle or dark film, which is the suboxide in question; it is probably owing to the decomposition of a portion of the ammonia, which in this case yields hydrogen to a part of the oxygen of the protoxide of silver.

According to Wöhler, it may be obtained also by subjecting citrate of silver to a temperature of 212°.

Suboxide of silver appears to be a di-oxide, composed of—

One equivalent of oxygen . .	8
Two equivalents of silver . .	216
Equivalent .	224

It does not readily, if at all, form salts with acids.

Peroxide of Silver has been stated to be obtained by electrizing a weak solution of silver. It separates at the positive pole in the state of minute acicular crystals.

Sulphuric and phosphoric acid decompose it with formation of respective salts of the protoxide, and by ammonia it is acted upon and decomposed with great energy.

It appears to be a binoxide, composed of

Two equivalents of oxygen .	16
One equivalent of silver . .	108
Equivalent .	124

Chlorine and Silver readily combine, and the compound, as already mentioned, forms one of ore of silver.

It may be artificially formed in several ways, first by heating the metal in a finely divided state in the gas, or by adding any soluble chloride, as common salt, to nitrate or any soluble salt of silver, except the hyposulphite.

When recently precipitated, or if kept from the action of light, chloride of silver is perfectly white, but by exposure to daylight it becomes slowly bluish-white, and eventually almost black. The direct rays of the sun produce this effect almost instantaneously; on this property is founded its use in photogenic drawing: the exact nature of the change which takes place does not appear to have been satisfactorily determined. This chloride is quite insoluble in water, either cold or hot; the stronger acids take it up sparingly, and it is precipitated from them by dilution; it is dissolved however to some extent by hyposulphurous acid, and readily and largely by ammonia. It is decomposed by hydrosulphuric acids, and soluble sulphurets, which immediately blacken it by converting it into sulphuret of silver; it is also decomposed by hydrogen gas, and by iron and zinc when put into contact with it and water. By mere heat it undergoes no change except fusion, and when it has solidified on cooling, it has the appearance of horn; hence the name of *horn-silver* for the native chloride,

It is composed of—

One equivalent of chlorine .	36
One equivalent of silver .	108
Equivalent	144

Chloride of silver is largely and advantageously used both in qualitative and quantitative analyses. to determine the presence and quantity of chlorine, chlorides, and hydrochlorates.

Fluorine and Silver may be combined to form fluoride of silver. It is an uncrystallizable soluble compound; when heated it fuses; and at a higher temperature and exposed to the air it is slowly reduced.

It is composed of

One equivalent of fluorine . .	18
One equivalent of silver . .	108
Equivalent .	126

Sulphur and Silver form sulphuret of silver; this compound has been already noticed as existing in nature and constituting the *vitreous silver-ore*. It may be prepared by direct action, as by heating alternate layers of silver and sulphur; thus obtained, it is a soft malleable dark-coloured compound; it may be procured also by decomposing solution of nitrate or of ammoniuret of silver by hydrosulphuric acid, hydrosulphates, or soluble sulphurets. It is insoluble in water, ammonia, or other alkalis or acids, except nitric acid, which decomposes and is decomposed by it with the formation of sulphate of silver.

It is composed of—

One equivalent of sulphur	16
One equivalent of silver .	108
Equivalent .	124

Phosphorus and Silver.—The sesubstances combine when heated together; and form a white brittle compound; when fused and exposed to the air, it loses phosphorus. It may be formed either by projecting phosphorus on red-hot silver, or by heating a mixture of silver filings, phosphoric acid, and charcoal.

It is composed of

One equivalent of phosphorus .	16
One equivalent of silver . .	108
Equivalent .	124

Iodine and Silver readily combine when hydriodic acid or iodide of potassium is added to a solution of nitrate of silver. The iodide of silver formed is precipitated of a greenish-yellow colour: it is insoluble in water or ammonia, and decomposed when heated with potash; when fused, it acquires a red colour, and is discoloured by light; in the invention of the Daguerreotype, a film of this compound, on the surface of a polished plate of silver, is the substance that receives the impressions of light. It is decomposed by concentrated nitric or sulphuric acid.

It is composed of

One equivalent of iodine .	126
One equivalent of silver . .	108
Equivalent .	234

The compounds containing oxide of silver consist of the ammoniuret and the oxisalts of silver: we shall first mention the

Ammoniuret of Silver.—Protoxide of silver dissolves with great readiness in ammonia, and by careful operation the substance discovered by Berthollet, and called *fulminating silver*, is obtained. It should be prepared only in very small quantity at a time, on account of the facility and violence with which it explodes; in exploding it forms water, sets free azotic gas, and metallic silver, remains; it is procured by adding a small quantity of solution of ammonia to oxide of silver; a portion is dissolved, and a black powder, which is the fulminating ammoniuret of silver remains; it may be also formed by adding solution of potash from the ammonio-nitrate of silver; a very gentle heat or slight friction causes it to explode, sometimes even before it is dry. Its exact composition has not been determined.

We come now to the compounds of the oxacids and oxide of silver, or the oxisalts of silver; it is the protoxide only which enters into combination with acids; at least they are the only well-known compounds. The first we shall mention is

Nitrate of Silver.—This is one of the most important salts of silver. It is generally prepared by adding the metal to the diluted acid, in which case the silver is oxidized by decomposing a portion of the nitric acid, and that which remains undecomposed dissolves the oxide formed. It may also be prepared, but less advantageously, by dissolving the protoxide of silver in the dilute acid; in this case no nitric oxide is evolved, for no nitric acid is decomposed. The solution is colourless, and by evaporation colourless crystals are readily obtained, the primary form of which is a right rhombic prism. Nitrate of silver has a bitter metallic taste, is soluble in about its own weight of water at 60°, and in half its weight of boiling water; the solution is neutral to litmus-paper. Cold alcohol dissolves only a little of this salt, but when boiling takes up a considerable quantity of it, the greater part of which separates on cooling.

By the action of light, especially when in contact with organic matter, nitrate of silver is rendered of a dark colour, and is then insoluble in water. When moderately heated, nitrate of silver fuses, and being then cast in a mould in small cylindrical sticks, it constitutes the argenti nitras of the Pharmacopœia, commonly called *lunar caustic;* if the heat applied be too great, the salt is decomposed, oxide of silver being left, which, if still more strongly heated, gives metallic silver. When sulphur, phosphorus, or charcoal is mixed with nitrate of silver, and struck on an anvil, detonation ensues, and metallic silver is obtained; the experiment should be made on very small quantities. Nitrate of silver is decomposed by simply placing charcoal or phosphorus in its solution, metallic silver being deposited in the crystalline state; the same effect is produced by several metals, and more especially copper, which is used in silver-refining for precipitating the silver from the nitrate in a pure state.

Chlorate of Silver may be obtained by dissolving protoxide of silver in chloric acid; the solution yields small rhombic crystals, which are soluble in four parts of water at 60°. This salt is not applied to any use.

Nitrate of silver is decomposed by sulphuric and phosphoric acids, and their soluble salts, sulphate and phosphate of silver, are thrown down. Potash and soda and the alkaline earths precipitate protoxide of silver; ammonia produces the same effect, but when added in excess, redissolves the oxide at first precipitated. Hydrosulphuric acid, hydrosulphates, and soluble sulphurets occasion the formation and precipitation of black sulphuret of silver.

Chlorine partially, and soluble chlorides and hydrochloric acid and hydrochlorates, perfectly, decompose nitrate of silver, chloride of silver being precipitated. It is on this account that nitrate of silver is employed, and with great accuracy, in both qualitative and quantitative analyses.

Nitrate of silver is composed of

One equivalent of nitric acid .	54
One equivalent of protoxide of silver	116
Equivalent .	170

Besides the uses already named, nitrate of silver is employed by precipitation with carbonate of soda, &c. for writing on linen; it is commonly called indelible ink.

Carbonate of Silver is prepared by adding a solution of carbonate of potash, or of soda, to one of nitrate of silver. It is a white substance, insoluble in water, but dissolved by ammonia, and decomposed by acids; it is blackened by exposure to light, and readily decomposed by heat. It is probably composed of

One equivalent of carbonic acid .	22
One equivalent of oxide of silver .	116
Equivalent .	138

Sulphate of Silver.—This salt may be formed by boiling finely divided silver in strong sulphuric acid, by dissolving the protoxide in dilute sulphuric acid, or by adding a solution of sulphate of soda to one of nitrate of silver, when it is thrown down as a crystalline precipitate.

Sulphate of silver is a colourless salt, soluble in about 90 parts of water at 60°; a saturated boiling solution deposits crystals on cooling, which are prismatic and anhydrous; when strongly heated, the acid is expelled, and metallic silver remains. It is sometimes employed as a chemical re-agent, and is composed of

One equivalent of sulphuric acid .	40
One equivalent of oxide of silver .	116
Equivalent .	156

It is decomposed by chlorides and sulphurets, in the same manner as the nitrate of silver.

Sulphite of Silver may be obtained by adding sulphite of potash to a solution of nitrate of silver, or by digesting oxide of silver in a solution of the acid. It has the form of crystalline grains, and, unlike most other salts of silver, is stated to retain its whiteness when exposed to light. It is composed of

One equivalent of sulphurous acid .	32
One equivalent of oxide of silver .	116
Equivalent . .	148

Hyposulphate of Silver is prepared by digesting carbonate of silver in hyposulphuric acid. It crystallizes in prisms.

Hyposulphite of Silver.—It is obtained by gradually adding a weak solution of nitrate of silver to a dilute one of hyposulphite of soda. It is a precipitate of a grey colour, and the supernatant liquor is stated by Herschel, who has particularly examined this salt, to be remarkably sweet, without any metallic flavour. It is also formed when chloride of silver is dissolved in a hyposulphite. This salt is very liable to spontaneous decomposition, and becomes black owing to the formation of sulphuret of silver. The hyposulphites have been advantageously employed in removing of the unchanged salt of silver in photogenic drawings. Hyposulphite of silver is composed of

One equivalent of hyposulphurous acid	48
One equivalent of oxide of silver .	116
Equivalent . .	164

Phosphate of Silver.—This is prepared by adding a solution of the common neutral phosphate of soda to one of nitrate of silver; a yellow precipitate is formed, which is quickly discoloured by exposure to light; becomes brown when heated, but regains its yellow tint on cooling; and when strongly heated, it melts. It is soluble in nitric and phosphoric acid. It is a subsesquiphosphate, composed of

1 equivalent of phosphoric acid .	36
1½ equivalent of oxide of silver .	174
Equivalent . .	210

Pyrophosphate of Silver is obtained by heating neutral phosphate of soda so as to expel its water, and adding a solution of it to one of nitrate of silver. This precipitate is of a white colour. Like the preceding, it is composed of one equivalent each of acid and base.

We shall mention the properties of a few of the salts formed by the combination of the vegetable acids with oxide of silver.

Acetate of Silver.—It may be prepared by dissolving oxide of silver in acetic acid, or, as it is a salt of slight solubility, in water, by decomposing nitrate of silver with acetate of soda, when it is thrown down as a crystalline flocculent precipitate. It is a colourless salt, sparingly soluble in water, and decomposed at a red heat. It is occasionally used as a chemical re-agent. It consists of

One equivalent of acetic acid .	51
One equivalent of oxide of silver .	116
Equivalent . .	167

Benzoate of Silver may be obtained either by digesting moist oxide of silver in a solution of benzoic acid, or by adding a benzoate to it. It is a white anhydrous compound.

Citrate of Silver is formed by adding a citrate to nitrate of silver. It is an insoluble white powder, which blackens by exposure to light, and detonates slightly when heated. It is composed of

One equivalent of citric acid .	56
One equivalent of oxide of silver .	116
Equivalent . .	172

Oxalate of Silver is precipitated when oxalic acid or an oxalate is added to nitrate of silver. It is insoluble in water, white, and rendered black by exposure to light. It detonates slightly when struck on an anvil. It is soluble in nitric acid, and decomposed by hydrochloric acid. It is probably composed of

One equivalent of oxalic acid . .	36
One equivalent of oxide of silver .	116
Equivalent . .	152

Cyanide of Silver is prepared by adding hydrocyanic acid to a solution of nitrate of silver; the hydrogen of the acid uniting with the oxygen of the oxide of silver, water is formed, and the cyanogen and silver combine, and form cyanide of silver, which is precipitated. It is colourless, insoluble in water or solution of potash or soda, but readily taken up by ammonia. Nitric and sulphuric acid act but slightly upon it, unless concentrated and heated; hydrochloric acid decomposes it, and hydrocyanic acid and chloride of silver result, and this is one of the methods of procuring the last-mentioned acid, adopted in the London Pharmacopœia. It is decomposed by hydrosulphuric acid, by which sulphuret of silver and hydrocyanic acid are obtained. It is composed of

One equivalent of cyanogen . .	26
One equivalent of silver . . .	108
Equivalent . .	134

Ferrocyanide of Silver is obtained when ferrocyanide of potassium is added to nitrate of silver. It is a white insoluble substance.

Cyanate of Silver is formed when cyanate of potash is added to nitrate of silver. It is a white powder, slightly soluble in hot water, and also in ammonia. It blackens when heated, and burns with deflagration, and there are produced di cyanide of silver, cyanic acid, carbonic acid, and azotic gas.

Fulminate of Silver. Fulminating Silver.—This very explosive compound is formed by dissolving 60 grains of silver in half an ounce of nitric acid of specific gravity 1·38; to the solution are to be added two ounces of alcohol of specific gravity 0·88, and the mixture is to be heated in a capacious flask; a white flocculent precipitate soon begins to appear, and when ebullition commences, the flask is to be removed from the heat; the effervescence still continues, and when it has ceased, the product is to be collected on a filter, washed with cold water, and dried at a temperature not exceeding 100° Fahrenheit.

Fulminate of silver is a greyish-white crystalline powder. It becomes darker by exposure to light; it dissolves in about 40 parts of boiling water, and separates, as the solution cools, in minute crystals. In the quantity even of a half grain it detonates violently, either by the action of heat, electricity, strong sulphuric acid, or friction. When placed on one flint, and slightly touched with another, explosion also takes place. It has been known to detonate with great violence when a little has remained between a stopper and the neck of a bottle, on screwing in the stopper. It should be preserved therefore in small portions, in paper, in a wide-mouthed corked vial. It is composed of

One equivalent of fulminic acid .	68
Two equivalents of oxide of silver .	232
Equivalent .	300

Alloys of Silver.—Little or nothing is known respecting the alloys of silver with the following metals:—Potassium, sodium, and the metals of the alkaline earths; manganese, cadmium, nickel, uranium, tellurium, titanium, cerium, chromium, and vanadium.

Iron and silver combine with difficulty. They separate on cooling, the iron retaining about one-eightieth of silver, and the silver about one-thirtieth of iron. According to Faraday and Stodart, steel containing about one five-hundredth of silver forms a good alloy for cutting instruments. Iron and silver form a bluish-white granular alloy; tin and silver, a white, hard, brittle alloy. When cobalt and silver are fused together, they separate during cooling, each retaining a portion of the other. Lead and silver give a dull brittle alloy; antimony and silver, a white brittle alloy; arsenic and silver form a grey, brittle, granular compound, containing about 14 per cent. of the former metal. Bismuth and silver give a yellowish-white, brittle, lamellar alloy; molybdenum forms a compact, brittle, grey, granular compound with silver; and tungsten, a brown, slightly malleable button; copper and silver readily combine, and the silver is rendered harder by it without much deterioration of colour; the standard silver of this country is composed of 11·10 silver and 0·90 copper. Mercury and silver amalgamate readily, and this compound is sometimes employed for plating, but this operation is now being most advantageously carried on by precipitation by means of voltaic electricity.

Properties of the Salts of Silver.—The solutions of the salts of silver are recognised by the following, among other properties which have been occasionally mentioned:—

They give a white precipitate, insoluble in water or in dilute acids, but readily in ammonia, by chlorides and hydrochlorates; the precipitate becomes black by exposure to the light.

Metallic silver is precipitated by copper and the solution of protosulphate of iron; black sulphuret, by hydrosulphuric acid and hydrosulphates. A yellow precipitate by arsenious acid and phosphate of soda; a red-brown, by arseniates; a crimson, by chromates; and white, by the ferrocyanide of potassium.

With respect to the uses of silver it is scarcely requisite to say anything, as they are well known in its application to coin and the formation of vessels of great beauty and durability.

SILVER, PRODUCTION AND CONSUMPTION. Silver-ores are found chiefly in veins which traverse the primary and the older of the secondary stratified rocks, but especially the former; and also the unstratified rocks, such as granite and porphyry, which are associated with the above. Some of the richest mines in South America are situated in primary strata; also in limestone and in grauwacke, and in still more secondary strata. In some of the mines of Peru, and in those of Kongsberg in Norway and Freiburg in Saxony, silver has been discovered in masses weighing from 100 to 800 lbs. In the mines of Europe the veins are numerous and slender; in some of the mines in the Harz Mountains and in the Hungarian mines the veins occur in a small number of spots, and are of considerable dimensions. In three of the richest districts of Mexico there is only one principal vein, which is worked in different places. One of these veins, in the district of Guanaxuato, is from 130 to 148 feet wide, and it has been traced and worked to an extent of nearly eight miles.

In Mexico there were 500 mining establishments, called *Reales*, at the time of Humboldt's visit, and from 3000 to 4000 veins or masses were worked. The most common ores are the sulphuret of silver, antimonial silver, and muriate of silver.

The average richness of all the ores in Mexico is from 3 to 4 ounces per quintal of 102 lbs. In one of the Mexican mines a working of one hundred feet in length yielded in six months 432,274 lbs. troy of silver, equal in value to about 1,000,000*l.* In Chili some of the mines yield only 8 oz. in 5000 lbs. of ore; but in the rich mine of Copiapo, discovered in 1832, the ore frequently contains 60 or 70 per cent. of silver. The average produce of the mines in Saxony is from three to four ounces in the quintal. The lead-mines of Craven in Yorkshire contained 230 ounces per ton; and those of Cardiganshire, worked in the reign of Charles I., yielded 80 ounces. The average proportion of the lead-mines of the north of England is 12 ounces per ton. Even when the proportion of silver is so low as eight ounces, or one grain per ½ lb., it has been found profitable to separate it.

The pure metal is separated from the ore by various processes; by mechanical division, roastings to separate the sulphur and other volatile matter, and melting at different stages of purification, with the addition of fluxes of various sorts. Refining is performed by amalgamation with quicksilver, the two metals being afterwards separated by distilling off the quicksilver.

The produce of the Mexican mines averaged annually 4,800,000*l.* from 1793 to 1803, of which nineteen-twentieths were silver. In the first ten years of the present century the average annual value was about 5,000,000*l.*, the quantity of pure silver annually produced in that time being 1,440,650 troy lbs. The mines of Potosi in Peru are the most famous in South America. [POTOSI.] The produce of the Chilian mines in 1832 was about 1,000,000 ounces. At the commencement of the present century Humboldt estimated the annual produce of the silver-mines of Chili, Peru, Buenos Ayres, and New Grenada, at nearly 700,000 lbs. troy, valued at 2,074,476*l.* sterling.

The annual average of both gold and silver coined in the different mints of Spanish America was estimated, in 1810, at 8 millions sterling, namely, in Mexico 24 millions of dollars; Lima, 6 millions; Potosi, 4½ millions; Santa Fé and Santiago, each 1½ million; and Popayan and Guatemala, nearly 1 million. The proportion of silver to gold coined at all these mints was stated as 30 to 1; but the proportion of silver to gold produced from all the American mines was as 62 to 1; and from the mines of all countries as 52 to 1. In a work published at Paris in 1807 by M. Brongniart, the value of the gold and silver brought annually into circulation from all parts of the world was estimated at nearly 46 millions of dollars; of which 36 were from the mines of Spanish America, 4½ from those of Portuguese America, and 5½ from the mines of the Old World. (*Report of Bullion Committee*, 1810.)

The most productive mines in Europe are those in Saxony, Austria, Hungary, Norway, Russia, and Spain. The mines in Saxony have been worked since the tenth century. The average annual produce of all the European mines in the last twenty years of the eighteenth century did not exceed 600,000*l.* in value. In the early part of the thirteenth century the mines of Schneeberg in Saxony are said to have yielded 600,000*l.* annually; but taking the average of all the mines of late years, the annual produce does not, according to the estimate of Mr. Jacob, exceed 400,000 lbs., or 100,000*l.* in value. The mines of Chemnitz and Kremnitz in Hungary have been worked about a thousand years. Those of the Tyrol have long ceased to be productive. The mine of Kongsberg in Norway was probably the richest in Europe during the middle of the last century. It yielded 649,270 lbs. troy, value nearly 2,000,000*l.*, in the forty years from 1728 to 1768. The silver of Russia is obtained from the refining of stream gold found in the Ural Mountains, and from lead-ores. Silver-mines were worked in Spain from a very early period by the Phœnicians, Carthaginians, Romans, and Moors; but they are now abandoned as unprofitable.

Native silver and several of the other varieties of the ores are met with in some of the Cornish copper-mines, and silver is extracted from the ore of English lead; but with these exceptions, and very small quantities which are occasionally found of this metal, silver cannot be considered as constituting one of the mineral treasures of the United Kingdom. A vein of silver-ore and the sulphuret was worked in Stirlingshire during the latter part of the last century, and from 40,000*l.* to 50,000*l.* were obtained, when the vein was lost. In 1607 a silver-mine was worked in Linlithgowshire.

The silver-mines of Asia have ceased to be very productive in modern times. There are mines in Armenia, but none are known to exist in Persia, nor in any part of the East India Company's possessions. Silver-mines are worked in China; and Mr. Davis remarks (*Chinese*) that the great quantities of silver brought to Lintin for many years past, to be exchanged for opium and exported to India, prove that there must be abundant sources in the empire. Silver is not obtained in any part of Africa.

Gold and silver appear to have been in request from the earliest ages. Abraham was rich in silver and in gold. He bought a field for a burial-place, for which he paid 400 shekels of silver, delivered 'by weight, according to the currency of the merchants.' (*Genesis*, xxii., 14-16.) Joseph, his great-grandson, was sold by his brethren for twenty pieces of silver (*Genesis*, xxxviii., 29); and when aftewards they went to Egypt to purchase corn, they brought 'silver in their sacks' mouth.' (*Genesis*, xlv., 22.) In the book of Job (xlii., 11-12), we read of silver passing from hand to hand as money. The writer of that book was acquainted with the fact that silver was found in veins and gold in particles, though the country in which he lived did not produce the precious metals. It is said (1 *Kings*, x.) that in the days of Solomon silver was nothing accounted of, and that 'the king made silver to be as stones in Jerusalem.' Darius Hystaspes, king of Persia, annually collected 9880 talents of silver, besides gold, as tribute from Asia and Africa; subsequently tribute came in also from the islands of the Mediterranean and from Europe as far west as Thessaly. Herodotus states (iii. 96) that the gold and silver were melted and poured into earthen vessels, and that the earthen vessels were then removed, which left the metal in a solid mass: when any was wanted, a piece was broken off as the occasion required. Silver was coined at Rome 266 B.C., before gold had been so employed. [COIN.]

For further information on the production and uses of the precious metals, the reader may refer to Mr. Jacob's elaborate 'History of the Consumption of the Precious Metals,' 2 vols. (1831). Chapter ii. contains an account of the mines of the antients, and their modes of mining and smelting. Chapter x. is an inquiry into the production of the precious metals during the middle ages, from the dissolution of the Western Empire to the discovery of America. Another chapter is on the produce of the mines at the epoch of this discovery; also one from this period to the opening of the mines of Potosi, in 1564; and two other chapters, one on the produce of gold and silver from 1700 to 1809, and the other extending the inquiry from 1809 to 1829, complete this part of the subject. The investigations of Humboldt, and the personal inquiries of Mr. H. G. Ward (*Mexico in* 1827), with the scattered notices of other writers, are collected and arranged by Mr. Jacob, whose work must always be valuable for reference in all questions relating to the history of prices. Several chapters of the work are devoted to this topic in connection with the increased supply of the precious metals after the discovery of America, and the rise of prices which occurred in Europe in the sixteenth century. The gold and silver coin in Europe, in 1492, Mr Jacob estimates at 34,000,000*l.*, which was increased in the course of the next 112 years by 138,000,000*l.*, making the total gold and silver currency in 1599, allowing for abrasion, &c., 172,000,000*l.* In book i., chapter xi., of the 'Wealth of Nations,' there is a 'Digression concerning the Variations in the Value of Silver during the course of the Four last Centuries.'

The proportional value of gold to silver was 12 and 10 to 1 from the Anglo-Saxon times to the discovery of America it is at present 14·28 to 1. In antient Greece the proportion varied from 15 and 10 to 1, and in Rome from 12 and 7 to 1. Herodotus (iii. 95) estimates it at 13 to 1. Since the discovery of America the proportion throughout the world has been 17 and 14 to 1. (Kelly's *Cambist.*)

Mr. Jacob gives the amount of silver coined in each reign from the time of James I.:—

		£
James I. . .	(22 years)	1,807,277
Charles I. and the Commonwealth .	(35 years)	9,776,544
Charles II. . .	(22 years)	3,722,180
James II. . .	(4 years)	2,115,115*
William and Mary, and William III.	(12 years)	7,093,074
Anne . . .	(13 years)	618,212
George I. . .	(13 years)	233,045
George II. . .	(33 years)	304,360
George III. from		
1760 to 1809 .	(49 years)	63,419
1809 to 1820 .	(11 years)	6,933,346

The last new silver coinage for the United Kingdom was commenced in 1816, since which time the quantity of silver coined in each year has been as follows:—

Years.	Amount Coined.	Years.	Amount Coined.
1816	£1,805,251	1829	108,259
1817	2,436,297	1830	151
1818	576,279	1831	33,696
1819	1,672,272	1832	145
1820	847,717	1833	145
1821	433,686	1834	432,775
1822	31,430	1835	146,665
1823	285,271	1836	·497,719
1824	282,070	1837	75,385
1825	417,535	1838	174,042
1826	608,605	1839	390,654
1827	33,019	1840	207,900
1828	16,288		
		Total	£11,108,265

The weight of silver coined, and the number and denomination of each coin issued from 1816 to 1840 inclusive, were as follows, according to a parliamentary paper (*Sess.* 1841):—

	Weight. lbs.	Number.	Value. £
Crowns .	140,144	1,849,905	462,476
Half-crowns .	1,190,876	31,438,434	3,929,804
Shillings .	1,540,080	101,645,280	5,082,264
Sixpences .	441,852	58,324,595	1,458,114
Fourpences .	52,140	10,325,320	177,062
Maunday money:—			
Fourpences	306	60,720	1,012
Threepences .	270	71,368	892
Twopences .	225	89,100	742
Pence .	272	215,424	897

The seignorage, or the difference between the price at which bullion is purchased and the mint price of the coin at 5*s.* 6*d.* an ounce, amounted to 616,747*l.* on the above. The Maunday money is coined for the purpose of being distributed by the Lord Almoner in Whitehall Chapel on Maunday Thursday.

When silver is issued for coin, it is always alloyed with

---

* Including £1,596,799 base money coined for Ireland.

copper; the maximum of hardness is produced by one-fifth of copper. One lb. of standard silver of the English coinage contains 11 oz. 2 dwts. of pure silver and 18 dwts. alloy, or 925 parts of pure silver in 1000 parts of standard silver. [MONEY.] For purposes connected with the manufacture of various articles of use and ornament the alloy is greater. At Birmingham rolled sheets are made which do not contain more than 3 or 4 dwts. of silver to each lb. of the inferior metal

The rolling of silver in contact with the inferior metals is performed by powerful flatting-mills. A bar of copper is made quite smooth and clear on one of its surfaces, and is then sprinkled over with glass of borax, and there is laid upon it a plate of fine silver, and the two are carefully bound together by wire. The mass is then exposed to a full red heat, which melts the borax and causes the silver to adhere to the copper. The ingot is now passed through a rolling-press and formed into a plate, both the silver and copper extending uniformly during the whole process, at the conclusion of which they are inseparably joined. The art of silver-plating was introduced at Sheffield about the middle of the last century. Another mode of plating is called 'silvering,' when an amalgam of silver and mercury is well rubbed upon the surface of the copper; by the application of heat the mercury is driven off, and the silver remains behind, adhering firmly to the copper, and capable of being highly polished.

Mr. Jacob estimates the annual consumption of silver in the United Kingdom at 3,282,046 oz., valued at 820,521*l.* The consumption for watch-cases is about 506,000 oz. annually: 100,000, each weighing on an average 2½ oz., are stamped annually at the London Assay-office; 60,000, each weighing 2 oz., are stamped at Birmingham; and 80,000, of the same weight, are stamped at the other assay-offices in the kingdom. About 900,000 oz. are used by coach-makers, harness-makers, and saddlers' ironmongers. In articles of small size, such as thimbles, of which hundreds of thousands are annually made; chains for watch-guards, pencil-cases, necks of smelling-bottles, locks of pocket-books, instrument cases, and portfolios, and small portions to handles of penknives and razors, the silver used is under the weight which subjects it to the stamp-duty of 1*s.* 6*d.* an oz., but a very considerable quantity of silver is employed in these minor objects. Leaf-silver for gilding is made two and a half times thinner than gold, and the gold-beaters require a considerable quantity of the metal for this purpose. Some articles are 'washed' with silver. Mr. Jacob distributes the total consumption as follows:—

That paying duty . . .	1,275,316 oz.
That used in watch-cases . .	506,740
That used in plating . .	900,000
That for other minor purposes .	500,000
	3,282,046

The value of the stock of silver in the hands of the manufacturers and dealers is estimated by the same authority at 3,280,000*l.* The value of ornaments and utensils of the precious metals in Europe and America, if brought to the crucible, Mr. Jacob values at 400,000,000*l.*, or one-fourth more than the value of the coined metals. The annual consumption of gold and silver in Europe and America for ornamental purposes he states to be nearly 6,000,000*l.*, that of Great Britain being valued at 2,457,000*l.* In M'Culloch's 'Dictionary of Commerce,' it is stated that Mr. Jacob's calculations are generally too high. Silver forms by far the largest proportion of the value of domestic utensils in which either of the two precious metals are used. In England the gold currency is of much higher relative value than that of silver [CURRENCY]; but in most other countries this is not the case. The coinage of silver and gold in France is estimated at 100,000,000*l.*, a very large proportion of which is of silver. Since the peace, the number of silversmiths and persons engaged in working silver and gold into articles of ornament and use has greatly increased on the Continent; and the increase of the same class is probably also considerable in the United Kingdom. See the articles ANDES, CHILE, MEXICO, PERU, POTOSI, for an account of the South American mines; AUSTRIA, HUNGARY, SAXONY, &c., for those of Europe.

(Jacob's *Inquiry into the Production and Consumption of the Precious Metals*, 2 vols., London, 1831; Humboldt's *New Spain*; *Personal Researches*, &c.; Ward's *Mexico*, &c.)

SILVER, *Medical Properties of*. In a purely metallic state silver has no action on the animal frame, and the only salt much used is the nitrate, termed also *lunar caustic*. This is always fused in proper moulds, from which it is turned out in the form of cylinders, about three inches long, and the eighth of an inch in diameter. They are at first white, but quickly become of a dark grey or black colour, from combining with organic matter in the air. To prevent this the cylinders are generally wrapped up in blue paper. When nitrate of silver is brought in contact with any part of the human frame, it causes first a white mark, which gradually changes to blue, purple, and at last to black. This occurs more rapidly if moisture be present; and is owing to a chemical combination of the metal with the albumen and fibrin of the animal tissues. If the part be wetted, and the caustic applied several times at short intervals, vesication results. Nitrate of silver acts therefore locally as an *irritant* and *corrosive*. When taken internally in small doses for a considerable time, such as six or twelve months, it is absorbed and deposited in various parts of the body, and when it is deposited in the *rete mucosum* of the skin it causes discolorations, which in most cases prove permanent. It has been employed frequently with success, but often with failure, in the treatment of epilepsy, chorea, and some forms of *angina pectoris*, as well as morbid sensibility of the stomach. Larger doses can be borne when it is administered in the form of pill than in solution. The pills should be made with mucilage and sugar, but not with bread-crumb, as the common salt, or chloride of sodium, decomposes the nitrate and renders it inert. In cases of poisoning by nitrate of silver, common salt is a ready and effectual remedy. The liability of nitrate of silver to produce discolorations of the skin in persons taking it internally constitutes a serious objection to its employment, and there appears little necessity for giving it, since any case of epilepsy likely to be benefited by it will generally receive equal good from the use of *oxide of zinc*, without the risk of stains or other inconvenience. It has been suggested that the use of nitric acid internally as well as externally may remove the discolorations; but it is better not to incur the chance of causing them, than trust to the remote chance of removing them by such an expedient.

The external employment of this agent is not liable to any objection when used cautiously, while its advantages are very great. It is the most powerful *direct antiphlogistic* agent known. All subacute inflammations in any part to which it can be immediately applied will subside under its influence. In inflammations not merely of the skin, but of mucous membranes when they occur in parts which are accessible, its influence is great, and speedily manifested. Many of the cases of croup which in an advanced stage are unmanageable, begin in the back part of the throat (fauces), and if these parts are freely touched with a pencil dipped in a strong solution of nitrate of silver, the farther downward progress of the inflammation may be arrested. The same treatment is applicable to the erythematous inflammation which frequently begins either externally, and spreads through the mouth or nose to the fauces, and thence down the œsophagus, or originates in the fauces, leading to very serious results. Erysipelatous inflammation occurring in any part of the body may be effectually limited by nitrate of silver. For this purpose a complete circle should be formed round the inflamed part, but on the sound skin. For this case the solid cylinder, moistened at the end, is best. The circle must be perfect, or the morbid action may extend, escaping at the smallest breach. Chronic inflammation, and even ulceration of the eyes, may be removed by nitrate of silver applied in different forms. Old indolent ulcers are stimulated to a healthy action by its use; and many cutaneous diseases removed by it. Recent burns have the severe pain often very much mitigated by it; but it must not in any of these cases be applied to too large a surface at once, as ill effects have followed such a practice. To specify all the uses of nitrate of silver would be impossible here, but one more deserves to be extensively known. It is the best application to chilblains, especially at first; but even after they break, it disposes them to heal.

When a solution of nitrate of silver is made, distilled water should invariably be used. The neglect of this rule causes many of the solutions applied to the eye to be not only useless, but hurtful. Oxide of silver has been recently strongly recommended as an antispasmodic, and not liable to the objections which attach to the nitrate.

SILVER, GERMAN. [Tutenag.]

SILVER-GRAIN. In making a horizontal section of the trunk of any tree, a number of straight lines will be seen radiating from the central pith through the wood to the bark. These rays are called by botanists medullary rays or plates, and by persons who work on wood *silver-grain*. They are composed entirely of cellular tissue, which is of a compressed form, and thence called muriform, and often do not consist of more than a single layer of cells, although in some trees, as Aristolochias, the layers are very numerous. In longitudinal sections of the stem they give it a remarkable satiny lustre, which constitutes the great beauty of some woods, as the plane and the sycamore. The great variety that is seen in the character of different woods appears to depend on the nature of the silver-grain, for the woody and vascular tissues do not present sufficient difference to constitute any obvious peculiarity. Thus in the cultivated cherry the plates are thin, and their adhesion to the bark slight, so that a section of this wood has a pale, smooth, homogeneous appearance: but in the wild cherry the silver-grain is much thicker; it adheres closely to the bark, and is arranged with great irregularity, so that this wood when cut has a deeper colour, and a twisted, knotted, irregular appearance. In the two species of oak the same kind of differences are observable. In Quercus sessiliflora the rays are thin and distant from each other, so that when a wedge is driven into the end of the trunk the plates of wood do not readily break into each other; but in Quercus pedunculata the rays are hard, and are so close together that the wood may be split up without any difficulty. [Stem.]

SILVIC ACID, a substance which with pinic acid [Pinic Acid] constitutes the greater portion of colophony, or common rosin. When this substance is digested in cold alcohol of specific gravity 0·833, the pinic acid dissolves, but the silvic acid remains insoluble in alcohol until it is boiled; on cooling, it separates in crystals of considerable size, the form of which, according to Unverdorben, is a rhombic prism terminated by four facets, but Laurent represents it as an acute rhomboid, the edges of which are usually serrated.

Silvic acid melts below 212°; is insoluble in water, but dissolves readily in hot alcohol and in æther, and is precepitated by water; it is soluble also in all proportions in the volatile and fixed oils. Concentrated sulphuric acid dissolves and water precipitates it from the acid; by the action of nitric acid it is converted into another resinous acid when it has been precipitated from alcohol by water; ammonia dissolves this acid readily, and the silvate of ammonia formed, as well as that of potash and of soda, is soluble in water; most silvates are however insoluble in it, but many of them are dissolved by alcohol and by æther; the silvate of magnesia especially is taken up by alcohol; the silvates of silver and lead are colourless and insoluble in water.

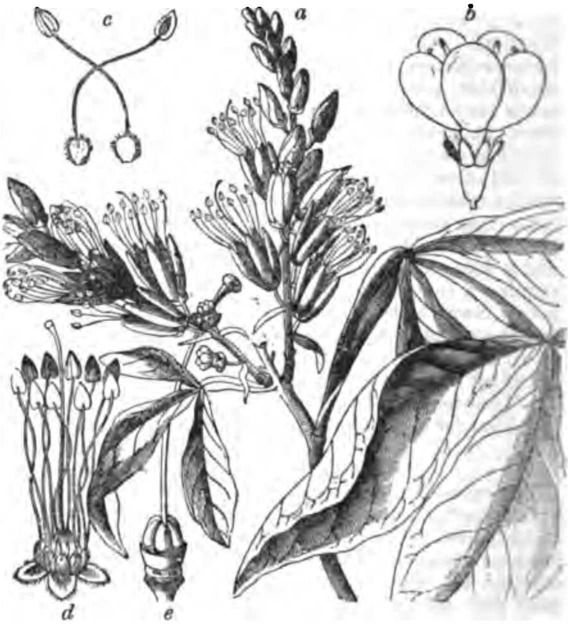
Silvic acid may be regarded as an oxide of oil of turpentine; its composition, as stated by the chemists above named, is as follows: it will be observed that there is no great difference between them, but they do not agree as to its constitution:—

	Unverdorben.	Laurent.	Equivalents.		
Hydrogen .	10·36	9·7	or 40 . .	= 40	10·2
Carbon . .	79·28	79·7	„ 52 . .	= 312	79·6
Oxygen . .	10·36	10·6	„ 5 . .	= 40	10·2
	100·	100·		392	100·

SIMARU'BA is the bark of the root of the Simaruba amara (Aublet), S. officinalis (of Dec. and 'Pharm. Lond.'), a tall tree, native of Guayana, and also of Jamaica, if the tree found in that island be not a distinct species. It is imported in bales containing pieces a foot or more in length, tolerably broad, and generally formed into rolls the whole length of the piece. Externally it is rough, warty, and has a dirty-yellow cuticle marked with transverse ridges; the epidermis below this is of a whitish-yellow colour. Internally smooth, with a greyish yellow colour. It is devoid of odour, but intensely bitter. Its chief constituents are *quassite*, resin, a volatile oil having an odour like benzoin, ulmin, mucilage, and some salts. It is tonic and demulcent in small doses, and therefore useful in the later stages of dysentery, but in larger doses it is emetic. The bark of the root of Simaruba versicolor (St. Hilaire) is very like that above described, and is used externally by the Brazilians as a wash to ill-conditioned ulcers, and to destroy vermin; but if taken internally it causes stupor and other narcotic symptoms; it should therefore be carefully distinguished from the former.

SIMARUBA'CEÆ, a natural order of plants belonging to the gynobasic group of polypetalous Exogens. The plants of this order are trees or shrubs, with alternate exstipulate usually compound leaves, and mostly without dots. The flowers are whitish-green or purple, on axillary or terminal peduncles, hermaphrodite, or occasionally unisexual. The calyx is 4 or 5 parted; petals four to five, twisted in æstivation; stamens twice as many as the petals, arising from the back of an hypogynous scale; ovary 4 to 5 lobed; style simple; stigma 4 or 5 lobed; fruit a drupe; seeds pendulous, exalbuminous, with a superior short radicle drawn back within thick cotyledons. With one exception they are all natives of Africa, India, and tropical America. This order was formerly included under Rutaceæ, but their differences from that order appear to many of sufficient importance to constitute a separate family. A. de Jussieu says, 'They are known from all Rutaceous plants by the coexistence of these characters, namely, ovaries with but one ovule, indehiscent drupes, exalbuminous seeds, a membranous integument of the embryo, and by the radicle being retracted within thick cotyledons.'

The plants of this order are all intensely bitter. The Quassia on this account is used in medicine. [Quassia.] Simaruba versicolor is so bitter that no insects will attack it; and when all other specimens of plants in dried collections have been attacked by *Ptini*, &c., specimens of this plant have been left untouched. The Brazilians use an infusion of this plant in brandy as a remedy against the bites of serpents.



Quassia amara.

a, brauch, showing flowers and compound leaves: *b*, flower; *c*, stamens separated, attached to hypogynous scale; *d*, stamens surrounding ovary: *e*, ovary seated on a stalk, to which the stamens are attached.

SIMBIRSK, a government of Asiatic Russia, is situated between 52° and 57° N. lat., and between 42° 20′ and 50° 20′ E. long. It is bounded on the north by Kasan, on the east by Orenburg, on the south by Saratow and Pensa, and on the west by Nischnei Novgorod, The area is 24,000 square miles. The surface is in general an undulating plain, but on the right bank of the Volga there is a range of hills, composed of clay, marl, limestone, and freestone, which rise to the height of 400 feet. The principal river of this government is the Volga, which enters it from Kasan, about the middle of the northern frontier, and runs in a direction nearly south to Stavropol, where it turns to the east; and there, after being joined by the Sok, coming from Orenburg, it makes a semicircular bend, and at Samara turns due west, in which direction it proceeds as far as the town of Sysran, when it again turns to the south. It is at this bend that the eminences on the Volga are highest, though they accompany the river in its whole course from north to south. Beyond the bend the surface of the country becomes flat, and assumes a character resembling that of the Steppe. All the rivers belong to the system of the Volga, which receives on the right the Ousa and the Sysran, and on the left the Tcheremchan, the Sok after its junction with the Kandoustcha, and the Samara. The Sviaga, running parallel to the Volga from south to north, joins that river in the government of Kasan; and the Soura, which is navigable in spring, coming from Pensa, traverses the western part of the government, and joins the Volga in the government of Nischnei Novgorod. The lakes and rivers are 560 in number, but they are all small. The climate is generally healthy; but the winter is very cold, and the summer very hot. The Volga is usually frozen for five months in the year.

The soil is generally fertile, consisting of a good black mould, which requires no manure. It is pretty carefully cultivated, and produces more corn than is wanted for the home consumption: the principal species of grain are rye, wheat, and spelt; but there are likewise oats, barley, millet, and buckwheat. The inhabitants cultivate also the poppy, peas, lentils, flax, much hemp, tobacco, and some potatoes. Horticulture is in a very backward state: none but the most ordinary kinds of culinary vegetables are grown, and the fruit is of bad quality. In the northern parts of the government there are extensive forests; but in the south they scarcely suffice for the supply of the inhabitants. Though there are good pastures, the breeding of cattle is not much attended to, except among the Calmucks, in the steppe of the circle of Slavrepel. The rich Calmucks have one hundred horses, as many oxen, and four hundred sheep. The Tartars apply to agriculture with great success. Game is pretty abundant, but the fur-bearing animals are scarce. The fisheries of various kinds in the Volga are productive. The minerals are alabaster, sulphur, and limestone; but neither salt nor metals, except some iron.

The population amounts to 1,200,000, of whom about 1,080,000, are Russians and Cossacks: the remainder may be estimated as, Tartars 60,000, Tcheremisses 40,000, Mordwins 4000, Tchuswasches 5000, Calmucks 8000, and Kissilbasches 2000. These numbers are of course only approximative. Not only the Russians, but most of the Tcheremisses, the Tchuswasches, and the Mordwins, profess the Greek religion: some few are still adherents to Shamanism, and the Tartars and Kissilbasches are Mohammedans.

Though agriculture is the chief occupation of the inhabitants, there are some manufactures, both in the country and in the towns; they are woollen cloths, blankets, carpets, sail-cloth, leather, and some of silk and nankeen. Glasswares, soap, and candles are also manufactured; and there are many brandy-distilleries. A great improvement in the manufactures has been made of late years. The exports consist of horses, oxen, hemp, apples, water-melons, in good years corn, fish, tallow, leather, raw hides, and millstones. The principal trading towns are Simbirsk and Samara. The schools in this government are under the university of Kasan; but they are very few, and only a small proportion of the inhabitants receive any education. The government endeavours to remedy this want by establishing every year some new schools.

Simbirsk, the capital of the government, is situated near the junction of the Sviaga and the Volga, on the right bank of the latter river. It stands on an eminence which commands a fine view of the Volga and over an immense extent of country uninterrupted by forests. The town is not regularly built, but there are some broad and straight streets. Almost all the houses are of wood, but neat and convenient within. The churches, 16 in number, are all of stone, except one, which is of wood. There are two monasteries, a gymnasium, and manufactories of candles and soap, and some tanneries. The town is in a very fertile plain, and on one side there are gardens and orchards. The population amounts to 13,500, who are in general in easy circumstances; but even the higher classes are without intellectual resources. Of the other towns the most considerable are the following:—1, Sysran, on the river of the same name, not far from its conflux with the Volga, has 7000 inhabitants (Schnitzler says 9800); 2, Samara, on the Volga, beyond the bend which it makes here, is a trading town, with 5000 inhabitants, which was built in 1591 as a defence against the Calmucks; 3, Stavropol, the chief town of the Calmucks, on the right bank of the Volga, was built expressly for these people, on their conversion to Christianity, about the year 1737. In the centre is a kind of fort, surrounded with palisades, which is the residence of the chief of the Calmucks. The Russian or Cossack garrison is in the upper town. The merchants reside together in a slobod, and the citizens in the lower town.

SIMEON STYLITES. [Monachism.]

SIMEON SETH (*Συμεὼν Σήθ*), or **SIMEON SETHUS**, or Simeon the Son of Seth, the author of several Greek works still extant, lived at Constantinople towards the end of the eleventh century. He held there the office of *πρωτοβεστάρχης*, or 'Master of the Wardrobe,' in the palace of Antiochus, from whence originated his title *Magister Antiochiae*, and this gave occasion to the false opinion that he was born at Antioch. His office appears to have given him the charge of the imperial jewels, which were kept in the palace named after the Eunuch Antiochus, who was consul A.D. 431. (Du Cange, *Glossar. Med. et Inf. Græcit.*, tom. i., p. 194, ed. Lugd., 1688, and *Constantinop. Christ.*, lib. ii., cap. 16, § 5, p. 168, ed Lutet. Paris., 1680.) Having taken the part of the unfortunate patrician Dalassenus against the usurper Michael of Paphlagonia, the latter banished him from Constantinople, A.D. 1038. He retired to Thrace, and founded on Mount Olympus a monastery, in which he composed several works, and peaceably ended his days. (Georg. Cedreni *Histor. Compend.*, p. 737, ed. Paris, 1647.) Sometime after the foundation of this monastery, Michael Dukas having ascended the throne, A.D. 1071, Simeon Seth dedicated to him his work entitled *Σύνταγμα περὶ Τροφῶν Δυνάμεων*, 'Syntagma de Cibariorum Facultate.' This contains an alphabetical list of eatable things and their properties, according to the opinions of Greek, Persian, Agarenian (or Arabian), and Indian physicians; and is the more valuable as at that time the trade with the East, and the seeking after foreign and costly articles of food at Constantinople, were very extensive. It is compiled chiefly from the treatise of Michael Psellus on the same subject, and shows us that the Greeks were beginning already to learn Materia Medica from the Arabians, to whom in return they imparted their theories. Simeon Seth also goes through the medicines then in use in alphabetical order, and he explains their mode of action according to the elementary qualities of Galen, and their different degrees. He says that Asparagus had been for some time introduced as an article of food (p. 6, ed. Gyrald.), and that it possesses great medicinal virtues. He is the first who speaks of yellow Amber (*ἄμπαρ*) which comes from a town in India, and which is the best; and also of Ambergris, which is an animal production, coming from fish (p. 8). Apricots (*βερίκοκκα*), he says, are indigestible and produce poorness of blood (p. 9). His work contains the first description of Camphor, which he says is the resin of a very large Indian tree; that it is cold and dry in the third degree; and that it is used with much advantage in acute diseases, especially in inflammations (p. 35). He is also the first who speaks of Musk, of which the best is of a yellow colour, and comes from a town to the east of Khorasan; the black musk comes from India: the properties attributed to this medicine are the same as those given to it in the present day (p. 41). The best Cinnamon comes from Mosul (p. 32). This work was first published, Basil., 1538, Gr. and Lat., 8vo., ed. Lilius Greg. Gyraldus, ap. Mich. Isingrinium. The Latin translation was improved and published separately, Basil., 1561, 8vo., ed. Domin. Monthesaurus, ap. Pet. Pernam. The last and best edition was published Paris, 1658, Gr. and Lat., 8vo., ed. Mart. Bogdan, ap. Dion. Bechet et Lud. Billanium.

Another of his works, entitled '*Σύνοψις καὶ Ἀπάνθισμα Φυσικῶν τε καὶ Φιλοσόφων Δογμάτων*,' 'Compendium et Flores Naturalium et Philosophorum Placitorum,' is still in MS. in several European libraries. A long account of it (extracted from Allatius, 'De Simeonum Scriptis') is given by Fabricius (*Biblioth. Gr.*, tom. xi., p. 323-326, ed. Harles).

But Simeon Seth is better known in the history of literature than in that of medicine, as having translated from the Arabic into Greek the work known under the name of 'Pilpay's Fables,' in which 'fifteen moral and political sentences' (says Gibbon, *Decline and Fall*, chap. 42) 'are illustrated in a series of apologues; but the composition is intricate, the narrative prolix, and the precept obvious and barren.' An account of the history, translations, and editions of this antient and curious work is given under Bidpai. (See also Fabricius, *loco cit.*; and Milman's note to Gibbon, vol. vii., p. 310.) He is also said to have translated from the Persian a fabulous history of Alexander the Greek, which at present exists, says

Warton (*Hist. of English Poetry*, vol. i., p. 129), under the adopted name of Callisthenes, and is no uncommon manuscript in good libraries. It is entitled Βίος 'Αλεξάνδρου τοῦ Μακεδόνος καὶ Πράξεις, 'De Vita et Rebus Gestis Alexandri Macedonis;' and a long passage from the beginning of the work is quoted by Abr. Berkel in the notes to Stephanus Byzantinus (*in v.* Βουκεφάλεια), and by Fabricius, *Biblioth. Gr.*, tom. xiv., p. 148-150 (ed. Vet.). This fabulous narrative is full (as might be expected) of prodigies and extravagancies, some specimens of which are given by Warton. Of all the romances on the subject of Alexander the Great, this by Simeon Seth was for some centuries the best known and the most esteemed; and it was most probably (says he) very soon afterwards translated from the Greek into Latin, and at length from thence into French, Italian, and German. The Latin translation was printed at Colon. Argentorat., 1489; perhaps before, for in the Bodleian Library there is an edition in 4to., without date, supposed to have been printed at Oxford, by Fred. Corsellis, about the year 1468. It is said to have been made by one Æsopus, or by Julius Valerius; supposititious names, which seem to have been forged by the artifice or introduced through the ignorance of scribes and librarians. This Latin translation however is of high antiquity in the middle age of learning; for it is quoted by Gyraldus Cambrensis, who flourished about the year 1190. It was translated into German by John Hartlieb Moller, a German physician, at the command of Albert, duke of Bavaria, and published at August. Vindel., fol., 1478. Scaliger also mentions (*Epist. ad Casaubon.*, 113, 115) a translation from the Latin into Hebrew by one who adopted the name of Joseph Gorionides, called Pseudo Gorionides.

SIMEON OF DURHAM, an English historical writer who lived about the beginning of the eleventh century. He was a teacher of mathematics at Oxford, and was afterwards precentor in Durham cathedral. He wrote a history of the kings of England from 616 to 1130, for which he was at great pains to collect materials, especially in the North of England, where the Danes had established themselves. The work was continued to 1156 by John, prior of Hexham. Simeon of Durham is supposed to have died soon after 1130, when his history terminates. This work is included in Twysden's 'Anglicanæ Historiæ Scriptores Decem.' Simeon also wrote a history of Durham cathedral, which was published in 1732: 'Historia Ecclesiæ Dunhelmensis, cui præmittitur T. R. Disquisitio de Auctore hujus Libelli; edidit T. Bedford,' Lond., 1732, 8vo.

SIMFEROPOL, the seat of the Russian government of Taurida, is situated in 45° 12′ N. lat. and 24° 8′ E. long., on an elevated plateau on the river Salgir. Simferopol is a modern town. There was indeed on this spot, in the time of the Khans, a place called Akmetschet (the white church), and sometimes called Sultan Serai, but it was of little importance, and now forms a small part of Simferopol, under the name of the Tartar quarter. The antient capital of the Khans was Baktschiserai, but it is confined to a small space in a rocky valley. The Russians, who love everything spacious and open, left that town to the Tartars, and built at Simferopol a capital according to their own taste, with immensely long and broad streets, in which horse-races might be held without interrupting the usual traffic. Being near the centre of the peninsula, it is well calculated for the seat of government. There are many pretty houses, with iron roofs painted green and adorned with many columns, like all the new Russian towns. Besides the government offices there are a Russian church, a pretty German church, one Greek and one Armenian church, four Tartar chapels, a gymnasium, and a seminary for Tartar schoolmasters. The population, about 6000 inhabitants, is a medley of Russians, Tartars, Armenians, Greeks, and 40 or 50 German families. There is here a very good botanic garden, or more properly speaking, a nursery where all kinds of useful plants, shrubs, and trees are cultivated, and sent to various parts of the empire. The town has no manufactures, and has only an inconsiderable trade by land, and scarcely any by sea. The immediate vicinity of the town does not produce much fruit or culinary vegetables. During the hot season fevers are very prevalent, and the water is very indifferent. Usewoloiski (as quoted by Hassel in 1821) makes the number of inhabitants 20,000; we imagine this is a misprint for 2000, for Stein in the same year gives 1800, and no subsequent account that we have seen states it above 6000. (Hassel; Hörschelmann; Kohl, *Reise in Süd Russland*, 1841.)

SI'MIADÆ, the name of a quadrumanous family of mammals. [Ape; Ateles; Baboon; Cheiropoda; Chimpanzee; Hylobates; Lagothrix; Mycetes; Nasalis; Orang-Utan; Quadrumana; Sakis; Sapajous; Semnopithecus, &c.]

These animals were known at a very early period. The *Kophim* of the Scriptures (1 *Kings*, x. 22; 2 *Chron.*, ix. 21), the *Ceph* of the Ethiopians, the *Keibi* and *Kubbi* of the Persians, the κῆβοι of the Greeks, and *Cephi* of the Romans, were clearly apes. They are to be traced in some of the earliest paintings of the Egyptians. (Rosellini, &c.)

In the garden of the Zoological Society of London, among a great variety of the *Simiadæ*, three of the forms which approach nearest to the human race may now (Sept., 1841) be studied; for three Chimpanzees (two males and a female), an Orang-Utan, and a Gibbon (*Hylobates agilis*)—the two latter females—are all living at the menagerie in the Regent's Park.

The *Cephi* exhibited by Pompey (Pliny, *Nat. Hist.*, viii. 19), as well as those shown by Cæsar, appear to have been Ethiopian apes; and in the Greek name inscribed near the quadrumanous animals, in the Prænestine pavement, the oriental origin of the word is apparent. It is remarkable that the name *Cebus* [Sapajous] is applied by modern zoologists to a genus of monkeys which could not have been known to the antients; for the *Cebi* of our present catalogues are exclusively American.

Fossil Simiadæ.

Remains of *Simiadæ* have been discovered and described from the tertiary formations of India, France, England, and Brazil. These fossils are illustrative of four of the existing types of quadrumanous, or rather Simious form. Thus we have *Semnopithecus* from India; *Hylobates* from the south of France; *Macacus* from Suffolk; and *Callithrix*, peculiar to America, found in Brazil. Nor is it unworthy of remark, that we here have evidence that so high a quadrumanous form as the Gibbon, a genus in which the skull is even more approximated to that of man than it is in the Chimpanzee, was living upon our globe with the Palæothere, Elephants, and other Pachyderms. We say that the skull of the Gibbon comes nearest to that of man; because, though the cranium of the young Chimpanzee approaches that of the human subject, it is far removed from it when the permanent teeth are developed.

From these evidences we have also proof that *Simiadæ* lived in our island during the Eocene period; whilst the presence of fossil vegetables, abundant in the London clay at Sheppy, and the remains of serpents in the same locality, show the degree of heat that must have prevailed here during that period, when *Simiadæ* were co-existent with tropical fruits and Boa Constrictors.

But Dr. Lund's observations relating to the extinct quadrumanous form detailed in his 'View of the Fauna of Brazil,' previous to the last geological revolution, require special notice. He states that it is certain that the family of *Simiadæ* was in existence in those antient times to which the fossils described by him belong; and he found an animal of that family of gigantic size, a character belonging to the organization of the period which he illustrates. He describes it as considerably exceeding the largest Oran-Utan or Chimpanzee yet seen; from these, as well as from the long-armed apes (*Hylobates*), he holds it to have been generically distinct. As it equally differs from the *Simiadæ* now living in the locality where it was discovered, he proposes a generic distinction for it under the name of *Protopithecus*, and the specific appellation of *Protopithecus Brasiliensis*.

As connected with this discovery, Dr. Lund records a tradition existing very generally over a considerable extent of the interior highlands, especially in the northern and western portions of the province of S. Paul and the Sertão of S. Francisco. According to this tradition, that district is still inhabited by a very large ape, to which the Indians, from whom the report comes, have given the name of *Caypore*, or *Dweller in the Wood*. This *Caypore* is said to be of man's stature, but with the whole body and part of its face covered with long curly hair; its colour brown, with the exception of a white mark on the belly immediately above the navel. It is represented as climbing trees with great facility, but most frequently going on the ground, where it walks upright like a man. In youth it is held to be a quiet inoffensive animal, living upon fruits, on which it feeds with teeth formed like those of the human race; but as it advances in age, its character is denounced as rapacious and blood-thirsty. Then it chooses birds and small quadrupeds; large canine teeth project from its mouth, and it becomes formidable to man. Its skin is supposed to be impenetrable to ball, with the exception of the white mark on the belly. It is an object of dread to the natives, who shun its haunts, which are betrayed by the *Caypore's* extraordinary footmark ending in a heel both before and behind, so that it is impossible to know in what direction the animal is gone.

Upon this tradition Dr. Lund remarks, that it is easy to trace in it the childish embellishments of a savage race; and he finds in the alleged double heel the meaning that the forepart of the foot is not broader than the hind and that the impressions of the toes are not distinguishable. As to the white spot in the belly, he remarks, that all the long-haired apes now found in Brasil have the central part of the belly very thinly covered with hair, so that when the hair is of a dark colour and the skin light, an effect is produced during the act of respiration as if there were a white spot on the stomach. The impenetrability of its hide, he observes, may seem fabulous, but he states that he is acquainted with a species of this family, the *Guigo* (*Mycetes crinicaudus*, Lund), which has this property This undescribed animal, he adds (which constitutes a remarkable link between *Mycetes* and *Cebus*, inasmuch as it combines the vocal organs of the former with the perfectly hairy tail of the latter), is provided with a skin clothed with such long and felted hair as to be shot-proof on the back and sides. It would seem, says Dr. Lund, to be well aware of its shield; for instead of seeking safety in flight, like other *Simiadæ*, when danger approaches it rolls itself up in a ball, so as to cover the least protected part, and thus defies the shot of the hunter.

Dr. Lund further remarks that he has introduced this tradition, less on account of its zoological interest, than for the striking coincidence it displays in many points with the stories related of the Pongo of Borneo. He asks, if no such animal exists in the district where the tradition is current, whence did it take its origin? Did the Indians receive it from their forefathers? May this tradition be considered one more testimony in favour of the Asiatic origin of the first inhabitants of America? In the Sertão of S. Francisco the tradition is coupled with additions which though, he remarks, they weaken its zoological interest, impart to it another, as betraying the only trace he had met with in that district of a belief in fairy existence. According to the native of Sertão, the Caypore is lord of the wild hogs, and when one of them has been shot, his enraged voice may be heard in the distance, when the hunter quits his game to save himself by flight. The Caypore is said to have been beheld in the centre of a herd of swine riding on the largest, and indeed has been described as an ape above and a hog below.

SIMILAR, SIMILAR FIGURES (Geometry). Similarity, resemblance, or likeness, means sameness in some, if not in all, particulars. In geometry, the word refers to a sameness of one particular kind. The two most important notions which the view of a figure will give, are those of *size* and *shape*, ideas which have no connection whatsoever with each other. Figures of different sizes may have the same shape, and figures of different shapes may have the same size. In the latter case they are called by Euclid *equal*, in the former *similar* (similar figures, ὅμοια σχήματα). The first term [EQUAL; RELATION], in Euclid's first use of it, includes united sameness, both of size and shape; but he soon drops the former notion, and, reserving equal to signify sameness of size only, introduces the word similar to denote sameness of form: so that the equality of the fundamental definition is the subsequent combined equality and similarity of the sixth book.

Similarity of form, or, as we shall now technically say, similarity, is a conception which is better defined by things than by words; being in fact one of our fundamental ideas of figure. A drawing, a map, a model, severally appeal to a known idea of similarity, derived from, it may be, or at least nourished by, the constant occurrence in nature and art of objects which have a general, though not a perfectly mathematical, similarity. The rudest nations understand a picture or a map almost instantly. It is not necessary to do more in the way of definition, and we must proceed to point out the mathematical tests of similarity. We may observe indeed that errors or monstrosities of size are always more bearable than those of form, so much more do our conceptions of objects depend upon the latter than the former. A painter is even obliged to diminish the size of the minor parts of his picture a little, to give room for the more important objects: but no one ever thought of making a change of form, however slight, in one object, for the sake of its effect on any other. The giant of Rabelais, with whole nations carrying on the business of life inside his mouth, is not so monstrous as it would have been to take the ground on which a nation might dwell, England, France, or Spain, invest it with the intellect and habits of a human being, and make it move, talk, and reason: the more tasteful fiction of Swift is not only bearable and conceivable, but has actually made many a simple person think it was meant to be taken as a true history.

Granting then a perfect notion of similarity, we now ask in what way it is to be ascertained whether two figures are similar or not. To simplify the question, let them be plane figures, say two maps of England of different sizes, but made on the same projection. It is obvious, in the first place, that the lines of one figure must not only be related to one another in length in the same manner as in the other, but also in position. Let us drop for the present all the curved lines of the coast, &c., and consider only the dots which represent the towns. Join every such pair of dots by straight lines: then it is plain that similarity of form requires that any two lines in the first should not only be in the same proportion, as to length, with the two corresponding lines in the second, but that the first pair should incline at the same angle to each other as the second. Thus, if LY be the line which joins London and York, and FC that which joins Falmouth and Chester, it is requisite that LY should be to FC in the same proportion in the one map that it is in the other; and if FC produced meet LY produced in O, the angle COY in one map must be the same as in the other. Hence, if there should be 100 towns, which are therefore joined two and two by 4950 straight lines, giving about 12 millions and a quarter of pairs of lines, it is clear that we must have the means of verifying 12¼ millions of proportions, and as many angular agreements. But if it be only assumed that similarity is a possible thing, it is easily shown that this large number is reducible to twice 98. For let it be granted that $l\,y$ on the smaller map is to represent LY on the larger. Lay down f and c in their proper places on the smaller map, each with reference to l and y, by comparison with the larger map: then f and c are in their proper places with reference to each other. For if not, one of them at least must be altered, which would disturb the correctness of it with respect to l and y. Either then there is no such thing as perfect similarity, or else it may be entirely obtained by comparison with l and y only.

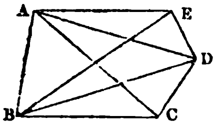
We have hitherto supposed that both circumstances must be looked to; proper lengths and proper angles; truth of linear proportion and truth of relative direction. But it is one of the first things which the student of geometry learns (in reference to this subject), that the attainment of correctness in either secures that of the other. If the smaller map be made true in *all* its relative lengths, it must be true in all its directions; if it be made true in *all* its directions, it must be true in all its relative lengths. The foundation of this simplifying theorem rests on three propositions of the sixth book of Euclid, as follows:—

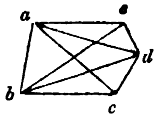
1. The angles of a triangle (any two, of course) alone are enough to determine its form: or, as Euclid would express it, two triangles which have two angles of the one equal to two angles of the other, each to each, have the third angles equal, and all the sides of one in the same proportion to the corresponding sides of the other.

2. The proportions of the sides of a triangle (those of two of them to the third) are alone enough to determine its form or if two triangles have the ratios of two sides to the third in one, the same as the corresponding ratios in the other, the angles of the one are severally the same as those of the other.

3. One angle and the proportion of the containing sides are sufficient to determine the form of a triangle: or, if two triangles have one angle of the first equal to one of the second, and the sides about those angles proportional, the remaining angles are equal, each to each, and the sides about equal angles are proportional.

From these propositions it is easy to show the truth of all that has been asserted about the conditions of similarity, and the result is, that any number of points are placed similarly with any other number of points, when, any two being taken in the first, and the corresponding two in the second, say A, B, and *a*, *b*, any third point C of the first gives a triangle ABC, which is related to the corresponding triangle *abc* of the second, in the manner described in either of the three preceding propositions. For instance, let there be five points in each figure:

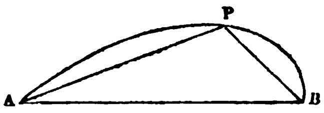


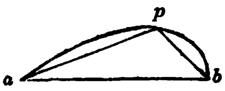


In the triangles BAE and *bae*, let the angles AEB and EBA be severally equal to *aeb* and *eba*. In the triangles ADB and *adb* let DA : AB :: *da* : *ab*, and DB : BA :: *db* : *ba*. In the triangles ACB and *acb* let the angles ABC and *abc* be equal, and AB : BC :: *ab* : *bc*. These conditions being fulfilled, it can be shown that the figures are similar in form. There is no angle in one but is equal to its corresponding angle in the other; no proportion of any two lines in one but is the same as that of the corresponding line in the other. Every conception necessary to the complete notion of similarity is formed, and the one figure, in common language, is the *same* as the other in *figure*, but perhaps on a different scale.

The number of ways in which the conditions of similarity can be expressed might be varied almost without limit; if there be *n* points, they are twice ($n-2$) in number. It would be most natural to take either a sufficient number of ratios, or else of angles: perhaps the latter would be best. Euclid confines himself to neither, in which he is guided by the following consideration:—He uses only salient or convex figures, and his lengths, or sides, are only those lines which form the external contour. The internal lines or diagonals he rarely considers, except in the four-sided figure. He lays it down as the definition of similarity, that all the angles of the one figure (meaning only angles made by the sides of the contour) are equal to those of the other, each to each, and that the sides about those angles are proportional. This gives $2n$ conditions in an n-sided figure, and consequently four redundancies, two of which are easily detected. In the above pentagons, for instance, if the angles at A, E, D, C, be severally equal to these at *a*, *e*, *d*, *c*, there is no occasion to say that that at B must be equal to that at *b*, for it is a necessary consequence: also, if BA : AE :: *ba* : *ae*, and so on up to DC : CB :: *dc* : *cb*, there is no occasion to lay it down as a condition that CB : BA :: *cb* : *ba*, for it is again a consequence. These points being noted, the definition of Euclid is admirably adapted for his object, which is, in this as in every other case, to proceed straight to the establishment of his propositions, without casting one thought upon the connection of his preliminaries with natural geometry.

Let us now suppose two similar curvilinear figures, and to simplify the question, take two arcs AB and *ab*. Having already detected the test of similarity of position with reference to any number of points, it will be easy to settle the conditions under which the arc AB is altogether similar to *ab*. By hypothesis, A and B are the points corresponding to *a* and *b*. Join A, B, and *a*, *b*; and in the arc AB take any point P. Make the angle *bap* equal to BAP, and *abp* equal to ABP; and let *ap* and *bp* meet in *p*. Then, if the curves be similar, *p* must be on the arc *ab*; for every point on AB is to have a corresponding point on *ab*. Hence the definition of similarity is as follows:—Two curves are similar when for every polygon which can be inscribed in the first, a similar polygon can be inscribed in the second.





It is easily shown that if on two lines, A and *a*, be described a first pair of polygons, P and *p*, and a second pair, Q and *q*, the proportion of the first and second pairs is the same, or P : *p* :: Q : *q*. The simplest similar polygons are squares; consequently, any similar polygons described on A and *a* are to one another in the proportion of the squares on A and *a*. This is also true if for the polygons we substitute similar curves; and it must be proved by the method of exhaustions [GEOMETRY, p. 154], or by the theory of limits applied to the proposition, that any curve may be approached in magnitude by a polygon within any degree of nearness.

The theory of similar solids resembles that of similar polygons, but it is necessary to commence with three points instead of two. Let A, B, C, and *a*, *b*, *c*, be two sets of three points each, and let the triangles ABC and *abc* be similar: let them also be placed so that the sides of one are parallel to those of the other. If then any number of similar pyramids be described on ABC and *abc*, the vertices of these pyramids will be the corners of similar solids. If P and *p* be the vertices of one pair, then the pyramids PABC and *pabc* are similar if the vertices P and *p* be on the same side of ABC and *abc* [SYMMETRY], and one of the triangles, say PAB, be similar to its corresponding triangle *pab*, and so placed that the angle of the planes PAB and CAB is the same as that of the planes *pab* and *cab*. The simplest similar solids are cubes; and any similar solids described on two straight lines are in the same proportion as the cubes on those lines. Similar curve surfaces are those which are such that every solid which can be inscribed in one has another similar to it, capable of being inscribed in the other.

It is worthy of notice that the great contested point of geometry [PARALLELS] would lose that character if it were agreed that the notion of form being independent of size, is as necessary as that of two straight lines being incapable of enclosing a space; so that whatever form can exist of any one size, a similar form must exist of every other. There can be no question that this universal idea of similarity involves as much as this, and no more; that in the passage from one size to another, all lines alter their lengths in the same proportion, and all angles remain the same. It is the subsequent mathematical treatment of these conditions which first points out that either of them follows from the other. If the whole of this notion be admissible, so in any thing less; that is, the admission implies it to be granted that whatever figure may be described upon any one line, another figure having the same angles may be described upon any other line. If then we take a triangle ABC, and any other line *ab*, there can be drawn upon *ab* a triangle having angles equal to those of *abc*. This can only be done by drawing two lines from *a* and *b*, making angles with *ab* equal to BAC and ABC. These two lines must then meet in some point *c*, and the angle *acb* will be equal to ACB. If then two triangles have two angles of one equal to two angles of the other, each to each, the third angle of the one must be equal to the third angle of the other; and this much being established, it is well known that the ordinary theory of parallels follows. The preceding assumption is not without resemblance to that required in the methods of Legendre. [PARALLELS.]

SI'MILE is admirably defined by Johnson to be 'a comparison by which anything is illustrated or aggrandised,' a definition which has been often neglected by poets. A Metaphor differs from a Simile in expression, inasmuch as a metaphor is a comparison without the words indicating the resemblance, and a simile is a comparison where the objects compared are kept as distinct in expression as in thought. Dr. Thomas Brown has well said, 'The metaphor expresses with rapidity the analogy as it rises in immediate suggestion, and identifies it, as it were, with the object or emotion which it describes; the simile presents not the analogy merely, but the two analogous objects, and traces their resemblances to each other with the formality of regular comparison. The metaphor, therefore, is the figure of passion; the simile the figure of calm description.' (*Lectures*, XXXV.) The metaphor is only a bolder and more elliptical simile. When we speak of the rudeness of a man, and say 'Mr. Jones is as rude as a bear,' we use a simile, for the rudeness of the two are kept distinct but likened; when we say 'that *bear* Mr. Jones,' we use a metaphor, the points of resemblance being confounded in the identification of rudeness with a bear. So, 'brave as a lion' is a simile—the 'lion Achilles' a metaphor. Where the resemblance is obvious, it may be more forcibly and as intelligibly expressed by a simple metaphor; but when the resemblance is not so obvious, it requires fuller elucidation, and then it must be expressed by a simile. Similes therefore, from their tendency to detail, are usually misplaced in passionate poetry, but metaphors constitute the very language of passion; for the mind, when moved, catches at every slight association to express itself, but never dwells on them with the deliberateness of a comparison.

Poets should never forget that similes are not used for their own sake, but for the sake of 'illustrating or aggrandising' the object or emotion they would express: hence an important but overlooked canon of criticism. Metaphors may be indefinite, for they are themselves the expressions of strong but indefinite emotions; but similes must be uniformly definite, clear, and correct, otherwise they are useless; for the simile is used to illustrate, by a known object, one unknown or indescribable: hence the necessity for its being intelligible. Moreover, images addressed to the eye must be such as are visually clear. These rules are continually violated by minor poets, but there are few cases of such violation in the greater poets, and even there the exceptions prove the rule.

(Brown's *Lectures on the Philosophy of the Mind;* Kames's *Elements of Criticism;* Bishop Lowth's *Lectures on Hebrew Poetry;* Hegel's *Vorlesungen über die Æsthetik;* Solger's *Æsthetik.*)

SIMMENTHAL. [Bern.]

SI'MMIAS was a native of Thebes, and is said to have been a disciple of Philolaus. He was a friend of Socrates (Plat., *Crito*, p. 45, B), and is introduced by Plato as one of the speakers in his 'Phædon.' (Diogenes Laertius (ii. 16, 124) mentions the titles of twenty-three dialogues which were in his time attributed to Simmias (Suidas, *v.* Σιμμίας), but none of his works have come down to us.

A second Simmias, a grammarian, was a native of Rhodes, and probably lived about the year 300 B.C. He is said to have written a work on languages, consisting of three books, and a collection of miscellaneous poems, consisting of four books. (Suidas, *v.* Σιμμίας; Strabo, xiv., p. 655.) Some of his poems, which however are of little value, are contained in the 'Anthologia Græca.' (Compare Athen., vii., p. 327; xi., p. 472 and 491.)

A third Simmias, who lived about the commencement of the Olympiads, wrote a work called Ἀρχαιολογία τῶν Σαμίων, of which nothing has come down to us. Suidas confounds this historian with Simmias the grammarian.

SIMNEL, LAMBERT. [Henry VII.]

SI'MOIS, River. [Troad.]

SIMON MACCABAEUS, or **MATTHES,** surnamed Thasi, was the second son of Mattathias, and brother of Judas Maccabaeus and Jonathan Apphus. Mattathias, when dying, recommended him to his brethren as their counsellor (1 *Macc.*, ii. 3). He distinguished himself on several occasions during the lives of Judas and Jonathan. (1 *Macc.*, v. 17; x. 74; 2 *Macc.*, viii. 22; xiv. 17). Under the latter he was made, by Antiochus Theos, governor over the coast of the Mediterranean from Tyre to the frontier of Egypt (1 *Macc.*, xi. 59); and here he took the fortified towns of Bethsur and Joppa, and founded Adida, in the plain of Sephela. (1 *Macc.*, xi. 65; xii. 33, 38.)

After the treacherous seizure of Jonathan by Trypho [Jonathan Apphus], Simon was chosen by the people as their chief (1 *Macc.*, xiii.); and, according to Josephus (*Antiq.*, xiii. 6, 6), as high-priest also. After putting Jerusalem in a state of defence, he marched out to meet Trypho, who did not venture to give him battle, and who was soon after compelled to retreat into winter-quarters in Gilead, where he murdered Jonathan and his two sons. Simon recovered his brother's corpse, and interred it in his father's sepulchre at Modin, and built over it a magnificent mausoleum, which was standing in the time of Eusebius. About this time (B.C. 143) Trypho had murdered Antiochus, and proclaimed himself king. Simon immediately declared for his competitor, Demetrius Nicator, with whom he made a very favourable treaty, whereby Simon was recognised prince and high-priest of the Jews, all claims upon whom for tribute Demetrius relinquished, and consented to bury in oblivion their offences against him. Thus the Jews became once more free and independent, and they began to reckon from this period (170 Aer. Seleuc.; 143-142, B.C.) a new civil æra, which is used on the coins of Simon as well as by Josephus and the author of the *First Book of Maccabees* (1 *Macc.*, xiii. 41.). The last remains of their bondage to the Syrians were removed in the next year by the surrender of the Syrian garrison in the citadel of Jerusalem.

The succeeding period of peace was employed by Simon in extending and consolidating his power, and improving the condition of his people. He made a harbour at Joppa, established magazines and armouries, improved the laws and administered them with vigour, restored the religious rites, and renewed the treaties of alliance which Jonathan had made with the Romans and Spartans. (1 *Macc.*, xiv., xv.) In the year 141 B.C., the people met at Jerusalem, and registered a public act recounting the services of the house of Mattathias, and recognising Simon and his heirs as perpetual prince and high-priest of the Jews: and this act was afterwards confirmed by Demetrius. (1 *Macc.*, xiv. 35.) After the capture of Demetrius by the Parthians, his successor Antiochus Sidetes renewed the treaty with Simon, allowed him to coin money, and declared Jerusalem a free and holy city. Soon afterwards however Antiochus not only refused to ratify this treaty, but demanded of Simon the surrender of several fortified places, including the citadel on Mount Zion, or the payment of 1000 talents. Simon refused these demands, and Antiochus sent a large army into Palestine, which was soon however driven back by John Hyrcanus and Judas, the sons of Simon (B.C. 139-8). For the next three years the Jews again enjoyed a season of tranquillity, during which Simon occupied himself in inspecting and improving the state of the country. In the course of his tour he visited his son-in-law Ptolemy, at his castle of Doc, where he and his two sons Mattathias and Judas were treacherously put to death by Ptolemy, who aimed at the principality of Judæa (B.C. 135). He was succeeded by his surviving son John Hyrcanus. [Hyrcanus, John; Asmonaeans; Maccabees.]

The coinage of Simon is the first of which we have any historical account among the Jews. [Shekel.]

(Josephus, *Antiq.*; Prideaux's *Connection;* Jahn's *Hebrew Commonwealth;* Winer's *Biblisches Realwörterbuch.*)

SIMON MAGUS, that is, the magician, is mentioned in the *Acts of the Apostles* as having imposed upon the people of Samaria by magical practices. When Philip the Deacon preached the gospel at Samaria, Simon was among those who received baptism at his hands. But when Peter and John came down to Samaria, and Simon perceived that the Holy Ghost was received by those upon whom they laid their hands, he offered them money if they would give him the same power. Peter vehemently rebuked him, and he showed some appearance of penitence (*Acts*, viii. 9-24); but the early Christian writers represent him as afterwards becoming one of the chief opponents of Christianity. According to them he was the founder of the Gnostic heresy, and was addicted to magical practices and to abominable vices. After travelling through several provinces, endeavouring as he went to spread his errors and to damage Christianity as much as possible, he came to Rome, where it is said that he worked miracles which gained him many followers, and obtained for him the favour of Nero. At last, as he was exhibiting in the emperor's presence the feat of flying through the air in a fiery chariot, which he was enabled to perform by the aid of dæmons, the united prayers of Peter and Paul, who were present on the occasion, prevailed against him, and the dæmons threw him to the ground. There are also other marvellous stories about his life and doctrines.

(Calmet's *Dictionary;* Winer's *Biblisches Realwörterbuch;* Lardner's *Credibility.*)

SIMON MATTHES. [Simon Maccabaeus.]

SIMON, RICHARD, was born at Dieppe, in Normandy, May 13, 1638. After he had finished his studies, he entered into the Congregation of the Oratory, and became lecturer on philosophy at the College of Juilly. Being summoned by his superiors to Paris, he applied himself to the study of divinity, and made great progress in oriental learning. There being a valuable collection of oriental manuscripts in the Oratory of Rue St. Honoré, Simon was directed to make a catalogue of them, which he did with great skill. In 1668 he returned to Juilly, and resumed his lectures on philosophy, and two years after published his defence of a Jew whom the parliament of Metz condemned to be burned on the charge of having murdered a Christian child: 'Factum pour le Juif de Metz,' &c. Paris, 1670. In the following year, with a view to show that the opinions of the Greek church are not materially different from those of the Church of Rome with respect to the Sacrament, he published his 'Fides Ecclesiæ Orientalis,' Paris, 1671, 8vo., and 1682, 4to. This work, which is a translation of one of the tracts of Gabriel, metropolitan of Philadelphia, with notes, Simon gave as a supplement to the first volume of the 'Perpetuity of the Faith respecting the Eucharist,' whose authors he accused of having committed many gross errors, and not having sufficiently answered the objections raised by the Protestant minister Jean Claude, in his 'Reponse au Traité de la Perpétuité de la Foi sur l'Eucharistie.' [CLAUDE.] This involved him in a controversy with the writers of Port-Royal, and laid the foundation of that opposition which he afterwards met with from the learned of his own communion. His next publication, which came out under the assumed name of Recared Simeon, was a French translation of the work of Leo of Modena: 'Cérémonies et Coûtumes qui s'observent aujourd'hui parmi les Juifs,' Paris, 1674, 12mo. A second edition appeared in 1681, under the name of the Sieur de Simonville, containing also a supplement respecting the Caraites and the Samaritans, and a comparison between the ceremonies of the Jews and the discipline of the Church. In 1675 he published the 'Voyage de Mont Liban,' from the Italian of Dandini, with notes, and about the same time his 'Factum du Prince de Neubourg, abbé de Feschamps, contre les Religieux de cette Abbaye,' in which work, as was usual with him, he took an opportunity to attack the Benedictines. But the work which rendered him most famous is his 'Histoire Critique du Vieux Testament,' which immediately after its publication (Paris, 1678, 8vo.) was suppressed on the ground that it contained doctrines dangerous to religion and the Church. The work however was so much admired for its learning and criticism, that it was reprinted the year after, and translated into Latin at Amsterdam, 1681, and into English at London, 1682, 4to., by John Hampden. After the publication of his 'Histoire Critique,' Simon left the Congregation of the Oratory, and repaired to Belleville, a village near Caux, where he held a curacy; but in 1682 he resigned his office and removed to Dieppe, and thence to Paris to renew his studies and make arrangements for the publication of other works. In 1684 he published at Frankfort, 'Histoire de l'Origine et du Progrès des Revenues Ecclésiastiques,' under the name of Jerome à Costa, of which a second edition appeared at the same place in 1709, in 2 vols. 8vo. In the same year (1684) he printed in London his 'Disquisitiones Criticæ de variis per diversa Loca et Tempora Bibliorum Editionibus,' which was immediately translated into English. In 1688 he published at Frankfort, under the name of John Reuchlin, 'Dissertation Critique sur la Nouvelle Bibliothèque des Auteurs Ecclésiastiques par Du Pin,' in which he defends some opinions contained in his 'Histoire Critique,' which had been controverted by Du Pin. His next publication was 'Histoire Critique du Nouveau Testament,' Rotterdam, 1689, 4to., an English version of which appeared the same year at London. Besides the above, Simon was the author or editor of many other works. He was unquestionably a man of profound learning and great acuteness, and he contributed in no small degree to lessen the authority of his own church; but a love of controversy, in all its bitterness, and too great a propensity to depreciate and abuse those who happened not to acquiesce in his opinions, rendered him equally obnoxious to Protestants and Roman Catholics. He died at Dieppe, in April, 1712, in the seventy-fourth year of his age.

SIMO'NIDES was a native of Iulis, in the island of Ceos, and was born about B.C. 556. His father's name was Leoprepes, and his grandfather's Simonides, who was also a poet.

Simonides is said to have obtained great fame as a poet at an early age. He appears to have remained in Ceos till about B.C. 525, when he removed to Athens, where he was honourably received by Hipparchus, and became acquainted with Anacreon and Lasus (Plato, *Hipparch.*, p. 228; Aelian, *Var. Hist.*, viii. 2). After the murder of Hipparchus, he took refuge with the Aleuadae and Scopadae in Thessaly, whose praises he celebrated in some of his poems (Theocrit., xvi. 34, &c., with the Schol.; compare Plato, *Protagor.*, p. 333). How long Simonides remained in Thessaly is not known; but after the battle of Marathon (B.C. 490) we find him again at Athens. For the next ten years he appears to have lived chiefly at Athens, and to have been actively engaged in the pursuit of his art. After the banishment of Themistocles and the death of Pausanias, with both of whom he lived on intimate terms, he retired to Hieron's court at Syracuse (Aelian, *Var. Hist.*, ix. 1; iv. 15), where he died, B.C. 467, in his ninetieth year.

Most of the poems of Simonides are lost; but enough have come down to us to enable us to form some opinion of the merits of his poetry, and to justify the panegyrics which the antient writers bestow upon him. He was one of the most distinguished of the elegiac poets, and particularly excelled in the pathetic, as we see in his 'Lament of Danae' and in other remains of his poetry. He is stated to have had the superiority over Aeschylus in an elegy which he composed in honour of those who died at Marathon, when the Athenians instituted a contest of the chief poets. But some of Simonides's best poems are epigrams, which species of poetry he carried to greater perfection than any of his predecessors. The Persian war gave constant employment to this muse, as he was frequently employed by the different states of Greece to adorn with inscriptions the tombs of those who fell, and the votive offerings which were dedicated in the various temples. We still possess several of his epigrams belonging to this period. Of these one of the most celebrated is upon the Spartans who fell at Thermopylæ: 'Stranger, tell the Lacedæmonians that we are lying here in obedience to their laws;' and another upon the Athenians who fell at Marathon: 'Fighting in the van of the Greeks, the Athenians at Marathon destroyed the power of the glittering Medians.' Simonides also celebrated the sea-fights of Artemisium and Salamis in two larger poems, which are often referred to by antient writers, but of which no fragments have come down to us.

The remains of the poems of Simonides have been published by Schneidewin, under the the title of 'Simonidis Carminum Reliquiæ,' Bruns., 1835, 8vo. The Greek letters Ξ, Ψ, Ω, are said to have been invented by Simonides, who is also stated to have converted the sign of the aspirate H into a long e.

Simonides of Ceos must not be confounded with Simonides of Amorgus, which is an island not far from Paros. The latter was a contemporary of Archilochus, and flourished from B.C. 693 to 662. He wrote iambics, in which he attacked private persons, and of which a few fragments have come down to us. He also wrote a satirical poem upon women in the iambic metre, which is still extant. The fragments of his poems have been published by Welcker Bonn, 1835.

(Müller's *History of the Literature of Greece*, p. 125, &c., 140; Bode's *Geschichte der Lyrischen Dichtkunst der Hellenen*, vol. i., p. 318, &c.; vol. ii., p. 122, &c.)

SIMONY is the buying or selling for money or other corrupt consideration any ecclesiastical benefice, dignity, or preferment, or the causing a clerk to obtain or to relinquish such benefice or preferment for corrupt consideration. The word is derived from Simon, who is mentioned in the 'Acts of the Apostles' (viii., 18-24) as having offered money to Peter and John in order that he might obtain from them apostolical powers.

Whether Simony was an offence at common law is at least doubtful. Lord Coke, it is true, repeatedly says that the common law doth abhor Simony, and adduces as evidence of this repugnance the fact that a patron of a living could not by the common law recover a pecuniary compensation for being impeded in his presentation. It is certain that Simony is a great ecclesiastical offence by the canons both of the Roman Catholic and of the Anglican church. The 40th canon of the latter (A.D. 1603), 'to avoid the detestable crime of Simony,' and because the buying and selling of spiritual and ecclesiastical functions, &c. 'is execrable before God,' prescribes an oath to be ministered to every person assuming such offices, by which he denies that he has made any Simoniacal payment, contract, or promise, directly or indirectly, for procuring such ecclesiastical office, or that he will perform any such contract made on his behalf without his knowledge.

But the offence now depends on the statute 31 Elizabeth, c. 6, although the word Simony is not mentioned in the act. By that statute any person presenting to a benefice for profit or 'any such corrupt cause' forfeits to the crown that presentation and double the value of one year's profit of the benefice, and the person paying the price is rendered incapable of holding that benefice (§ 5). Any person so corruptly admitting or instituting another is subject to the like pecuniary penalty, and the benefice is 'eftsoons merely void,' and the presentation reverts to the patron as though the party so admitted were dead (§ 6). An incumbent resigning or exchanging a benefice with cure of souls for profit, and the person with whom the bargain is made, both forfeit double the price, together with two years' profit of the benefice (§ 8). Any person obtaining for such corrupt consideration the ordaining of a minister, forfeits 40*l.*, and the minister so corruptly ordained forfeits 10*l.* and is incapable of holding any ecclesiastical preferment for seven years. The modifications which that enactment has under gone by subsequent statutes and decisions will be found under the head BENEFICE (p. 223-6).

The indignation of ecclesiastical authorities against Simony, excepting in so far as relates to the admission of persons into the ministry, seems somewhat unreasonable, and is certainly inefficacious, for the trafficking in ecclesiastical preferment is extensively pursued. Provided that the qualification of persons for holy orders is carefully investigated before their admission to the ministry, and that the discipline of the church can be strictly and easily enforced by the bishops and other ecclesiastical authorities, the reason why a minister who has been admitted to a benefice for a pecuniary consideration should be disqualified for his office is not very obvious, especially in a country where advowsons are by law a marketable commodity, and the legislature recognises a bargain for compelling a minister to resign a benefice in favour of another person, provided the latter is within certain degrees of consanguinity to the patron.

(Rogers's *Ecclesiastical Law;* Bacon s *Abridgment,* 'Simony.')

SIMOOM. [SAMIELI.]

SIMPLE BODIES. [ATOMIC THEORY.]

SIMPLE CONTRACT debts are those which are contracted without any engagement under the seal of the debtor or of his ancestor, and which are not of record by any judgment of a court. Money due for goods bought by the debtor is the most usual of simple contract debts; and the declaration against a defendant, in an action for goods sold, usually alleges that the defendant undertook (or contracted) to pay the plaintiff the sum due. Simple contract debts are the last which are payable out of a deceased person's estate, when the assets are insufficient. [EXECUTOR.]

SIMPLI'CIUS, a native of Tibur, succeeded Hilarius as bishop of Rome, A.D. 467. He had a controversy with Acacius, Patriarch of Constantinople, about precedence. Simplicius dedicated several churches at Rome to particular saints, and he also framed several regulations concerning the discipline of the clergy of Rome. He died A.D. 483.

SIMPLI'CIUS was a native of Cilicia, and lived in the reign of Justinian. He had been trained in the study of philosophy by Ammonius, and appears to have been engaged in teaching at Athens when Justinian issued the decree which imposed perpetual silence on the few yet remaining votaries of heathen science and superstition in that city. Simplicius and six of his philosophic friends, who were resolved not to abandon the religion of their forefathers, left Athens, to seek in a foreign land the freedom which was denied to them at home. They went to Persia, where Chosroes then reigned, expecting to find all their hopes realised; but when they saw the actual state of affairs in the East, they repented of the steps which they had taken, and declared that they would rather die on the borders of the empire than enjoy the favours and the wealth which the barbarian monarch might bestow upon them. They returned to their country; and Chosroes, in a treaty which he at the time concluded with the Greek emperor, nobly stipulated that the seven philosophers who had visited his court should be exempt from the penal laws which Justinian enacted against his pagan subjects. Simplicius and his friends, after their return, lived in peace and retirement at Athens, where they devoted the remainder of their lives to the study of philosophy, enjoying the reputation of being wise and virtuous men.

Simplicius wrote Commentaries on Aristotle's Categoriæ, Physica, De Coelo, and De Anima. One of his objects in these commentaries is to reconcile the Platonic and Stoic systems with the Peripatetic school, to which he himself belonged. They are the most valuable of all the extant Greek commentaries on Aristotle; for Simplicius possessed a profound knowledge of his author, as well as of other philosophical writers of antiquity; and as he frequently quotes the opinions of antient philosophers whose works are no longer extant, his commentaries are a fruitful source for those who wish to study the history of antient philosophy. His commentaries are printed in some of the early editions of Aristotle; they are also contained in 'Scholia in Aristotelem, collegit Ch A. Brandis,' Berlin, 1836, &c.

Simplicius also wrote a Commentary on the Enchiridion of Epictetus, which for its pure and noble principles of morality has commanded the admiration of all ages. The best separate edition of this commentary is that by Schweighäuser, with a Latin translation, in 2 vols., Leipzig, 1800. It has been translated into English by Dr. G. Stanhope, London, 1704, 8vo.; into French by Dacier, Paris, 1715; and into German by Schulthess, Zürich, 1778.

SIMPLON. [SWITZERLAND.]

SIMPSON, THOMAS, a distinguished English mathematician, was born at Market-Bosworth in Leicestershire, August 20, 1710. He appears even in his boyhood to have had a strong inclination for acquiring information by reading and conversation; but his father, who was a weaver, intending that he should follow that occupation, endeavoured to divert him from a pursuit which interfered with the labour of his hands. The impulse of genius however prevailed over the remonstrances of the parent, and the youth, having quitted his father's house, went to reside at Nuneaton, where, in the exercise of his trade, he obtained the means of subsisting, and during the intervals of leisure he indulged his taste for the acquisition of knowledge.

Young Simpson was led to the study of mathematics by having accidentally obtained possession of a copy of Cocker's 'Arithmetic,' to which was annexed a short treatise on algebra; and, similarly to what is related of Tycho Brahé, it is said that he applied himself to astronomy from admiration of the science in consequence of the occurrence (in 1724) of a great eclipse of the sun at the time, which had been predicted. It is added that an itinerant pedlar and fortune-teller instructed him at the same time in the mysteries of judicial astrology, and this art he occasionally practised during several years.

While yet a stripling he married a woman about fifty years of age, the widow of a tailor and the mother of two children, of whom the younger was his senior by two years; all the family however appear to have lived together in harmony, Simpson working at his trade by day, and increasing his income by keeping a private school in the evenings. In 1733 he went to reside at Derby, where he continued to follow the united avocations of weaver and schoolmaster, and where he found means to increase his knowledge of mathematics. With arithmetic, geometry, and algebra he was already acquainted; and now, having obtained a loan of Stone's translation of the Marquis de l'Hôpital's 'Analyse des Infinimens Petits,' he was enabled by the force of genius and unremitting application to make himself master of the direct and inverse method of fluxions. Being thus qualified, he began in or before the year 1735 to write answers to the mathematical questions in the 'Ladies' Diary,' and even to propose questions for solution in that work. Some of the questions have a certain degree of intricacy, and they afford evidence that, at this time, the scientific attainments of Simpson, considering his means, must have been very extensive.

In the year 1735 or 1736 Simpson came to London and took lodgings in Spitalfields, where at first he both worked at the loom and gave instruction, as he had done in the country; but his great abilities becoming known to the world, and being perhaps more conspicuous from the obscurity of his situation, he was enabled to give up his trade and devote himself wholly to science. Having brought his family to the metropolis, he established himself there as a teacher of the mathematics, and employed his leisure hours in extending his researches into the highest branches of the science.

On the death of Dr. Derham, Mr. Simpson was, in 1743, appointed professor of mathematics in the Royal Military Academy at Woolwich; and this post he held during nearly all the rest of his life. He is said to have been successful in acquiring the friendship and esteem of his pupils; and while exerting himself diligently in fulfilling his public duties, he found time to compose numerous works on the most abstruse points in the mathematical and physical sciences.

In 1746 he was admitted a fellow of the Royal Society, and on account of the mediocrity of his circumstances he was excused the payment of the admission fee and the annual subscriptions: several of his mathematical papers were printed in the 'Transactions,' but most of them were afterwards republished in the volumes of his works. In 1760, when the present bridge at Blackfriars was about to be built, Mr. Simpson was consulted with other mathematicians concerning the form which would be most advantageous for the arches; he appears in consequence to have taken some pains in investigating the conditions of the stability of vaults, and to have given the preference to those of a hemi-cylindrical form, but he did not live to complete the work, and the results of his researches have never been made public.

As Mr. Simpson advanced in life, he became gradually a prey to melancholy, which appears to have been increased by the influence of bad habits; his mental faculties were at length so far impaired that he became incapable of performing the duties of his professorship, and in the beginning of the year 1761 he was prevailed on to retire to his native town. The fatigues of the journey increased his disorder, and he died May 14, in that year, in the fifty-first year of his age.

Considering the circumstances attending Simpson's early life, and the laborious occupation in which he was afterwards engaged, it is not without surprise that we contemplate the number of works which he wrote, and the profound research those works display. His first publication, which came out in 1737, was entitled 'A New Treatise of Fluxions,' in which the direct and inverse methods, as they were called, are demonstrated with considerable precision and perspicuity, and agreeably to the manner of Newton; the work also contains several useful applications of the calculus to subjects in natural philosophy and astronomy. Thirteen years afterwards, that is, in 1750, he published 'The Doctrine and Applications of Fluxions,' which he dedicated to the earl of Macclesfield, and which, though it embraces the same subjects as form the body of the 'Treatise,' must, from the numerous improvements it contains, be considered as a separate work.

In 1740 Simpson published 'A Treatise on the Nature and Laws of Chance,' besides 'Essays on several subjects in pure and mixed Mathematics;' and two years afterwards 'The Doctrine of Annuities and Reversions,' with tables showing the values of single and joint lives. These works were followed, in 1743, by 'Mathematical Dissertations on Physical and Analytical Subjects,' among which will be found an investigation of the figure of a planet revolving on its axis, and of the force of attraction at the surfaces of bodies which are nearly spherical; also a theory of the tides and of astronomical refractions. These dissertations were dedicated to Martin Folkes, Esq., the president of the Royal Society.

'An Elementary Treatise on Algebra' was published in 1745; 'The Elements of Geometry,' in 1747; and in the next year 'A Tract on Plane and Spherical Trigonometry,' with the 'Theory of Logarithms.' With the elements of geometry are given notes in which are suggested improvements on some of the demonstrations of Euclid; but in making occasional observations on the notes given in the first edition of Dr. Robert Simson's 'Euclid,' for example on the note to the first proposition of the eleventh book, he has fallen into some slight inaccuracies which have been remarked on in the succeeding editions of the latter work. A second edition of Thomas Simpson's 'Geometry' was published in 1760.

In the year 1752 he published 'Select Exercises in Mathematics,' in which are given many geometrical and algebraical problems with their solutions, and a theory o gunnery; but his last and most valuable work was that which is entitled 'Miscellaneous Tracts' (1754). This consists of eight separate papers, four of which relate to pure mathematics, and the others to physical astronomy. The first paper contains investigations for determining the precession of the equinoxes and the nutations of the earth's axis; the second contains equations for correcting the place of a planet in its orbit on the hypotheses of Bullialdus and Seth Ward; and the third is on the manner of transferring the motion of a comet from a parabolical to an elliptical orbit. In the fourth paper are explained the advantages, in point of accuracy, which arise from using a mean of several astronomical observations instead of one single observation. The fifth contains the determination of certain fluents; the sixth, the resolution of algebraic equations by means of surd divisors; and the seventh, a general rule for the resolution of isoperimetrical propositions. The eighth paper contains the resolution of some important problems in astronomy; the propositions in the third and ninth sections of the first book of Newton's 'Principia' are demonstrated, and the general equations are applied to the determination of the lunar orbit.

In order that the merit of this last paper may be rightly appreciated, it is necessary to observe that about the year 745 the modern analysis was first applied to the determination of the elements of the orbits of the earth, moon, and planets; these bodies being supposed to perturbate each other's motions by their mutual attractions, as well as to be subject to the general attraction of the sun. In the prosecution of the research, the mathematicians Clairaut, D'Alembert, and Euler particularly investigated the effect of the sun's attraction in causing a progression of the apogee of the moon's orbit, which progression, being a remarkable consequence of perturbation, was considered as a test of the correctness of the general principle and law of attraction which had been assumed by Newton. The first efforts of M. Clairaut showed an amount of progression in the period of a revolution of the moon about the earth, equal to about half only of that which had been determined from astronomical observations ('Mémoires de l'Académie,' 1747); and it is remarkable that both D'Alembert and Euler obtained at the same time a like erroneous result. This circumstance at first caused some doubts to be entertained of the truth of Newton's hypothesis, that the force of attraction varies inversely as the square of the distance: but the process employed by the three mathematicians being one of successive approximations only, it was afterwards discovered by Clairaut that, on continuing the process, the second step in the approximation produced a quantity nearly equal to that which had been obtained by the first step; and thus the computed progression was found to coincide with the results of observation. Now Simpson, employing a differential equation of motion like that which had been used by the foreign mathematicians, obtained the values of its terms by means of indeterminate coefficients; a method which entirely avoided the inaccuracy resulting from the species of approximation which they had adopted; and thus he arrived at once at the true value of the progression.

The 'Tracts' were not published till seven years after Clairaut's 'Mémoire' came out, and it appears that, in the interval, that mathematician during a visit to England had an interview with Simpson; the latter states however, in the preface to his 'Tracts,' that previously to having had any communication with M. Clairaut, he had discovered that the movement of the moon's apogee could be accounted for on the Newtonian law of gravitation. There is therefore no reason to doubt that Simpson had the merit of arriving at a determination which served to confirm the truth of that law by a process entirely his own: the whole investigation exhibits profound mathematical skill, and fully entitles him to the character of having been one of the ablest analysts, for all the purposes of practical science, of which the country can boast.

Mr. Simpson continued during the whole of his life his contributions to the 'Ladies' Diary,' of which work he was the editor from 1754 to 1760.

SIMSON, ROBERT, one of the many mathematicians who have given a lustre to the universities of Scotland, was a son of Mr. John Simson, of Kirton Hall in Ayrshire, and was born in October, 1687. About the year 1701 he was sent to the university of Glasgow, where he acquired that proficiency in the learned languages which he retained during all his life, and at the same time he made considerable progress in moral philosophy and theology, being destined by his father for the church. Young Simson soon however found a pursuit more congenial to his taste in the study of mathematics, and chiefly of the antient geometry: to this subject he applied himself at first as a relief from what he considered as a more laborious occupation, and it became at length almost the sole employment of his life.

In 1710 Mr. Simson made a visit to London, where he remained about a year, and where he became acquainted with Dr. Halley, Mr. Caswell, Dr. Jurin, and Mr. Ditton; from the conversation of the last gentleman, who was then mathematical master of Christ's Hospital, he gained, not as a pupil, but as a friend, a considerable accession to his knowledge of science.

On the resignation of Dr. Robert Sinclair, Mr. Simson was appointed, in 1711, to succeed him as professor of mathematics in the university of Glasgow. He then applied himself to the duties of his office, and regularly gave lectures on five days in each week during the session of seven months. This practice he continued for nearly fifty years; but in 1758, being then seventy-one years of age, he was obliged to employ an assistant, and three years afterwards the Rev. Dr. Williamson, who had been one of his pupils, was appointed his successor.

In 1735 Dr. Simson published in 4to. a 'Treatise on Conic

Sections,' and a second edition in 1750: in this work the investigations are conducted agreeably to the spirit of the antient geometry, and propositions are introduced expressly that it might serve as an introduction to the treatise of Apollonius on the same subject.

By the advice, it is said, of Dr. Halley, Simson early directed his attention to a restoration of the works of the Greek geometers, and his first effort was made on the porisms of Euclid: a branch of the antient analysis which is only known from the short account in the works of Pappus. In this difficult task however he succeeded, but his 'Tract' on the subject was not published till after his death. Having acquired a sort of key to that analysis, he undertook a restoration of the 'loci plani' of Apollonius, and this he completed about the year 1738. The work was first published in 1746, and Dr. Simson acquired by it the reputation of being one of the most elegant geometers of the age. Another subject on which the peculiar talents of Dr. Simson were exercised, was the 'sectio determinata' of Apollonius, and this also he was so fortunate as to restore. The work appears to have been commenced at an early period of his life, but it was only published, along with the Porisms, after his death.

A perfect edition of the principal part of Euclid's 'Elements' was the next object of Dr. Simson's labours. Numerous errors were known to exist in the Greek copies, and the correction of these was a task worthy of a scholar who had made the antient geometry almost exclusively his study. An edition of the 'Elements' and of the 'Data' was published in 4to. about 1758, and the work has always enjoyed a high character both for precision in the definitions and accuracy in the demonstrations. It is probable that the British mathematician has even corrected errors which existed in the original text, though his high regard for Euclid has led him to assume that all those which he has discovered have arisen from the negligence or unskilfulness of the antient editors or copyists. Having been very generally used for the purposes of elementary instruction, many editions of this work have since been published.

After his retirement Dr. Simson employed himself chiefly in correcting his mathematical writings; but though he had several works nearly fit for publication, he printed none except a new edition of Euclid's 'Data.' He was seriously ill only during a few weeks previously to his death, which took place October 1, 1768, in the eighty-first year of his age.

In 1776 Earl Stanhope published, at his own expense, and for private circulation, the above-mentioned restorations of Euclid's books of Porisms, and of the two books of Apollonius 'De Sectione Determinata:' together with these works the same nobleman published a tract on the limits of ratios and another on logarithms, both of which had also been written by Dr. Simson. An edition of the works of Pappus was found among the Doctor's MSS., and was sent by his executors to the University of Oxford.

Dr. Simson, though devoted to geometry, was well acquainted with the modern analysis, and the latter was occasionally the subject of his college lectures; it is however to be regretted that so much of his time was spent in the effort to restore the precise works of the antients, when it might have been more profitably employed in forming a connected system of their analysis, and in showing its application to the solution of problems relating to physical science. He was never married, and the greater part of his long life was spent within the walls of the college; his hours of study, his exercises, and even his amusements being regulated with great precision. In his disposition he was cheerful and sociable; and his conversation, which was animated, abounded with literary anecdote and good humour, though he was subject, when in company, to occasional fits of absence. He was a man of strict integrity and pure morals, and he appears to have had just impressions of religion, though he never allowed the subject to be introduced in mixed society.

SIN. One of the few passages of Scripture in which we have something which approaches to the character of a definition relates to this word: 'Sin is the transgression of the law.' (1 *John*, iii. 4.) Within this definition would be comprehended all actual sins, when the word law is interpreted to mean the Christian law, the rule by which the minds of all who profess Christianity are bound: and not merely open palpable offences against the law, such as murder, theft, lying, and the like, but sinful omissions of duty, and those sins which are only those of contemplation and thought: since the Christian rule commands us not to neglect the performance of our duties, and to keep a watch over the thoughts as well as over the actions and words.

It was this comprehensive and most excellent law which was in the mind of the Apostle when he said that 'sin was transgression of the law,' or at least that other divine law which bound the conscience of the Jews. But the expression may be taken to express more generally any law which a person holds in his conscience to be binding upon him, whether it be a law of nature only, or a law in which the natural perception of right and wrong is modified by and mixed with what is received as the will of God concerning us by direct revelation from him.

When the word sin is however applied to any act, it is always, among correct writers or speakers, used with reference, either expressed or implied, to religious obligation, and to the responsibility in which we stand to God, and the liability in which we are to future punishment. 'To do wrong' would express the same act as 'to commit sin;' but we use the former phrase without thinking of the offence which is done against God in any act of the kind; not so when we use the other phrase.

Under this definition it is evident that there may be degrees in sin: and we mention this to remove what we deem an erroneous opinion on this subject, which goes the length of saying that there is really no difference between the slightest violation of any moral obligation and the more heinous transgressions. The error on this point arises out of one of the commonest mistakes in respect of language—confounding words in their abstract with words in their concrete state. It is true that sin in the abstract is one and indivisible, and there are no degrees in it; it expresses that which is most offensive in the sight of a pure, holy, and judging God. But when we say 'a sin,' we then refer to some particular act; and common sense tells us that in all acts in which the law is transgressed there is not the same amount of moral turpitude, the same amount of defiance to the Divine Power, the same injury to society or to our neighbour, and consequently not the same amount of offence in the sight of God. At the same time it cannot be too strongly inculcated upon all to keep a watchful guard upon themselves lest they commit even the smaller offences; for nothing is more certain in the philosophy of mind, than that small offences lead imperceptibly to the toleration of greater, so that the man who thinks little of small offences may become, before he is aware, guilty of those of the most heinous nature.

There is also what divines call Original Sin; a phrase which is differently interpreted by different persons. By some it is considered as being the act of sin committed by our first parents when they transgressed the law which had bound them not to eat of the fruit of a certain tree; and this act of sin is regarded as partaken in by all the posterity of Adam, who were, as it were, existent in him their common father, and as fixing upon all the guilt of his sin, and exposing them to punishment which would be inflicted for this particular sin, to say nothing of their own sin, but for the great redemption. There are many modifications of this notion and many intermediate shades of opinion till we arrive at the view of original sin which represents the nature of man as changed by the transgression in this particular of our common ancestor; so that a nature previously perfectly innocent and free from the least tendency to sin, became changed into one in which the disposition to sin is inherent and the repugnance to the Divine will strong and universal. There are some classes of professing Christians who do not use the phrase original sin, though they admit the proneness of man to sin, attributing it to his ignorance and imperfection, to the violence of his appetites and passions, and in general referring it to that state of probation in which it seems to them to have been the intention of their Maker to place us.

SINAI, MOUNT. [ARABIA, p. 213.]

SINA'PIS, the name of a genus of plants belonging to the natural order Cruciferæ or Brassicaceæ. All the species are known by the name of mustard, a word derived from *mustum ardens*, in allusion to their hot and biting character. The genus is known by its siliquose fruit, which is rather terete with nerved valves; small, short, acute style; subglobose seeds disposed in one row in each cell, and spreading calyx. The leaves are of various forms, lyrate or deeply toothed. The flowers yellow, arranged on terminal bractless racemes. They are chiefly natives of the temperate parts of both hemispheres of the old world. Between 40 and 50 species of this genus are enumerated. Of these two species are well known and much cultivated in this country, *Sinapis nigra* and *S. alba*, the black and white mustard.

S. nigra, the black mustard, is known by its smooth, even, somewhat tetragonal siliques closely pressed to the peduncle; lyrate lower leaves, and lanceolate upper leaves. It is found in cultivated fields, waste grounds, and roadsides throughout Europe. The young plants of both black and white mustard are eaten as salad, and are both cultivated for this purpose. The black however differs from the white mustard in the flowers and seed being much smaller, and in the latter being black. But the great purpose for which the black mustard is grown is for the seeds, which when ripened and powdered form the well-known condiment mustard. 'To raise the seed for flour of mustard and other officinal occasions, sow either in March or April in an open compartment, or large sowings in fields, where designed for public supply. Sow moderately thick, either in drills six or twelve inches asunder, or broad-cast, after the ground has been properly ploughed and harrowed, and rake or harrow in the seed. When the plants are two or three inches high, hoe or thin them moderately where too thick, and clear them from weeds. They will soon run up to stalks, and in July, August, or September return a crop of seed ripe for gathering; being tied up in sheaves and left three or four days on the stubble.' (Don's Miller.) Rain damages the crop very much. Black mustard exhausts the soil rapidly. It is cultivated to a great extent in the county of Durham. When once grown it is difficult to extirpate on account of the great vitality of the seeds, which, if buried at almost any depth and for any length of time, will germinate when brought to the surface. In preparing the flour of mustard in this country, the black husk of the seed is separated by delicate sifting. This process, which is not gone through on the Continent, makes the British mustard of so much lighter and more agreeable colour. The mustard on the Continent however is stronger, as the greater proportion of the volatile oil on which the strength of the mustard depends resides in the testa, or husk of the seed, which in this country is thrown away.

S. alba, white mustard: siliques hispid, spreading, rather narrower than the ensiform beak: leaves lyrate, smoothish; stem smooth. It is a native of Britain and most countries in the south of Europe. It is frequently cultivated, and when young is eaten as a salad. Its seeds are white, and by expression yield a bland insipid oil perfectly free from acrimony, but leaving behind a cake more pungent than the seeds themselves. In the culture of this plant for salad the seed should be sown once a week or fortnight, in dry warm situations, in February and March, and in shady borders in the heat of summer. They are best sown in shallow flat drills, from three to six inches apart. The seeds should be put in thick and regular, and covered with not more than a quarter of an inch of mould. In winter or early spring it may be grown under a hand-glass, or in hotbeds and stoves.

SINAPIS. Two species of this genus are used in this country to yield the mustard of commerce, S. alba and S. nigra, or white mustard and black mustard. Both are annuals, the latter extensively cultivated in Yorkshire and Durham. Of the former the seeds are large, smooth, not veined or reticulated, and when bruised and mixed with water, do not evolve a pungent odour. The integument or skin is also thin, and the quantity of fixed oil obtained from it is less than from that of the black mustard. White mustard is of a light colour externally (but one variety is blackish), and when reduced to powder, is of a light yellow colour.

The seeds of black mustard are about the size of the head of a common pin, ovato-globose, of a reddish-brown, beautifully veined, internally yellow, oily, and yielding a yellowish-green powder. The chemical constitution of the two is essentially different, as it is only the black mustard which evolves, when bruised and mixed with water, the pungent principle which irritates the eyes, nostrils, and skin. The white mustard possesses a non-volatile principle, which is developed by the addition of water. It is the young plants from this species which are eaten with cress as a salad.

The chemical constitution of black mustard seems to be of the most complex kind. According to Dr. Pereira, it contains myronate of potash, myrosyne, fixed oil, a pearly fat matter, gummy matter, sugar, colouring matter, sinapisin, free acid, peculiar green matter, and some salts, chiefly sulphate and phosphate of lime. The volatile oil does not pre-exist in the mustard, but is formed, when water is added, 'by the mutual action of the contained myrosyne and myronate of potash (sinapisin?).' It may be obtained by distilling one part of the marc (*i.e.* the cake of bruised mustard-seeds which remains after the fixed oil has been expressed) with from five to eight parts of water. It is soluble in alcohol and æther, and also, what is very singular, in water, requiring however five hundred parts for its solution. Water in which it is dissolved is a powerful vesicant and rubefacient. It has been recommended as a counter-irritant in the same cases as sinapisms or mustard-poultices are employed. It possesses the advantage of extreme rapidity of action; and when used in cases of torpor or coma, if on the return of sensibility the patient complains of pain from the application, this can be immediately removed by washing the part with sulphuric æther, a property no other rubefacient agent possesses, and which entitles it to a preference in many cases. It is the only volatile oil of indigenous origin which is heavier than water, its specific gravity being 1·015 at 68° of Fahr. It possesses the same power as other volatile oils in preventing the development of fungi.

The fixed oil is perfectly bland, like that of olive or rape, which last it greatly resembles. It exists to the extent of 20 per cent. in white, and about 28 per cent. in black mustard-seed. To obtain it the seeds are crushed in a mill or between rollers, and the skins should be subjected to pressure as well as the farina or flour. The cake may then be sifted and reduced to a fine powder, as it retains all the pungent properties. In France the oil is generally left in the seeds, which renders them very difficult to powder, and makes it expensive. It is also less potent than English mustard in equivalent quantity. The marc or cake is sometimes used as manure, but this is a waste. The oil is valuable for burning, especially as it does not freeze, except at a temperature below zero. It also forms, with an alkali, a firm good soap. It has been supposed to be anthelmintic as well as purgative, but its medicinal properties are insignificant.

Flour of mustard, mixed with water, forms the well-known condiment so much used with all the more indigestible articles of food, the solution of which it seems to favour by rousing the powers of the stomach. A table-spoonful of mustard in a tumbler of water forms a ready and useful emetic in many cases of poisoning, especially when narcotic poisons have been taken. Added to foot-baths, mustard has a revulsive action, which is often serviceable in the commencement of colds, and when gout has seized the stomach or brain; also when cutaneous diseases have suddenly receded.

Sinapisms are generally directed to be made with vinegar, but water of the temperature of about 100° Fahr. is preferable, and less expensive. French mustard for the table is often prepared with vinegar. Some years ago, the seeds of white mustard, taken whole, in the dose of a table-spoonful, were recommended as a cure for many complaints. This was only an old practice revived, and not free from danger, as the seeds have been known to lodge in the intestines and cause death. See Cullen's 'Materia Medica,' vol. ii., p. 170. Respecting the mustard-plant of Scripture, see 'Trans. of Linnean Society of London,' vol. xvii., p. 449.

SINCAPORE. [SINGAPORE.]

SINCLAIR, SIR JOHN, Bart., third son of G. Sinclair, Esq., heritable sheriff of Caithness, was born at Thurso castle, in the county of Caithness, in the year 1754.

He embraced the profession of the law, and was called to the English bar in 1782, having been admitted a member of the faculty of advocates in Scotland in the year 1775.

In 1780 he was chosen member for his native county, and sat in the house during several successive parliaments, sometimes for Caithness, sometimes for other places. He was created a baronet in 1786, and in 1810 was honoured with a seat at the board of privy council. He was likewise a member of several learned societies, and became extensively known by his writings, which, for more than fifty years, issued rapidly from the press. His death took place at Edinburgh, on December 21, 1835, in the 82nd year of his age.

Sir J. Sinclair did much for the improvement of his country. He established a very useful society in Scotland in 1791 for improving wool, and his exertions led to the formation of the Board of Agriculture in 1793, of which he was the first president. Among the most important of his numerous works may be mentioned his 'Statistical Account of Scotland;' 'History of the Revenue of Great Britain;' and 'Account of the Northern Districts of Scotland.' The first of these is an extraordinary work, and displays an almost incredible amount of labour and research.

SINDE. [HINDUSTAN.]

SINDIA, FAMILY OF. The origin of this celebrated family of Mahratta chiefs and princes is comparatively modern. The family were sudras, of the peaceful tribe of koombee, or cultivators. The first who distinguished himself as a soldier was

RANOJEE SINDIA, who was originally a potail, or head man of a village. The Paishwa Bajerow, who succeeded his father Biswanath Row in 1720, appointed Ranojee to the humble office of bearer of his slippers. A circumstance which seemed to show his fidelity and attachment to his master is said to have led to his promotion. Bajerow one day found him asleep on his back, with the slippers firmly clasped to his breast, and was so much pleased as to appoint him immediately to a station in his body-guard. Ranojee Sindia was active and enterprising, and he was rapidly promoted. In 1743 he had risen to the highest rank of Mahratta chiefs; for when Bajerow came into Malwa in that year, Ranojee signed a bond which was required by the emperor of Delhi, Mahomed Shah, as a surety for the good conduct of his master the Paishwa. Before Ranojee died he had obtained the hereditary government of one-half of the extensive province of Malwa. By his wife, who belonged to his own tribe, he had three sons, Jeypah, Duttagee, and Juttabah; and by a Rajpoot woman he had two sons, Tukajee and Madhajee, of whom

MADHAJEE SINDIA became the head of the family. The date of his birth is uncertain; it was probably about 1743; he was present at the battle of Paniput in 1761, when the Mahrattas were defeated by Ahmed Shah Abdallah and his Afghans, in union with the Rajpoot and Mohammedan princes of northern Hindustan. In this disastrous battle one-half of the Mahratta army, which amounted to 200,000 men, are said to have been slain. Madhajee Sindia was pursued by an Afghan horseman for many miles, who at length overtook him, and left him for dead in a ditch, after having wounded him with his battle-axe in the knee in such a manner as to render him lame for life. The Sindia family, as well as the other Mahratta chiefs, were for a time deprived of all their possessions in Malwa and Hindustan proper; but this was not of long continuance. The Paishwa Bajerow died in 1761, and was succeeded by his son Madhoo Row, under whom, on the death of Mulhar Row Holkar in 1764, Madhajee Sindia became the most powerful of the Mahratta chiefs. Besides being the principal leader of the household-horse of the Paishwa, he had a large army of his own; and the return of Ahmed Shah to Cabul, and the contests among the Mohammedan princes under the weak emperor Shah Alim II., in a few years afforded opportunity to him and his brother Tukajee Sindia to recover their former hereditary government and possessions in Malwa and northern Hindustan.

In 1770, on the invitation of Nujeeb ud Dowlah, who was the minister of Shah Alim, Madhajee Sindia, Bassajee Row, and Tukajee Holkar entered Hindustan proper with their armies, for the purpose of expelling the Sikhs, who had invaded the emperor's territories. This was soon accomplished; and on the death of Nujeeb ud Dowlah in 1771, Madhajee Sindia obtained possession of Delhi, whither he invited Shah Alim to return from Allahabad, where he had been living under the protection of the British since 1755. In December the same year the emperor was crowned with great pomp in his capital. He was not however the less in subjection. Madhajee compelled him to sign a commission by which he appointed the Paishwa vicegerent of the empire: and the Paishwa, by a like commission, appointed Madhajee his deputy.

In 1772, and again in 1773, with his two colleagues Bassajee and Holkar, Sindia invaded and ravaged Rohilcund, and was preparing to cross the Ganges, when the murder of the young Paishwa Narrain Row, the usurpation of the office by his uncle Ragoba, and the appearance of the British and the nabob of Oude, who had been invited to assist the Rohillas, caused him to return to Poona. A confederation of Mahratta chiefs was got up against Ragoba, who, after a reign of a few months, was compelled to fly. Sevajee Madhoo, the posthumous son of Narrain Row, was appointed Paishwa, and Ballajee Pundit, better known as Nana Furnavese, was elected dewan, or minister. The British, on the condition of his ceding to them certain territories, came to the assistance of Ragoba, which occasioned a war between them and the Mahrattas. This war, twice interrupted by treaties which were not completed, continued till 1782, when the treaty of Salbhye was concluded, by which Madhajee Sindia was confirmed in all his possessions, the places taken from him by the British were restored, and he was recognised by them as an independent prince.

Madhajee Sindia had now time and opportunity to prosecute his plans of aggrandisement. In 1785 he again appeared at Delhi, and by the murder of two of the imperial ministers once more got the emperor into his power; he also conquered Agra and Alyghur, and obtained possession of nearly the whole of the Doab About this time he engaged in his service a Frenchman, De Boigne, who became of the most essential service to him; for by his assistance he formed an army consisting of troops regularly disciplined; he fought pitched battles, besieged fortresses previously deemed impregnable, gradually subjected raja after raja to contribution, and added district after district to his possessions, till he became master of nearly all the territory southwest from the banks of the Ganges to the Nerbudda. The battle of Meerta, gained by De Boigne in 1790 over the collected forces of Joudpoor, had made Sindia master of that principality, as well as of the weaker state of Odeypoor; to these conquests was added soon after that of Jypoor, which was followed in 1792 by the defeat of the troops of Junkajee Holkar, when four corps of regular infantry belonging to Holkar's army, which were commanded by a French officer, were almost utterly destroyed Sindia himself had returned to Poona in 1791, where he died in 1794.

Madhajee Sindia's life was one of incessant activity; he was engaged in a series of contests in which he displayed great talent and untiring energy, and by which his power and possessions were gradually extended, consolidated, and confirmed. His habits throughout the whole of his career were those of a plain soldier; he was never seduced by luxury, and he despised the trappings of state. Though occasionally guilty of violence and oppression, his life was for the most part unstained by cruelty; his disposition was mild, and he was desirous of improving the countries which he conquered. Towards the British and those states which were unconnected with the Mahratta government he conducted himself as an independent prince, but in matters relating to the Paishwa he paid the most scrupulous attention to all the forms of humility, of which he made a curious display when Sevajee Madhoo Row, at the termination of his minority in 1791, entered upon the duties of his office, and Sindia came to Poona to pay his respects to him. Sir John Malcolm thus relates it: 'The actual sovereign of Hindustan from the Sutleje to Agra, the conqueror of the princes of Rajpootana, the commander of an army composed of sixteen battalions of regular infantry, 500 pieces of cannon, and 100,000 horse, the possessor of two thirds of Malwa, and some of the finest provinces in the Deckan, when he went to pay his respects to a youth who then held the office of Paishwa, dismounted from his elephant at the gates of Poona; placed himself in the great hall of audience below all the mankarries, or hereditary nobles of the state, and when the Paishwa came into the room, and desired him to be seated with others, he objected on the ground of being unworthy of the honour, and, untying a bundle that he carried under his arm, produced a pair of slippers, which he placed before Madhoo Row, saying, 'This is my occupation; it was that of my father.' Madhajee, at the moment he said this, took the old slippers the Paishwa had in use, which he wrapped up carefully, and continued to hold them under his arm; after which, though with apparent reluctance, he allowed himself to be prevailed upon to sit down. It has been supposed that by this affected humility he aimed at obtaining the situation of dewan to the Paishwa; if such however was his object, he was frustrated in it, for Nana Furnavese still retained it.

Madhajee Sindia had no sons. His brother Tukajee had three, of whom the youngest, Anund Row, became the favourite of his uncle, who adopted Dowlut Row Sindia, the son of Anund Row, as his heir.

DOWLUT ROW SINDIA, at the death of his grand-uncle, was only thirteen years of age. He was opposed by the widows of Madhajee, who set up another prince in opposition to him, and he was not established in his power till after several battles had been fought. He married, soon after his accession, the daughter of Sirjee Row Gatkia, an artful and wicked man, who became his minister, to whom is doubtless to be ascribed much of the rapacity and cruelty which marked the early part of Dowlut Row's reign. The seizure and imprisonment of Nana Furnavese, the murder of several Brahmins, the plundering of Poona and the neighbouring places under pretence of paying the expenses of his marriage; and the aiding of Casee Row Holkar in the murder of his brother Mulhar Row, are among his early atrocities; in addition to which it should be mentioned, that when Sirjee Row Gatkia defeated Jeswunt Row Holkar in 1801, he plundered the city of Indore, set fire to the best houses, and murdered many of the inhabitants; in 1802 however Holkar defeated Sindia, and re-established himself in Malwa. But the interference of the British at length put a stop to this career of spoliation and bloodshed. The Paishwa Bajerow, having been defeated by Jeswunt Row Holkar in 1802, fled to Bassein, and placed himself under the protection of the British, by a treaty, the chief conditions of which were, that he should cede to them the island of Salsette, and they should restore him to the office of Paishwa. After many fruitless negociations with Sindia and the Raja of Berar, the British resident left the court of Sindia, August 3, 1803, and war was commenced on the 8th by an attack on the fortress of Ahmednugghur by Major-General Wellesley, which he soon took, and followed up on the 25th of September, 1803, by the battle of Assaye, when he gained a complete victory over the confederated forces of Sindia and the Raja of Berar, which were under the command of the French general Péron, and greatly more numerous than his own. In Hindustan Proper, General Lake, on the 29th of August, 1803, defeated Sindia's forces in the Doab, took the strong fort of Alyghur, and afterwards the cities of Delhi and Agra. In the short period of five months was included a series of the most brilliant and decisive victories; the battles of Delhi and Laswaree, of Assaye and Arghaum, the reduction of the strong forts of Ahmednugghur, Alyghur, Agra, Gwalior, Asserghur, and Cuttack, besides a number of inferior conquests. The two Mahratta chiefs were compelled to sue for peace separately. Sindia's brigades, which had been trained under De Boigne and Péron, and which amounted to at least 40,000 well-disciplined infantry, were destroyed; 500 guns, cast in the foundries which Madhajee had established, were taken; and by the treaty of December, 1803, he was compelled to cede to the British the Upper Doab, Delhi, Agra, Saharunpoor, Meerut, Alyghur, Etawah, Cuttack, Balasore, the fort and territory of Baroach, &c., amounting altogether to more than 50,000 square miles. By a treaty of defensive alliance, February 27, 1804, he engaged to receive a British auxiliary force in those dominions which he was suffered to retain, which were still large, and which were considerably increased, after the subjugation of Holkar, by the territory of Gohud and the strong fort of Gwalior, which were given up to him by the treaty of Muttra, November 23, 1805, one of the conditions of which treaty was, that his father-in-law Sirjee Row Gatkia should be for ever excluded from his councils.

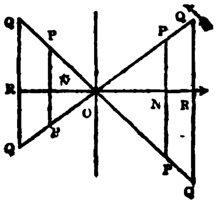
Dowlut Row Sindia, though he retained for a considerable time no friendly feeling towards his British alllies, by whom he had been so severely humbled, never again ventured into a direct contest with them; and after he was freed from the influence of his father-in-law, he became by degrees better disposed towards them; so that in the war of 1818, by which the Mahratta power was entirely destroyed, he prudently kept aloof, though the Paishwa urgently called upon him for his assistance. The consequence was that he retained his territories, and continued on friendly terms with the British till his death, which took place March 21, 1827. He left an army of about 14,000 infantry, 10,000 cavalry, and 250 pieces of ordnance, with territories worth about 1,250,000*l.* per annum.

Janko Row Sindia, the present Raja of Gwalior, was elected by the widow of Dowlut Row, Baiza Bai. She was expelled from his territories in 1833 by Janko Row, who is now (1841) about 19 years of age.

(Malcolm's *Political History of India*; Malcolm's *Central India*; Mill's *British India*; *Biographie Universelle*; *Art de vérifier les Dates*.)

SINE and COSINE. We separate from the article Trigonometry the mere description and properties of these fundamental terms, which, though originally derived from simple trigonometry, are now among the most useful foundations of mathematical expression. For what we have to say on their history, we refer to the article just cited.

According to the antient system of trigonometry, the sine and cosine are only names given to the abscissa and ordinate of a point, not with reference to the position of that point in space, but to the radius vector of that point and its angle. Thus, measuring angles from the line ON, and in the direction of the arrow, the angle NOP has an infinite number of sines and cosines. With reference to the *radius* OP, PN is the sine and ON the cosine of ∠NOP; but with reference to the radius OQ, QR is the sine and OR the cosine. The fundamental relation



$$(\text{sine }\theta)^2 + (\text{cosine }\theta)^2 = (\text{radius})^2$$

is obvious enough.

The student always began trigonometry with this multiplicity of definitions, and with the idea of some particular radius being necessary to the complete definition of the sine and cosine. But as he proceeded, he was always taught to suppose the radius a unit; that is, always to adopt that line as a radius which was agreed upon to be represented by 1. Hence he gradually learned to forget his first definition; and, passing from geometry to arithmetic, to use the following: PO being unity, the sine of NOP is PN, which is therefore in arithmetic the fraction which PN is of PO; and the cosine is the fraction which ON is of PO. If QO had been used as a unit, the result would have been the same; for by similar triangles, RQ is the same fraction of QO which NP is of PO.

In the most modern trigonometry, and for cogent reasons, the student is never for a moment allowed to imagine that the sine and cosine are in any manner representatives of lines. In a practical point of view, the final definition of the old trigonometry coincides exactly with that of the new; but the latter has this advantage, that all subsequent geometrical formulæ are seen to be homogeneous in a much more distinct manner. The definition is this: The sine of NOP is not NP, nor any number to represent NP; it is the fraction which NP is of PO, considered as an abstract number. Thus if ON, NP, PO, be in the proportion of 3, 4, and 5, PN is $\frac{4}{5}$ of OP: this $\frac{4}{5}$ is the sine of NOP, not $\frac{4}{5}$ of any line, nor any line considered as $\frac{4}{5}$ of a unit; but simply $\frac{4}{5}$, four-fifths of an abstract unit. Similarly the cosine is the fraction which ON is of OP. In just the same manner the abstract number π, or 3·14159.... is not styled (as it used to be) the circumference of a circle whose diameter is a unit, but the proportion of the circumference to the diameter, the number of times which *any* circumference contains its diameter. We cannot too strongly recommend the universal adoption of this change of style, a slight matter with reference to mere calculation of results, but one of considerable importance to a correct understanding of the meaning of formulæ.

The line OP being considered as positive [Sign], the signs of PN and NO determine those of the sine and cosine; and the manner in which the values of these functions are determined when the angle is nothing, or one, two, or three right angles, is easy enough. The following short table embraces all the results of sign:—

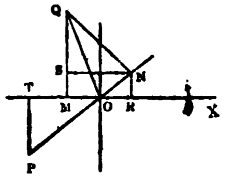
$$\begin{array}{lccccccccc} & \text{O} & & \text{I} & & \text{II} & & \text{III} & & \text{IV} \\ \text{Sine} & 0 & + & 1 & + & 0 & - & 1 & - & 0 \\ \text{Cosine} & 1 & + & 0 & - & 1 & - & 0 & + & 1. \end{array}$$

Read this as follows:—When the angle $=0$, the sine $=0$, from thence to a right angle the sine is positive: at the right angle the sine is $+1$; from thence to two right angles the sine is positive, &c.

The fundamental theorems of the sine and cosine, from which all their properties may be derived, are,

$$\sin(a+b) = \sin a \cos b + \cos a \sin b$$
$$\sin(a-b) = \sin a \cos b - \cos a \sin b$$
$$\cos(a+b) = \cos a \cos b - \sin a \sin b$$
$$\cos(a-b) = \cos a \cos b + \sin a \sin b$$

all which theorems are in fact contained in any one of them, as soon as that one is shown to be universally true. It frequently happens however that the student is allowed to assume the universal truth of these theorems upon too slight a foundation of previous proof: drawing a figure for instance in which both angles are less than a right angle. We give, as an instance, the proof of the first formula when both angles are greater than two right angles. Let XOP $=a$, POQ $=b$, both angles being measured in the direction of revolution indicated by the arrow. The sum is four right angles + XOQ, which has the same sine and cosine as



XOQ. From any point Q in OQ draw perpendiculars on OX and OP, and complete the figure as shown. Then $\sin(a+b)$ is positive, and is the fraction which QM is of QO, or QM : QO; QM and QO being expressed in numbers. But

$$\frac{QM}{QO}=\frac{QS}{QO}+\frac{NR}{QO}=\frac{QS}{QN}\,\frac{QN}{QO}+\frac{NR}{NO}\,\frac{NO}{QO}$$

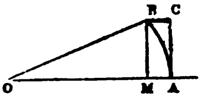
$$\text{By similar triangles }=\frac{OT}{PO}\,\frac{QN}{QO}+\frac{PT}{PO}\,\frac{NO}{QO}.$$

Now, remembering the magnitudes of a and b, and the rule of signs established, we have

$$\sin a=-\frac{PT}{PO},\ \cos a=-\frac{OT}{PO},\ \sin b=-\frac{QN}{QO},$$
$$\cos b=-\frac{NO}{QO};$$

and substitution immediately gives the first formula. We shall not here dwell on the minor consequences of these formulæ, but shall refer to the collection in TRIGONOMETRY.

The connection of the sine and angle depends in great part upon the following theorem:—if x may be made as small as we please, $\sin x : x$ may be made as near to unity as we please. Observe that this theorem, supposes the angle x to be measured by the theoretical unit [ANGLE], or the angle 1 to be the angle of which the arc and radius are equal. The proof depends upon the assumption that in the adjoining obvious figure the arc AB is less than its containing contour AC + CB. If the radius OB be r, we see that x must be arc AB : r, or AB $=rx$. Also BM $=r\sin x$, BC $=$ AM $=r-r\cos x$, by definition. Now the arc AB is greater than BM, and less than BM + MA, or rx lies between $r\sin x$ and $r\sin x+r-r\cos x$, or x lies between $\sin x$ and $\sin x+1-\cos x$;



$$\text{or between }\sin x\text{ and }\sin x+\frac{\sin^2 x}{1+\cos x};$$

$$\text{whence }\frac{x}{\sin x}\text{ lies between 1 and }1+\frac{\sin x}{1+\cos x}.$$

Hence, x diminishing without limit, the difference between 1 and $x:\sin x$ diminishes without limit, and therefore that between 1 and $\sin x : x$ which was to be proved. From hence it follows that $1-\cos x$ and $\frac{1}{2}x^2$ approach to a ratio of equality, as may be readily proved from the equation

$$1-\cos x=\frac{x^2}{2}.\left(\frac{\sin x}{x}\right)^2\frac{2}{1+\cos x}$$

in which the second and third factors have unity for their limit. Hence then, when x is very small, x and $1-\frac{1}{2}x^2$ are very near representatives of the sine and cosine; and the goodness of the representation may be increased to any extent by diminishing x.

The complete theory of the sine and cosine, from and after the two theorems just established, depends upon the introduction of the square root of the negative quantity. If we take ordinary algebra only [as in NEGATIVE, &c. QUANTITIES, p. 134, col. 2], in which the impossible quantity is unexplained, we have the most common mode of proceeding. The explanations afterwards given would make this theory the most simple imaginable, to a student who had learned algebra from the beginning in the manner pointed out. To take the middle course, let us assume the rules of algebra [OPERATION] independently of the meanings of the symbols. Let $\sin x$ and $\cos x$ be defined as 'such functions of x that $\sin(x+y)$ gives $\sin x.\cos y+\cos x.\sin y$, and $\cos(x+y)=\cos x.\cos y-\sin x.\sin y$.' Observe that we do not in thus defining say there *are* such functions; we only say, *if there be* such, let them have these names. Then, as in NEGATIVE, &c. cited above, we see that if $\phi x=\cos x+\sqrt{-1}.\sin x$, the relation $\phi(x+y)=\phi x\times\phi y$ follows; whence [BINOMIAL THEOREM] ϕx can be nothing but K^x, where K is independent of x. Let $x=1$, whence $\phi(1)=K$, or we have

$$\cos x+\sqrt{-1}.\sin x=(\cos 1+\sqrt{-1}.\sin 1)^x\ \ldots\ (1)$$

and similarly it is shown that

$$\cos x-\sqrt{-1}.\sin x=(\cos 1-\sqrt{-1}.\sin 1)_x\ \ldots\ (2).$$

From these we get, by multiplication,

$$\cos^2 x+\sin^2 x=(\cos^2 1+\sin^2 1)^x:\ (3)$$

if it be possible, let $\cos^2 1+\sin^2 1=1$, then $\cos^2 x+\sin^2 x$ is always $=1$, or at least [ROOT] we may always take one pair of forms satisfying this condition. Hence, making $\cos 1+\sqrt{-1}.\sin 1=e$, we have $\cos 1-\sqrt{-1}.\sin 1=e^{-1}$, and the two equations give

$$\cos x=\frac{e^x+e^{-x}}{2}\ \sin x=\frac{e^x-e^{-x}}{2\sqrt{-1}}\ (4)$$

which will be found to satisfy all the conditions used in defining them, namely,

$$\frac{e^{x+y}+e^{-x-y}}{2}=\frac{e^x+e^{-x}}{2}\,\frac{e^y+e^{-y}}{2}-\frac{e^x-e^{-x}}{2\sqrt{-1}}\,\frac{e^y-e^{-y}}{2\sqrt{-1}}.$$

$$\frac{e^{x+y}-e^{-x-y}}{2\sqrt{-1}}=\frac{e^x-e^{-x}}{2\sqrt{-1}}\,\frac{e^y+e^{-y}}{2}+\frac{e^x+e^{-x}}{2}\,\frac{e^y-e^{-y}}{2\sqrt{-1}}$$

$$\left(\frac{e^x+e^{-x}}{2}\right)^2+\left(\frac{e^x-e^{-x}}{2\sqrt{-1}}\right)^2=1$$

To determine what algebraical formula e must be, take the universal formula

$$e^x=1+\log e.x+(\log e)^2\frac{x^2}{2}+(\log e)^3\frac{x^3}{2.3}+\ldots$$

whence we easily get from (4)

$$\sin x=\frac{\log e}{\sqrt{-1}}.x+\frac{(\log e)^3}{\sqrt{-1}}\,\frac{x^3}{2.3}+\frac{(\log e)^5}{\sqrt{-1}}\,\frac{x^5}{2.3.4.5}+\ldots..$$

$$\cos x=\qquad 1+(\log e)^2\frac{x^2}{2}+(\log e)^4\frac{x^4}{2.3.4}+\ldots..$$

Now e, as far as our definitions have yet extended, is wholly undetermined, every value of e being applicable. Let us add to our conditions that $\sin x : x$ shall approach to unity as x is diminished without limit: but $\sin x : x$ approaches to $\log e:\sqrt{-1}$; therefore $\log e=\sqrt{-1}$, or $e=\varepsilon^{\sqrt{-1}}$.

The preceding is purely symbolical; we merely ask how are previous symbols, used under certain laws, to be put together so as to represent certain new symbols which are to have certain properties. Let us now take the real geometrical meaning of $\sin x$ and $\cos x$, and the complete system of algebra, in which $\sqrt{-1}$ is explained [NEGATIVE, &c. QUANTITIES]. In that system, if a line equal to the unit-line be inclined to it at an angle x, it is obviously represented by $\cos x+\sqrt{-1}.\sin x$, and any power of it, whole or fractional, can be obtained by changing x into mx so that

$$\cos mx+\sqrt{-1}.\sin mx=(\cos x+\sqrt{-1}.\sin x)^m$$

is an immediate consequence of definition; and making $x=1$, the equation

$$\cos m+\sqrt{-1}.\sin m=(\cos 1+\sqrt{-1}.\sin 1)^m$$

follows at once. To prove that $\varepsilon^{\sqrt{-1}}$ and $\cos 1+\sqrt{-1}.\sin 1$ are identical, in the most logical manner, requires a previous definition of an exponential quantity, in a sense so general, that exponents of the form $a+b\sqrt{-1}$ shall be included: without this, the new algebra just referred to is not free from the results of INTERPRETATION.

However we may proceed, the series above given for the sine and cosine of x become

$$\sin x = x - \frac{x^3}{2.3} + \frac{x^5}{2.3.4.5} - \frac{x^7}{2.3.4.5.6.7} + \dots$$

$$\cos x = 1 - \frac{x^2}{2} + \frac{x^4}{2.3.4} - \frac{x^6}{2.3.4.5.6} + \dots$$

and these series are always convergent. Their present form depends entirely on the unit chosen; if however by x we mean x°, x', or x'', we must write

$$\sin x = ax - \frac{a^3 x^3}{2.3} + \frac{a^5 x^5}{2.3.4.5} - \dots .$$

$$\cos x = 1 - \frac{a^2 x^2}{2} + \frac{a^4 x^4}{2.3.4} - \dots .$$

where [ANGLE, p. 23] a is ·01745,32925…., ·00029,08882,…., ·00000,48481,…. according as x means a number of degrees, of minutes, or of seconds.

The preceding is enough on the fundamental meanings of these terms, and on their connection with algebra. Some applications will be seen in TRIGONOMETRY.

SINE and COSINE, CURVES OF. By the curve of sines is meant that which has the equation $y = \sin x$, and by the curve of cosines, that which has the equation $y = \cos x$: it being understood that x stands for as many angular units as there are linear units in the abscissa. The undulatory forms of these curves are easily established· and if the ordinate of a curve consist of several of them, as in $y = a \sin x + b \cos x + c \sin 2x$, the several parts of the compound ordinate may be put together in the same manner as that in which the simple undulations are compounded in ACOUSTICS, p. 92. Except as expressing the most simple form of undulating curves, these equations are of no particular use in geometry.

SINE-CURE. Sine-cures are ecclesiastical benefices without cure of souls, and are of three sorts:—1. Where the benefice is a donative [BENEFICE, p. 220], and is committed to the incumbent by the patron expressly without cure of souls, the cure either not existing or being entrusted to a vicar; this is the strictest sine-cure. 2. Certain cathedral offices, viz. the canonries and prebends, and, according to some authorities, the deanery. 3. Where a parish is destitute, by some accident, of parishioners; this last kind has been called depopulations, rather than sine-cures.

Rectors of a parish in which vicars were likewise established with cure of souls have often by degrees exempted themselves from their ecclesiastical functions, and so have obtained sine-cures; but this is rather by abuse than legitimately.

Sine-cures are exempt from the statute of pluralities. (Burn's *Ecclesiastical Law.*)

SINEW. [TENDON.]

SINGAPORE is a British settlement in the East Indies, situated at the most southern extremity of the Malay Peninsula. It consists of the island of Singapore, and about fifty islets dispersed in the sea south and east of the principal island, or in what is called the Straits of Singapore. The territories of this settlement embrace a circumference of about a hundred miles, including the seas and straits within ten miles of the coast of the island of Singapore, and they lie between 1° 8′ and 1° 32′ N. lat., and between 103° 30′ and 104° 10′ E. long.

The island of Singapore occupies about half the space between the two capes with which the Malay Peninsula terminates on the south, Capes Buru and Ramúnia (commonly called Romania). It has an elliptical form, and is about 25 miles in its greatest length from east to west, and 15 in its greatest width. It contains an estimated area of about 275 square miles, and is about one-third larger than the Isle of Wight. It is divided from the continent of Asia by a long and narrow strait called Salat Tabrao, or the old strait of Singapore. This strait is nearly forty miles long, and varies in width between two miles and a quarter of a mile. At its western extremity, near the island of Marambong, it has only a depth of 2½ fathoms, but farther east it is nowhere less than five fathoms deep. This strait was formerly navigated by vessels bound for the China Seas; but the advantages which the Straits of Singapore offer for a speedy and safe navigation are so great, that the Salat Tabrao has not been used since the Straits of Singapore have become known. The last-mentioned strait extends along the southern coast of the island of Singapore, and the most navigable part lies within the British possessions. It is the high road between the eastern and western portions of maritime Asia.

The surface of the island is gently undulating, here and there rising into low rounded hills of inconsiderable elevation. The higher ground rises in general not more than a hundred feet above the sea; the highest hill, called Bukit Tima, which is north-west of the town, but nearer the northern than the southern shores of the island, does not attain 200 feet. The shores of the island are mostly low, and surrounded by mangrove-trees. In a few isolated places low rocks approach the sea, chiefly along the Salat Tabrao. In several places however the coast is indented by salt creeks, which sometimes penetrate into the land three and even five or six miles. When the island was first occupied by the British it was entirely, and is still for the greater part, covered with a forest composed of different kinds of trees, five or six of which are well adapted for every object of house-building. The soil of the interior is composed of sand and of clay iron-stone, mixed up with a large portion of vegetable matter, which gives it a very black appearance. There is a general tendency to the formation of swamps. Rivulets are numerous, but they are of inconsiderable size. Their waters are almost always of a black colour, disagreeable taste, and peculiar odour, properties which they appear to derive from the peculiar nature of the superficial soil over which they pass, which in many parts resembles peat-moss. The water however drawn from wells which are sunk lower than the sandy base is less sensibly marked by these disagreeable qualities.

The climate of Singapore is hot, but equable, the seasons varying very little. The atmosphere throughout the year is serene. The smooth expanse of the sea is scarcely ruffled by a wind. The destructive typhons of the China Sea, and the scarely less furious tempests which occur on the coasts of Hindustan, are not known. The tempests of the China Sea however sometimes occasion a considerable swell in the sea, and a similar but less remarkable effect is produced by a tempest in the Bay of Bengal. It is only in this way, and as it were by propagation, that the sea is affected by remote tempests, and their effects are particularly remarkable in the irregularity of the tides, which at times run in one direction for several days successively, and with great rapidity. In the numerous narrow channels which divide the smaller islands, their rapidity is sometimes so great that it resembles water issuing through a sluice. The regular and periodical influence of the monsoons is slightly felt, the winds partaking more of the nature of land and sea breezes. To these circumstances must be attributed the great uniformity of the temperature, the absence of a proper continual and periodical rainy season, and the more frequent fall of showers. Few days elapse without the occurrence of rain. According to an average of four years, the number of rainy days was 185, and that of dry only 180. The greatest quantity of rain falls in December and January, and the smallest in April and May. These frequent rains keep the island in a state of perpetual verdure.

The thermometer ranges during the year between 72° and 88°. The mean annual temperature is 80·7° of Fahrenheit. In the four months succeeding February it rises to 82·50°, and in the four months succeeding October it sinks to 79°. The daily range of the thermometer never exceeds ten degrees. Crawfurd states that the climate of Singapore is remarkably healthy, which he attributes to the free ventilation that prevails, and to the almost entire absence of chilling land-winds, but Newbold thinks that it is not so healthy as Malacca, and he ascribes this to the less regular alternations of the land and sea breezes.

Singapore is not rich in agricultural productions. No part of it was cultivated when the British took possession of the place, and at first the soil was considered ill adapted for agricultural purposes. But it now appears that considerable tracts near the town have been cleared by the Chinese, and that this industrious people have succeeded in cultivating different kinds of fruits and vegetables, rice, coffee, sugar, cotton, and especially pepper and the betel-vine (*Piper siriboa*). Only the summits of the higher grounds are barren, but on their slopes and in the depressions between them the soil frequently has a considerable degree of fertility. Tropical fruits succeed very well, such as the mangusteen, pine-apple, cocoa-nut, orange, and mango. The mango is found wild in the forests. The tropical vegetables, as the egg-plant, different kinds of pulse, the yam, the batata, different varieties of cucumber, and some others, grow very well, but the climate is too hot for most European vegetables. The produce of the paddy-fields, as well as of the orchards, is far from being sufficient for home consumption, and accordingly large quantities of rice are imported from Sumatra and Java, and fruits from Malacca.

The animals of Europe have been introduced, but most of them are few in number, as pasture-grounds are scarce. The Chinese however keep a great number of hogs. None of the large quadrupeds of the continent of Asia, such as elephants, rhinoceroses, tigers, and leopards, are met with on the island, but there are several kinds of monkeys, bats, and squirrels; also the *Ictides*, the porcupine, the sloth (*Bradypus didactylus*), the pangolin, the wild hog, and two species of deer, the *Moschus pygmaeus*, which is smaller than an English hare, and the Indian roe (*Cervus munjac*). Sometimes the dugong (*Halicora dugong*) is taken in the straits. It is ten or twelve feet long, and the flesh is considered for flavour and delicacy not inferior to beef: the skin is as strong as that of the hippopotamus. Birds are numerous, especially different kinds of passeres, climbers, and waders, particularly the first, which are remarkable for their novelty and beauty. Tortoises are common. The coral reefs and shoals in the vicinity of Singapore furnish that delicate fern-like sea-weed called aggar-aggar (*Fucus Saccharinus*) in abundance, and it forms an article of considerable export to China, where it is used in thin glues and varnishes. It is made into a very fine jelly by Europeans and the native Portuguese. The average annual produce is 6000 peculs, or 7980 cwt., and it is sold at three dollars the pecul.

In 1819, when the British took possession of the islands, the population amounted to about 150 individuals, mostly fishermen and pirates, who lived in a few miserable huts; about thirty of these were Chinese, the remainder Malays. The first census was taken in 1824, and then the population amounted to 10,683 individuals. Since that period it has constantly been increasing, and at the census of 1836 it was found to amount to 29,984 individuals. More than half of the population were settled in the town of Singapore, which contained 16,148 individuals, of whom there were 12,748 males and 3400 females. West of the town only a few settlements occur along the southern shores of the island, and on some of the small islands near the coast. These settlements constitute the district of Singapore town, and contained in 1836 only 4184 individuals, viz. 2338 Chinese, of whom forty-one only were females, and 1755 Malays, of whom 759 were females; and the remainder, with a trifling exception, Klings and Bugis. The country east of the town, which is named the District of Kampong Glam, contains a greater number of settlements, and they extend to the shores of the Salat Tabrao, and the islands of Tekong and Pulo Ubin, which lie within the strait. In this district there were 9652 individuals, viz. 4288 Malays, of whom 2050 were females; 3178 Chinese, of whom 72 only were females; 1515 Bugis, of whom 672 were females; and the remainder 671 were made up of Javanese, Balinese, and a few Bengalees and Klings. The islands of Tekong and Ubin contained 1901 inhabitants.

The population is composed of nearly all the nations of Southern Asia and the Indian Archipelago, among whom a small number of individuals of European origin have settled, as appears from the following table, which also shows the increase of the population in two years, and the disproportion between males and females:—

Population of the Island of Singapore in 1834 *and* 1836.

Nations constituting the Population.	1834.		1836.	
	Males.	Females.	Males.	Females.
Europeans, nearly all Britons . .	100	38	105	36
Indo-Britons . .	55	58	65	52
Native Christians, mostly Portuguese .	186	140	224	201
Armenians . .	32	12	26	8
Jews . . .	6		4	
Arabs . . .	55	11	33	8
Malays . . .	5,173	4,279	5,122	4,510
Chinese . . .	9,944	823	12,870	879
Natives of the Coast of Coromandel, Chuliahs, and Klings (Telingas) . .	1,659	69	2,246	102
Natives of Hindustan	439	155	427	155
Javanese . .	400	269	580	323
Bugis and Balinese .	1,346	1,018	1,032	930
Caffres . . .	37	25	17	24
Siamese . . .	..	..	2	1
Parsees . .	..	..	2	..
	19,432	6,897	22,755	7,229

These censuses do not include the military, their followers, nor the convicts, as Singapore is a place of banishment from Calcutta and other parts of Hindustan. The number of these classes of inhabitants may be estimated at about 1200. The Europeans and Chinese constitute the wealthier classes. The Europeans are for the most part merchants, shopkeepers, and agents for mercantile houses in Europe. Most of the artisans, labourers, agriculturists, and shopkeepers are Chinese. The Malays are chiefly occupied in fishing, collecting sea-weed, and cutting timber, and many of them are employed as boatmen and sailors. The Bugis are almost invariably engaged in commerce, and the natives of India as petty shopkeepers, boatmen, and servants. The Chuliahs and Klings are daily labourers, artisans, and petty traders. The Caffres are the descendants of slaves, who have been brought by the Arabs from the Arabian and Abyssinian coasts. The most useful are the Chinese settlers. A common Chinese labourer gets from four to six Spanish dollars a month, a Kling from three to four and a half, and a Malay from two and a half to four and a half. A Chinese carpenter will earn about fifteen dollars a month, a Kling eight, and a Malay only five. The immigration of the Chinese is much favoured by circumstances. Among the dense population of China there are many paupers, who are a burden to the state, and the government connives at the poorer classes quitting the country, though it is contrary to their antient laws. The poor Chinese leaves his country without a penny, and agrees with the captain of the junk to pay from eight to twelve dollars for the passage. On landing he enters into one of the secret societies, which are always formed by the Chinese, and the society pays the passage-money and engages his services. In three months he has generally paid his debt, and then he begins to make his fortune. The Chinese emigrants at Singapore and Penang are mostly from Canton, Macao, or Fokien. Many of those of Fokien become merchants, and show a strong propensity to speculate largely. The Canton emigrants are the best miners and artisans.

It is very probable that the population of the settlement now (1841) amounts to more than 36,000 individuals, which gives more than 130 individuals to a square mile, which is a considerable population even in a country that has been settled for centuries, and is certainly a very surprising population in a country which twenty years ago was a desert.

The town of Singapore stands on the southern shores of the island, in 1° 17′ 22″ N. lat. and 103° 51′ 45″ E. long., on a level and low plain of inconsiderable width, fronting the harbour. It extends about two miles along the shore, but only a thousand yards inland, where it is enclosed by hills from 100 to 150 feet high. The commercial portion of the town occupies the most western extremity, and is separated from the other parts by a salt creek, called the Singapore river, which is navigable for small craft. A good wooden bridge connects it with the eastern part, which contains the dwellings of the Europeans, the public offices, and the military cantonments. Contiguous to this portion of the town is the government-house, which is built on a hill. The most eastern part is occupied by the sultan of Johore, the Malays, and Bugis. The whole of the warehouses, and all the dwelling-houses in the principal streets in their vicinity, are built of brick and lime, and roofed with red tiles. The more distant dwelling-houses are built of wood, but roofed with tiles. It is only on the distant outskirts of the town that there are huts with thatched roofs. The Malays and Bugis live in huts. The population (16,148 individuals) consisted, in 1836, of 8233 Chinese, 3617 Malays, 2157 Chuliahs and Klings, and the remainder was made up by Javanese, Bengalees, Bugis, native Christians, and Europeans. Ships lie in the roads of Singapore at the distance of from one to two miles from the town, according to their draught. With the assistance of lighters, cargoes are discharged and taken in with scarcely any interruption throughout the year, The lighters convey the goods to the river of Singapore, where they discharge them at a convenient quay, and at the door of the principal warehouses. There is no want of common artisans. The Chinese follow the occupations of shoemakers, bakers, butchers, blacksmiths, gunsmiths, goldsmiths, and carpenters; they also manufacture pearl sago on an extensive scale, for the European market, the material being obtained from the island of Sumatra. They also employ a great number of forges, in which native arms and domestic and agricultural implements are made. These latter articles are mostly sent to the settlements of the Chinese on the different islands of the Indian Archipelago.

The principal public buildings at Singapore are the government-house, a court-house, a gaol, custom-house, Mission chapel, and the Singapore Institution. Sir Stamford Raffles formed a very extensive plan for this institution, which however has not been carried into effect. At present t consists of three schools, English, Malay, and Tamul, and the number of scholars amounts to upwards of seventy. A Chinese school on a large scale was contemplated in 1837, and has probably been opened. Some Chinese youths are to be admitted as students, to reside at the institution, and to receive instruction both in English and Chinese for a term of four or five years. There are several native schools in the town.

If the commerce of Singapore were limited to the produce of the place, it would hardly give employment to two or three vessels. Besides the pearl sago and the iron implements, it exports only a small quantity of pepper and gambier, and perhaps at present coffee of its own growth, together with a large quantity of aggar-aggar. But Singapore has become the London of Southern Asia and the Indian Archipelago. All the nations that inhabit the countries bordering on the Indian Ocean resort to it with the produce of their agriculture and manufacturing industry, and take in exchange such goods as are not grown or produced in their own countries. All of them find there a ready market, which at the same time is well stocked with European goods. This effect has partly been produced by the wise policy of declaring the harbour of Singapore a free port, in which no export or import duties, nor any anchorage, harbour, nor lighthouse fees are levied. The effect of this policy was evident even at the beginning of the settlement. In the first year the exports and imports by native boats alone exceeded four millions of dollars, and during the first year and a half no less than 2889 vessels entered and cleared from the port, of which 383 were owned and commanded by Europeans, and 2506 by natives · their united tonnage amounted to 161,000 tons. In 1822 the tonnage amounted to 130,689 tons, and the total value of exports and imports to upwards of eight millions of dollars.

Number and tonnage of square-rigged vessels which entered into and cleared at the port of Singapore in 1835 *and* 1836.

Names of Places from and to.	INWARD.				OUTWARD.			
	1835.		1836.		1835.		1836.	
	No.	Tonnage	No.	Tonnage	No.	Tonnage	No.	Tonnage
Great Britain . .	16	5316	19	5596	32	9432	25	7210
Continental Europe	3	961	3	836	6	1525	7	1794
America	8	894	2	709	1	450	7	2147
Mauritius . . .	1	498	1	150	2	506	2	506
Bourbon	1	120	1	296	1	120	1	214
China	62	29,351	88	40,582	127	61,302	134	66,023
Manilla	22	5668	27	6379	14	2754	13	1834
Calcutta . . .	79	30,963	87	38,013	54	18,108	53	17,131
Madras and Coast	13	4079	18	10,237	8	2513	10	5771
Bombay and Coast	45	26,770	31	15,081	28	16,319	34	18,704
Arabia	1	448	1	254	3	904	5	1378
Moulmein . . .	1	203	3	300	3	510	7	2214
Ceylon	5	1021	4	665	2	550	2	147
Malacca	54	6535	53	5812	33	8945	52	5390
Penang	47	7703	57	10,157	62	7618	54	8566
Java	89	19,013	78	16,677	75	17,025	52	11,082
Sumatra . . .	15	2652	14	3417	17	3439	12	2759
Rhio	10	2409	8	304	16	3219	12	2009
Siam	6	1984	9	3050	6	1683	8	2862
Cochin China . .	5	1662	4	997	1	250	6	1636
New South Wales	9	2737	6	1657	2	357	2	394
Cape of Good Hope							1	218
Borneo	17	3013	13	2484	15	2215	17	2683
Tringanu and the other neighbouring ports	6	988	7	646	8	825	6	648
Bally and Eastern Islands	7	1423	10	1764	1	405	11	2047
"	517	156,513	539	166,053	517	155,974	533	165,417

According to this statement the number of vessels which entered the port in 1836 exceeded the number in 1835 by 22, and by 9540 tons; and the number of vessels which cleared out in the first-mentioned year exceeded that of the preceding year by 16, and by 9443 tons. This statement however does not include the native craft, which are largely used in the intercourse with Sumatra, the Malay Peninsula, Rhio, Borneo, and the neighbouring islands, and which in 1836 amounted to 1484, of 37,521 tons. If these are added, the shipping that entered the port in 1836 amounted to 203,574 tons.

The commerce of the newly established colony increased at first with incredible rapidity. In the year 1824, only five years after its foundation, the imports amounted to 6,914,536 Spanish dollars, and the exports to 6,604,601. In the following year however it suffered some slight diminution, and it may be said that it has been nearly stationary since that period; for in 1835 the imports amounted only to 6,611,778 dollars, and the exports to 6,238,131. In the former account however the exports to and the imports from Malacca and Penang probably were included, whilst they were not taken into account in 1836. In this year goods to the value of 160,970 dollars were imported from Malacca, and others amounting to 168,867 dollars exported to that settlement. The commercial intercourse with Penang was much more important; the goods imported from that settlement were to the value of 426,176 dollars; and those that were exported rose to 544,640 dollars. If these sums are added, the exports in 1835 amounted to 7,325,285 dollars, and the imports to 6,825,277; and the whole commerce exceeded that of 1824 by 631,425 dollars. From 1835 an increase both in imports and exports took place; for in the year ending with the 30th of April, 1837, the imports amounted to 8,243,629 dollars, and the exports to 7,806,965 dollars, exclusive of the trade with Malacca and Penang, so that the difference between that year and the preceding was 1,900,032 Spanish dollars.

The commerce of Singapore may be divided into the Eastern trade, that of the Straits, and the Western trade. The Eastern trade, or that which is carried on with the countries east and south-east of Singapore, comprehends the commerce with China, the Spanish settlement of Manilla, the independent tribes of the Indian Archipelago, the Dutch settlements on the island of Java and at Rhio, and the countries of the Peninsula beyond the Ganges which lie east of the Malay Peninsula. The most important branches of this commerce are those with China, Java, and Siam.

The commerce with China is entirely carried on in Chinese vessels. The Chinese junks come from the ports of Canton, Changlim, and Ampo, in the province of Quantong, from Amoy in the province of Fokien, and from the island of Hainan. They leave their respective ports during the north-east monsoon, about January, and return with the south-west monsoon, which blows from April to October. They perform the voyage from Canton in from 10 to 20 days, and from Fokien in 12 or 15 days. The most valuable, but not the largest of the Chinese junks are from Amoy; the largest come from the province of Quantong, and the smallest and least valuable from Hainan. They bring annually from 2000 to 2500 emigrants to Singapore. The imports from China amounted, in the year ending the 30th of April, 1836, to 712,265 dollars; the most important articles were Spanish dollars, 138,927 in number; raw silk, 113,942 dollars; chinaware, 93,902; tea, 57,509; tobacco, 47,239; cassia, 93,092; nankeens, 25,715; and gold-thread, 11,016 dollars. Minor articles were camphor, copperware, earthenware, ironware, paints, piece-goods, salt, sugar-candy, and woollens. The imports entered under the head of sundries amounted to 152,440 dollars. The exports to China amounted in the same year to 1,079,752 dollars, and consisted chiefly of opium and such articles as had been brought to Singapore from the Indian archipelago Next to opium, which amounted to 252,327 dollars, the most important articles were edible birds'-nests, to the amount of 162,852; tin, 117,386; and trepang, 74,723 dollars. Rice was sent there to the amount of 59,408; pepper, 56,023; betel-nut, 44,962; and ratans, 36,019 dollars. Other articles of importance were woollens (25,064 d.), European piece-goods (20,796 d.), cotton-twist (18,100 d.), raw cotton (16,155 d.), aggar-aggar (16,100 d.), camphor barus (16,155 d.), spices (11,314 d.), tortoise-shell (12,684 d.), sandal-wood (11,143 d.), and lakka-wood (10,800 d.). Minor articles were antimony, birds' feathers, canvas, dragon's-blood, gambier, gold-dust, glassware, European gold thread, hides, garro-wood, spirits, and sundries. Spanish dollars were sent to China to the number of 21,864.

The commerce between Singapore and Manilla is carried on partly by Spanish and partly by American and English vessels. In the year ending on the 30th of April, 1836, the imports from that settlement into Singapore amounted to 166,086 dollars, of which cigars constituted more than one-half the amount, viz. 89,468 dollars. Sugar was brought to the amount of 23,190 dollars, and the other minor articles were trepang, cotton, hides, indigo, mother-of-pearl shells, oils, wines, sapan-wood (8802 d.), spirits, and sundries (8842 d.). Cowries were imported to the amount of 2252 dollars, and also 3000 dollars.

The trade with Celebes is almost exclusively in the hands of the Bugis of Waju, a country on the western side of that island, the inhabitants of which have colonized many islands of the Indian Archipelago, and carry on what may be called the foreign trade of the countries in which they have settled. They disperse the goods obtained at Singapore over most of the islands east of Celebes, as far as the coast of New Guinea, and also over that chain of islands called the Lesser Sunda Islands. [SUNDA ISLANDS.] Their country vessels, called *prahus*, arrive at Singapore during the prevalence of the eastern monsoon. The goods brought by the Bugis from Celebes in 1835 amounted to 214,703 dollars. The most important articles were tortoise-shell (61,878 d.), gold-dust (23,230 d.), mother-of-pearl shells (21,277 d.), coffee (14,098 d.), trepang (12,756 d.), birds'-nests (10,190 d.), and rice (10,501 d.). Minor articles were birds' feathers and birds of paradise, bees'-wax, hides, oils, paddy, ratans, aggar-aggar, spices, and tobacco. The importation of sundries amounted to 23,287 dollars, and 21,650 dollars in specie were also brought to Singapore. The value of the goods exported to Celebes was 339,966 dollars, and the principal articles were derived from Europe and Hindustan, viz. opium (71,162 d.), India piece-goods (66,236 d.), European piece-goods (47,881 d.), cotton-twist (44,244 d.), and copper coin brought from England (12,076 d.). The exportation of raw silk (17,498 d.) and of gambier (13,334 d.) was also considerable. Minor articles were arms, benjamin, or benzoin, chinaware, earthenware, gold thread, ivory, iron and steel (7315 d.) ironware and cutlery (5510 d.), nankeens, stick-lac, tobacco (7569 d.), and woollens (7547 d.). Besides, there went 8792 dollars in specie and 4000 Java rupees.

The commerce between Singapore and the northern coast of Borneo is almost exclusively carried on by native vessels, many of which are of great size; some of them are managed by Bugis. The articles imported from that island in 1835 amounted to 268,074 dollars. The most important article was gold-dust, to the value of 128,748 dollars. Other articles of importance were edible birds'-nests (30,355 d.), ratans (28,776 d.), antimony-ore (24,872 d.), pepper (17,847 d.), and camphor barus (10,478 d.). Minor articles were sago (9102 d.), tortoise-shell (8624 d.), bees'-wax (8360 d.), trepang (5067 d.), ebony, hides, rice, sugar, tobacco, garro-wood (5957 d.), and lakka-wood (4472 d.). The sundries amounted to 7137 dollars, and the dollars in specie to 5290. The goods exported to Borneo were to the value of 231,342 dollars. The largest articles were India piece-goods (110,934 d.), opium (73,490 d.), nankeens (17,311 d.), Malay piece-goods (17,024 d.), and European piece-goods (9160 d.). There were also arms (5507 d.), iron and steel (6775 d.), ironware and cutlery (4449 d.), raw silk (5155 d.), china-ware (3138 d.), gambier (3792 d.), cotton-twist (2627 d.), gunpowder (2001 d.), and China sundries (2309 d.). Minor articles were trepang, benjamin, earthenware, ivory, rice, salt, saltpetre, stick-lac, tea, tobacco, woollens, Java and Eastern sundries. To these were added 9389 dollars in specie, Java rupees to the amount of 4840 dollars, and copper coin to the amount of 100 dollars.

An active commerce is carried on between Singapore and the rival settlement of the Dutch at Rhio. [RHIO.] The imports into Singapore from that place amounted, in 1835, to 111,395 dollars, of which the pepper alone amounted to 82,483 dollars, and the rice to 12,349. Minor articles were bees'-wax, cotton, gambier, hides, sugar, tin (2700 d.), and Java sundries; there were also 7933 dollars in specie imported. The exports to Rhio amounted to 167,461 dollars, and consisted especially of dollars in specie (84,882), European piece-goods (25,938 d.), India piece-goods (16,940 d.), rice (12,911 d.), and opium (5252 d.). Minor articles were anchors and grapnels, arms, chinaware, ebony, iron and steel, lead, oils, paints, ratans, raw silk, sago, salt, spelter, tea, lakka-wood, and sundries, with Java rupees amounting to 400 dollars.

The direct commerce between Singapore and Java is limited to the three ports of Batavia, Samarang, and Surabaya, but European and India goods may be shipped from these places to any other Dutch settlement on the island of Java, or on the other islands of the Archipelago, the Moluccas excepted. The exports of Java to Singapore, in 1835, amounted to 876,321 dollars. The most considerable articles were—tin (155,527 d.), European piece-goods (142,317 d.), birds'-nests (101,949 d.), and rice (86,479 d.). Next to these were tobacco (44,139 d.), spices (41,845 d.), ratans (34,589 d.), spirits, especially hollands (26,938 d.), Java sundries (26,145 d.), pepper (18,176 d.), sandal-wood (18,490 d.), sugar (17,043 d.), gold-dust (14,523 d.), cotton (10,751 d.), and tortoise-shell (10,059 d.). The importations were—woollens (9394 dollars), European sundries (8088 d.), arrack (7856 d.), hides (7519 d.), glass-ware (6275 d.), mother-of-pearl shells (5308 d.), and cotton-twist (4223 d.). Minor articles were camphor, camphor barus, coffee, copper-ware, copper sheathing, ebony, ivory, indigo, oils, paints, provisions, spelter, stick-lac, sugar-candy, tea, wine, garro-wood, and Eastern sundries. There were also brought to Singapore 48,374 dollars in specie, Java rupees to the amount of 4709 dollars, doubloons (980 dollars), and cowries (150 dollars). The exports from Singapore to the ports of Java were of the value of 568,470 dollars. The most valuable articles were India piece-goods (135,900 d.), opium (118,495 d.), and China sundries (70,790 d.). Next to these were raw silk (40,135 d.), cigars (27,112 d.), china-ware (22,336 d.), gunnies (15,252 d.), tea (14,310 d.), wheat (11,749 d.), and nankeens (10,994 d.); European sundries (9231 d.), China piece-goods (7617 d.), India sundries (7308 d.), copper (6433 d.), pepper (6014 d.), iron and steel (5537 d.), Straits sundries (4935 d.), tobacco (4829 d.), saltpetre (4449 d.), tin (4000 d.), and cassia (3340 d.) Minor articles were arms, benjamin, bees'-wax, canvas, cordage, dragons'-blood, earthenware, glue, glass-ware, gunpowder, ivory, lead, oils, provisions, European piece-goods, Malay piece-goods, sago, stick-lac (3758 d.), woollens, and American sundries (2052 d.). There are still to be added 7024 dollars in specie, and Java rupees to the amount of 2000 dollars.

The island of Bally, whose surface does not much exceed 2000 square miles, sent to Singapore goods to the amount of 59,724 dollars, of which the rice alone fetched 37,274 dollars; the tobacco 8288 d., the tortoise-shell 4021 d., and the edible birds'-nests 2755 d. Minor articles were trepang, bees'-wax, coffee, hides, sandal-wood, and Eastern sundries (1230 d.); also 4270 dollars in specie. The goods exported from Singapore to Bally amounted to 65,073 dollars, and consisted especially of opium (24,264 d.), copper coin (13,339 d.), India piece-goods (10,119 d.), and European piece-goods (4583 d.), with several minor articles, as arms, chinaware, earthenware, gold thread, ivory, ironware, China piece-goods, raw silk, woollens, and China sundries, with 200 dollars in specie.

The commerce between Singapore and the several islands which lie in the sea between the settlement and Java, including Banca, is also considerable. The goods brought from them amounted to 133,536 dollars. The larger articles were tin (47,461 d.), trepang (10,662 d.), India sundries (7942 d.), Eastern sundries (5622 d.), pepper (5689 d.), aggar-aggar (4869 d.), and tortoise-shell (4882 d.). Minor articles were bees'-wax, birds'-nests, chinaware, coffee, ebony, ghee, gambier, gold-dust, gram, oils, paddy (3612 d.), ratans, rice, sago, tobacco, wheat, garro-wood, and sapan-wood. There were also 12,296 dollars in specie sent to Singapore. The exports from our settlements amounted to 101,180 dollars, and consisted principally of opium (18,528 d.), India piece-goods (12,450 d.), rice (11,902 d.), raw silk (6858 d.), European piece-goods (5829 d.), and Malay piece-goods (5047 d.). Minor articles were anchors, arms, cotton-twist, earthenware, gambier, gold thread, gunpowder, iron and steel, ironware, nankeens, oils, sago, stick-lac, sugar, tea, tobacco (2500 d.), wheat, garro-wood, spirits, and sundries. Besides, 17,110 dollars in specie and 300 dollars in copper coin were exported.

The commerce between Singapore and Siam is mostly carried on by the Chinese who are settled in that country and in junks built at Bangkok and other places. The imports from Siam amounted, in the year terminating with the 30th of April, 1836, to 282,019 dollars. The principal articles were sugar (114,453 d.), rice (43,330 d.), stick-lac (18,264 d.), iron-ware (12,379 d.), sapan-wood (11,674 d.), oils (8485 d.), salt (7959 d.) and Eastern sundries (6483 d.). Minor articles were china-ware (2147 d.), hides, ivory, paddy, India piece-goods, raw silk, sugar-candy (2250 d.), tea, spirits, and China sundries. The imported silver consisted of 12,120 dollars, and ticals to the amount of 35,913 dollars. The goods imported into Siam were of the value of 180,604 dollars. The principal articles were European piece-goods (58,155 d.), India piece-goods (26,845 d.), cotton-twist (19,913 d.), opium (18,925 d.), ratans (9533 d.), ebony (9200 d.), bees'-wax (8475 d.), woollens (5085 d.), gambier (4708 d.), and iron and steel (4560 d.). Minor articles were anchors, arms, betel-nut, earthenware, lead, lakka-wood, and European, India, China, and Eastern sundries. Only 400 dollars, and cowries to the amount of 100 dollars, were sent to Siam.

The commerce with Cochin China is much less considerable. It is likewise carried on by the Chinese settled at Kangkao and Saigun in Camboja, and at Quinhon, Faifo, and Hué in Cochin China. In 1835 the imports from these places amounted to 62,319 dollars, and consisted chiefly of sugar (27,055 d.), rice (10,356 d.), copper (9300 d.), and salt (4388 d.), with some ebony, indigo (2970 d.), iron, oils, raw silk, tea, and Eastern sundries. The exports amounted to 91,073 dollars, and the principal articles were woollens (28,534 d.) and opium (26,019 d.). The other articles, as arms, canvas, copper sheathing, gambier (4708 d.), iron, iron-ware (2485 d.), lead, piece-goods, ratans, saltpetre, spelter, tea, tobacco, sapan-wood, European sundries (3267 d.), and China and Eastern sundries, amounted in general to small sums; but 9500 dollars in specie were exported.

The commerce of the Straits is carried on with the Malay Peninsula and with the island of Sumatra. The harbours on the eastern side of the peninsula, which trade with Singapore, are Pahang, Tringanu, and Calantan, and this trade is rather active. The trade with the western coast of the peninsula is not important, and is almost entirely limited to the harbour of Salangore. In 1835 the imports from these places to Singapore were 319,134 dollars. The most valuable articles were gold-dust (145,040 d.) and tin (107,670 d.). Pepper amounted to 11,273 dollars, and sugar to 4210 dollars. The other articles were trepang, bees'-wax, birds'-nests, coffee, ebony, ghee, hides, ivory, iron-ware, ratans (2216 d.), raw silk, rice, stick-lac, tortoiseshell, garro-wood, lakka-wood, and several other articles; 31,313 dollars were also imported. The exports in 1835 amounted to 316,370 dollars. The principal article was opium, to the amount of 169,348 dollars, and next to it followed cotton-twist (40,867 d.), tobacco (30,034 d.), Malay piece-goods (21,538 d.), European piece-goods (14,994 d.), and India piece-goods (9474 d.). Minor articles were arms, bees'-wax, cotton, earthenware, gambier, iron and steel (3431 d.), iron-ware and cutlery, raw silk, salt, and several sundries. There were also 14,408 dollars sent from Singapore to these ports.

The commerce between Singapore and the island of Sumatra is almost entirely limited to the ports along the eastern coast of the island; there is hardly any commercial intercourse with the Dutch settlements of Bencoolen, Padang, and Trappanuli, which are on the western coast. The commerce of the eastern coast is divided between Singapore and Penang. The ports south of the free port of Batu Bara send their goods to Singapore, whilst those which are farther north visit Penang. The harbours connected with the first-named settlement are Campar, Siack, Indragiri, Iambie, Assahan, and Batu Bara. The goods imported from these places amounted to the sum of 130,921 dollars. The principal articles were coffee (44,842 d.), betel-nut (24,946 d.), cotton (12,134 d.), sago (10,972 d.), ratans (8261 d.) gold-dust (5936 d.), and benjamin (4652 d.). Minor articles were trepang, bees'-wax (3712 d.), dragon's-blood, gambier, hides, ivory, iron, iron-ware, mother-of-pearl shells, paddy, pepper, rice (3682 d.), spices, tortoise-shell, lakka-wood, and several sundries. There were also sent to Singapore 1250 dollars, and Java rupees to the amount of 300 dollars. The goods exported to these places amounted to the value of 165,601 dollars. The principal articles were India piece-goods (37,774 d.), European piece-goods (16,443 d.), raw-silk (12,680 d.) opium (11,767 d.), Malay piece goods (10,837 d.), China sundries (6995 d.), iron (6390 d.), and salt (5915 d.). Minor articles were arms (2475 d.), brass-ware, china ware (3196 d.), copper sheathing, cotton-twist, earthenware, gold thread, gunpowder, iron-ware, nankeens, oils, stick-lac, tea, tobacco, wheat, woollens, and several sundries. There were also sent to Sumatra 26,906 dollars, and Java rupees to the amount of 1800 dollars.

The western trade of Singapore comprehends that with Calcutta, Madras, Bombay, the island of Ceylon, and Arabia, with the Cape of Good Hope, Mauritius, and Australia, and with Europe and America. In the commerce which is carried on between Singapore and Calcutta larger capitals are employed than in that with China or Great Britain. The imports from Calcutta amounted, in 1835, to 1,191,390 dollars. The principal article was opium, of which 1640 chests, of the value of 957,855 dollars, were imported. Next to it were India piece-goods, which amounted to 135,679 dollars; gunnies (24,745 d.), cotton (21,060 d.), rice (14,042 d.), wheat (13,978 d.), India sundries (8024 d.), and saltpetre (7451 d.). The other articles, as brass-ware, canvas, copper-ware, cordage, copper sheathing, ebony, ghee, hides, mother-of-pearl shells, tobacco, and European sundries, amounted only to small sums. The exports from Singapore to Calcutta were to the value of 876,851 dollars. The most valuable article was gold-dust, which amounted to 473,565 dollars. Tin was sent to the amount of 69,045 dollars, pepper 44,839 d., cigars 29,550 d., European piece-goods 20,669 d., sapan-wood 18,829 d., spirits 17,992 d., ratans 13,465 d., gambier 10,230 d., Java sundries 8402 d., spices 6333 d., Eastern sundries 5721 d., canvass 5931 d., cotton-twist 5619 d., European sundries 4712 d., and tea 4510 d. Minor articles were anchors and grapnels (2014 d.), arms, benjamin, bees'-wax, betel-nut (3589 d.), cassia (3951 d.), copper, cordage, glass-ware, iron and steel, sago (3142 d.), sugar-candy, tobacco, wine, sandal-wood, woollens, and India, China, and American sundries (3916 d.). From Singapore there were sent to Calcutta 70,189 dollars, sicca rupees to the amount of 5092 dollars, Java rupees 1943 dollars, sycee silver 650 dollars, ticals 25,004 dollars, sovereigns 475 dollars, gold mohurs 93 dollars, and cowries 2989 dollars

The commerce with Madras is much less important. The imports from that place to Singapore amounted only to 151,133 dollars. The largest article was India piece-goods (132,679 d.), and all the others, except ebony (6822 d.), amounted to small sums, and were trepang, earthenware, ghee (2993 d.), mother-of-pearl shells, European piece-goods (2880 d.), rice, wine, spirits, and a few sundries. The exports to Madras amounted to 138,365 dollars, and consisted principally in money, viz. 99,758 dollars in specie, ticals to the amount of 17,000 dollars, sicca rupees 311 dollars, and Java rupees 125 dollars. Cigars, amounting to 5187 dollars, were the most important article Other articles were benjamin, chinaware, cordage, earthenware, gold-dust, glassware, iron and steel, ironware (2984 d.), European piece-goods, ratans, sago, spices, sugar-candy, woollens (2168 d.), spirits, and some sundries.

The commerce with Bombay is more important. The imports from that place amounted to 156,904 dollars. Opium was to the amount of 117,195 dollars, and India piece-goods 19,578 dollars. The other articles were of little value, and consisted of brassware, cotton (2308 d.), grain, saltpetre, tortoiseshell, woollens, and a few sundries; there were also imported 13,000 dollars. The exports to Bombay amounted to 196,757 dollars. The largest articles were gold-dust (38,683 d.), tin (31,050 d.), sugar (30,489 d.), spices (17,051 d.), piece-goods (11,202 d.), ratans (7598 d.), and cigars (5441 d.). Minor articles were benjamin, betel-nut, cassia (2962 d.), gambier, ivory, oils, pepper, raw silks, sago, garro-wood (3360 d.), sapan-wood, spirits, and several sundries. Bombay received also from Singapore 30,437 dollars, ticals to the amount of 5896 dollars, Bombay rupees 371 dollars, gold coins 92 dollars, and doubloons 62 dollars.

The exports from Singapore to Ceylon amounted only to 3849 dollars, and consisted of chinaware (1097 d.), ratans, cigars, sugar (1358 d.), and a few sundries. But Ceylon sent to Singapore goods to the amount of 30,876 dollars, of which ebony alone was of the value of 19,872 dollars. The other articles, except cordage (4669 d.), were small, and consisted of trepang, birds' feathers, canvas, ghee, hides, India piece-goods, wheat, spirits, and some sundries.

The imports from Arabia to Singapore amounted only to 6395 dollars, and consisted of India sundries (4240 d.), and small quantities of gold thread, tortoiseshell, oils, and salt.

But Singapore exported to Arabia, probably on account of the pilgrims who go from the Malay Peninsula and the Indian Archipelago to Mecca, the value of 70,153 dollars, of which 41,000 dollars were in specie. The largest articles of goods were benjamin (8708 d.), tin (6779 d.), sugar (5885 d.), and garro-wood (4710 d.) Minor articles were gold-dust (607 d.), pepper, India piece-goods, rice, sago, spices, sugar-candy, sapan-wood, and a few sundries.

The imports into Singapore from the Cape, Mauritius, and Australia amounted only to 4860 dollars, of which 2900 were in specie, to which arms and ebony in small quantities were added. But Singapore exported to these places goods to the amount of 88,674 dollars. The most important articles were tin (12,570 d.), cigars (11,272 d)., wheat (11,017 d.), Eastern sundries (8739 d.), sugar (6425 d.), and coffee (5886 d.) The other articles were of less importance, and consisted of antimony, bees'-wax, canvas, cassia, cordage (2608 d.), gram, gambier, gold-dust, gunnies, opium (2400 d.), pepper, paddy, provisions (2302 d.), ratans, rice (2633 d.), sago, sugar-candy, tea (2360 d.), tobacco, wines, spirits, and European sundries (3216 d.).

The United States of America carry on an active commerce with Singapore, but as most of their goods are not adapted for the market of Southern Asia, they generally pay for the goods that they buy with ready money. They imported 87,800 Spanish dollars, and also manufactured goods (14,548 d.), provisions (9853 d.), and American sundries (9122 d.) Minor articles were canvas, cordage, gunpowder, hides, cigars, and tobacco (1556 d.) The whole importation amounted to 125,897 dollars, whilst the articles exported were of the value of 177,526 dollars. The most important articles among the exports were tin (43,751 d.), sugar (38,184 d.), coffee (34,279 d.), pepper (19,793 d.), tortoise-shell (6784 d.), rice (6258 d.), and gunnies (5760 d.). Minor articles were antimony, betel-nut, canvas, cassia (3956 d.), cordage, dragon's-blood, gambier, hides, oils, opium (2660 d.), India piece-goods, ratans (2117 d.), sago, cigars, spices (2400 d.), tea, and several sundries.

As to the harbours of continental Europe, that of Hamburg had the greatest share in the trade. But the imports from these places amounted only to 65,657 dollars, and the largest articles were spirits (12,876 d.), piece-goods (12,700 d.), wine 10,578 d.), and European sundries (16,584 d.). Minor articles were arms, canvas (3000 d.), cordage (2300 d.), cotton-twist (2340 d.), glassware, gold thread, iron (2161 d.), ironware, lead, oils, paints, provisions, salt, and woollens. The goods exported from Singapore to these parts amounted to 115,303 dollars. The largest articles were coffee (42,649 d.), tin (23,319 d.), sugar (15,942 d.), pepper (13,772 d.), European sundries (5329 d.), and cassia (3355 d.). Minor articles of export were bees'-wax, cordage, gold-dust, hides, rice, ratans, sago (2084 d.), cigars (2386 d.), tortoise-shell, sapan-wood, arrack, and some sundries.

The commerce of Singapore with Great Britain is nearly equal to that with Calcutta, and more active than that with China. Great Britain imported into the port of Singapore in the year ending with the 30th of April, 1836, goods to the amount of 1,150,808 dollars. The most important article consisted of several kinds of piece-goods, to the amount of 575,776 dollars. Other articles of importance were cotton-twist (58,994 d.), European sundries (56,772 d.), iron (49,409 d.), woollens (48,976 d.), arms (45,778 d.), earthenware (31,560 d.), glassware (23,480 d.), gunpowder (20,793 d.), copper sheathing and nails (16,728 d.), ironware and cutlery (15,486 d.), anchors and grapnels (14,383 d.), and wines (13,445 d.). The importations were — beer (8281 d.), canvas (5188 d.), cordage (6684 d.), opium (2000 d.), paints (3077 d.), provisions (4220 d.), spelter (3296 d.), and spirits (4724 d.). Minor articles were brassware, gold thread, lead, and tea. Great Britain sent also to Singapore 17,000 Spanish dollars, and copper coin to the amount of 25,072 dollars. The goods shipped at Singapore for Great Britain amounted to the value of 890,017 dollars. The most important articles were tortoise-shell (125,101 d.), tin (101,204 d.), pepper (91,289 d.), raw silk (70,675 d.), sugar (62,406 d.), Eastern sundries (59,586 d.), coffee (53,644 d.), tea (44,376 d.), sago (35,891 d.), spices (34,939 d.), mother-of-pearl shells (27,570 d.), China sundries (25,544 d.), bees'-wax (22,656 d.), cassia (22,298 d.), antimony (18,704 d.), gambier (16,339 d.) hides (13,950 d), benjamin (8708 d.), Java sundries (7982 d.), ratans (6988 d.), Straits sundries (5943 d.), and ivory (5053 d.). Minor articles were birds' feathers and birds of paradise, camphor, cordage (2524 d.), coloured cotton-twist (2541 d.), dragons'-blood, ebony, gold-dust (4355 d.), nankeens (3440 d.), oils, China piece-goods, rice, cigars, wines, sapan-wood (4262 d.), and India sundries (3106 d.). There were also sent to Great Britain 95 sovereigns, and cowries to the value of 1086 dollars.

Such is the state of the commerce of Singapore at present, but it will probably increase largely in a few years. If the Chinese government continue the vexatious restrictions on our commerce at Canton, it may be expedient to discontinue the direct commercial intercourse with the Celestial empire. Instead of Canton, the settlement of Singapore would be the market to which tea and other articles of Chinese industry would be brought, and our goods adapted for their consumption would be sold. The consumption of all these articles, with the exception of opium, would probably be much increased by such a change, for the Chinese themselves would be able to sell their goods at a less price at Singapore than we have hitherto paid for them at Canton. Our vessels and merchants have to pay very heavy dues, whilst Chinese vessels pay very little in comparison, and are almost entirely free from dues whenever a part of their return cargo consists of rice. This article is at present always to be had at Singapore, and might be grown to an indefinite extent in the eastern districts of Sumatra and in our Tenasserin provinces, if there was a demand for it. Thus it is probable that the Chinese junks would be able to sell tea and other articles at least 10 per cent. less than we pay for them at Canton; besides, the tea is brought to Canton by a transport over land of many hundred miles, whilst the countries in which it grows are near the sea; and it could be brought directly from Amoy, Ningpo, and Sanghae, to Singapore, at a much less expense. The only difference would be, that our vessels, instead of proceeding to Canton, would stop at Singapore; but that can hardly be considered a loss, when we reflect that the increased consumption of Chinese goods, in consequence of the decrease in price, would certainly be attended by an increase of our shipping.

History.—On the site of the present British settlement formerly stood the capital of a Malay kingdom. According to the history of that nation, Sang Nila Utama, from Menangkabau in Sumatra, founded the city of Singhapúra (the lion's town) about 1160, and Raffles was able in 1819 to trace the outer lines of the old city. It then was the capital of the kingdom of Malacca. This town was taken in 1252 by a king of Java, and the residence of the king was transferred to the town of Malacca, which was then founded. After that event the town seems gradually to have decayed, and the country to have been abandoned; for when the British, after having restored the town of Malacca to the Dutch in 1816, wished to form a settlement on the shores of the Strait of Malacca or its neighbourhood, that they might not be entirely excluded from the commerce of the Indian Archipelago by the Dutch, they found on their arrival at Singapore that the population of the whole island did not exceed 150 individuals, as already stated. It was then a part of the kingdom of Johore, which had been so reduced by internal discord, that some of the superior officers had become independent. One of them, the Tumungong, or chief justice, had got possession of the island of Singapore and the adjacent country, and from him the British obtained, in 1819, permission to build a factory on the south shore of the island. Soon afterwards a person who had some claim to the throne of Johore came to the British settlement and received a small pension. From this person, who was afterwards king of Johore, and the Tumungong, the British obtained, in 1824, the sovereignty and fee-simple of the island, as well as of all the seas, straits, and islands, for the sum of 60,000 Spanish dollars, and an annuity of 24,000 Spanish dollars for their natural lives. In 1826 Singapore was placed under the provincial government of the Straits Settlement, which is fixed on the island of Penang.

(Crawfurd's *Journal of an Embassy to the Courts of Siam and Cochin China*; Finlayson's *Mission to Siam and Hué*; Moor's *Notices of the Indian Archipelago*, &c.; Newbold's *Political and Statistical Account of the British Settlements in the Straits of Malacca*.)

SINIGAGLIA. [Pesaro et Urbino.]

SINKING FUND. [National Debt.]

SINO'PE, or SINUB. [Paphlagonia.]

SINTOC, or SINDOC, sometimes written Syndoc, is the bark of a species of Cinnamomum, which has been called C. Sintoc by Blume, who says it is a tree 80 feet in height, indigenous in the primeval forests of Java. It is in flattish pieces, of a warm spicy taste, but is seldom seen in this country. It resembles the Calilawan bark, called clove-bark by some, which is called *kulie-lawan* by the natives of Java, and is the produce of a nearly-allied species, the *Cinnamomum Calilawan* of Blume, which grows in similar situations with the former, and of which the bark is used as a spice, and its essential oil is employed as a medicine and as a perfume by the Javanese.

SIOUX INDIANS, one of the most numerous and powerful of the native tribes within the territories of the United States of North America. They inhabit a large tract between 42° and 49° N. lat. and 90° 30′ and 99° 30′ W. long., comprehending nearly the whole of the country between the Mississippi on the east and the Missouri on the west, north of 42° 30′ N. lat., or the present territory of Iowa. They also occupy a large tract of the territory of Wisconsin on the east of the Mississippi, extending along the river from Fort Crawford on the south to the St. Croix river, and the whole country west of the last-mentioned river as far north as Lake Spirit, and westward to the eastern banks of the Mississippi. In these parts their country borders on that of the Algonquins, who occupy the tract west of Lake Superior, but along the banks of the Red River of Lake Winnipeg the Sioux claim the whole tract to the boundary-line of the United States (49° N. lat.). On the banks of the Missouri they are found near Fort Mandan on the north (47° 30′), and at the mouth of the Soldiers' River (42°) on the south, and it is stated that they hunt in the country west of the Missouri between 43° and 47° N. lat. The southern boundary of their country may be marked by a line drawn from the mouth of Soldiers' River to Fort Crawford.

The Sioux Indians call themselves Dacotas, but in their external relations they assume the name of Ochente Shakoan (the nation of the seven fires or councils), a name which refers to a division into seven great tribes, of which they were formerly composed. The French Canadians divide them into Gens du Lac and Gens du Large. The former once lived about Spirit Lake, and are now principally found along the banks of the Mississippi. They live in villages, and have begun to apply themselves to the cultivation of the ground. The Gens du Large, under which name the greater number of the tribes are comprehended, rove about in the prairies between the Mississippi and Missouri, and live almost exclusively by the chase. On these prairies the buffalo is found in uncommon numbers, and probably there is no part of North America in which this animal is so plentiful. Hence the means of subsistence are very abundant, and the nation of the Dacotas is more numerous than any other in such high latitudes. It is stated that the Dacotas themselves compose a population of 28,000 individuals, and that there are above 7000 warriors. The Assiniboines, who live north of the Dacotas, within the territories of the Hudson's Bay Company, formerly constituted an integral portion of the Dacotas, but separated from them in consequence of a quarrel, whence they are named, by the Dacotas, Hoka (the revolted). The Chippewas name them Assiniboines or Stone Boines, and the Dacota they call Boines. This branch of the Dacota Indians is stated to be no less numerous than the Dacotas themselves.

The language of these two tribes differs from that of their neighbours, yet some distinctions of the nature of dialects appear to prevail in some words as spoken by the roving Indians and by the Dacotas. They believe in the existence of a Supreme Being, and a great number of subordinate beings, whose powers and attributes vary much. The Supreme Being is called Wahkan Tanka, or Great Spirit, and they consider him as the Creator of all things, and as the ruler and disposer of the universe; they hold him to be the source of all good and the cause of no evil. The next spirit in respect to power is the Wahkan Shecha, or Evil Spirit, whose influence is exclusively exerted in doing evil. The third divinity is the thunder, whose residence they fix in the west, and some believe that it dwells on the summit of the Rocky Mountains, because in this country all thunder-storms come from the west. The thunder is considered the spirit of war. They offer sacrifices to these three powers, and these sacrifices are accompanied with prayers, but not with dances.

To rise early, to be inured to fatigue, to hunt skilfully, to undergo hunger without repining, are the only points to which the Dacotas think it important to attend in the education of their children.

The Dacotas who live along the Mississippi and St. Peter's river raise maize, and they also cultivate beans, pumpkins, and other vegetables. But these agriculturists constitute only a small portion of the tribe: by far the larger part occupy themselves with hunting wild animals, especially the buffalo. The other animals which abound in their country are beavers, otters, martens, minxes, musk-rats, lynxes, wolverines, elks, moose deer, bears, and wolves. As the wild animals are so abundant in their country, the Dacotas are not obliged to live in small societies, but they generally live in camps consisting of eighty or a hundred lodges, each lodge containing several families. Sometimes there are above three hundred warriors in one encampment.

(Lewis and Clarke's *Travels up the Missouri, &c.*; and Keating's *Narrative of an Expedition to the Source of the St. Peter's River, &c., under the command of Major Long.*)

SIPHNO, called also *Siphanto* and *Sifanno* (by Carpacchi, *Isole del Mondo*), an island in the Archipelago, forming one of the group called the Cyclades. The original name was Merope; it was called Siphnus from a personage of that name. It was colonised by Ionians from Athens. (Herodot., viii. 48.) In the reign of Polycrates, the tyrant of Samos, about 520 B.C., the inhabitants were very flourishing in consequence of their gold and silver mines, and, according to Herodotus (iii. 57), they were the most wealthy of the islanders. They had a deposit at Delphi of the tenth of the produce of the mines. Some exiles, who were expelled from Samos by Polycrates [SAMOS], invaded Siphnus about this time, and levied a contribution of 100 talents. The Siphnians were among the few inhabitants of the Archipelago who resisted the Persian claim of earth and water, and they contributed one small ship of war at the battle of Salamis. (Herod., viii. 48.) Their mines were not afterwards so valuable (Demosthenes, *περι συντάξεως*). Pausanias (x., 11) says that after a time they ceased to send treasure to Delphi, and that in consequence the sea broke in on their mines and destroyed them. Siphnus is very little noticed by antient authors. From Stephanus Byzantinus, Hesychius, and Suidas we learn that the natives were of dissolute manners, insomuch that to do like a Siphnian (*Σιφνιάζειν*) was a term of reproach. In the work of Constantine Porphyrogennetus 'De Thematibus,' Siphnus is in the theme of Hellas, and in the Synecdemus of Hierocles it forms part of the Provincia Insularum.

In the reign of Henry I., Latin emperor of Constantinople, Marco Sanado, the first duke of Naxos, conquered the island and made it part of his dominions. It passed from him into the hands of the Gozzadini family, who held it till it was wrested from them by Barbarossa, after the capture of Rhodes in the time of Soliman II. It was, in common with the neighbouring islands, partially protected from the oppressions of the Turks by the Venetians; and Tournefort (*Voyage du Levant*) mentions that about 50 years before his visit to the place, so little was the power of the Porte there, that the inhabitants, assisted by a Provençal corsair, expelled the Turks who had been sent there to work the lead-mines.

Siphnus is between 36° 50′ and 37′ 10′ N. lat., and in 25° 10′ E. long.: it is situated to the south-east of Serpho, north-east of Milo, and south-west of Paro, lying immediately opposite Antiparo. It is of an oblong form, narrower at the north than at the southern extremity. Pliny reckons it at about 28 Roman miles in circumference, and Carpacchi (Isole del Mondo) at 40. Tournefort mentions five ports, which were much frequented about 50 years before his visit there: Faro, Vathy, Kitriani, Kironisso, and Kastron, of which Kastron is on the east, Faro and Kitriani on the south, and Vathy on the west side. Another on the east side, Agia Sosti, is marked in the map attached to Fiedler's 'Reise durch Griechenland,' 1841. Tournefort gives the names of five villages, Artimone, Stavril, Catavati, Xambela, and Petali; and of four convents of caloyers, Brici or La Fontaine, Stomongoul, St. Chrysostome, and St. Hélie.

Fiedler mentions only two towns: Kastron, on a strong and rocky hill overlooking the sea, which is the residence of the governor; and Stawri, the Stavril of Tournefort, in the centre of the island. Siphnus is in the pashalik of Nakscha. The bishop is also bishop of Milo. The population in the time of Tournefort was about 5000; they were taxed in the year 1700 at 4000 crowns of French money. The lands are chiefly laid out in vineyards; the wine is not so good as that of the neighbouring islands. The chief trade is in silk, figs, honey, wax, sesame, and cotton stuffs, which are celebrated for their quality: the inhabitants import the raw material. There are very few sheep, horses, or horned cattle. The climate is good, and the inhabitants long-lived.

Siphnus was celebrated among the antients for a sort of stone mentioned by Pliny (*Nat. Hist.*, xxxvi. 22), of which drinking-cups were made, which was easily carved, and hardened afterwards by boiling oil. This was a species of talc, according to Fiedler, who gives further particulars relating to the geology of the island. Tournefort was shown the situation of one gold-mine, but could not discover the entrance. Fiedler gives an account of one near Agia Sosti.

The antiquities of the island are few. On the south side, at Porto Plati Gallo, are the remains of an old Greek town. Tournefort speaks of a temple sacred to Pan near the castle, which is also noticed by Carpacchi, and of several marble sarcophagi with good sculpture. There are also Greek inscriptions, which are given by him and Fiedler. The Greek coins of Siphnus are very numerous: they are of gold, silver, and copper. The types on them are the head of Apollo (there was a town called Apollonia in Siphnus, according to Stephanus Byz., Ἀπολλωνία), the Chimæra, head of Bacchus, and a dove with wings spread. The coins struck under the emperors have Pallas on the reverse. Kastron is a castle built apparently when the Venetians first occupied the island. Various buildings bear the arms of the Gozzadini family, three of whom were still living there in the time of Tournefort.

SIPHON (σίφων), a tube or pipe. This machine, which has been described in the article HYDRAULICS, was probably invented in the second century B.C., by Hero of Alexandria, who, in the 'Spiritalia,' or Pneumatics, mentions its employment for the purpose of conveying water from one valley to another over the intervening ground.

In order that a fluid may issue from that branch of a siphon which is on the exterior surface of the vessel containing it, it is necessary, as has been stated in the article above mentioned, that the extremity of the branch should be below the surface of the fluid in the vessel; but it may be observed that there is an exception to the rule when the interior diameter of that branch is very small; for example, when it is less than 1-10th of an inch, the interior diameter of the branch in the vessel being considerably greater. For if such a fluid as water or wine be introduced into a bent tube having one branch only very small, and the open ends be uppermost, the top of the fluid in the more slender branch will, by the effect of capillary attraction, stand higher than the top of that in the other branch. It would follow therefore, that if the bent tube were inverted, and the orifice of its larger branch were placed under the surface of the fluid in a vessel, the fluid would begin to issue from the other branch, though the orifice of the latter were a little above the level of that surface.

The effect of a siphon may be produced by capillary attraction alone; for if a piece of cotton cloth have one of its extremities in a vessel of water, and part of it be made to hang over the edge of the vessel, the water will be attracted along the threads of the cloth, and will descend from thence in drops, provided the extremity of the part thus hanging over be below the surface of the water in the vessel.

The phenomena presented by springs of water are explained by supposing that the rain which is absorbed in the earth occasionally finds its way by small channels to some interior cavity, and from thence by other channels, which may be considered as natural siphons, to an orifice on a lower level at the surface of the ground. At this orifice it issues in a stream of water, which continues to flow till the surface of the water in the cavity has descended below the tops of the vertical bends in the channels: the water then ceases to flow till the rains again raise the water in the cavity above those bends. But it sometimes happens that a spring, without ceasing to flow, discharges periodically greater and smaller quantities of water in given times; and this is accounted for by supposing the existence of two cavities either unconnected or communicating with one another by small channels. The channels leading from one of these cavities to the point of efflux are supposed to be below the level of the water in both cavities, so that the water flows through them continually; but if the channels from the other have vertical bends, so that they act as siphons, and at the same time these channels carry off the water in them faster than it can flow from the first cavity to the second, it will be only when the water in the latter cavity is above the level of all such bends that a discharge will take place from thence. As the water in that cavity may only attain the necessary height in consequence of periodical falls of rain, it will follow that corresponding increases in the total quantity of water discharged can only then take place.

For the amusement of young persons, several philosophical toys have been constructed, in which the effects are produced by means of concealed siphons. The siphon is sometimes placed within a figure in the middle or on the edge of a cup, and sometimes between its exterior and interior sides. Such are Tantalus's Cup and the siphon fountain.

SIPHONA'RIA. [SEMIPHYLLIDIANS, vol. xxi., p. 218.]

SIPHONIA. [SPONGIADÆ.]

SIPHO'NIA, a genus of plants of the natural family of Euphorbiaceæ, consisting of two species, but one may be only a variety of the other. This is celebrated as being the tree which yields the large quantities of caoutchouc, called *Cahuchu* by the native Americans, annually imported from Para in South America. The genus has been named Siphonia, from the Greek word *siphon* (σίφων) a tube, from the purposes to which caoutchouc is applied; but it was originally called *Hevea* by Aublet, and the name was changed by Richard from its similarity to *Evea*. The species, or South American caoutchouc, was named *S. Cahuchu* from its Indian name Cahuchu. The same plant was first called *Jatropha elastica* by the younger Linnæus; so that it is known and referred to by three names, and in some works these are considered to indicate distinct plants. Aublet has figured the plant, and Jussieu the details of its inflorescence.

Siphonia elastica is a tree fifty to sixty feet in height, common in the forests of Guiana and Brazil, and which has been introduced into the West Indies. Condamine frequently mentions it in his voyage down the Amazon. Caoutchouc [CAOUTCHOUC] is the milky juice of the plant which exudes on incisions being made, and solidifies on exposure to the air. Aublet states that a deep incision is first made into the wood near the bottom of the tree, another is then made longitudinally from the upper parts of the tree down to the first lateral and oblique incision, others are also made along the stem, which terminate in the longitudinal one, and the milky juice which exudes from all is collected in a vessel placed at the original incision. He also states that the nuts are edible, and Mr. Morney says that a caterpillar, which spins a tough coarse kind of silk, feeds on the leaves.

SIPHONI'FERA, M. D'Orbigny's name for an order of testaceous Mollusks, consisting of the families *Spirulidæ*, *Nautilidæ*, *Ammonitidæ*, and *Peristellidæ*, according to the arrangement of M. Rang. The latter family comprises the genera *Ichthyosarcolites* and *Belemnites*.

SIPHONOBRANCHIA'TA, M. De Blainville's name for the first order of his first subclass of Mollusks, *Paracephalophora dioica*. He describes the *Siphonobranchiata* as possessing organs of respiration constantly formed of one or two pectiniform *branchiæ*, situated obliquely on the anterior part of the back, and continued in a cavity, the superior wall of which is provided with a tubiform canal more or less elongated and attached to the columella; and arranges under the order the following families:—SIPHONOSTOMATA; ENTOMOSTOMATA; and *Angyostomata*.

The *Angyostomata* are described as differing very little from the other families as far as the *animal* is concerned, and as possessing a very large subventral foot, which can be folded together longitudinally for the purpose of being withdrawn into the shell.

The aperture of the *shell* of the family is described as being more or less notched anteriorly, generally very narrow, but always much longer than it is wide, and the columella as being straight or nearly straight.

The *operculum* is rudimentary in a certain number of genera, and entirely null in others.

The *genera* arranged under the *Angyostomata* are *Strombus*, *Conus*, *Terebellum*, *Oliva*, *Ancillaria*, *Mitra*, *Voluta*, *Marginella*, *Peribolus*, *Cypræa*, and *Ovula*.

SIPHO'NOPS, Wagler's name for a genus of Cæcilioïdians.

The first suborder of the Batrachians, the *Péromèles* of MM. Duméril and Bibron, consists but of one family, the *Ophiosomes* (snake-bodied Batrachians) or *Cæciloidians* Their round elongated form, without either tail or feet, approximates so closely to that of the serpents, that the greater number of authors have arranged them in the order Ophidians, acknowledging at the same time the anomalies which they present, and observing that they ought to form a very distinct group. [Serpents, vol. xxi., p. 281.]

The characters which lead to the classification of these reptiles into one family, and to their separation from all others, are, 1st, a body extremely extended in length, and of a cylindrical shape; 2nd, the absence of limbs or lateral appendages proper for locomotion; 3rd, a skin naked in appearance and viscous, but concealing between the circular folds which it forms many rows or rings of flat, delicate, imbricated scales, with free and rounded borders, resembling those of the greater part of the fishes; 4th, the rounded orifice of their cloaca situated below, very near the posterior extremity of the body, which is sometimes truncated, as it were, and rounded; sometimes obtusely pointed, as in the genus *Typhlops;* 5th, their head, as in all the Batrachians, is articulated to the spine by means of two distinct and separate condyles; 6th, their lower jaw moves upon the cranium without any separate articular bone, and the two branches which form it are short and very solidly soldered together towards the symphysis of the chin.

Scales of Cæcilia albiventris.

In the Serpents the occipital bone presents, below the vertebral hole, a single articular eminence, or condyle; and the structure and disposition of the jaws will be remembered by those who have referred to the article Serpents. The brevity of the jaws, and their construction in the Cæcilioïdians, reduce the aperture of their mouth to a very small diameter.

The bodies of the vertebræ of the Cæcilioïdians are doubly excavated into cones, instead of being concave before and convex behind. Their tongue is large, papillose, fixed by its borders upon the gums in the concavity of the jaw, and not protractile, nor forked, nor susceptible of entering into a sheath. The disposition and structure of their teeth are noticed in the article Serpents and more fully detailed in this.

Professor Owen observes that in the extinct family of the Labyrinthodonts [Salamandroides], the Batrachian type of organization was modified so as to lead directly from that order to the highest form of reptiles, viz. the loricate or crocodilian Saurians; that some of the existing edentulous genera of the *Bufonidæ* [Frogs] connect the Batrachian with the Chelonian order, and that the family founded upon the Linnean genus *Cæcilia* forms the transition to the ophidian reptiles. 'The characters,' says the Professor, 'which retain the *Cæciliæ* in the Batrachian order are generally known, and may be briefly enumerated as the double occipital condyle, the biconcave vertebræ, the smooth mucous integument with minute and concealed scales, and the branchial apertures retained by the young some time after their birth. In the fixed tympanic pedicle, and the anchylosed symphysis of the lower jaw, the *Cæciliæ* are also far removed from the typical ophidian structures; but the teeth, in their length, slenderness, sharp points, wide intervals, and diminished number, begin to exhibit the characters of the dental system of the serpent tribe.' (*Odontography.*)

The characters above set forth show the connection which these reptiles have with the Batrachians; but there is one striking feature, metamorphosis, which is not yet quite satisfactorily made out. Muller indeed states that he had observed young *Cæciliæ* whose neck was furnished with small branchial fringes, as will be hereafter more particularly noticed.

The departure in a degree of the *Cæcilioïdians* from the Batrachians is marked by the presence of small scales; by ribs which are forked at their vertebral extremity, and much more distinct than in the genus *Pleurodeles;* by the absence of a sternum; and especially by the form and structure of the mouth, the aperture of which is small, the lower jaw being shorter than the upper, and the teeth long, sharp, and generally curved backwards.

The *Cæcilioïdians* resemble many species of the osseous fishes of the division of the *Murænidæ* in the form and structure of the skeleton, the articulation of the jaws, the mode of implantation of the teeth, &c.; but the mode of junction of the head with the spine by means of two condyles, the presence of lungs and nostrils which open distinctly within the cavity of the mouth, and the entire absence of branchiæ, remove these animals from that class.

ORGANIZATION.

Skeleton.—The cranium presents above a single vaulted piece, in which no trace of orbits is perceptible. The lower jaw is not articulated with the skull by an intermediate bone, as in the birds, lizards, and serpents, but nearly as it is in the mammals, without however there being the slightest trace of a zygomatic bone. The branches of the lower jaw are joined anteriorly by a true suture, as in the lizards.

Professor Owen states that the teeth are implanted in a single row upon the maxillary, intermaxillary, and palatine bones, the upper jaw being thus provided with two semi-elliptical and sub-concentric series; that there are also two rows of equal-sized teeth on the premandibular bones of the lower jaw in certain species: the *Cæcilia,* he remarks, is the last example in the ascending survey which he has taken of the dental system of this disposition of teeth, which was so common in the class of fishes.

'There are,' writes the Professor, 'twenty teeth in the anterior or outer premandibular row in the lumbricoïd and white-bellied *Cæciliæ*, and ten or twelve of much smaller size in the second row. There are twenty teeth in the outer row of the upper jaw, of which six are supported by the intermaxillaries, and sixteen in the inner or palatine row. All these teeth are long, slender, acute, and slightly recurved. In the rostrated *Cæcilia* the first two teeth of the maxillary and premandibular series are longer and stronger than the rest: they are succeeded by small and recurved teeth; the median margins of the palatal bones are bristled with small teeth; the second row in the lower jaw is represented by two small recurved teeth on the internal border of the premandibular bones. In the modification of the dental system presented by this species may be perceived a retention of the Batrachian type. The annulated Cæcilia (*Siphonops annulatus*) has the maxillary and palatine teeth strong, pointed, and slightly recurved. In the glutinous and two-banded *Cæciliæ* (*Epicrium*), the teeth are slender, acute, and more inclined backwards, thus approaching nearer to the ophidian type; in the latter species (*Epicrium —Rhinatrēma—bivittatum*) the palatal series, instead of ranging concentrically with the outer row, is chevron-shaped with the angle turned forwards and rounded off. The teeth of the *Cæcilia* are sub-transparent; their intimate structure corresponds with that of the frog's tooth; but their mode of implantation resembles that of the teeth of the Labyrinthodonts, the base being anchylosed to the parietes of a shallow alveolus.' (*Odontography.*)

In the junction of the vertebræ there is an entire difference from that of the lizards and serpents, and a perfect approximation to that of the perennibranchiate batrachians and fishes. All the bodies of the vertebræ are hollowed, both before and behind, by tunnel-shaped cavities, in which ligamentous fibres are implanted; they are not really articulated, but placed one upon the other. Their superior spinous processes are like those of the *Amphisbænæ* and those in the neck of birds, in other words, depressed so as to present only a slight *carina.* Each body of a vertebra is furnished below with an apophysis curved backwards, and forked forwards for the reception of the eminence of the preceding vertebra. On the sides is seen a small projection, on which one of the bifurcations of the rib is applied, for the other and longer fork rests upon an inferior eminence. The ribs are short, straight, directed backwards, and triangular, forked as in the birds, and united to the vertebræ very nearly in the same manner.

Respiratory System.—In *Cæcilia lumbricoïdea* the rudiment of a lung only has been observed; and Meyer, who made this observation, and recognised also scales under the folds of the skin, conceives that these animals are species between the two orders of reptiles which he indicates under the name of *Ophisaurians* on account of the existence of the ribs and the presence of the single lung. Müller announced the existence of branchial holes in a young *Cæcilia* (*hypocyanea*) preserved in the Museum of Natural History at Leyden. He noticed an aperture of the size of a line on each side of the neck, at some lines' distance from the extremity of the buccal slit. This aperture was much wider than it was deep, situated in the yellow stripe which exists on the sides. The edge of the hole was rough (âpre), and in the interior were observed black fringes, which appeared to be fixed to the horns of the *os hyoïdes*, or branchial arcs; but they did not project beyond the external orifices. The holes themselves are in free communication with the buccal cavity. It must be remembered that this observation was made without dissection. The specimen is four inches and a half in length, whilst an adult individual, which showed no trace of holes, was more than a foot long.

Generation.—Mayer thinks that he observed two intromittent organs in the *Cæciliæ*. See further the remarks at the end of this article.

SYSTEMATIC ARRANGEMENT.

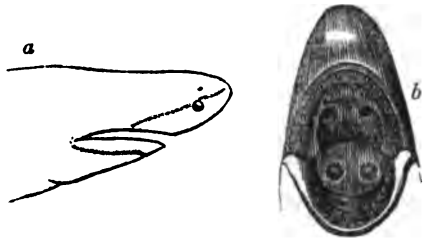
The position assigned to the Cæcilioïdians will be found in the articles REPTILES and SERPENTS. We will only here add that Müller proposes for them the name of *Gymnophids*, his first order of naked amphibians. The second order consists of the *Derotremes*, the third of the *Proteïdians*, the fourth of the *Salamandrines*, and the fifth of the *Batrachians*. Tschudi arranges the *Cæcilioïdians* between the Pipas and Salamanders, adopting the three genera of Wagler, who placed them between the *Amphisbænæ* and the *Batrachians*.

Geographical Distribution of the Suborder.—America, Asia, and Africa.

Genera.—*Cæcilia, Siphonops, Epicrium, Rhinatrema.*

Cæcilia.

Generic Character.—*Head* cylindrical; muzzle projecting. Maxillary and palatine teeth short, strong, conical, and slightly curved. *Tongue* velvety or cellulose, most frequently offering two hemispherical convexities corresponding to the internal orifices of the nostrils. Eyes distinct or not distinct through the skin. A fosset or false nostril below each nostril. (D. and B.)



Head of Cæcilia lumbricoidea.

a, seen in profile: b, mouth open, to show the tongue, the teeth, and the internal orifices of the nostrils. (Dum. and Bib.)

Geographical Distribution of the Genus.—Of the four species, one is Asiatic, one African, and two American.

Example, *Cæcilia lumbricoidea.*

Description.—The longest and most slender of the whole family, its length being more than ninety times the diameter of its body measured towards the middle. MM. Duméril and Bibron state that individuals fifty-three centimetres long have the thickness of a stout goose-quill; cylindrical; its body however being rather smaller in its last part than its first, excepting at the extremity, where it is always a little convex. The muzzle is wide and rounded; the maxillary and palatine teeth are rather long, sharp, a little sessile backwards, and separated from each other. The tongue adheres to all parts in the concavity formed by the submaxillary branches; its surface exhibits small vermiculiform folds and furrows, and there are two hemispherical convexities, corresponding to the internal orifices of the nostrils, which are great and oval. The external nostrils are two very small lobes situated on each side of the end of the muzzle, under which are seen two very small apertures, upon a portion of the border of each of which there seems to be a small tentacle. MM. Duméril and Bibron were unable to perceive the eyes through the skin, which is perfectly smooth over the whole head; that which envelopes the body is scarcely marked with circular folds, except at the posterior extremity, that is to say, at about the twenty-secondth of the length of the body, where there are from twelve to fifteen. When these folds are raised, large but delicate scales are discovered, bearing much resemblance to those of the carp, forming one or two verticillations, in the composition of which they show themselves to be very distinctly imbricated. The vent is situated under the terminal extremity of the body, which is rounded. The colour is of a brownish or olive tint.

Locality.—Surinam.

Siphonops. (Wagler.)

Generic Character.—*Head* and *body* cylindrical; muzzle short; maxillary and palatine teeth strong, pointed, and a little recurved; tongue large, entire, adhering on all sides, with a surface hollowed into small vermiculiform sinkings. Eyes distinct through the skin. A fosset or false nostril in front of and a little below each eye.

MM. Duméril and Bibron remark that the species of this genus generally have the muzzle shorter than the *Cæciliæ*, which gives their mouth the air of opening less under the head. The fossets or false nostrils are placed not under the muzzle, but under the eyes, a little more or less forward. The skin which covers the eye is sufficiently transparent to enable the observer to see that organ through. The border of their nostrils and false nostrils are without the least rudiment of a tentacle. Their teeth resemble those of the *Cæciliæ*; but their tongue, whose surface is furrowed with small vermiculiform sinkings, has no hemispherical protuberances.

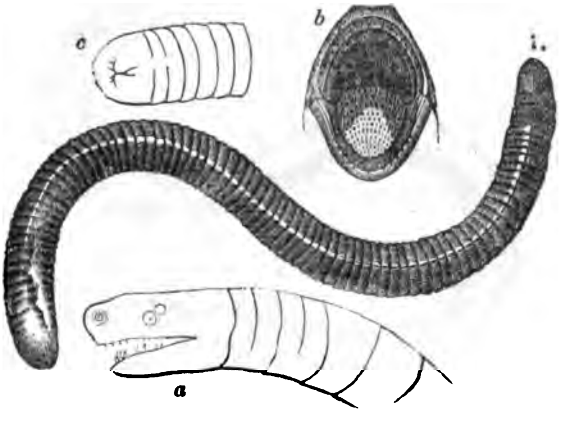
Geographical Distribution of the Genus.—Two species only are known, both American.

Example, *Siphonops annulatus* (*Cæcilia annulata*, Auct.).

Description.—Muzzle very short, very thick, very much rounded, hardly less than the back of the head. Nostrils opening on the sides of the muzzle, entirely at the end, and a little upward. False nostrils placed below each eye, and very slightly forward. Diameter of the body a sixteenth or seventeenth of its total length: it is rather strong, and perfectly cylindrical, of the same size throughout its extent. There are from eighty-six to ninety annular folds, slightly and equally separated from each other; these cease a little in front of the vent, so that the skin of the terminal extremity of the body, which is rounded, offers no wrinkles.

MM. Duméril and Bibron state that in no individual could they discover scales in the thickness of the skin, where they probably exist, as in the other *Cæciliæ*, but doubtless much smaller and more difficult of exposure, on account of the extremely close tissue, which renders it as it were coriaceous. Colour olive or bluish-ash, but, in all, the circular folds have a white tint.

Locality.—Cayenne and Surinam.



1, Siphonops annulatus very much reduced. a, head and neck seen in profile; b, mouth open, to show the tongue, the teeth, and the internal orifices of the nostrils; c, terminal extremity of its body seen below. (Dum. and Bibr.)

Epicrium. (Wagler. *Ichthyophis*, Fitzing.)

Generic Character.—*Head* depressed, elongated; *muzzle* obtuse; maxillary and palatine teeth of loose texture (effilées), sharp, and couched backwards. *Tongue* entire, with a velvety surface; eyes distinct through the skin, a fosset (with a tentaculated border?) below the eye, near the border of the upper lip. *Body* subfusiform, with numerous circular folds close-set one against the other. (Dum. and Bibr.)

Example, *Epicrium glutinosum; Cæcilia glutinosa*, Linn.: the only species known.

Description.—The diameter of the body taken near the middle is the twenty-second or twenty-third part of the total length. There are about three hundred and twenty-five folds, rather uniformly approximated. Those which occupy the two first thirds of the length of the trunk do not completely surround it, that is to say, they do not descend so as to meet under the belly. These same folds of the two first thirds of the length of the trunk are remarkable for breaking on a point of their circumference, so as to form, each of them, a very open chevron, the summit of which, directed forwards, is found placed on the medio-longitudinal line of the back. The other folds of the body, those, namely, which surround the last third of it, form complete rings. The scales which these folds hide are small, numerous, delicate, transparent, subcircular, and offering on their superior surface a small figure in relief, representing a net with quadrilateral meshes. A yellowish band extends to the right and left all along the body, from the muzzle to the anal extremity: above and below the tint is slate-colour.

Locality.—Java and Ceylon.

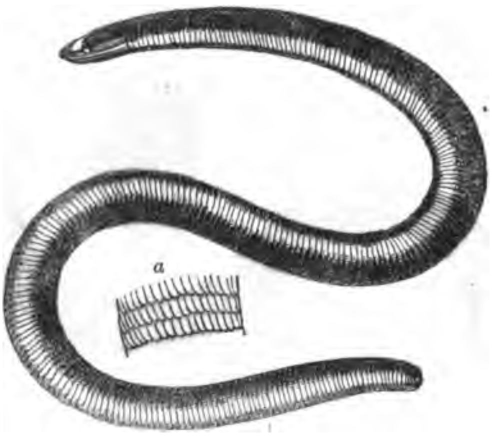
Rhinatrema. (Dum. and Bibr.)

Generic Character.—*Head* depressed, elongated; muzzle obtuse; maxillary and palatine teeth of loose structure (effilées), sharp, and couched backwards. *Tongue* entire, of a velvety surface. *Eyes* distinct through the skin. No fossets, neither under the muzzle nor below the eyes. *Body* subfusiform, with numerous circular folds.

Example, *Rhinatrema bivittatum*; *Cæcilia bivittata*, Auct.: the only species.

Description.—Head a little elongated and slightly depressed, bearing some resemblance in form to that of certain Ophidians, particularly of the *Coronellæ*. The teeth very loosely constructed (effilées), and very much couched backwards; the second row above, instead of forming a curved line like the first, makes an angle rounded at its summit. The diameter of the middle of the trunk is one twenty-sixth of the total length of the body, round which there are three hundred and forty perfectly annuliform folds. There exists a small conical tail. The folds of the skin may be easily raised by a point; and a great number of circular transparent scales, with a surface relieved by projecting lines, forming a sort of net. There is a large yellow band on each side of the body; the submaxillary branches, whose border is brown, are of the colour of the lateral bands, as well as the margin of the cloaca, and a small longitudinal stripe upon the tail.

Locality.—Cayenne?



Rhinatrema bivittatum. *a*, its scales.

MM. Duméril and Bibron terminate their account of the *Cæciliæ* with the following information.

M Leperieur, during his stay at Cayenne, having procured a living *Cæcilia*, which he placed in a vessel filled with water, he saw it bring forth, in the space of some days, from five to seven young, perfectly similar to their mother. Upon this MM. Duméril and Bibron observe that the *Cæciliæ*, in spite of their bearing a greater resemblance to the Batrachians than to the other reptiles, must be ovoviviparous. The fecundation of their germs must be effected in the interior of their body; and their metamorphoses must take place in the body of their mother, as in the case of the Black Salamander of the Alps. [CECILIANS.]

SIPHONOSTO'MATA, M. de Blainville's name for his first family of SIPHONOBRANCHIATA.

The forms comprised under this family are principally to be found under the extensive genus *Murex* of Linnæus. All the known animals belonging to it are carnivorous and marine, and all are furnished with a horny operculum. The *Siphonostomata* are thus subdivided by M. de Blainville:—

* No persistent *bourrelet* on the right lip.

Pleurotoma. (Lam.)

Generic Character.—*Animal ?*

Shell fusiform, slightly rugose, with a turriculated spire; aperture oval, small, terminated by a straight canal more or less long. The right lip trenchant and more or less incised.

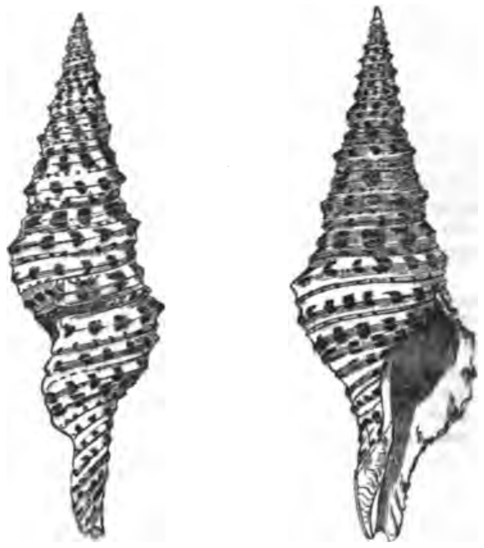
Operculum horny.

A. Species in which the incision is a little behind the middle of the lip, and the tube of considerable length.

Example, *Pleurotoma Babylonia.*

Description.—The shell fusiform-turreted, transversely carinated and belted, white, with black-spotted belts, the spots quadrate; whorls convex; tube or canal rather long.

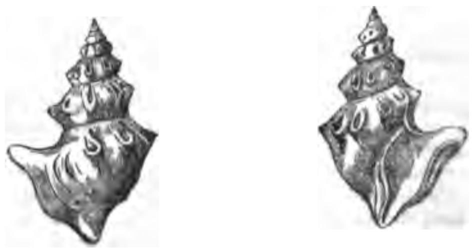
Locality.—The East Indian Seas and the Moluccas.



Pleurotoma Babylonia.

B. Species in which the incision is entirely against the spire, and whose tube is short. (Genus *Clavatula*, Lam.)

Example, *Pleurotoma auriculifera.*



Pleurotoma auriculifera.

This genus has been taken on different bottoms at depths varying from eight to sixteen fathoms.

Lamarck characterises 23 living species of *Pleurotoma*, and 30 fossil, the latter mostly from Grignon. Defrance makes the number of fossil species 95.

Mr. G. B. Sowerby has described in addition 36 living species collected by Mr. Cuming, M. Deshayes one, and Dr. Turton one. (*Synopsis Testaceorum*; *Zool. Proc.*, &c.) M. Deshayes in his tables makes the number of living species 71, and the number of fossil (tertiary) 150. Of these he records *Pl. Cordieri*, *Caumarmondi*, *Vulpecula*, *craticulata*, and a new species as both living and fossil (tertiary). In Europe the principal localities for the fossils are the calcaire grossier, the London clay, the contemporary beds near Bordeaux, and the Subapennine beds. Dr. Mantell notes an imperfect *Pleurotoma* in the blue clay of Bracklesham. Mr. Lea has described and figured eleven fossil species from the new tertiary at Claiborne, Alabama. Professor Sedgwick and Mr. Murchison notice three species, *prisca* (?), *fusiformis*, and *spinosa*, from the Gosau deposit and its equivalents in the Alps; and Mr. Murchison records two species, *Pleurotoma articulata* and *Pl. corallii*, in the Silurian rocks. (*Silurian System.*)

Rostellaria. (Lam.)

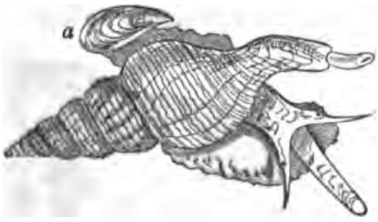
This genus, in our opinion, belongs to the STROMBIDÆ, under which article it will be described.

Fusus. (Lam.)

Generic Character.—*Animal* not differing much from that of *Murex*.

Shell fusiform, often ventricose in the middle, rugose, thick, and with a very elevated spire; canal very straight and elongated; aperture oval; right lip trenchant, the left smooth.

Operculum horny



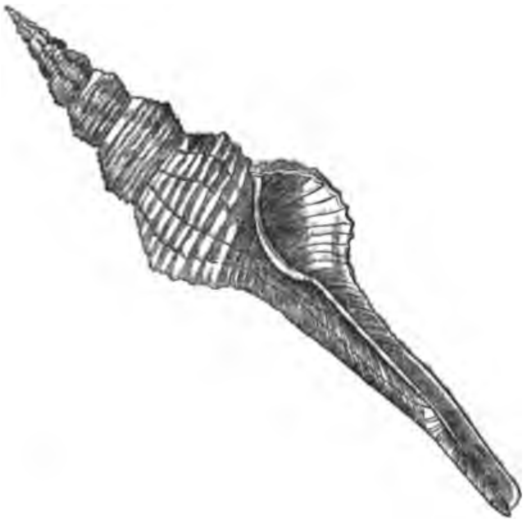
Animal of Fusus. a, operculum.

A. Turriculate or subturriculate, but not umbilicated species.

Example, *Fusus Colus* (*Murex Colus*, Linn.).

Description.—Shell fusiform, narrow, transversely furrowed, white, the apex and base rufous; whorls convex, nodulously carinated in the middle; canal long and slender; the lip sulcated within, and denticulate on the margin.

Locality.—The East Indian Ocean.



Fusus Colus.

B. Species subturriculated and umbilicated. (Genus *Latirus*, De Montf.)

Example, *Fusus filosus*.

Description.—Shell fusiform-turreted, thick, knotty, but smooth to the touch, whitish yellow girt with numerous orange-red lines; whorls knotty above, the knots hemispherical; the aperture white; the lip striated within.

Locality.—The seas of New Holland.

C. Subturriculate species, with the canal notched at the extremity.

Example, *Fusus articulatus*.

Description.—Shell fusiform-turreted, very delicately striated transversely, shining, saffron-coloured or violaceous-cœrulescent, girt with articulated bay lines; lip sulcated within; columella with one plait above; canal short and emarginate.

D. Species with the whorls of the spire rounded and convex.

Example, *Fusus Islandicus*.

Description.—Shell fusiform-turreted, ventricose below, not knobbed, transversely striated, white, the whorls convex; the lip thin, smooth within; the canal rather short and subrecurved.

Locality.—The seas of Iceland.

E. Muricoïd species.

Example, *Fusus muriceus*.

F. Buccinoïd species.

Example, *Fusus buccineus*.

Fusi have been found on bottoms of mud, sandy mud, and sand, at depths ranging from the surface to eleven fathoms.

Lamarck records 37 living species of *Fusus*, and 36 fossil, nearly all from France, and principally from Grignon. Defrance makes the number of the latter 70, four of which are analogues from Grignon, and one from the Plaisantin.

M. Deshayes in his tables gives sixty-seven as the number of living species of *Fusus*, and 111 as that of the fossil species (tertiary): of these he records *Fusi craticulatus*, *rostratus*, *strigosus*, *lignarius*, *sinistrorsus*, *Tarentinus*, *antiquus*, *brevicauda*, *carinatus*, *despectus*, and *Peruvianus*, both living and fossil (tertiary). Dr. Mantell notes one species (*longævus*) from the blue clay at Bracklesham. Professor Sedgwick and Mr. Murchison enumerate six species from the Gosau deposit and its equivalents in the Alps. Dr. Fitton notes *Fusi clathratus*, *quadratus*, *rigidus*, *rusticus*, and an indistinct species in the strata below the chalk. (*Observations on the Strata between the Chalk and Oolite*, &c., in *Geol. Trans.*, 2nd series, vol. iv.) Mr. Lea records sixteen new species from the tertiary beds at Claiborne, Alabama, and one from Maryland. (*Contributions to Geology*.)

Pyrula. (Lam.)

Generic Character.

Shell pyriform, in consequence of the lowness of the spire; the canal conical and very long or moderate, sometimes slightly notched; aperture oval, rather large; columella smooth and bent; right lip trenchant.

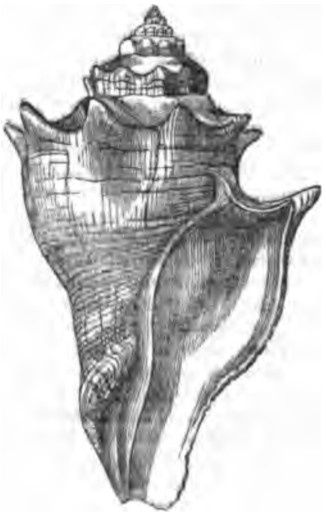
Operculum horny.

A. Subfusiform species; the spire being slightly elevated.

Example, *Pyrula carnaria*. (*Pyrula Vespertilio*, Lam.; *Fusus carnarius*, Mart.; *Murex Vespertilio*, Gm.)

Description.—Shell subpyriform, thick, ponderous, muricated anteriorly, of a rufous-bay colour; the last whorl crowned above with compressed tubercles; spire rather prominent; the sutures simple; canal sulcated and subumbilicated.

Locality.—East Indian Ocean.



Pyrula carnaria.

B. Species with a long and rather narrow tube; spire very short.

Example, *Pyrula Spirillus*.

Description.—Shell ventricose anteriorly, the canal very long, delicately striated transversely, white, spotted with saffron-colour; body-whorl abbreviated, carinated in the middle, flattened above, tuberculated below the middle; spire very much depressed, its apex mamilliferous.

Locality.—East Indian Ocean. Coasts of Tranquebar.

C. Species with a long and rather narrow tube, but sinistrorsal or left-handed, and with the indication of a plait on the columella or pillar. (Genus *Fulgur*, De Montf.)

Example, *Pyrula perversa*.

Description.—Shell sinistrorsal, pyriform, very ventricose, smooth, yellowish-white, ornamented with broad rufofuscous longitudinal lines; the last whorl crowned above with tubercles; the upper whorls tuberculiferous at the base; the canal or tube rather long and striated.

Locality.—The Antilles. Bay of Campeachy.

D. Species more ventricose and delicate.

Example, *Pyrula Ficus.*

Description.—Shell fig-shaped, delicately decussated, cœrulescent-grey; sprinkled with variegated bay or violet spots; transverse striæ the largest and most crowded; the spire short, convex, mucronated at the centre; mouth cœrulescent-violaceous generally.

Locality.—The East Indian Ocean. The Moluccas.

Pyrula Ficus.

E. Ventricose species, with a short tube; aperture very large and wide, sensibly notched.

Example, *Pyrula Melongena.*

Description.—Shell pyriform, turgidly ventricose, cœrulescent, glaucous, or rufous, banded with white; the whorls channelled at the sutures; the last sometimes unarmed, but more frequently muricated, with various sharp tubercles; spire short, acute; aperture smooth and white.

Locality.—West Indian Seas; Antilles.

F. Species still shorter; aperture very wide; the right lip subalated.

Example, *Pyrula abbreviata.*

Description.—Shell subpyriform, very ventricose, rather rough, transversely sulcated, cinerescent-white; the spire rather prominent; the canal short, widely umbilicated; muriculated on the back with subechinate elevated furrows; outer lip striated within, and its margin denticulated.

Pyrulæ have been found on mud, sandy mud, and sand, at depths ranging from the surface to nine fathoms.

The number of living species recorded by Lamarck is twenty-eight. M. Deshayes has described one more (*P. fulva*), and a variety of *P. Vespertilio*, Lam. Lamarck records six fossil species, four from Grignon and Courtagnon, one from Parnes, and one from Houdan. Defrance notices twelve, three of which, from the Plaisantin, he considers as analogous, and other three from the neighbourhood of Bordeaux, analogues also. M. Deshayes, in his tables, makes the number of living *Pyrulæ* thirty-one, and the number of fossil (tertiary) twenty-one; of these last he indicates *Pyrulæ reticulata, Ficus, Melongena,* and *Spirillus,* as being found both living and fossil (tertiary). Dr. Mantell records two species, *bulbiformis ?* and *lævigata,* from the blue clay of Bracklesham in Sussex, and one from the arenaceous limestone of Bognor. Dr. Fitton records three, *Brightii, depressa,* and *Smithii ?*, from the strata below the chalk (gault of Kent). Mr. Lea records three, *Pyrulæ cancellata, elegantissima,* and *Smithii,* from the tertiary beds at Claiborne, Alabama.

Fasciolaria. (Lam.)

Generic Character.

Animal of Fasciolaria. *a*, operculum.

Shell fusiform, not very thick, rather convex in the middle, with a moderate spire; aperture oval; canal rather long, sometimes slightly bent; right lip trenchant, often wrinkled internally; columellar lip with some very oblique plaits.

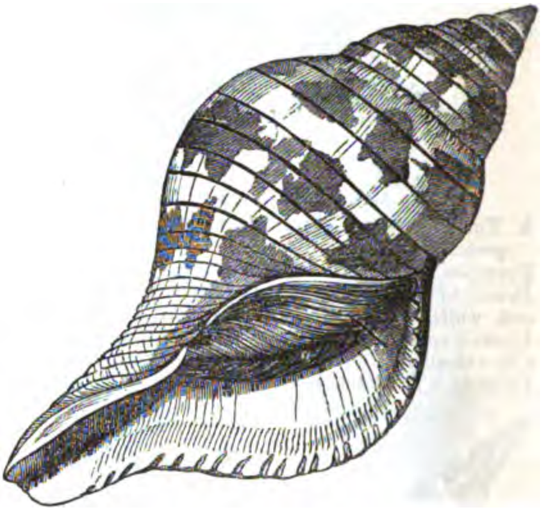
Operculum horny.

A. Fusiform, but not tuberculous species.

Example, *Fasciolaria Tulipa.*

Description.—Shell fusiform, ventricose in the middle, unarmed, smooth, sometimes orange-rufous, sometimes marbled with white and bay, girt with transverse brown lines unequally congregated; whorls very convex; sutures fimbriated at the margin; tube sulcated; outer lip white, and striated within.

Locality.—West Indian Seas; the Antilles.



Fasciolaria Tulipa, with the operculum in situ.

B. Fusiform and tuberculous species.

Example, *Fasciolaria Trapezium.*

Description.—Shell fusiform, ventricose, tuberculiferous, rather smooth, white or rufescent, girt with rufous lines; the tubercles conical, subcompressed, and in a single series in the middle of the whorls; columella reddish-yellow; outer lip elegantly striated within, the striæ red.

Locality.—The East Indian Ocean.

C. Tuberculated and turriculated species.

Example, *Fasciolaria filamentosa.*

Description.—Shell elongated, fusiform, turreted, transversely sulcated, white, painted with longitudinal orange-red stripes; middle of the whorls subangulated, and the whorls themselves crowned with short and compressed tubercles; the canal rather long; the outer lip striated within.

Locality.—The East Indian Seas.

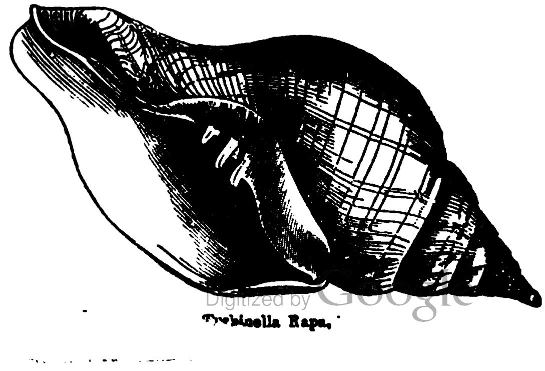
Fasciolariæ have been found on muddy bottoms, at depths ranging from the surface to seven fathoms.

Lamarck records eight living species. Mr. Broderip has described one (*granosa*) brought by Mr. Cuming from Panama. M. de Blainville states that seven fossil species are known. M. Deshayes, in his tables, makes the number of living *Fasciolariæ* seven only, and the number of fossil (tertiary) species five. Professor Sedgwick and Mr. Murchison record one species (*Fasciolaria elongata*) in the Gosau deposit and its equivalents in the Eastern Alps. Mr. Lea notices two, *Fasciolariæ plicata* and *elevata,* in the Claiborne tertiary, Alabama.

Turbinella. (Lam.)

Generic Character.—*Animal* imperfectly known.

Shell ordinarily turbinated, but also sometimes turriculated, rugous, thick; spire rather variable in form; aperture elongated, terminated by a straight canal, often sufficiently



Turbinella Rapa.

short; the left lip nearly straight and formed by a callosity hiding the columella, which has two or three unequal, nearly transverse plaits; right lip entire and trenchant.

A. Fusiform and nearly smooth species.

Example, *Turbinella Rapa.*

Description.—Shell subfusiform, ventricose in the middle, thick, very ponderous, unarmed, white; the whorls above covering the base of the preceding one; canal rather short; columella subquadriplicated.

Locality.—The East Indian Ocean.

B. Turbinaceous and spiny species.

Example, *Turbinella Scolymus.*

Descripion.—Shell subfusiform, ventricose in the middle, tuberculated, pale yellow; spire conical, tuberculato-nodose; the last whorl crowned above with great tubercles; canal transversely sulcated; the columella orange-coloured and three-plaited.

Locality.—The East Indian Ocean.

C. Turriculated, subfusiform species.

Example, *Turbinella Infundibulum.*

Description.—Shell fusiform-turreted, narrow, many-ribbed, transversely sulcated, the ribs longitudinal and thick, the furrows smooth and red, and the interstices yellow; canal perforated, the aperture white.

Turbinellæ have been found on bottoms of sandy mud, at depths varying from the surface to eighteen fathoms.

Lamarck records 23 living species, all from the seas of warm climates. Mr. Broderip describes three more brought by Mr. Cuming from the Galapagos Islands, Elizabeth Island, and the Caracas. M. de Blainville observes that when he wrote (1825) no fossils had been found. M. Rang (1829) states that there are fossil species. M. Deshayes, in his tables, makes the number of living species 32 and the number of fossil (tertiary) 3.

* * A persistent *bourrelet* on the right lip.

Columbella. (Lam.)

Generic Character.—Animal incompletely known.

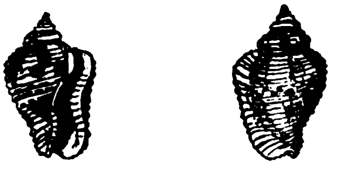
Shell thick, turbinated, with a short obtuse spire; aperture narrow, elongated, terminated by a very short canal slightly notched, narrowed by a convexity at the internal side of the right lip and the plaits of the columella.

Operculum horny, very small.

Example, *Columbella mercatoria.*

Description.—Shell ovate-turbinated, transversely sulcated, white, painted with small, rufo-fuscous, transverse, subfasciculated lines, sometimes banded; outer lip denticulated within.

Locality.—The Atlantic Ocean.



Columbella mercatoria.

Columbellæ have been found on bottoms of sandy mud and mud at depths ranging from the surface to sixteen fathoms.

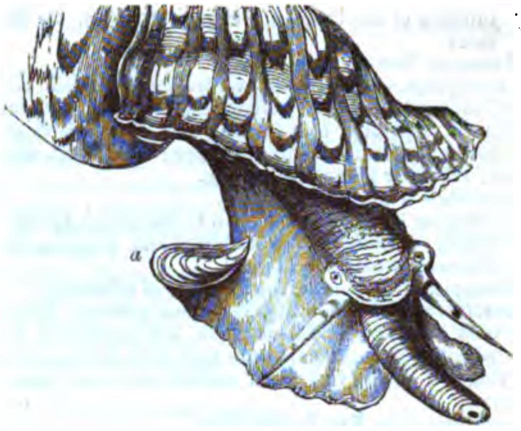
Lamarck describes eighteen species, all from the seas of warm climates. M. de Blainville acknowledges that this genus would perhaps be better placed among the operculated *Angyostomata*, or narrow-mouthed testaceous gastropods. M. Rang however arranges it between *Triton* and *Turbinella*. Mr. G. B. Sowerby has described thirty-nine additional species brought home by Mr. Cuming. Defrance notices one fossil species. M. Deshayes, in his tables, makes the number of living species thirty-three and of fossil (tertiary) four. M. de Blainville remarks that the *Columbella avara* of Say has not the character of the thickened right lip.

Triton. (Lam.)

Generic Character.—Animal a good deal resembling that of *Murex*.

Shell oval, with the spire and canal straight and moderate; ordinarily rugose, furnished with few varices, which are scattered and arranged longitudinally; aperture suboval, elongated, terminated by a short open canal; the columellar lip less excavated than the right, and covered by a callosity.

Operculum horny and inclined to oval.



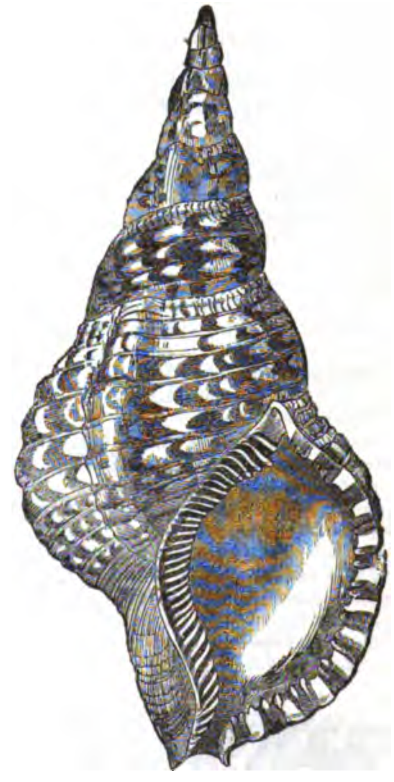
Animal of Triton.
a, operculum.

A. Comparatively smooth species, with cordons slightly or not at all marked, with the exception of that of the right lip.

Example, *Triton variegatus*, the marine trumpet or Triton's shell.

Description.—Shell elongated-conical, trumpet-shaped, ventricose below, girt with very obtuse smooth ribs, white, elegantly variegated with red and bay; the sutures crisped at the margin; the aperture red; the columella wrinkled with white and with a single plait above; the edge of the outer lip spotted with black, the spots bidentated with white.

Locality.—The seas of the West Indies and the Asiatic seas, especially those of the torrid zone.



Triton Variegatus.

B. Species more tuberculous, or spiny, whose aperture is more open, and terminated by a more or less ascending canal. (Genus *Lotorium* of De Montfort.)

Example, *Triton Lotorium.*

Description.—Shell fusiform-turreted, distorted below, very much tuberculated, transversely rugous, and striated, rufous; the whorls above angulate-tuberculated; canal tortuous, the extremity recurved, the aperture trigono-elongated and white; the outer lip toothed within.

Locality.—East Indian Ocean.

C. Species with a shorter spire, always very tuberculous, most frequently umbilicated, a sinus at the posterior junction of the two lips. (Genus *Aquillus*, De Montfort.)

Example, *Triton cutaceus*.

Description.—Shell ovate, ventricose-depressed, cingulated, tuberculato-nodose, yellow-rufescent; the belts rather prominent, separated by a furrow; the whorls above angulato-tuberculate, rather flattened above; canal short, umbilicated; the outer lip notched within.

Locality.—The Atlantic Ocean.

D. Species like those of section C, but whose aperture is closely narrowed by a callosity and irregular teeth. (Genus *Persona*, De Montf.)

Example, *Triton Anus*, the Grimace of collectors.

Description.—Shell ovate, ventricose-gibbous, distorted, flattened beneath; nodulous above, subcancellated, white, spotted with rufous; the aperture narrowed, sinuous, irregular, ringent; the lip very much toothed; the canal short and recurved.

Locality.—The East Indian Seas.

Tritons have been found on various bottoms at depths ranging from the surface to thirty fathoms.

The number of living species recorded by Lamarck amounts to fifty-one. Mr. G. B. Sowerby has described eight additional species, and Mr. Broderip the same number brought home by Mr. Cuming. Lamarck describes three fossil species, all from Grignon. M. de Blainville states that one of the species has its analogue. Defrance makes the number of fossil species ten, one from the Plaisantin, an analogue according to Brocchi. M. Deshayes in his tables, published before the descriptions of Mr. Sowerby and Mr. Broderip, makes the number of living species of *Triton* 43 and of fossil (tertiary) 25. Of these last, he records *Tritones nodiferus*, *Lampas*, *Scrobiculator*, *succinctus*, *clathratus*, and *unifilosus* as both living and fossil (tertiary).

Struthiolaria. (Lam.)

Generic Character.

Shell oval, the spire elevated, the aperture oval and wide; canal very short, very much notched; right lip sinuous, not toothed, furnished with a bourrelet; columellar border callous, extended; a sinus at the posterior union of the two lips.

Operculum horny.

Example, *Struthiolaria nodulosa*.

Description.—Shell ovate-conical, thick, transversely striated, white, painted with undulated, longitudinal, saffron-coloured flame-like lines; whorls angulated above, flattened on the upper side, nodulous at the angle; the sutures simple, the outer lip luteo-rufescent within.

Locality.—The seas of New Zealand.

Lamarck records two living species. M. Deshayes, in his tables, also makes the number of living species two; and he records one fossil (tertiary), with a query, from Paris.

Ranella. (Lam.)

Generic Character.

Shell oval or oblong, depressed, having only two varices situated laterally; aperture oval; canal short, and a sinus at the union of the two lips, backwards.

A. Non-umbilicated species. (Genus *Bufo*, De Montf.)

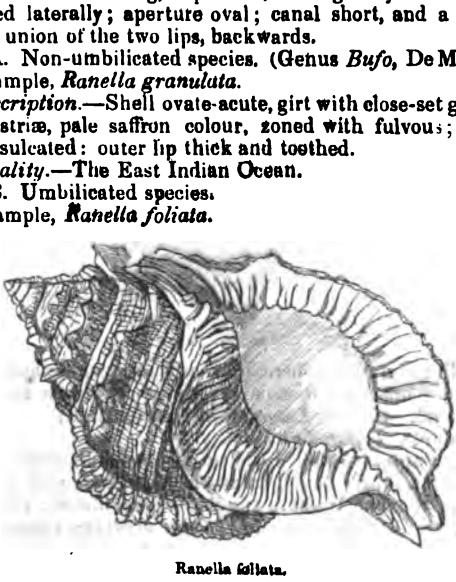
Example, *Ranella granulata*.

Description.—Shell ovate-acute, girt with close-set granulated striæ, pale saffron colour, zoned with fulvous; columella sulcated: outer lip thick and toothed.

Locality.—The East Indian Ocean.

B. Umbilicated species.

Example, *Ranella foliata*.



Ranella foliata.

Description.—Shell ovate conical, ventricose, not compressed, of a flesh or pale rose-colour; with frequent transverse, subgranulated, low ridges, the interstices between which are longitudinally striated; the whorls armed with one row of sharp tubercles, the middle of which are the longest, the other ridges of the body whorl obsoletely tuberculated here and there; the columellar lip expansive and foliated, and the margin of the outer lip expanded and thin; the aperture ovate, very strongly and thickly furrowed, of a rich orange-colour, and terminating above in a deep foliated sinus, which extends beyond the varix. (Brod.)

Locality.—The Mauritius.

Ranellæ have been taken on different bottoms at depths varying from the surface to eleven fathoms.

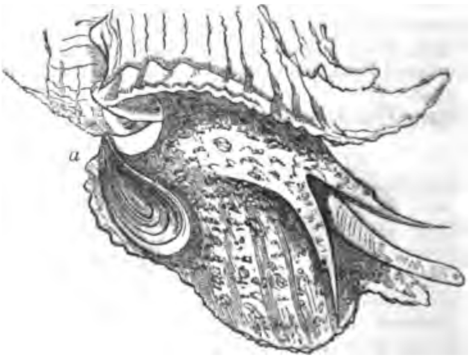
Lamarck describes fifteen living species. M. Deshayes has described another; and Mr. Broderip nine new species, eight of which were brought home by Mr. Cuming. M. de Blainville states that there is but one fossil species, but allows that Defrance admits five, three of which, from Italy, are identical. M. Deshayes, in his tables, gives the number of living species as nineteen, and of fossil (tertiary) as eight: of these last he records *Ranellæ gigantea*, *granulata*, *pygmæa*, and *tuberosa*, as living and fossil (tertiary).

Murex. (Linn.)

Generic Character.—*Animal* furnished with two long and approximated tentacles; mouth without jaws, but armed with hooked denticles in lieu of a tongue; foot rounded, generally rather short; mantle large, often ornamented with fringes on the right side only; branchiæ formed of two unequal pectinations; anus on the right side in the branchial cavity; orifice of the oviduct on the right side at the entrance of the same cavity; orifice of the deferent canal at the end of the exciting organ, on the right side of the neck.

Shell.—Oval, oblong, more or less elevated on the spiral side, or prolonged forwards; external surface always interrupted by rows of varices in the form of spires or ramifications, or simply tubercles, generally arranged in regular and constant order; aperture oval, terminated anteriorly by a straight canal, which is more or less elongated and closed; right lip often plaited or wrinkled; columellar lip often callous.

Operculum horny.



Animal of Murex.

a, operculum.

A. Species with a very long and spiny tube. (*Thorny Woodcocks* of collectors.)

Example., *Murex Tribulus*, Linn. (*Murex tenuispina*, Lam.)

Description.—Shell ventricose anteriorly, the tube very long, elegantly spired throughout its length, the spires set in triple order, each row at regular intervals, greyish or purplish grey; the spires very long, thin, rather closely set, and somewhat hooked; body of the shell transversely sulcated and striated; the spire prominent.

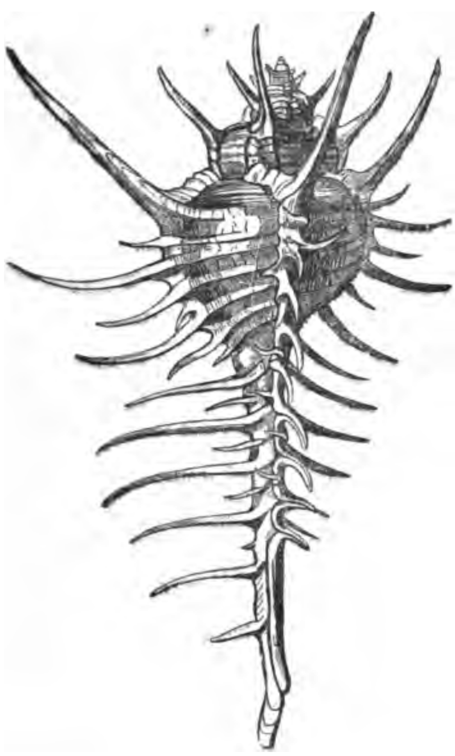
Locality.—The Indian Ocean; Moluccas.

This is the *Venus's Comb* of collectors, and when perfect is a most delicate and striking shell.

B. Species with a very long tube and without spines. (Genus *Brontes*, De Montf.)

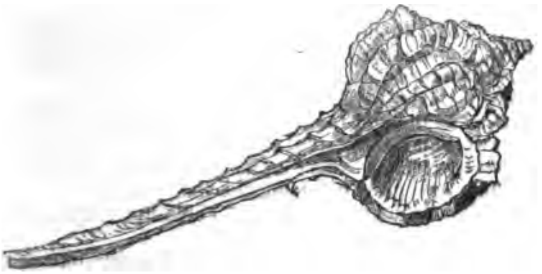
Example, *Murex Haustellum* (*Snipe's or Woodcock's head* of collectors).

Description.—Shell anteriorly ventricose, naked, scarcely armed, fulvous inclining to red, lineated with bay; body of the shell rounded and furnished with three or more ribs between the varices; the tube very long and slender; the spire short; mouth roundish, red.



Murex Tribulus (Common Thorny Woodcock; Murex rarispina, Lam.):

Locality, the East Indian Ocean; Moluccas.



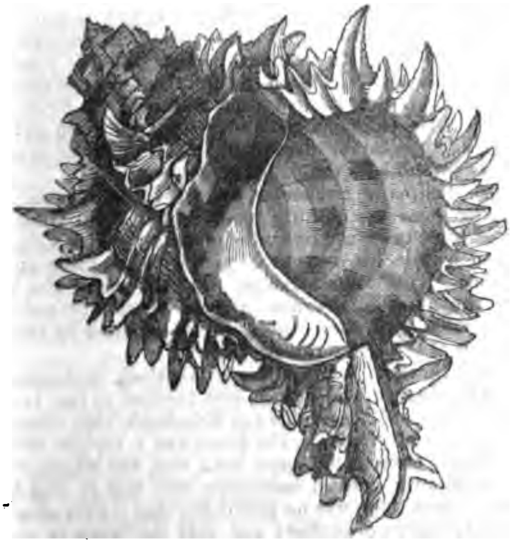
Murex Haustellum.

C. Species with three elevated, flattened, and comparatively thin varices.

Example.—*Murex acanthopterus*.

Description.— Shell oblong, fusiform, trialated, transversely sulcated and striated, white; the alæ membranaceous; whorls angulated; aperture ovate-rounded.

Locality.—East Indian Seas.



Murex regius.

D. Species with three ramified varices. (Genus *Chicoreus*, De Montf.)

Example, *Murex adustus*.

Description.—Shell abbreviate-fusiform, suboval, ventricose, thick, with three rows of frond-like ramifications, transversely sulcated, black; the fronds short, curved and dentate-muricated; the tubercle of the interstices very large; aperture small, roundish, white.

Locality.—East Indian Ocean.

E. Species which have a greater number of varices; the tube nearly closed.

Example, *Murex regius*.

No description can convey an adequate idea of the splendid colouring of this species when it is in fine condition; the form is given below.

Locality.—The western coast of Central and South America.

F, Subturriculated species.

Example, *Murex lyratus*.

Description.—Shell fusiform-turreted, thin, multifariously varicose, horny-fulvous; the varices thin and lamelliform; the interstices smooth; the whorls convex; the tube short.

G. Subturriculated species; the tube closed; a tube pierced towards the posterior extremity of the right side, and persistent upon the whorls of the spire. (Genus *Typhis*, De Montf.)

Example, *Murex pungens*, fossil.

H. Species more globular; the spire and canal shorter, very open; the aperture rather wide,

Example, *Murex vitulinus*.

Description.—Shell ovate-oblong, ventricose, somewhat rough, with seven rows of varices, which are obtuse, asperulate, and ruddy; the interstices white; tube narrow, somewhat acute; the aperture white; the lip toothed internally

I. Species which have an oblique fold very much anterior to the collumella, and an umbilicus. (Genus *Phos*, De Montf.)

Murices have been found on different bottoms at depths ranging from five to twenty-five fathoms; and species of *Typhis* on sandy mud at depths varying from six to eleven fathoms.

Lamarck records 66 recent and 15 fossil species, mostly from Grignon. To the recent species are to be added 26 *Murices* described by Mr. Broderip from specimens brought home by Mr. Cuming, and 5 of *Typhis* (recent), also described by Mr. Broderip.

M. de Blainville remarks that among the fossil species of France there is no true analogue; but he adds that Defrance, who admits 50 fossil species, counts 30 analogues from the Plaisantin, after Brocchi.

M. Deshayes, in his tables, makes the number of recent species of Murex (apparently including *Typhis*) 75, a number much below the mark, and gives 89 as the number of fossil species (tertiary). Of these last he records the following as having been found both living and fossil (tertiary):—*cornutus*, *Brandaris*, *trunculus*, *erinaceus*, *tripterus*, *cristatus*, *fistulosus*, *tubifer*, a new species, *elongatus*, *angularis*, *saxatilis* (var.), another new species, *Lasseignei*, and a third new species.

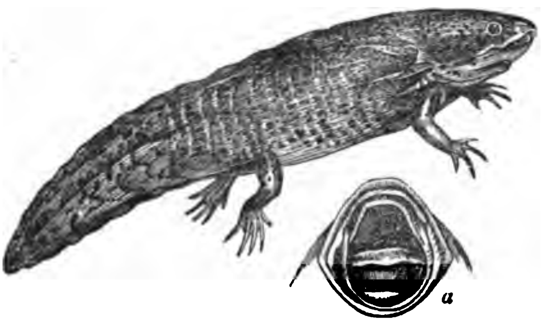
Dr. Mantell records one species (*argutus*) from the blue clay of Bracklesham (Sussex); and another (*Smithii*) from the arenaceous limestone of Bognor. Professor Phillips names one (*Haccanensis*) from the coralline oolite of Yorkshire. Dr. Fitton records one (*Calcar*) from the gault of Kent and Blackdown; and Mr. Lea one from the Claiborne tertiary, Alabama.

The ENTOMOSTOMATA and *Siphonostomata* may be considered as the two great tribes of carnivorous gastropods or trachelipods appointed to keep down the undue increase of the CONCHIFERA and herbivorous gastropods, whose shells the majority of those carnivorous testaceans penetrate by means of an organ which makes a hole as truly round as if it had been cut by an auger, and then feed on the juices of the included animal.

Dr. Buckland notices this habit with a view to the condition of the testaceous inhabitants of the earlier seas of our planet with his wonted felicity. 'Most collectors,' says the Professor, 'have seen upon the sea-shore numbers of dead shells, in which small circular holes have been bored by the predaceous tribes, for the purpose of feeding upon the bodies of the animals contained within them; similar holes occur in many fossil shells of the tertiary strata, wherein the shells of carnivorous trachelipods also abound; but perforations of this kind are extremely rare in the fossil shells of any older formation. In the green-sand and oolite they have been noticed only in those few cases where they are accompanied by the shells of equally rare carnivorous mollusks; and in the lias and strata below it,* there are neither perforations, nor any shells having the notched mouth peculiar to perforating carnivorous species. It should seem from these facts that, in the economy of submarine life, the great family of carnivorous trachelipods performed the same necessary office during the tertiary period which is allotted to them in the present ocean. We have further evidence to show that in times anterior to and during the deposition of the chalk, the same important functions were consigned to other carnivorous mollusks, viz. the testaceous cephalopods: these are of comparatively rare occurrence in the tertiary strata and in our modern seas; but throughout the secondary and transition formations, where carnivorous trachelipods are either wholly wanting or extremely scarce, we find abundant remains of carnivorous cephalopods, consisting of the chambered shells of *nautili* and ammonites, and many kindred extinct genera of polythalamous shells of extraordinary beauty. The molluscous inhabitants of all these chambered shells probably possessed the voracious habits of the modern cuttle-fish; and by feeding like them upon young *testacea* and *crustacea*, restricted the excessive increase of animal life at the bottom of the more antient seas. Their sudden and nearly total disappearance at the commencement of the tertiary era would have caused a blank in the "police of nature," allowing the herbivorous tribes to increase to an excess that would ultimately have been destructive of marine vegetation, as well as of themselves, had they not been replaced by a different order of carnivorous creatures, destined to perform in another manner the office which the inhabitants of the ammonites and various extinct genera of chambered shells then ceased to discharge. From that time onwards we have evidence of the abundance of carnivorous trachelipods, and we see good reason to adopt the conclusion of Mr. Dillwyn, that in the formation above the chalk the vast and sudden decrease of one predaceous tribe has been provided for by the creation of many new genera and species possessed of similar appetencies, and yet formed for obtaining their prey by habits entirely different from those of the cephalopods. The design of the Creator seems at all times to have been to fill the waters of the seas and cover the surface of the earth with the greatest possible amount of organised beings enjoying life; and the same expedient of adapting the vegetable kingdom to become the basis of the life of animals, and of multiplying largely the amount of animal existence by the addition of *carnivora* to the *herbivora*, appears to have prevailed from the first commencement of organic life to the present hour.' (*Bridgewater Treatise.*)

SI'RACUSE. [SYRACUSÆ.]

SIRE'DON, Wagler's name for the AXOLOTL. Since that article was written, further information has been obtained relative to the structure of this genus of perennibranchiate Batrachians. The form and character of the teeth, as given by Professor Owen, will be found in the article SALAMANDRIDÆ, vol. xx., p. 328, and we avail ourselves of this opportunity to introduce a reduced copy of the figure of the animal, lately published by MM. Duméril and Bibron, to whose excellent work on Reptiles we refer for the latest particulars known.



Siredon seen in profile; *a*, mouth seen in front, open to show the teeth.

We shall confine ourselves in this article to an account of its organization, as observed by Cuvier, so that the reader may have some notion of its relationship to the other perennibranchiate Batrachians.

Cuvier then remarks that the Axolotl approaches nearly to the Salamander, and especially to its larva. The cranium of the Axolotl is indeed more depressed; its sphenoïd bone wider and flatter; the bones of the nose proportionally smaller; the ascending apophyses of the intermaxillary bones longer and narrower; but, especially, in lieu of those large and fixed bones which Cuvier calls vomers or palatines, there are two oblong plates detached from the cranium beset with teeth in quincuncial order, and continuing themselves with the pterygoïds, which reach them because they are longer than in the Salamander, and which also carry teeth in front on their external edge. Behind, these pterygoïds are widened, without always articulating themselves to the sphenoïd, as in the Salamander of the Alleghanies. [SALAMANDRIDÆ, vol. xx., p. 332.] The space between the orbital and the petrous bone is also more considerable than in the Salamanders. The lower jaw has a regular dental portion forming the symphysis and the greatest part of the external surface, and armed all along its superior edge with small, fine, and pointed teeth; an articular portion, which doubles the posterior part of the internal surface of the preceding, forms the posterior angle and carries the articular tubercle; lastly, there is a true opercular bone, long and delicate, covering at the internal surface the interval of the two preceding, but furnished throughout with very small pointed teeth arranged in quincuncial order. And this is the structure which we find in the SIREN, with this difference, that the dental portion in the latter has no true teeth, which are only seen on the opercular bone.

In all the Axolotls that Cuvier examined, the branchial apparatus was cartilaginous. It consisted of two suspensory branches, or anterior horns, affixed to the cranium under the fenestra rotunda, carrying an unequal piece, to which two lateral branches were attached on each side: the first carried the first arch of the branchiæ; the second, the three others. The first of these arches had dentilations on its posterior border; the two intermediate ones, on both their borders. Under the unequal piece was one which went backward, and whose extremity was bifurcated.

When Cuvier wrote this description (in the *Ossemens Fossiles*), he thought that this animal was the larva of some unknown Salamander; but in his last edition of the *Règne Animal* he corrected this conjecture, and placed it where all zoologists now place it, among the Batrachians.

SIREN (Zoology), a genus of Perennibranchiate Batrachians.

Generic Character.—Form elongated, nearly like that of the eels; branchial tufts three on each side; no posterior feet, nor any vestige of a pelvis; head depressed; gape of the mouth not wide; muzzle obtuse; eye very small; the ear concealed; lower jaw armed with a horny sheath and several rows of small teeth; the upper jaw toothless; but numerous small, pointed, retroverted teeth occur on the palatal region. [SALAMANDRIDÆ, vol. xx., p. 328.]

Dr. Garden appears to be the first who called attention to this form, which is declared by Cuvier to be one of the most remarkable of the class of Reptiles, and indeed of the whole animal kingdom, from the anomalies of its organization, and its apparent relationship with different families, and even classes. Dr. Garden (1765-1766) sent a description of this reptile to Linnæus and Ellis, and the former, relying upon Dr. Garden's assurance that the Siren did not change its form, established an additional order for it in his class *Amphibia*, with the name of *Meantes*.

Pallas, Hermann, Schneider, and Lacépède however saw, as Cuvier remarks, nothing more in the *Siren* than the larva of some large unknown Salamander; whilst Camper, followed by Gmelin, went so far as to give it a place among the fishes. The latter arranges it at the end of the Eels, under the name of *Muræna Siren*. These differences of opinion sufficiently show the doubts which arose on the examination of this extraordinary form.

Cuvier, in 1807, satisfactorily established, in a memoir read to the Institute of France, and inserted in the 1st vol. of the 'Zoological Observations of Humboldt,' that whatever changes it might undergo, the Siren was a reptile *sui generis*, which never could have hind feet, and whose whole bony framework differed essentially from that of the Salamanders; that there was no probability that it ever changed its form or lost its *branchiæ*; and that the *Siren* is consequently a true amphibian, which respires at will throughout its life, either in the water by means of branchiæ, or in the air by means of lungs. This conclusion rested upon that solid basis which has given such value—a value daily becoming more appreciated—to the views of this great zoologist,—his personal observations made on the osteology and splanchnology of the animal.

---

* Carnivorous gastropods occur in the Silurian rocks; and the long tube of the *Siphonostomata* is equally characteristic of carnivorous habits with the notch of the *Entomostomata*.

Dr. Garden had, in his correspondence with Linnæus and Ellis, come to the same conclusion from other evidence. Dr. Garden had observed the animal from the length of four inches to that of three feet and a half; he had satisfied himself that in the whole province there was not, with the exception of the alligator, any Saurian or Salamander which exceeded six or seven inches in length, and he had convinced himself that it was oviparous, and that it propagated without losing its branchiæ.

In 1766 Hunter, as we shall presently see, declared the Siren to be a complete form, on the most satisfactory evidence: the specimens dissected by him were brought from South Carolina in 1758.

That the *Siren* is a perfect animal belonging to the perennibranchiate batrachians is now admitted by all zoologists. Cuvier indeed remarks (*Règne Animal*), that the branchiæ of *Siren intermedia* and *Siren striata* have been regarded as not participating in their respiration, and that in consequence Mr. J. E. Gray has formed them into the genus *Pseudobranchus*. Cuvier however adds, that it is, nevertheless, not difficult to see on their lower surface folds and a vascular apparatus, the use of which does not appear doubtful to him; and that M. Leconte has satisfactorily demonstrated that both these species, as well as *Siren lacertina*, are perfect animals.

Cuvier remarks that the *Siren* should be judged of not after *Amphiuma*, but from itself. He accordingly procured some sirens, and saw an osteology so finished and so firm, that it was impossible to believe that they were not adult. The branchiæ of these individuals were perfectly entire, and their lungs completely developed, and rich in well-filled vessels. No doubt therefore existed in his mind that the animals used both.

He observes, that it had been objected that it would be impossible for these animals to respire air without ribs or diaphragm; and without the power possessed by the tortoises and frogs to cause it to enter by the nostrils, in order that, so to speak, it might be swallowed, because the nostrils of the Sirens do not lead into the mouth, and the branchial apertures must let it escape. But his own observations made upon well-preserved individuals showed Cuvier that the nostrils in the siren *do* communicate with the mouth by a hole pierced, as in the *Proteus*, between the lip and the palatal bone which carries the teeth. The membranous opercula of their branchiæ are muscular internally, and capable of hermetically sealing the apertures; then it is very easy for the siren, by dilating its throat, to introduce the air into the mouth, and to force it afterwards, by contracting the throat, into its larynx. Even without this structure of the nostrils, the animal could produce the same effect by opening its lips a little: a theory which Cuvier applies to the *Proteus* as well as the *Siren*.

The simultaneous existence, observes the same author, of a larynx and a trachea with a branchial apparatus not only permanent, but perfectly ossified in many of its parts, is also worthy of especial attention, and proves, as is evident in the frogs and salamanders, that the branchial apparatus is no other than a more complicated os hyoides, and not a combination of pieces proceeding from the sternum and larynx. He adds, that it is to the salamanders that the sirens approach most nearly by the structure of the head, although neither the general form nor the proportions of the parts have so near similarity.

Having thus given a general view of the conformation of this extraordinary animal, we proceed to a sketch of the details of its

ORGANIZATION.

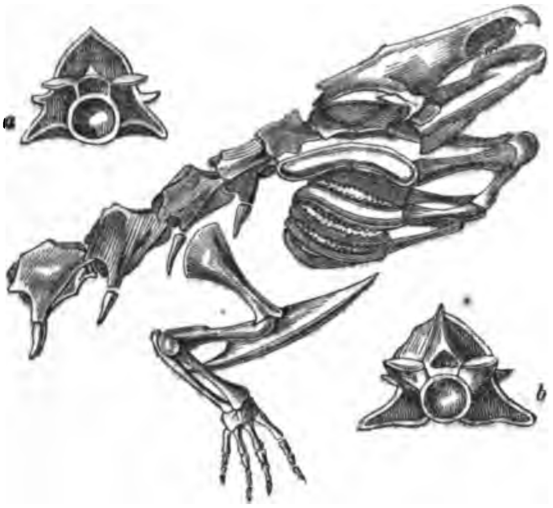
Skeleton.—The *skull* of the siren is narrowed in front by reason of the excessive reduction of the maxillary bones, which consist only of a very small osseous point. Behind there is a strong occipital crest on the parietal and petrous bones. The pieces which form the lower jaw, instead of being transverse like the branches of a cross, are directed obliquely forwards. The parietal bones occupy the greatest portion of the upper part of the cranium. They have each in front a point, expanding so as to lodge between them the posterior part of the principal frontal bones, which have each a groove for the lodgment of the posterior point of two slender bones, which proceed beside each other to the end of the muzzle. At their sides are attached two other bones, which are slender and pointed backwards, and which descend and widen far in order to raise the anterior edge of the jaw. Cuvier takes the first for the nasal bones, and the others for intermaxillary bones. These last are toothless, but their edge is trenchant, and furnished, when the animal is alive or well preserved, as well as the edges of the lower jaw, with a sheath which is nearly horny, is easily detached from the gum, and has its analogue in the tadpoles of the frogs. [SALAMANDRIDÆ, vol. xx., p. 328.] Between them, at the end of the osseous muzzle, is an aperture, but not that of the nostrils. In the recent animal it is closed, and the nostril is pierced on each side on the outside of the intermaxillary bone. In the crocodile the intermaxillary adheres to the external side of the nasal bone, and all the reptiles, except the crocodile, have the nostril on the outside of the ascending apophysis of the intermaxillary bone; but the peculiarity in the Siren is, that the intermaxillary ascending to the frontal bone entirely separates the nasal bone from the frame of the external nostril. The maxillary bone excludes the nasal in the same way in the chameleon. A very small bone, suspended in the flesh below the external nostril, and without any tooth, is the sole perceptible vestige of the maxillary bone. The cavity of the nostril is covered below with a simple ligamentous membrane. The internal nostril is situated on each side, near the commissure of the lips, between the lip and the palatine teeth. All the lower part of the cranium and the face is composed of a large and wide sphenoïd, which extends from the occipital hole to the intermaxillaries. The sides of the cranium, in the orbital region and the front of the temporal bone, are closed by a single bone, in which are pierced, forward, the olfactory aperture; farther back, the optic hole, and another for the first branch of the fifth pair, and probably for the small nerves of the eye. The inferior surface of this lateral bone forms part of the palate at the sides of the sphenoïd bone. It is plain that it performs the functions of the orbital part of the sphenoïd bone, or what has been called the anterior sphenoïd, and that it fulfils in part those of the ethmoïd. Between it and the petrous bone is a great membranous space, in which is pierced the hole for the rest of the fifth pair of nerves. The petrous bone and the lateral occipital bone are perfectly distinct. It is in the petrous bone only that the fenestra ovalis is pierced, or rather cut out, but the lower part of its frame is, nevertheless, completed by the lateral occipital and the sphenoïd. Its aperture, which is large, is directed a little downwards. In the fresh state it is closed by a cartilaginous plate similar to that in the Salamander. There is only a single tympanic bone fitted obliquely by its posterior stem on the superior surface of the petrous bone, and enlarging below nearly like a trumpet, in order to furnish a large facet to the lower jaw. Cuvier found neither mastoïdian, pterygoïdian, jugal, superior occipital, nor basilary bone, and he remarks that the occurrence of the two last is impossible, when the position of the suture, which separates the lateral occipital bones, is considered. To the palate, under the anterior and lateral part of the sphenoïd and orbital bones, are fitted two delicate plates beset with hooked teeth. They may be taken for the vestiges of vomers and of palatines, or, if it be preferred, of palatines and pterygoïdians; but Cuvier did not find sufficiently marked characters to warrant giving them those names. The first, which is the largest, has six or seven oblique rows of pointed teeth, making a kind of wool-card. Those of the middle have each twelve teeth; the anterior and posterior ones have less. The second plate has four rows of similar teeth, each row consisting of from five to six.

The lower jaw of the Siren is composed of four bones on each side; one of which forms the symphysis and the trenchant border of the jaw, which it invests externally up to near its posterior extremity. One cannot, Cuvier observes, avoid taking it for the analogue of the dental portion, but it is not the portion which carries the teeth, and it has only its trenchant edge invested in the fresh animal with a horny covering, analogous to that which forms the edge opposed to the upper jaw. The posterior extremity of this trenchant edge, more elevated than the rest of the border of the bone, serves for the coronoïd apophysis. The second bone forms the greatest portion of the internal surface and the posterior angle, and carries, above, the third, which is the articular tubercle. The fourth is a delicate and narrow lamina which performs the office of the opercular bone, and covers, on the internal surface, a vacancy left between the two first. The whole of this bone is beset with small pointed teeth disposed quincuncially like those of the palatal plates.

The *os hyoïdes* of the Siren is an os hyoïdes of the larva of a Salamander or of the Axolotl, but very much ossified in many of its parts. The suspensory branch or anterior horn is a bone stouter and longer than the humerus, dilated at its two ends, narrowed in its middle, and suspended to the cranium by a ligament. The first unequal piece is also a very hard bone dilated anteriorly, compressed posteriorly, and narrowed in its middle. The second unequal piece is a pedicle, which is divided behind into many radiating apophyses: the whole of this, again, is very bony, and the two lateral branches are equally so. The first, which is the stoutest, carries the first arch of the branchiæ; the second, which is more slender, carries the three others. These gill-arches are not ossified, but always remain cartilaginous, as in the Axolotl, and are, like those of the Axolotl, denticulated. They are united by ligaments at their external extremity, which a ligament attaches also to the root of the anterior horn. The same pieces, or very nearly the same, may be seen in the *Proteus*.

The *shoulder-blade* of the Siren is slender, nearly cylindrical, narrowed in its middle, and augmented, on the spinal side, by a cartilaginous lamina. The *clavicle* and the *coracoïd* are represented by two cartilaginous lobes, one directed forwards, the other much wider, proceeding upon the breast and crossing upon that of the opposite side. In the external border of this coracoïd cartilage, near and a little behind the articular fossa, is a bony semilunar lamina which is the sole representative of the bony coracoïd: but there is nothing similar for the clavicle. The *humerus* compressed laterally above, from before backwards below, and narrowed in its middle, has its extremities cartilaginous. It is the same with the two bones of the fore-arm, both rather slender, and the internal bone or radius widened below. The bones of the *carpus* remain cartilaginous.

Each of the four *fingers* has a metacarpian and two phalanges only.

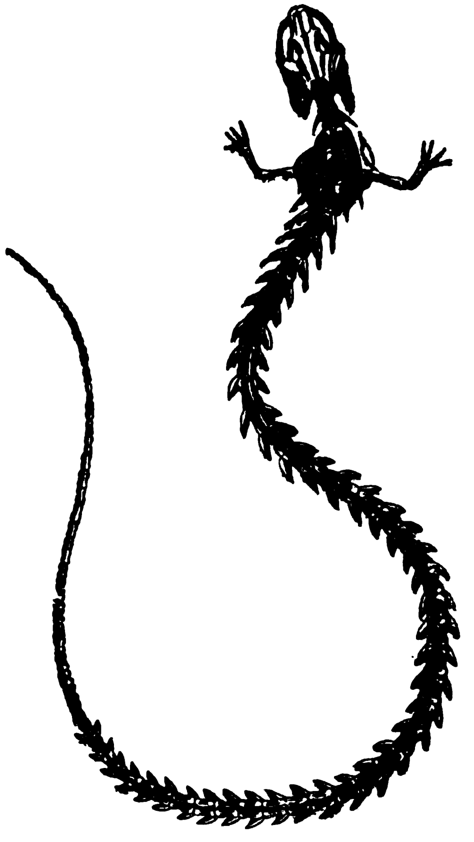


Anterior portion of the skeleton of Siren lacertina. *a*, dorsal vertebra seen behind; *b*, the same seen before.

There is no vestige of a pelvis, nor of any posterior extremity, either osseous or cartilaginous.

Cuvier did not find in a large individual more than forty-three *vertebræ* in the trunk and forty-four in the tail: but the individual which he described in 1807 had three more. These vertebræ, all perfectly ossified and complete, do not resemble in his opinion those of any of the reptiles of which he had previously treated, nor indeed of any other animal. Their bodies have their two articular faces hollow and united by a cartilage in the form of a double cone, as in the fishes. Their articular apophyses are horizontal, and the posterior apophyses of one vertebra lie on the anterior apophyses of the other. A horizontal crest on each side goes from the anterior to the posterior. In lieu of a spinous apophysis, they have a vertical crest, which at half its length becomes bifurcated, and the branches go to terminate on the articular posterior apophysis. Their very wide transverse apophyses are composed of two laminæ united at their posterior border up to their common point; the upper, which is oblique, coming from below the anterior articular apophysis and from below the neighbouring part of the lateral crest, the lower coming from the sides of the body, to which it adheres by a horizontal line. The body below is also compressed into a sharp ridge (arête).

In the *vertebræ* which carry the *ribs*, the upper lamina of the transverse apophysis is but little marked, and the point is stout and divided into two lobes for the two tubercles of the rib, as in the salamanders. Cuvier only found eight of these vestiges of ribs on each side, commencing from the second vertebra. The two last have the head simple. At the tail, the transverse apophyses, which have already become rather small, promptly disappear: the articular apophyses diminish also by degrees. The body of the vertebra takes a very compressed form, and gives below two small laminæ, which intercept a canal for the vessels, like the chevron bones in the lizards.



Entire skeleton of Siren lacertina.

Respiratory Organs.—John Hunter in 1766 gave the following accurate and interesting description of the two-fold respiratory apparatus of the Siren:—"On the posterior and lateral parts of the mouth are three openings on each side, these are similar to the slits of the gills in fish, but the partitions do not resemble gills on their outer edges, for they have not the comb-like structure. Above and close to the extremity of each of these openings, externally, so many processes arise, the anterior the smallest, the posterior the longest; their interior and inferior edges and extremity are serrated, or formed into fimbriæ: these processes fold down and cover the slits externally, and would seem to answer the purposes of the comb-like part of the gill in fish. At the root of the tongue, nearly as far back as these openings reach, the trachea begins, much in the same manner as in birds. It passes backwards above the heart, and there divides into two branches, one going to each lobe of the lungs. The lungs are two long bags, one on each side; which begin just behind the heart, and pass back through the whole length of the abdomen, nearly as far as the anus. They are largest in the middle, and honeycombed on their internal surface through their whole length." (*Phil. Trans.* lvi., 1766.)

In the Museum of the Royal College of Surgeons in London this part of the organization is well illustrated. No. 1062 presents a *Siren lacertina*, with the ventral parietes of the abdomen removed, together with all the viscera, except the lungs, which have been distended with spirit. These commence immediately below the pericardium, and extend almost to the anus. A bristle is passed through the trachea, and the laryngeal orifice is exposed by the removal of the cranium. The branchiæ are external, three on each side, and suspended to four cartilaginous arches of the hyoïd bone. The three internal branchial apertures of the left side may be seen. No. 1063 exhibits the right side of the head of a larger specimen of *Siren lacertina*, showing the branchial arches and gills of that side. The first and fourth branchial arches are fixed, the intermediate ones only being free. Their concave margins are provided, as in many fishes, with small pointed processes, which lock into one another and defend the branchial passages. The gills increase in size from the first to the third, which is suspended to both the third and fourth arches. They are subdivided and fimbriated inferiorly, where the surface is most vascular: the branchial arteries may be seen injected on the convex side of the cartilaginous arches. The origin and subsequent reunion of the branchial vessels to form the aorta are shown in the preparation No. 914 (from which the present was taken), noticed below. No. 1064 is a portion of the lungs of the same *Siren*, laid open to show the ramifications of the pulmonary artery, which form a vascular network upon the internal surface of this simple respiratory bag. (*Catalogue*, vol. ii.)

Circulating System.—John Hunter describes (1766) the heart of the Siren as consisting of one auricle and ventricle. What answers,' says Hunter, 'to the inferior vena cava, passes forwards above, but in a sulcus of the liver, and opens into a bag similar to the pericardium: this bag surrounds the heart and aorta as the pericardium does in other animals; from this there is an opening into a vein which lies above, and upon the left of the auricle, which vein seems to receive the blood from the lungs, gills, and head, is analogous to the superior vena cava, and opens into the auricle which is upon the left ventricle. The aorta goes out, passing for a little way in a loose spiral turn, then becomes straight, where it seems to be muscular: at this part the branches go off, between which there is a rising within the area of the aorta like a bird's tongue, with its tip turned towards the heart. This account of the venæ cavæ opening into the cavity of the pericardium may appear incredible; and it might be supposed that, in the natural state of the parts, there is a canal of communication going from one cava to the other, which being broken or nipt through in the act of catching or killing the animal, would give the appearance above described. I can only say that the appearances were what have been described in three different subjects which I have dissected, and in all of them the pericardium was full of coagulated blood. But besides the smallness of the subjects, it may be observed that they had been long preserved in spirits, which made them more unfit for anatomical inquiries. They had been in my possession above seven years.' (*Phil. Trans.*, lvi.)

In the Museum of the College of Surgeons the preparation No. 912 shows the anterior part of the body of a *Siren lacertina*. The ventral parietes have been removed, together with the pericardium, to show the heart *in situ*. It is of an elongated form, and consists of a large fimbriated auricle, divided internally into two chambers, and of a flattened oblong ventricle, giving off a single artery, which, after a half-spiral twist, dilates into an elongated fleshy bulbus arteriosus. The blood from the body passes into a large membranous sinus formed by the union of the two anterior venæ cavæ with the large posterior cava. The latter vessel pours its blood into the sinus by two orifices on either side a septum, which extends forwards as far as the openings of the anterior cavæ, where it terminates in a free semilunar margin; the sinus is then continued forwards, and terminates in the chamber analogous to the right auricle. White bristles pass from the posterior cava through the sinus on either side the septum into the anterior cavæ. A black bristle is passed through the right pulmonary vein into the trunk common to the two, which traverses but does not communicate with the sinus proper to the veins of the body, and terminates in the chamber analogous to the left auricle.

The bulbus arteriosus is laid open, to show the valvular protuberance which projects into it from the dorsal aspect. On the opposite side of the preparation the cranium and upper jaw are removed to show the apertures leading from the mouth to the lungs and gills, the simultaneous existence of which through life forms the chief characteristic of this tribe of truly amphibious reptiles. No. 913 is the heart of a Siren. The auricle, consisting of two chambers, appears as one cavity externally. It is remarkable for its large size, its weak parietes, and the number of fimbriated follicular processes which it sends off, and which gives it an appearance similar to the branchial divisions of the vena cava in the cephalopods. The ventricle is here seen to be slightly bifid at the apex. The artery is membranous at its commencement. The bulb is here laid open to show the internal valvular projection. No. 913 A presents the heart and pericardium of a *Siren lacertina*, prepared to show the internal structure of the auricles and ventricle. White bristles pass from the veins of the body into the right auricle, and black ones through the pulmonary veins into the left auricle. This is much smaller than the right auricle, corresponding to the quantity of blood which it receives. The pulmonary veins unite into a common trunk, which seems to pass through the great sinus of the veins of the body, but it adheres to the parietes of that sinus by its posterior surface. Here Professor Owen remarks that it is probably this remarkable structure which led Hunter to suppose that the sinus was part of the pericardium, and that the venæ cavæ opened into it. The Professor then quotes Hunter's description, above given, and adds, with truth, that all anatomists since Hunter's time have concurred in ascribing but one auricle to the heart of the Siren, and that Cuvier regards this simple structure of the central organ of the circulation as common to the Batrachian order of reptiles. The outward form of the auricle, observes Mr. Owen, naturally suggests such an idea, and it is only in favourable specimens that the true structure, as it is shown in this preparation (made by him), can be made out. The ventricle is connected to the pericardium, not only by the reflection of the serous layer from the bulbus arteriosus, but by a duplicature of the same membrane, which passes from the lower third of the posterior edge of the ventricle, and incloses the coronary vein: this vein is continued from the apex of the ventricle to the sinus. The muscular parietes of the ventricle are about a line in thickness, and of a loose fascicular structure. The cavity is partially divided by a rudimentary septum, which extends from the apex half way towards the base of the ventricle, and there terminates in a concave edge directed towards the orifice of the artery. The whole inner surface is reticulated by decussating carneæ columnæ, one of which has been detached from its connection to the septum, which intervenes to the two auricular apertures, and which supports the valvular structure that closes them from within. The artery and bulbus arteriosus are laid open, showing in the latter the remarkable valvular projection described by Hunter. In conclusion, Professor Owen remarks that the vessels on the back part of the talc, which supports the preparation, are, the inner ones, the pulmonary arteries, the outer ones, the jugular veins of anterior cavæ. No. 914 is the anterior part of the body of a large *Siren lacertina*, prepared to show the heart and principal vessels injected. The fimbriated structure and magnitude of the auricles are well seen when thus distended, and they then advance forwards on both sides of the ventricle and bulb, so as almost to encompass those parts. The two divisions of the venous sinus may be observed below the ventricle, with the termination of the coronary vein and the attachment of the ventricle to the sinus. Behind the ventricle appear two superior cavæ which terminate at the sides of the sinus. The portions of the lungs which remain are laid open to show their reticulate structure, and the relative positions of the pulmonary arteries and veins: white bristles are placed in the former, and black ones in the lateral vessels. On the left side of the preparation, the origin of the pulmonary artery, from the posterior branchial arch, is shown. The remainder of the branchial vessels, with the exception of small branches to the head, are collected into one trunk, which unites with the corresponding vessels of the opposite side to form the aorta or systemic artery. The tongue, the interior of the air tube, the internal branchial aperture, and the branchiæ of the left side, the eye and nostril, and structure of the integument are also favourably displayed in this preparation. [PROTEUS and PROTOPTERUS.]

We now proceed to lay before our readers such other preparations in this noble collection as illustrate the circulating system in animals approximating to the perennibranchiate batrachians, so that the student may compare this part of their organization with that of the Siren.

No. 915 shows the anterior part of the body of an AMPHIUMA (*Amph. means*, Garden), prepared to show the heart and great vessels *in situ*. Professor Owen states that the blood is returned from the body, as in the preceding species, by two anterior venæ cavæ, and one large posterior cava, which form by their union a membranous sinus. The auricles or venous chambers of the heart are proportionately smaller and less fimbriated, and are situated more to the left and superior part of the ventricle. The ventricle is connected to the pericardium at its apex, and gives off from its opposite extremity a single artery, which, after a half-spiral turn, dilates into a large bulb, which is broader and shorter than in *Siren lacertina*, and is grooved externally. The two pulmonary arteries are given off from the posterior part of the extremity of the bulb, which then divides into two branches, each of which again subdivides on the side of the œsophagus. As there are no external gills, so there are no lateral branches sent off from the branchial arteries; but these, after winding round the arches of the hyoïd bone, terminate in a single trunk on either side, and form by their union the aorta, which is seen, injected, behind the pharynx. On the left side of this preparation the internal branchial aperture is preserved, and on the right side the branchial arches of the hyoïd bone are shown. The lungs are laid open so as to display their reticulate and longitudinally plicate structure, and the relative positions of the pulmonary arteries and veins.

Professor Owen further observes that this preparation is figured by Rusconi (*Amours des Salamandres Aquatiques*, pl. v., fig. 8) as a portion of the adult *Siren lacertina*, which he supposes to have lost the external branchiæ, and to have acquired the posterior extremities in a manner analogous to the salamanders; and that Rusconi endeavours to invalidate the opinion which Hunter, after an extensive and minute comparison of their entire structure, had formed of the specific difference of the *Amphiuma* and *Siren*, as well from each other as from the *Kattewagoe* or *Menopoma* of Harlan. The manuscript alluded to by Rusconi, and which contains detailed accounts of the anatomy of *Amphiuma* and *Menopoma*, as well as of the *Siren*, is given entire in the description of the plates illustrative of the 2nd vol. of the Museum Catalogue, where (plates xxiii. and xxiv.) the circulating and respiratory organs of the 'Chuah Chisstannah, or Crawfish-eater, or Kattewagoe' (*Menopoma Alleghaniensis*, Harlan [SALAMANDRIDÆ, vol. xx., p. 332], are beautifully displayed; and Professor Owen remarks that the conclusions as to the distinctions of these amphibia to which Hunter arrived, have been subsequently confirmed by a similar series of investigations instituted by Cuvier, and above noticed.

No. 916 of the same museum exhibits the lower jaw, tongue, fauces, with part of the abdominal viscera, and the heart *in situ* of *Menopoma Alleghaniensis*. The greater part of the pericardium has been removed. The ventricle is of a flattened triangular form, resembling that of osseous fishes: the auricles are smaller in proportion than in the *Siren*, and are situated wholly to the left of the ventricle. The veins of the body terminate in a membranous sinus situated below the auricles. The aorta, after making a spiral turn to the left side, dilates into a large bulb which gives off four vessels on each side. The first or posterior pair are the smallest, and ramify on the œsophagus and lungs; but they are not distinctly shown in this preparation. The second and third pairs are the largest: they are seen passing outwards, and winding round the arches of the hyoïd bone. The two branches unite on each side, and, after sending off small arteries to the head, converge on the posterior part of the œsophagus, and unite to form the descending aorta. The fourth small pair of arteries pass outwards, and wind over the anterior part of the first hyoïdian arch: they send off in this course some small arteries to the head, and ultimately unite with a cephalic branch given off from the united trunk of the third and second branchial arteries. The right lung is here preserved, and a black bristle is inserted into it from the trachea. White bristles are placed in the right branchial aperture, which is left entire, showing the absence in this form, as in *Amphiuma*, of external gills. On the left side the branchial arches of the hyoïd bone are preserved. Besides the parts concerned in the circulatory and respiratory functions, the stomach, duodenum, liver, pancreas, and spleen are well shown in this preparation. No. 917 exhibits the heart, pericardium, and trachea of the last-noticed species. Here the ventricle is laid open to show the loose, fasciculate, muscular structure, which, as in the *Testudo Indica*, occupies the whole of its cavity. The bulb of the aorta is laid open to show the two rows of semilunar valves, three in each row, and the origins of the branchial arteries. The preparation is suspended by the pericardium, behind which is the flattened air-tube, in which distinct cartilaginous rings may be seen. (*Catalogue*, vol. ii.)

Generative System.—No. 2695 exhibits the posterior part of a *Siren lacertina*, with the ventral parietes of the abdominal cavity removed to display the female organs of generation. The ovaria are seen as two irregular elongated bodies, situated on each side of the root of the mesentery, and bearing impressions of the convolutions of the intestines. They contain innumerable minute ovisacs of a greyish colour, with a few others of a larger size, and of a very dark colour. The oviducts are external to the ovaria, and are attached to the sides of the spine, each by a broad duplicature of peritoneum: they commence anteriorly by a simple, elongated, slit-like aperture, without fimbriated margins, and are immediately disposed in about twenty parallel transverse folds, which gradually diminish, and finally cease about three inches from the cloaca, where the oviducts open behind the rectum upon small prominences: bristles are placed in these outlets. The contracted allantoïd bladder is seen anterior to the rectum: the posterior extremity of the kidney extends behind the oviducts, a short way beyond the cloaca. No. 2696 shows the anterior extremity of the oviducts and liver of a Siren. The oviducts are much attenuated at their commencement, but soon increase in size, and become thicker in their parietes. (*Catalogue*, vol. ii.)

No preparation of the male organs of the *Siren* appears to exist in the College Museum; but there are two illustrative of those of *Amphiuma* and *Menopoma*, which we proceed to lay before our readers.

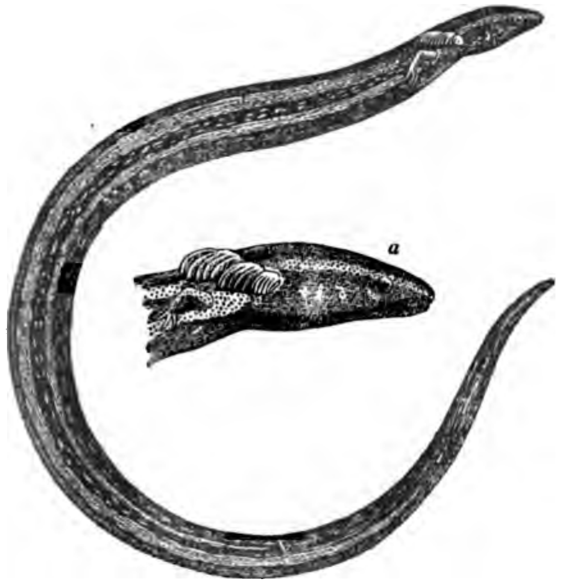
No. 2397 is the posterior moiety of an Amphiuma (*Amphiuma didactylum*), with the abdominal cavity laid open, and exposing to view the termination of the intestinal canal, supported by its broad and simple mesentery, the termination of the right lung, the long allantoïd bladder attached by a duplicature of the peritoneum to the mesial line of the abdomen, and the testes with their adipose appendages: the latter may be observed projecting on each side of the root of the mesentery; and behind them are the testes, elongated, subcylindrical, ash-coloured bodies, tapering at both extremities: the vasa deferentia descend in the form of white ligamentous tubes, and finally open into the posterior part of the termination of the rectum, which is laid open. The renal organs are almost concealed by the parts above described: they have been injected. No. 2938 exhibits the male organs, kidneys, allantoïd bladder, and large intestine of the Menopome (*Menopoma Alleghaniensis*). The testes in this subject are less elongated, and of a more compact oval, thus indicating a further stage of advancement above the class of fishes. The efferent vessels leave the testis at a longitudinal groove at their posterior and internal surfaces, at the line of reflection of the supporting processes of peritoneum, and on each side unite to form a vas deferens, which descends along the edge of a process of peritoneum external to the kidneys, and finally opens into the termination of the rectum, as in the Amphiume. The kidneys are opake white bodies, which, beginning by small extremities near the lower end of the testes, slightly enlarge as they descend to the cloaca. The injected aorta occupies their posterior interspace, and there sends off the arteries for the hinder extremities. (*Catalogue*, vol. ii.)

Siren lacertina grows to the length of three feet; its colour is blackish. The feet have four toes, and the tail is compressed into an obtuse fin.

This Siren inhabits the marshy grounds of Carolina, especially those where rice is cultivated. It lives in the mud from whence it makes excursions, sometimes on land and sometimes in the water. From the swampy places by the sides of pools and under the overhanging trunks of old trees where it is found, it was called by the inhabitants 'the Mud Iguana.' Garden was of opinion that it feeds on serpents, and that it uttered a cry similar to that of a young duck; but Barton contests these statements. Its food is generally believed to consist of earth-worms, insects,

&c. There is now (Sept., 1841) a fine lively specimen in the parrot-house in the garden of the Zoological Society in the Regent's Park. It is kept in a vessel of pond-water with a deep bottom of mud, in which it bides itself, and is twenty inches long, as large as the wrist of a stout child of six months old, and very eel-like in its movements and appearance. About a dozen and a half of earth-worms are supplied to it as food every other day.

Siren striata is blackish, with two longitudinal yellow stripes on each side; has only three toes on each foot, and is about nine inches in length.



Siren striata.

a, head and anterior part seen in profile, showing the branchiæ and foot.

Whilst the article was passing through the press, Professor Owen was so good as to send the following highly interesting observations on the blood-globules of the *Siren* for insertion in this work:—

'Among the important generalizations which the numerous observations of recent microscopical anatomists have enabled the physiologist to establish respecting the form and size of the blood-discs in different classes of animals, the most interesting seems to be that which Professor Wagner has enunciated respecting the relation of the magnitude of the blood-disc to the persistence of the branchial apparatus in the Batrachian order of reptiles on the occasion of his description of the blood-discs of the *Proteus anguinus*.

The absolute size of these particles in that perennibranchiate reptile, in which they may be distinguished by the naked eye, renders them peculiarly adapted for minute investigations into the structure of the nucleus and capsule of the blood-disc: but the value of the relation between their size and the persistency of the external gills must depend upon the correspondence of other perennibranchiate reptiles with the Proteus in this respect. The superior size of the blood-discs of the newts to those of the land-salamanders and tailless Batrachians has been confirmed by Professor van der Hoeven's observations on the blood-discs of the gigantic newt of Japan (*Sieboldtia*, SALAMANDRIDÆ, vol. xx., pp. 331, 332), of which a fine specimen has been for several years kept alive at Leyden; and I have been able to add another instance of the still greater relative size of the blood-discs in the perennibranchiate reptiles by the examination of those of the largest existing species of that family, the *Siren lacertina*, of which a specimen twenty inches in length is now (October 15th) living at the Zoological Gardens. The blood was obtained from one of the external gills, and immediately subjected to examination. The blood-discs presented the elliptical form which hitherto without exception has been found to prevail among the air-breathing oviparous vertebrated animals: the ellipse was not quite regular in all the blood-discs; several were sub-ovate, a few slightly reniform and thicker at the more convex side: all were as compressed, or disc-shaped, as in other Batrachians, with the nucleus slightly projecting from each of the flattened surfaces.

'The nucleus did not partake in the same degree with these varieties of form, but maintained a more regular elliptical form; the varieties in question appearing to depend on pressure acting upon the capsule and the coloured fluid surrounding the nucleus. Yet when the ellipse of the blood-disc was, as it happened in a few cases to be, longer and narrower than the average, the form of the nucleus presented a similar modification of size.

'The following is a table of the averages of many admeasurements of these blood-discs, made with the screw micrometer* :—

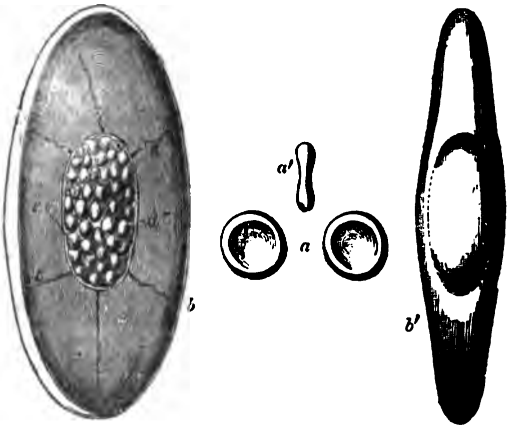
	English inch.
'Long diameter	1-450th
Short diameter	1-850th to 1-870th
Long diameter of nucleus	1-1000th
Short diameter of ditto	1-2000th
Thickness of ditto	1-3800th

(as viewed edgeways covered by the capsule).

'The nucleus was circumscribed by a double line, the outer one more regular than the inner one, which appeared crenated. This appearance was due to the structure of the nucleus, or the contents of the nucleolar capsule, which was indicated by the outer line. These contents consisted, in every blood-disc examined, of a number of moderately bright spherical nucleoli, sufficiently distinct to be counted, when viewed by a Powell's 1-10th inch objective, with the eye-piece, magnifying 700 linear diameters: the ordinary number of nucleoli seen in one plane or focus being from twenty to thirty, the total number was of course much greater. The facility as well as certainty of the demonstration of such a structure in a good microscope of the present day will be readily admitted when it is remembered that the nucleus of the blood-disc of the Siren is three times the size of the entire human blood-disc. These tuberculate nuclei, when removed from the capsule, were colourless; the component granules or cells have a high refracting power: viewed *in situ* they present a tinge of colour lighter than that of the surrounding fluid, and dependent upon the thin layer of that fluid interposed between the nucleus and the capsule.

'The external capsule of the blood-disc is smooth, moderately resisting, elastic, as was easily seen by the flattening of the parts of two blood-discs that might come in contact, and the recovery of form when they were floated apart.

'As the fluid contents of the blood-disc in part evaporated during the process of desiccation, the capsule fell into folds in the interspace between the nucleus and the outer contour, these folds generally taking the direction of straight lines, three to seven in number, radiating from the nucleus.' (R. Owen, Sept. 25, 1841.)



Blood-discs of Man and Siren, drawn by tne camera lucida under a magnifying power of 700 linear dimeusions.

a, Human blood-discs; *a'*, ditto viewed edgewise; *b*, Siren's blood-disc; *b'*, ditto viewed edgewise; *c*, folds of external capsule, produced by desiccation; *d*, capsule of nucleus; *e*, nucleoli.

SIRENS (Σειρῆνες) are described in the 'Odyssey' as two maidens who sat by the sea and so charmed with their music all who sailed by, that they remained on the spot till they died. Ulysses, by the direction of Circe, had himself tied to the mast, and stopped the ears of his companions with wax, by which means he was able to hear their music, and escape from its influence. (*Od.*, xii. 39, &c., 169.) The ship of Ulysses, with himself tied to the mast, it frequently represented on gems, and other works of antient art. (See *Dictionary of Greek and Roman Antiquities*, p. 52.) The number of the Sirens was afterwards increased to three, and various names were given to them by different writers. They were usually called the daughters of Melpomene and Achelous (Apollod., i. 3, § 4), and were represented by artists with the feathers and wings of birds (compare Ovid, *Met.*, v. 522, &c.) They were urged by Hera to contend with the Muses, who conquered them, and tore off their wings. (Paus., ix. 34, § 2.)

---

* 'I was indebted to Mr. Stokes for the use of the one attached to his admirable microscope by Powell.

SIRHIND, a district of northern Hindustan, which extends from 29° 27′ to 31° N. lat., and from 73° 38′ to 77° 38′ E. long. The northern boundary is formed by the Sutlej, and the Jumna forms a part of the eastern boundary. The principal river is the Gagur. Most of the other rivers are affluents of the Gagur. Sirhind constitutes a portion of what are called the Hill States, and is inhabited by the Sikhs. [Hindústan, p. 233.] The town of Sirhind, from which the district derives its name, though formerly a place of importance, is now little else than a heap of ruins.

SIRI, VITTO'RIO, born at Parma in 1625, became a priest, and afterwards went to Paris, where he found favour with Louis XIV., who appointed him his almoner and historiographer. Siri wrote a journal in Italian, entitled 'Mercurio Politico,' which he continued for many years, and as Louis acted for a long period the principal part on the political stage of Europe, he was flattered at having by him a writer who contributed to spread his fame in a foreign language. Siri however was not a fulsome flatterer, and although he often praised Louis, he did not always spare his ministers and other powerful men of that and the preceding reign, and this freedom passed unheeded chiefly from the circumstance of his writing in a language foreign to France, and which was not understood by the people in general. Besides the 'Mercurio Politico,' the collection of which consists of fifteen thick volumes, Siri wrote another journal, entitled 'Memorie Recondite,' which fills eight volumes. Le Clerc (*Bibliothèque Choisie*, vol. iv., p. 138) observes that both these works contain a vast number of valuable authentic documents. The general style of the writer is however prolix and heavy. Siri died at Paris, in 1685. (Corniani, *Secoli della Letteratura Italiana.*)

SIRI'CIUS, a native of Rome, succeeded Damasus I. as bishop of that city, A.D. 384, under the reign of Valentinian II. We have several letters by him written to various churches on matters both of dogma and of discipline. Some of them are in condemnation of the Priscillianists, Donatists, and other heretics; one is directed to Anycius, bishop of Thessalonica, on matters of jurisdiction; another to Himerius, bishop of Tarracona, which is one of the oldest instances of a bishop of Rome sending mandates to other churches to be received as ecclesiastical laws. Siricius is also one of the first bishops of Rome who wrote concerning the celibacy of the clergy. He directed that a priest who married a second wife after the death of the first should be expelled from his office. (Platina, *Lives of the Popes*; Dupin, *Nouvelle Bibliothèque, Vie de Siricе.*) The council of Nicæa had already decreed that all clerks who had been married before they took orders, should be allowed to retain their wives according to the antient tradition of the church, but that priests and deacons should not marry after their ordination. Siricius died A.D. 398.

SI'RIUS and **PRO'CYON** (Σείριος and Προκύων), the Greek names of the bright stars in the constellations of the Great and Little Dog [Canis Major and Minor]. These are Orion's dogs, according to some, and those of minor personages, according to others: the whole of their mythic explanations form a strong proof, in addition to those already noticed, that the constellations are not Greek in their origin. In a passage of Hesiod he has been supposed to speak of the sun under the name of Sirius; and Hesychius defines the word to mean both the sun and the dog-star. Dr. Hutton informs us that the Egyptians 'called the Nile Siris, and hence their Osiris,' which he has copied from Sir John Hill, who derives Sirius from Siris, but does not say where he got his information: probably from some writer of his own calibre. The Egyptians called the dog-star Sothis [Sothiac Period], and from its heliacal rising had warning that the overflow of the Nile was about to commence. Now the overflow of the Nile follows the summer solstice; whereas, by the precession of the equinoxes, the heliacal rising of Sirius is now about the tenth of August. This heliacal rising is a very indefinite phenomenon, and will serve any system: by it Bailly, from Bainbridge's calculations, was able to carry back the settlement of Egypt 2800 years before Christ: while Newton, by a reckoning made on the same principles, made many antient events seem later than was generally supposed.

The greatest heats of summer generally follow the summer solstice, and in the Mediterranean latitudes, and in antient times, it was observed that the unhealthy and oppressive period coincided with the heliacal rising of the dog-star. We say *the* dog-star, without specifying whether it was Sirius or Procyon; it is uncertain which it was, and may have been both, for the heliacal risings do not differ by many days. The star itself was in Latin *canicula*, which should seem to apply to the lesser dog, and Horace says—

> 'Jam *Procyon* furit
> Et stella vesani Leonis [sc. Regulus]
> Sole dies referente siccos.'

Pliny supports the same meaning of canicula, and perhaps Hyginus; also the framers of the Alphonsine Tables, and Bede and Kepler, among the older moderns: while Germanicus and Julius Firmicus, with Apian, Magini, Argoli, H. Stephens, and Petavius, among the moderns, contend for Sirius, which is the more common opinion. All antiquity attributed an evil influence to the star; and though Geminus among the antients, and Petavius among the moderns, thought that the effects were to be attributed to the sun alone, they had hardly any followers until the fall of judicial astrology. Even at this day, when the heats of the latter part of the summer are excessive, we are gravely told that we are in the dog-days; and the almanacs, in which an absurdity has the lives of a cat, persist to this very year in informing us that the dog-days begin on the 3rd of July, and end on the 11th of August. Now as the heliacal rising of Sirius takes place about the very end of this period, it is clear that the cart has got before the horse, or the mischief before the dog. Moreover it is notorious that in our island the oppressive heats of the summer, during which dogs are apt to run mad (which is what many people think the name arises from, as indeed it was antiently recorded among the effects of the star), generally fall about the middle or end of August. The real classical dog-days are the twenty days preceding and the twenty days following the heliacal rising of whichever star it was, Sirius or Procyon. It is perfectly useless to retain this period: surely these dogs have had their day.

SIRMOND, JACQUES, was born at Riom, in France, October 22, 1559. Having completed his studies at the Jesuits' college at Billom, the first which that Society had in France, he adopted the rule of St. Ignatius, and prepared himself, by a diligent study of the antient languages, for fulfilling the duties of a teacher. When he had finished his noviciate, his superiors required him to come to Paris as professor of rhetoric, in which city he remained till 1790, when he repaired to Rome, on the invitation of the Père Aquaviva, General of the society of Jesuits, who chose Sirmond as his secretary. In this employment he continued sixteen years, during which he examined diligently the manuscripts in the Vatican library, as well as the inscriptions and other remains of antiquity, of which Rome possessed such an abundant supply.

In 1608 the Père Sirmond returned to Paris, and soon afterwards commenced a visitation of the libraries and archives of the convents, and was thereby enabled to save from destruction a great number of documents of the highest value for the history of the middle ages. Sirmond's first publication was the 'Opuscules' of Geoffroi, abbé de Vendôme, in 1610; from which time he continued to add to his reputation by other publications almost every year. Pope Urban VII. invited him to return to Rome, but Louis XIII. retained him in France, and in 1637 made him his confessor.

The Père Sirmond, having left the court on the death of Louis XIII. in 1643, recommenced his literary labours, which had been somewhat interrupted by attention to the duties of his late dignified office, and continued with unabated ardour to occupy himself in the same way till his death, October 7, 1651, when he was 92 years of age.

Sirmond's 'Ouvrages' were collected and published in 1696, in 5 vols. folio. The first three volumes contain the 'Opuscules' of those Fathers and other ecclesiastical writers which had been published by Sirmond, with prefaces and notes; the fourth volume contains his Dissertations; and the fifth volume contains the works of Théodore Studite. This edition of Sirmond's Works is by the Père La Baume, and is preceded by a Life of Sirmond by the editor, his Funeral Oration by Henri de Valois, and a list of Sirmond's Works in manuscript as well as printed. In this edition are included the Works of Ennodius bishop of Pavia, of Sidonius Apollinaris, of Eugenius bishop of Toledo, the Chronicles of Idatius and Marcellinus, the Collections of Anastasius the Librarian, the Capitularies of Charles-le-Chauve and his successors, the works of St. Avit, of Théodulphe bishop of Orleans, &c. Father Sirmond published other ecclesiastical writers besides those included in the above edition, among which are 'L'Histoire de Reims,' by Flodoard, the 'Lettres de Pierre de Celles,' the 'Œuvres' of Radbert, of Theodoret, of Hincmar archbishop of Reims, &c. Sirmond published also a Collection of the Councils of France, 'Concilia Antiqua Galliæ,' Paris, 1629, folio.

(*Biographie Universelle.*)

SIROCCO. [WIND.]

SISIN'NIUS, a Syrian by birth, succeeded John VII. as bishop of Rome, A.D. 707, and died twenty days after his election. He was succeeded by Constantine.

SISON, the name of a genus of plants belonging to the natural order Umbelliferæ. It possesses the following characters:—calyx obsolete; petals broadly obcordate, deeply notched, and curved with an inflexed point; styles very short; fruit ovate, laterally compressed; carpels with five filiform equal ridges, of which the lateral ones are marginal; interstices with single, short, club-shaped vittæ; seed gibbous, convex, plane in front; universal and partial involucre of few leaves.

Several species were formerly referred to this genus which are now placed under various genera. The only species that is now decidedly referred to Sison is the *S. Amomum*, hedge bastard stone parsley. It is a native of France, Sicily, Italy, Greece, and Great Britain. It is not unfrequent in this country, especially in chalk soils in rather moist ground, under hedges, &c. It is known by its erect, terete, paniculately branched stem; pinnate leaves, the lower leaflets rather toothed and lobed, upper ones cut into narrow segments. The flowers are cream-coloured. The green plant when bruised has a peculiarly nauseous smell, something like that of bugs. The seeds are pungent and aromatic, and were formerly celebrated as a diuretic, but are now little used.

SISSOO, a tree well known throughout the Bengal presidency, and highly valued on account of its timber. It is common chiefly in the forests and beds of rivers which extend all along the foot of the Himalayas up to 30° N. lat. The trunk is generally more or less crooked, lofty, and often from three to four feet in diameter. The branches are numerous and spreading; the leaves pinnate, with 5 alternate roundish acute leaflets, which from their small size and drooping nature give the tree a very light and elegant appearance.

The Sissoo yields the Bengal shipbuilders their crooked timbers and knees. Dr. Roxburgh describes it as being tolerably light, remarkably strong, but not so durable as could be wished; the colour is light greyish-brown, with dark veins; he says that upon the whole he scarcely knows any other tree more deserving of attention, from its rapid growth in almost every soil, its beauty, and uses. Captain Baker, in his 'Experiments on the Elasticity and Strength of Indian Timbers,' describes the Sissoo in structure somewhat resembling the finer species of teak, but as being tougher and more elastic, and as employed by the natives for house furniture, beams, cheeks, spokes, naves and fellies of wheels, keels and frames of boats, blocks, and printing-presses. It is universally employed both by Europeans and natives of the north-west provinces where strength is required.

The Sissoo belongs to a genus Dalbergia, which abounds in valuable timber-trees, as *D. latifolia*, which is usually called Blackwood-tree by the English, and of which the wood is exported as a kind of ebony: sometimes also called Black Rose-wood. It is one of the largest timber-trees of India, being 15 feet in circumference, with the wood of a greenish-black colour, with lighter-coloured veins running in various directions, and admitting a fine polish, and therefore much admired as furniture-wood. Captain Baker found it, like the Sissoo, able to sustain a weight of 300 pounds, when teak broke with 1128 lbs. S. Dalbergia Ougeinensis, found in central India, is also highly valued for timber: the pillars of Sindia's palace at Ougein are made of it.

SISTERON, the chief town of an arrondissement in the department of Basses Alpes in France, on the right bank of the Durance, at the junction of the Buech, 437 miles from Paris by Lyon, Grenoble, and Gap. Sisteron was known to the Romans by the name of Segustero (*Itinerarium Antoninini*, and *Peutinger Table*) or the town of the Segesterii (*Notitia Provinciarum*), afterwards altered into Segesterium, Sistericum, and Sisteron. It is not known to what people it belonged. In the sixth century it became the seat of a bishopric, and was the object of attack in the ninth century to the Saracens and the Hungarians. The townsmen embraced the Huguenot party in the religious contests of the sixteenth century. The Catholics in consequence attacked the town and took it, A.D. 1562; but it was afterwards retaken by Lesdiguières. The town is calculated to be 479 metres, or 1570 feet, above the level of the sea. It is situated at the foot of a rock, upon which is an old citadel, and is surrounded by an embattled wall flanked with towers, but is commanded by the surrounding heights, so as to be little defensible in modern warfare. There are two bridges, one of a single arch over the Durance, the other over the Buech. The ex-cathedral has a fine altar-piece by Vanloo; there are two other churches, an hospital, and a prison. The population in 1831 was 3937 for the town, or 4429 for the whole commune. The townsmen manufacture hats, leather, and pottery; there are lime-kilns; and trade is carried on in almonds, wool, oil, and truffles; there are ten yearly fairs. The surrounding country produces a great quantity of walnuts and almonds, and some good wine. Urns, vases, lamps, medals, and other Roman antiquities have been dug up here.

SISTRUM, a musical instrument of percussion, of the highest antiquity, constructed of brass, and shaped like the frame and handle of a racket, the head part of which had three, and sometimes four, horizontal bars placed loosely on it, which were tuned, most probably, by some scale, and allowed to play freely, so that when the instrument was shaken, piercing, ringing sounds must have been produced. Some writers have confounded the sistrum with the cymbals, though the instruments could have had nothing in common except their harsh metallic sounds.

SISY'MBRIUM (from Σισύμβριον), the name of a genus of plants belonging to the natural order Cruciferæ. It possesses a roundish silique seated upon a torus; two stigmas, somewhat distinct, or connate into a head; calyx equal at the base; ovate or oblong seeds; flat, incumbent, sometimes oblique cotyledons; stamens not toothed. The species are mostly perennial or annual herbs, with yellow or white flowers, and leaves very variable on the same plant. About fifty-eight species are enumerated, but comparatively few of these are cultivated. The genus however belongs to an order that possesses no injurious plants, and a few of the species are well known on account of their uses.

S. officinarum, Common Hedge-Mustard, has muricate pilose leaves, a pilose stem, and subulate pods pressed to the rachis. It is a native of Europe, and grows in waste places and way-sides, among rubbish, and along the sides of walls. It is plentiful in Britain, and also the north of Africa. The whole plant is warm and acrid, and is often cultivated for use as a pot-herb. It is eaten by sheep and goats; but cows, horses, and swine refuse it. In medicine it was formerly much used as an expectorant in chronic coughs and asthma. It was also recommended in ulcerations of the mouth and throat. The stimulant properties of this and other plants belonging to the order would make them undoubtedly valuable remedies in many diseases in the absence of other means, but in modern medicine more powerful and certain remedies have thrown into disuse many agents formerly highly valued.

S. Irio, London Rocket or Broad-leaved Hedge-Mustard: stem and leaves smooth; leaves runcinate; lobes toothed; pod erect. It is a native of waste places throughout Europe, but especially about London. It is said to have entirely covered the ground in the following spring of the great fire of London in 1666. The former species is also remarkable for appearing on the ground where fires have existed. In such cases the ashes of the fires constitute a nutriment peculiarly adapted for the growth and development of these plants. The whole of this plant possesses the hot biting character of the mustard. Several varieties have been recorded.

S. Sophia, Five-leaved Hedge-Mustard, or Flixweed: leaves doubly pinnatifid, slightly hairy; lobes linear or oval; pedicels four times longer than the calyx; petals shorter. It grows on dry banks, waste ground, dunghills, and among rubbish in most parts of Europe. It is frequent in Great Britain. It has derived its name of flixweed and that of 'wisdom of surgeons' from its supposed power of controlling diarrhœa, dysentery, &c. Whatever may have been its former reputation, it is now almost entirely fallen into disuse.

S. millefolium, Millfoil-leaved Flixweed: leaves somewhat tripinnate, hoary; lobules blunt, small; stems shrubby; petals larger than the calyx. A native of Teneriffe, on the rocks in the lower parts of the island. It is a small branched shrub, with corymbose flowers. It is a greenhouse species, growing well in a rich light soil; and young cuttings will readily root under a hand-glass when placed in a sheltered situation.

S. strictissimum, Spear-leaved Hedge-Mustard: leaves lanceolate, stalked, toothed, pubescent. It has intensely yellow flowers, with pods two inches long; the stem is erect, and branching at the top. It is a hardy perennial, adapted for shrubberies, and may be easily increased by division of the root.

This genus at one time included that now known under the name of *Nasturtium*. The latter was originally separated by Brown, and is principally distinguished by the position of the cotyledons, a point of primary importance in the whole order of Brassicaceæ. In Sisymbrium the cotyledons are folded with their back upon the radicle, whilst in Nasturtium their edges are presented to it; in the former the cotyledons are said to be incumbent, in the latter accumbent.

A well known species of *Nasturtium* is the *N. officinale*, formerly *Sisymbrium Nasturtium*, the common water-cress. In addition to the characters of the genus, this plant is known principally by the form of its leaves. The leaf is composed of from 5 to 7 leaflets, which are arranged opposite each other on a common petiole with a terminal leaflet. The leaflets are somewhat heart-shaped and slightly waved and toothed; they are succulent, and their surface is smooth. The terminal leaflet is always largest. The upper leaves do not separate into distinct leaflets, being pinnatifid with narrow segments. The petiole of the leaf does not in any manner embrace the stem. The flowers are white, and the pods, when ripe, are about an inch long. This plant is a native of rivulets throughout the world, and is very plentiful in Great Britain. It has a warm agreeable flavour, and has long been one of the most popular plants as a salad. It was formerly much used in medicine as a diuretic and antiscorbutic, but its great consumption now is as an article of diet. As it frequently grows amongst plants that are not wholesome, and that bear to it a general resemblance, it would be well for every one to be acquainted with its characters. The plant most frequently mistaken for it, especially when out of flower, is the fool's water-cress. [SIUM.] From this it may be always distinguished, and in fact from all other Umbelliferæ, by the petioles of the leaves not forming a sheath round the stem.

The water-cress is cultivated to a very great extent in the neighbourhood of London. The plants are placed out in rows in the bed of a clear stream in the direction of the current, and all that is required for their successful growth is replanting occasionally and keeping the plants clear of mud and weeds; sandy and gravelly bottoms are best. 'Some market-gardeners who can command only a small stream of water, grow the water-cress in beds sunk about two feet in a retentive soil, with a very gentle slope from one end to the other. Then, according to the slope and length of the bed, dams are made six inches high across it, at intervals, so that when these dams are full, the water may rise not less than three inches on all the plants included in each. The water, being turned on, will circulate from dam to dam, and the plants, if not allowed to run to flower, will afford abundance of young tops in all but the winter months.' (G. Don.) Water-cresses grown in this way have not so fine a flavour as those from natural streams.

SITKHA is the name of the most important of the Russian settlements on the west coast of North America, though its proper name is New Arkhanghelsk. This place lies in 57° 2′ 50″ N. lat. and 135° 18′ W. long., and is built on one of the group of islands which received from Vancouver the name of King George III.'s Archipelago. The outward coast of this extensive group had been seen before by Cook in his third voyage, who called a very elevated island, which had the appearance of a cape, Mount Edgecombe, but he afterwards suspected that it was an island. The space between this small island of Edgecombe and the larger island which lies east of it, forms the harbour of the settlement. When Vancouver surveyed this coast, he thought that the outward coast, which extends from Chatham Sound on the south (56° N. lat.) to Cross Sound (58° N. lat.) on the north, constituted one large island, which he called King George III.'s Island; but it was afterwards ascertained that it was divided by a narrow strait into two islands, and since that time the northern island has been called by the native name of Sitkha, while the southern has received the name of Baranoff Island, in honour of the founder of the Russian settlement. On the last-mentioned island Baranoff built a small fort in 1799, which was destroyed in 1802 by the natives of the tribe of the Koloshes. But in 1804 Baranoff expelled them from the strait which constitutes the harbour of New Arkhanghelsk, and founded in the vicinity of one of their villages the present town. The harbour, which Vancouver named Norfolk Sound, but which is now better known as the Bay of Sitkha, is spacious and safe, and offers excellent anchorage opposite the settlement. The place itself is surrounded by a wooden wall, and enclosed by mountains of considerable elevation, which are almost covered with forests, in which excellent timber is found. Ship-building constitutes the most important of the branches of industry, and all the vessels of the American Company are now built at this place, since ship-building has been discontinued at Okhotsk. New Arkhanghelsk is the centre of the administration of the Russian territories in America, over which the American Company exercises sovereign powers, nearly in the same way as the Hudson's Bay Company over a much more extensive portion of North America. The collecting of furs is the exclusive object of both companies, and New Arkhanghelsk may be compared with Fort York, which lies nearly under the same latitude on the eastern coast of America. But New Arkhanghelsk is larger: its population in 1833 amounted to 847 individuals, of whom 406 were Europeans, and 307 descendants of Europeans and native women, and 134 only Aleutes and Koloshes. New Arkhanghelsk has also a much greater commerce by sea, and the vessels of the Company visit California, whence they import grain and salt, and dried meat; and the Sandwich Islands, where they obtain salt for curing their fish. The number of vessels employed by the Company in this commerce and in the transport of the furs which have been collected in the different smaller settlements amounts to twelve; their tonnage is stated not to exceed (1833) 1565 tons.

Wrangell continued to make meteorological observations during his stay at New Arkhanghelsk (1833 and 1835), and Baer has taken advantage of his work to compare the climate of Nain on the coast of Labrador with that of Sitkha. The result is contained in the following table, which expresses the mean temperature of the seasons and of the year:—

	New Arkhanghelsk.	Nain.
Winter (Dec.—Feb.)	+34·74	−1·26
Spring (March—May)	42·28	+22·38
Summer (June—Aug.)	56·30	45·62
Autumn (Sept.—Nov.)	47·89	36·00
Annual mean temper.	+45·30	+25·50

Thus it appears that the mean annual temperature of these two places, situated respectively on the eastern and western coasts of North America, differs nearly 20 degrees of Fahrenheit; in winter the difference amounts to 36 degrees, and in summer to nearly 11½ degrees. But though these observations prove the great superiority of the western coast of North America over the eastern in respect to climate, a comparison between Sitkha and Bergen in Norway shows that the western coast of the old continent is much more favoured by nature. For though Bergen is 3 degrees and 20 minutes nearer the pole, the mean temperature of the winter is +36°, of the spring +45°, of the summer +58°, and of the autumn +48°, and the mean annual temperature nearly 47°. The climate of the last-mentioned place may also in other respects be compared with that of Sitkha, especially in regard to humidity. Sitkha however is certainly more humid; for in 1828 there occurred 120 days in which rain fell without interruption, and 180 days in which showers were frequent, so that only 66 days were free from rain. Snow is frequent during three or four months, but it does not lie long on the ground. It is considered rare if the frost continues for ten days together. It is to this great degree of humidity that the failure of all attempts to cultivate grain is attributed; for there are many other places in which it succeeds, and in which the mean temperature of summer is from 8° to 10° lower. The prevailing winds are from the south-east and the south-west. Thunder-storms occur only in November and December, and never in summer.

(Langsdorf's *Voyages and Travels in various parts of the World;* Lütke's *Voyage autour du Monde;* and Wrangel's *Statistische und Ethnographische Nachrichten über die Russischen Besitzungen an der Nordwestküste von America.*)

SITKOPF. [JAPAN.]

SITTA. [NUTHATCH.]

SITTINGBOURNE. [KENT.]

SIUM, the name of a genus of plants belonging to the natural order Umbelliferæ. The calyx possesses 5 teeth or is obsolete; petals obcordate with an inflexed point, or entire and ovate; fruit laterally compressed or contracted, and subdidymous, crowned with the reflexed styles with their depressed bases; carpels with 5 equal, filiform, rather obtuse ridges, of which the lateral ones are marginal; interstices with one or many vittæ; seed subterete. The universal involucre varies; the partial one is composed of many leaves.

S. Sisarum, Skirret, is the best-known plant of this genus. The root is composed of fascicles of fusiform tubers; stem terete; leaves pinnate, upper ones ternate, leaflets ovato-lanceolate, acute, serrated; involucre of 5 reflexed leaves; commissure, according to Koch, with 4 vittæ. It has white flowers. The tubers of the root are about the size of the finger, and were formerly greatly esteemed in cookery, but are now gone much into disuse. The French call this plant *Chervis*, the Germans *Zucker-wurzel*, and in the north of Scotland, where it is much eaten when cooked, it is called *crummock*. When eaten, the tubers are boiled and served up with butter, forming, according to an old writer, 'the sweetest, whitest, and most pleasant of roots.'

The Skirret is a native of China, and is reputed to possess in that country peculiar medicinal virtues. Sir J. E. Smith observes that the Chinese have long been in the habit of sending this root to Japan as the true Ginseng of Tartary, or *Panax quinquefolia* of Linnæus, a plant possessing very different properties.

The Skirret may be propagated by seeds and offshoots. The seeds should be sown in the months of March and April, in small drills eight inches apart, in an open space of lightish ground. When the plants are one or two inches high, they should be thinned, and they may be used as they attain size till August, September, or October. Plants of the last year will always afford offsets, which may be broken off the old roots and planted in rows. For procuring seed the plants should be left till the following autumn.

S. nodiflorum, Fool's Water-cress, or procumbent Water-parsnip, possesses a rooting, procumbent, striated stem; pinnate leaves, oblong equally serrated leaflets; umbels sessile, opposite the leaves. It is a native of Europe, in ditches and rivulets, and is common in Great Britain. A small and large variety are recorded, the one not attaining more than three or four inches in height, the other as many feet. It was formerly admitted into the 'London Pharmacopœia,' on account of its efficacy in cutaneous diseases and scrofula. Dr. Withering has recorded his opinion in its favour, and related a remarkable case in which benefit was derived from its use. He administered three or four ounces of the juice in milk daily. This plant has often been represented as very poisonous; but if thus much of the juice can be taken with impunity, it can hardly be very active. This, with some other species of Sium, has been placed by Koch under a new genus, *Helosciadium.* The principal difference consists in the number of vittæ found in the interstices of the carpels; *Sium* having several vittæ, *Helosciadium* only one.

There are many other species of Sium, four of which are British, but none of them are cultivated for their beauty or applied to any particular uses.

SIVA, the personification of the destroying principle, forms, with the two other gods, Brahma and Vishnu, the Trimûrti, or triad, of the Hindus; and although, in allusion to his office as destroyer, he is classed third, yet he is generally allowed to occupy the second place among the Hindu deities, or even (according to Kindersley) the first, as his supremacy appears to have obtained more general assent than that of Vishnu. Indeed the worship of Siva is so predominant, that Brahma, who is the only one of the three mentioned by Manu, and who seems to have enjoyed a larger share of adoration in antient times, has now only one temple in India, while Mahâdeva (a name of Siva) and the adventurous Vishnu, whose incarnations attract so much of the veneration of the Hindus, are, in fact, the only gods of the whole Hindu pantheon who have numerous worshippers. This however is no proof that Siva or Vishnu dates from a later period. The personification of the three divine attributes originates, no doubt, with the Vedas, and the names of the three gods are mentioned, though rarely, and without the least allusion to their pre-eminence over the elemental gods or over each other; but we do not find that the two great sects of India, the Vaishnavas (followers of Vishnu) and the Saivas (worshippers of Siva) came into existence before the seventh or eighth century of our æra. It is therefore to the Purânas (the scriptures of the modern Hindu religion) that we must ascribe the extension of the worship of Siva and the character which now distinguishes this god. We cannot however point out the difference between the mode of worshipping Siva now and in the time of Manu, the Vedas being too little known, and the extracts from them, which have been hitherto published, unsatisfactory. We must therefore limit ourselves to the description of the present popular form of Siva worship, which in all probability had not assumed its actual state before the great Saiva reformer, Sankara Acharya, who lived in the eighth or ninth century. (*Vishnu Purâna*, pref., p. x.) This opinion is supported by the well-founded assertion that the Saiva faith was instituted by Paramata Kalânala, who is described in the 'Sankara Vijaya' of Ananda Giri as teaching at Benares, and assuming the insignia that characterize the Dandis, a sect of Saivas of modern times. (*As. Res.*, xvi. 22.) No allusion is made in the Purânas to the original power of this god as destroyer; that power not being called into exercise till after the expiration of twelve millions of years, when according to Pauranic accounts, the Kaliyuga will come to a close together with the universe; and Mahâdeva is rather the representative of regeneration than of destruction. Indeed the worship of the type which represents him as the vivifying principle, the *linga* (phallus, a smooth black stone in the form of a sugar-loaf, with a projection at the base like the mouth of a spoon) is spread all over India, and the number of worshippers of this image is far greater than the worshippers of all the other gods. (Ward, i. 16.) There are however a few legends in Hindu mythology in which Siva appears as the actor without any reference to the worship of the *linga.* The linga is indeed the only form under which Siva is now adored in most parts of India. According to Professor Wilson (*Vishnu Purâna*, xliv.), 'There is nothing like the phallic orgies of antiquity; it is all mystical and spiritual. The linga is twofold, external and internal. The ignorant, who need a visible sign, worship Siva through 'a mark' or 'type,' which is the proper meaning of the word 'linga,' of wood or stone; but the wise look upon this outward emblem as nothing, and contemplate in their minds the invisible inscrutable type, which is Siva himself. Whatever may have been the origin of this form of worship in India, the notion upon which it was founded, according to the impure fancies of European writers, is not to be read even in the Saiva Purâna.' Indeed the emblems under which the Hindus exhibit the elements and operations of nature are not indecorous, and the low cylinder of stone, which is meant for the symbol of the creative power, suggests no suspicion of its original import; and nothing whatever belongs to the worship of the linga, or to the terms in which this is mentioned, which has the slightest tendency to lead the thoughts from the contemplation of the god to an undue consideration of the object by which he is typified. The best refutation however of the injurious suppositions to which the accounts of many travellers have given rise, will be the words which Siva himself is supposed to say in the Saiva Purâna: 'From the supreme spirit proceed Purusha (the generating principle), Prakriti (the generative nature), and Time; and by them was produced this universe, the manifestation of the one god. . . . Of all organs of sense and intellect the best is mind, which proceeds from

Ahankâra;* Ahankâra, from intellect; intellect, from the supreme being, who is in fact Purusha. It is the primeval male, whose form constitutes this universe, and whose breath is the sky; and though incorporeal, that male am I.' This doctrine is pure enough, and the few aberrations which remind one of the orgies practised in honour of Bacchus, are not sufficient to justify us in stigmatizing it as vile and infamous.

The linga however is only the type of Siva as the god who presides over generation. His other forms are many, and they vary in so far as they attribute to him the qualities of creator, preserver, destroyer, and regenerator, and represent him in his various *avatâras* (incarnations, eight of which are called by the common name of Bhairava, and are severally termed Asitânga, Ruru, Chandra, Krodha, Unmatta, Kûpati, Bhîshana, and Sanhâra, all alluding to terrific properties of mind or body. He is sometimes seen with two hands, at others with four, eight, or ten, and with five faces; he has a third eye in his forehead, the corners of which are perpendicular, which is peculiar to him; a crescent in his hair, or on his forehead, encircling the third eye; he wears earrings of snakes, and a collar of skulls. Mahâdeva, when represented thus, but with one head, has four hands, in one of which he holds a pâsa, the use of which is to extract the souls out of the bodies of men, when their time is come, and is a common attribute of Yama, the god of death (*S. Sâvitryupakhyana*, ed. Bopp., p. 25), a tris'ula is upheld by the other, and the two other hands are in a position of benediction. As Bhairava (the lord of dread) he is frightful to behold; great tusks burst through his thick lips; the hair, which is stiff and erect, gives his face a dreadful aspect; the fall of the necklace is impeded by numerous snakes which twine round his body. This is also the idol which shows him as Mahâ-kâla, or god of time. It is in this character that he is supposed to delight in bloody sacrifices, and that the Saiva Sannyâsis (followers of Siva who practise the yoga to the highest degree) inflict on themselves the cruelties which have rendered so conspicuous the temple of Jaggernaut (Jagannâtha, the lord of the world). [YOGA.] A very minute account of the fortitude and self-denial of the deluded Yogis is given in Ward's 'View on the Religion of the Hindus' (i. 19). His consort Sakti, who in her corresponding character is celebrated as the goddess Durgâ or Kâlî, participates in these horrible sacrifices, and has lately become more notorious by the exposure of the homicidal practices of the Thugs, who recognise in her their tutelary divinity. Siva is also the god of justice. In that character he rides a white bull, the symbol of divine justice (Manu, viii. 16), and is often seen with the *parashu* (battle-axe) in his hand, and the sacred string. On pictures he is often represented as if rubbed over with ashes, and with a blue neck; the epithet of Nîlakanta (blue-necked) was given to him in commemoration of his having drunk the poison which arose from the sea, and threatened to destroy mankind. But the character in which he is more generally known, and which his followers imitate, is that of the Kapâla-bhrit (skull-bearer). Skanda-Purâna makes him describe himself in the following words:—'Pârvatî (his bride) must be foolish to practise so severe a penance in order to obtain me, Rudra (one of his 1000 names), a wandering mendicant, a bearer of a human skull, a delighter in cemeteries, one ornamented with bones and serpents, covered with ashes and with no garments but an elephant's skin, riding on a bull, and accompanied by ghosts and goblins.' Now this, except that the unearthly beings who follow him are represented by a crowd of dirty people, is exactly the description of a Saiva digambara (sky-clad, *i.e.* naked—a kind of religious mendicants), if, instead of the god's third eye, we add a round dot on the nose, made of clay or cow-dung, and a mark on the forehead, composed of three curved lines, instead of the *chandra* (half-moon) which Rudra obtained at the churning of the ocean. When asked for the reason why they and their god carry a human skull, they refer to the Vâmana-Purâna: 'Formerly, when all things moveable and immoveable had been destroyed, and nought remained but one vast ocean; while universal darkness reigned, that lord who is incomprehensible and subject to neither birth nor death reposed in slumber on the abyss of the waters for a thousand divine years; but when his night had passed, desirous of creating the three worlds, he, investing himself with the quality of impurity, assumed a corporeal form with five heads. Then also was produced from the darkness another form, with three eyes and twisted looks, and bearing a rosary and trident. Brahma next created *Ahankâra* (self-consciousness), which immediately pervaded both Siva and himself, and under its impression Rudra thus said to Pitâ-Mahâ:—"Say, O lord! how camest thou here, and by whom wert thou created?" Brahma replied, "And whence art thou?" and instantly caused the new-made sky to reverberate with a wondrous sound. Sambhu (Siva) was thus subdued, and stood with a countenance downcast and humbled, like the moon in an eclipse, and the fifth head of Brahma thus addressed him rendered red-dark with anger at his defeat:—"I know thee well, thou form of darkness! with three eyes, clothed with the four quarters of the sky (*i.e.* naked), mounted on a bull, the destroyer of the universe." On hearing these words Sambhu became incensed with anger, and while he viewed the head with the terrible glances of his world-consuming eye, his five heads, from his wrath, grew white, red, golden, black, and yellow, and fearful to behold. But Brahma, on observing these heads glowing like the sun, thus said:—"Why dost thou agitate thyself and attempt to appear powerful? for, if I choose, I could this instant make thy heads become like bubbles of water." This heard, Siva, inflamed with anger, cut off with the nail of his right hand the head of Brahma which had uttered such fierce and boasting words: but when he would have thrown it on the ground, it would not, nor ever shall it, fall from his hand.' The beautiful idea which is obscured by the extravagances of this passage, namely, that the creation in itself involves subsequent destruction, need hardly be pointed out. In nearly all the representations of Siva, the Ganga (Ganges) is seen either flowing from his head or beaming on his head-piece. There is an interesting fable which makes it flow from Pârvatî's fingers, but for which we refer our readers to Moore's 'Hindu Pantheon' (p. 41).

The origin of the linga worship is, we find, differently accounted for in different Purânas. The 'Linga-Purâna,' which contains 11,000 verses (*Mackenzie Coll.*, i. 39), states that the primitive linga is a pillar of radiance in which Mahâdeva is present. The appearance of the great fiery linga takes place, in the interval of a creation, to separate Vishnu and Brahma, who not only dispute the place of supremacy, but fight for it, when the linga suddenly springs up, and puts them to shame; after travelling upwards and downwards for a thousand years in each direction, neither of them can approach its termination. Upon the linga, the sacred monosyllable *Om* is visible, and the Vedas proceed from it, by which Brahma and Vishnu become enlightened, and acknowledge the superior might and glory of Siva (*Vishnu-Purâna*, xliii.). This legend, by which, in its Tamul version, the circumstance of Brahma having neither temple nor worshippers is accounted for, is given in Kindersley's 'Specimen of Hindu Mythology' (p. 21). In his travels in search of the head of the column, Brahma is said to have found a Cauldairy flower which Siva had purposely dropt from his head. He entreated it to bear false witness for him, that he had actually found the top of the column. The flower rashly consenting to the fraud, both returned to Siva, and asserting the falsehood agreed on, Siva, in his just resentment, decreed that Brahma should never receive any external worship. A very fanciful story about the linga is given in the 4th volume of the 'As. Res.,' p. 368; and another, which Abbé Dubois states to be derived from the 'Lainga,' but which, in fact, is from the 'Padma-Purâna,' may be found in this author's 'Moeurs, &c. des Peuples de l'Inde,' vol. ii., p. 417. But the pure, original, mystical idea, which must undoubtedly have been expressed in the Vedas, is poorly preserved in the Purânas, and almost entirely lost in the daily worship of the present Hindus, who, although without any admixture of obscene thoughts, adore their stone, or the image which they make themselves from the clay of the sacred river where they perform their ablutions, in much the same way as an African venerates his fetish. Siva, who as the type of the regenerating principle is also that of fire, which quality is represented by a triangle with the apex upwards (Δ), is the object of a very ludicrous ceremony when the heat is great. Fearing lest he should set on fire the whole world, they put above his idol a basin full of water with a small aperture at the bottom, in order that the water which drops on him may moderate his ardour. (Dubois, ii., 304.) We need not wonder if the linga worship has given rise to sects whose practices are far from admitting any apology There is, according to Dubois (i. 154), a sect called *Vîra-Saiva*, who reject altogether the authority of the Vedas and the other sacred works of the Hindus, who deny the distinction of casts, maintaining that the linga renders all men equal; even a Vaisya, who embraces this doctrine, is, in their opinion, equal to a Brâhmana. They state that where the linga exists, there is also the throne of the deity, without distinction of ranks and persons; and that the humble hut of the labourer where this sacred sign exists, is much above the sumptuous palace where it is not to be found. This doctrine, which is in direct opposition to the customs of the Hindus, has never had many followers.

---

* Literally the 'I-Maker' is the Hindu term for the power of self-consciousness, or, what is implied by this, individuality; for further information see YOGA.

To continue the account of his adventures: Siva marries Pârvatî, and lives with her in the midst of the eternal snows of Mount Kailâsa. His heaven is however one of the most splendid in Hindu mythology, and a description of it may be found in Ward's 'View' (i. 30); it is a translation from the Kritya Tatwa. There also are his two sons; Ganesa, the leader of the heavenly choristers, and, as Vigneswara, the god of difficulties, whose head is that of an elephant; and Kartikeya, the six-faced god of war. It is there that he was thus addressed by Brahma and the other gods:—'I know that thou, O Lord, art the eternal Brahm, that seed which, being received in the womb of thy Sakti (aptitude to conceive), produced this universe; that thou, united with thy Sakti, dost in sport create the universe from thy own substance, like the web from the spider.' Here it was that he reduced to ashes the 'flowery-bowed mind-bewitcher' Kâma (the god of love), pierced by whose arrows he had neglected to avenge the wrong done to him and his consort by his father-in-law Daksha. On the top of Kailâsa it is that the worshippers of Siva will be admitted to the sports of the inhabitants, where Mahâdeva invented for the amusement of his bride the heavenly dance, to which his faithful attendant Nandi plays the musical accompaniment. There lie before the door his vehicle, the white bull, and the tiger on which his consort rides. Though wanting all the splendours of the Swarga (Indra's heaven), the abode of Siva, when drawn in the glowing colours of the East, is no less gratifying. From thence he is supposed to bless his worshippers, 'when, with Pârvatî on his knees, he, the lord of the world, on whose brow shines the moon throwing its beams over the mountain of the north, deigns to allow the Suras and Asuras (gods and demons) to wear for their frontal ornament the reflection of the radiance of the nails of his feet, and the Ganga, rushing from the top of his head, refreshes the air of his sacred dwelling' (*Kathâ Sarit Sâgara*). This is a favourite subject among the Hindu painters, and we must allow that their conception of it is generally good and well executed.

The religious service is the same as that which is used at the worship of Siva under his other names. In performing the linga-pûja, for that is the Sanscrit name for sacrifice or worship, all its various parts are performed in due order. The directions for it may be found in the Lainga-Purâna (i. 25), translated by Kennedy (p. 306):—'Having bathed in the prescribed manner, enter the place of worship; and having performed three suppressions of breath [YOGA], meditate on that god who has three eyes, five heads, ten arms, and is of the colour of pure crystal, arrayed in costly garments, and adorned with all kinds of ornaments: and having thus fixed in thy mind the real form of Maheswara, proceed to worship him with the proper prayers and hymns. First sprinkle the place and utensils of worship with a bunch of *durbha* dipped in perfumed water, repeating at the same time the sacred monosyllable *Om*, and arrange all the utensils and other things required in the prescribed order; then in due manner repeating the proper invocations, prayers, and hymns, preceded by the sacred word *Om*, prepare the offerings. For the *Padiam*, they should consist of Ushiram (root of the Andropogon muricatus), sandal and similar sweet-smelling woods, &c. Having then with due rites prepared a seat, invoke with the prescribed prayers the presence of Parameswara, and present to him the *padiam*, the *âchamanîyam*, and *argyha*. Next bathe the linga with perfumed waters, the *panchagavyam* (five produces of the cow), clarified butter, honey, the juice of the sugar-cane, and, lastly, pour over it a pot of pure water consecrated by the requisite prayers. Having thus purified it, adorn it with clean garments and a sacrificial string, and then offer flowers, perfumes, frankincense, lamps, fruits, and different kinds of prepared eatables and ornaments. Thus worship the lingam with the prescribed offerings, invocations, prayers, and hymns, and by circumambulating it, and by prostrating thyself before Siva represented under this symbol.' For an explanation of the technical terms here employed, we refer to Dubois (i. 199).

The Purânas which the worshippers of Siva are most acquainted with, and which have more or less of a Saiva bias, are the Mâtsya, Kaurma, Saiva, Lainga, Skhanda, and Agneya, to all of which the term of Tâmasa, or works of darkness, is given. The Padma-Purâna contains the thousand names of Siva at length, and is better known than the others. None of them however have yet been published, and the reader will have to judge of the general tendency of these works from the extracts that we have given. It is remarked that they are not so popular as the Purânas, which contain the narratives of Vishnu's wonderous deeds, and that they have not found their way into the modern literature of India. If therefore the thousand visible manifestations of Siva's presence on earth, under as many different names, are known to the present Hindus by tradition only, we shall not be surprised that they united them all in one common typification by means of the linga. There are however a few exceptions. A form of Siva which is especially worshipped by the lower orders, who consider him as the destroyer of children, is known under the name of *Panchânana*; it is a misshapen stone, anointed and painted, and then placed under trees. Another form which is still preserved is that of the *Kâlurâya*, the god of forests. He is represented as sitting on a tiger, and carrying a bow and arrows. The woodcutters worship him to insure protection from wild beasts. These numerous names of Siva have led Europeans into a notion contrary to that which induced the Hindus to make the linga the general type for all the forms of this god; they naturally enough supposed each of his numerous names and pagodas to belong to a distinct and separate deity. Hence the erroneous notion about polytheism in India, whilst it is evident, even from the few passages we have quoted, that the original monotheism of Hindu religion had in the progress of time become pantheism, which is prevalent all over the East. Even at present the follower of Siva denies the divinity of Vishnu, and *vice versâ;* although both these gods, now representing the Supreme Being, were only types of divine qualities attributed to the Trimûrti. But the allegory eventually acted too strongly on the imagination of the people. Brahma, as creator, had finished his work, and could not with propriety act any more. Siva therefore and Vishnu were destined to do all that fancy could suggest; but still Mahâdeva is the only god to the Saivas, whilst Narâyana is the one chosen by the Vaishnavas. For this we have the express words of the Radha Tantra, which says that the form of Arddhanareswara (half man, half woman) was assumed by Siva in order to prove that he was the one Brahma, in whom both the female and male powers are united. (Rolle, i. 15; Bohlen. i. 150.) This notion of the animating and recipient principles being united in one, has been embodied in the statue termed Arddhanarî; one half of Siva, from head to foot, bears all the ornaments of Pârvatî or Bhâvanî; the other is exactly the same as that in which he is usually exhibited. The Vyaghra (tiger) of Kâlî is also seen under the female half of this symbol, and the bull Nandi lies at the foot of the man portion of Siva.

Sects of Saivas.—The *Dandis* are separated into two classes. 1, The *Dandis* proper are the only legitimate representatives of the fourth asrama, or mendicant life, into which the Hindu is to enter after passing through the previous stages of student, householder, and hermit. (Manu vi. 33.) They worship Siva as Bhairava; the ceremony of initiation consists in a small incision being made in the inner part of the knee, and in drawing the blood of the novice as an acceptable offering to the god. 2, The *Dasnâmi Dandis* admit only Brahmans into their fraternity, and are the primitive members of the Dandi order. Sânkara, the teacher of the caste, has perpetuated his influence by writings, the best of which are his Bhâshyas, or Commentaries on the Sûtras (aphorisms) of Vyâsa, and on the Bhagavad-Gîta. They are distinguished by carrying a small dand (or wand), whence they derive their name, and a piece of cloth dyed with red ochre. They shave their hair and beard; wear only a cloth round their loins; and subsist upon food obtained ready dressed from the houses of the Brahmanas. Their principal study is that of the Vedanta works. (*As. Res.*, xvii. 169.)

The other sects are the *Raudras, Ugras, Bhâktas, Jangamas, Pâsupatas,* and others, each of which wears the linga on some part of the dress or person, and are distinguished from each other accordingly. This sign is often worn in small cases of silver or brass. (Dubois, i. 147.) Their occupations are generally similar to those of the Dandis (for the principal points in which they differ, see Vishnu). Their scriptural authorities are the Siva-Gîta, Siva-sanhita, Siva-harasya, Rudra Samoha Tantra, and a great number of Tantras which are little known.

Among the sects of Siva there are women who are devoted to the service of their gods, under the name of spouses of the gods. They are called linga-vadhvas, and wear the stamp of the linga on their thigh. Although known to be the concubines of the priests, they enjoy considerable respect. (Dubois, i. 179.)

Among the chief places of pilgrimage sacred to Siva, is Kasi, or Benares, which contains the finest temple, known under the name of the Pagoda of Vis'wes'wara. Chandra Sekhara, a mountain near Chittaganga, on which stands a temple of Siva, is another place of pilgrimage. The surface of a pool of water at this place is said to emit inflammable air, from the fire of which pilgrims kindle their burnt offerings. According to a statement of Ward (ii. 130), Ekamrakanana, a place on the borders of Orissa, contains 6000 temples. Not less than 70,000 or 80,000 people are said to visit this place at the drawing of the car of Jagannâtha, when all castes eat together.

Of the festivals of Siva the chief is that called Sivarâtri. It lasts three days, which are employed in performing various rites before the linga, which they wash four times. The occasion of this is the Bhavishya-Purâna: 'A bird-catcher detained in a forest in a dark night climbed a Bilwa-tree, under which was an image of the linga; by shaking the boughs of the tree the leaves and drops of dew fell upon the image; with which Siva was so much pleased, that he declared the worship of the linga on that night should be received as an act of unbounded merit.' (Ward, ii. 20; Dubois, ii. 328 and 530.) This takes place on the 14th of the increase of the moon in February. For the other festivals common to both sects, see Vishnu. The Monday is generally consecrated to Nandi (Siva's bull), and no work is done.

The shape of the temples of Siva does not differ from those of the other gods. The chief entrance into the great temple is by a high massive pyramid, the top of which has generally the form of a crescent; it invariably faces the east. Beyond the gate there is a large court, at the farther extremity of which another gate leads through a pyramid of less height, but of the same form. A small yard separates it from the temple of the idol. In the middle of it there is either a huge bull or a linga carved in stone, raised on a pedestal, or put under a canopy supported by four pillars. This is the first object of adoration to the visitors, who then pass through a low narrow door into the inside of the temple. This door is the only passage for light and air, there being no windows. A lamp, which burns night and day, gives a tolerable light. The interior of the building is generally divided into two parts, sometimes into three, the first of which is the most spacious, and is destined to receive the people; the second, or the *adytum*, in which the idol resides, is much smaller and darker, and generally shut, the door being opened only by the officiating priest, who, with some of his attendants, has alone the right of entering this mysterious place for the purpose of washing the image, and dressing and bringing offerings to it. This part is often built in the shape of a vault, but it is so low as to make a prolonged stay in it rather oppressive.

Among the trees sacred to Siva the chief are the Vepu and the Bilwa, the leaves of which are often brought as offerings to the god. The first of these trees has to undergo the singular ceremony of being married to the Aswata (the holy fig-tree); the formalities are much the same as those which take place at the marriages of the Brâhmanas. Siva himself is said to be the stem of the Aswata-tree, of which Brahma is the root and Vishnu the branches. Besides the Vepu and the Bilwa, there are numberless inanimate objects sacred to Siva.

It has already been mentioned that the bull is the animal which enjoys the greatest veneration from the Saivas, and to which a day in the week is consecrated.

The worshippers of Siva are distinguished from the rest of the Hindus by burying their dead bodies, instead of burning them. The obsequies are performed in the following manner, if the deceased is a Saiva Sanhyâsi:—The corpse is deposited, with its legs crossed, in a large basket made of bamboo, which four Brâhmanas carry to the grave, which is dug in the neighbourhood of a river or pond. It is about six feet deep, and of a circular form. They cover the bottom of it with a thick layer of salt, upon which the deceased is placed in a sitting position; the space between him and the sides of the grave is then filled with salt up to the chin of the corpse, with the view of holding up the head so as not to allow of its being moved. A great number of cocoa-nuts are then thrown against it until the skull is quite broken, when they throw salt upon the place so as to hide entirely the fractured head. They then erect over the grave a kind of tumulus, an elevation about three feet high, on the top of which a linga of two feet, made of clay, is placed, and immediately consecrated by the *mantras* (incantations) of the Brâhmanas, who present to it kindled lamps, flowers, incense, bananas, and other offerings. This ceremony is performed with the accompaniment of sacred hymns, which are sung by those who are present at the burial. At the termination of this discordant concert, as it is termed by Dubois, he who presides at the ceremony goes three times round the linga, inclines himself before it, and expresses his hope 'that by virtue of the sacrifice offered to the linga, the deceased may be agreeable to Siva, and that being once received by Brahma (*paramâtma*, the universal soul) he may not be obliged to be born again.' During two days which follow this ceremony, offerings are brought to the linga every morning, and the sacred mantras are repeated. A year afterwards the ceremony is performed again, but with less expense to the family of the deceased.

It has been mentioned in the course of this article, that nothing indecent occurred at the festivals in honour of Siva, or in worshipping his type the sacred linga; but since so much has been said in support of an assertion tending to throw doubt upon the strict observance of all the rules of decency, and to identify the practices of the linga worshippers with the phallic ceremonies of the Greeks, it seems proper to state what may have occasioned this report.

There is indeed in India a sect, which some writers have stated to belong to the Saivas, whilst others describe them as votaries of Vishnu; others again, and apparently with more reason, speak of them as independent of either: they are called Sâktas, and adore the female organ of generation under the type of the *yoni* (pudendum muliebre, a figure of stone or wood in the shape of a heart). Their name Sâkta is derived from Sakti, which means power, aptitude, and is the name of Siva's consort.

These Sâktas seem to found their religious belief on a passage in one of the Upanishads to the Atharvan-Veda, quoted by Windischmann, p. 847: 'Voluptatem in amplexu foeminæ, et voluptatem emissionis et voluptatem acquirendi nati fausti, qui desiderium patris post mortem ejus adimpleat, et gaudium quod in illo tempore simul provenit, etiam Brahma esse qui scit oportet eum meditari de illa (*i.e.* cum illa yogam inire);' and certainly in some of their festivals they commit great excesses. Dubois, an eye-witness, states expressly that they are held in honour of Vishnu (i. 402). The ceremony of the Sakti-pûja is performed at night with more or less secrecy, a minute description of which is given by Dubois. We shall content ourselves with observing that the least odious of these orgies are those where they limit themselves to drinking and eating all that is forbidden them by their Sâstras, and where men and women violate the most sacred rules of decency. This is the only instance where the worship of the generating principle has been made the pretext for the most revolting orgies, where the idea degenerated in the same manner as it did in Rome and Greece. There too the principle was the same—a highly philosophical and moral idea. The doctrines of the Egyptians laid the foundation of the Eleusinian mysteries; Isis became Demeter, Orus the Bacchus Iacchus. That same Isis was the Sakti of the Hindus: the notion which this Sanscrit word conveys suits exactly the description of the Egyptian goddess by Plutarch. According to him Isis was the generative power (δύναμις), which lay dormant until Osiris's vivifying principle had reproduced himself by her in his son Horus. The same idea was in Plato's mind when he said that nature was composed of three things, and could be represented by a triangle. There are still some passages of Greek and Roman writers which prove that the worship of the phallus had in other places been as pure as that of the linga. Tacitus, for instance (*Hist.*, ii. 3), describes a linga in the temple of Paphian Venus without being aware of it; these are his words:—'Simulacrum deæ non effigie humana; continuus orbis latiore initio tenuem in ambitum, metæ modo exsurgens, et ratio in obscuro;' and Rolle, ii. 342, says, without mentioning his authority, 'It was the custom of the Greeks to put phalli on the tombs, that the productivity of nature, extinct, or rather, stopped for a short time by death, might take a new life.' This coincides exactly with the ceremony observed by the Saivas at their funerals; it does not appear however what kind of images were used upon this occasion: but those which Pliny (xix. 4) mentions, and which he calls *satyrica signa*, must have differed from those which are described as belonging to the Greeks. Another circumstance which is remarkably like the practice of the Hindus which we have mentioned, is the custom of wearing phalli in small silver cases to protect children against *fascinations*, as stated by Varro (*Ling. Lat.*, vi. 5, p. 99, Bip.). Other traces of the linga, as considered by the Hindus, may be found in Socrates (*Hist. Eccl.*, 5, 17), where he relates that at the destruction of a temple of Serapis in Alexandria a number of signs were found, the purpose of which was not understood; among them there was one in the shape of a cross, which the heathens stated to be the symbol of a future life. The Christians, he continues, by the means of this cross made a great number of proselytes. Now this cross is the same by which we mark the planet Venus (♀), and which, when first seen, was supposed to mean the key to the mysteries. Jablonsky was the first who understood its real import, when he expressed himself thus: 'Cruci ansatæ sive phallo adeo similis est lingam illud Brahmanum ut ovum ovo similius esse nequeat.'

For the description of the degraded phallic worship we must refer to the 2nd vol., pp. 257-274, of the 'Indian Antiquities' of T. Maurice, who traces the origin of the linga worship back to Egypt, and gives a faithful paraphrase of the account contained in Diodorus Siculus, by which he only proved how little he knew the Hindu view of the subject.

The rage for identifying the gods of the Eastern nations with those of the West has not spared Siva. He was Bacchus, and Saturn, and Pluto; in fact, he was said to be almost the entire pantheon of Greece and Rome and Egypt. Neither is this to be wondered at, seeing that the Greeks and Latins ascribed different attributes to different deities. The Hindus have only one to whom to ascribe all attributes. Siva is also, and it appears originally, the representative of fire. This element penetrates earth and water, represented by Brahma and Vishnu, imparts to them some of its vigour, develops their qualities, and brings everything in nature to that state of increase, maturity, and perfection which they would not attain without it. But ceasing to act beneficially on the created things, they perish: this agent of reproduction, when free and visible, consumes the body, the composition of which he himself had effected: to this quality he owes his title of god of destruction.

The reader who may wish to see the connection of the Hindu gods with those of Greece and Rome will find ample materials in the papers which Col. Wilford inserted in the earlier volumes of the 'Asiatic Researches:' they cannot however be implicitly relied on.

(Vans Kennedy, *Researches into Ancient and Hindu Mythology*; Ward, *View of the Religion, Literature, &c. of India*; Wilson, *Vishnu Purâna — Oxford Lectures*; Rolle, *Recherches sur Bacchus et les Mystères*; P. von Bohlen, *Das Alte Indien*; Kindersley, *Specimen of Hindu Literature*; Moore, *Hindu Pantheon*; *Asiatic Researches*; Dubois, *Mœurs, &c. des Peuples de l'Inde*.)

SIVAS, or **SIWAS**, a town in Asia Minor, on the north bank of the river Kisil-Irmák, in 39° 25′ N. lat. and 36° 55′ E. long.; 165 geographical miles south-west by west from Trebizond, and 87 north-east from Kaisariyeh. It is the capital of a pashalic which comprehends the whole eastern part of Asia Minor, and which still bears the name of Rúm, or Rúmiyah, which was applied to the whole Turkish empire before its expansion. The valley of the Kizil-Irmák, the antient Halys, here spreads out into a broad and fertile plain. The situation being level, with the exception of only one small circular elevation in the south-west, the whole city is seen to much advantage when approached from the north. It is interspersed with trees, without being buried in them, like most of the towns in these parts. The great number of chimneys seen above the house-tops indicates that the winter is severe; and the inhabitants affirm that it is as cold as at Erz-rúm. The houses are well-built, partly tiled, partly flat-roofed, and intermingled with gardens. These, with the numerous minarets, give a cheerful aspect to the place. The bazaars are extensive and well stocked with goods, including many of British manufacture. The consumption of Sivas itself, and the circumstance of its furnishing supplies to many places, causes its transit-trade to be extensive. Sivas is inhabited by about 6000 families, of whom 1000 or 1100 are Armenians, and the rest Moslems. The place was once called Cabira, a name that was changed to Diopolis by Pompey, and subsequently to Sebaste. Sivas is a corruption of the word Sebaste. It was the theatre of the great contest, in 1401 A.D., between Bajazet and Timour, in which the former was defeated. An Armenian historian states that the town then contained 120,000 souls; and that it capitulated to Timour, on condition that their lives should be spared, which condition he most barbarously violated.

(Mr. Johnston's *Journal*, in the *American Missionary Herald*, Oct. 1837; and Mr. Consul Suter's *Journal*, in *London Geographical Journal*, 1841.)

SIWAH is the modern name of the oasis in the Sahara, which was called by the Greeks and Romans Ammonium, Ammonia, or Ammoniaca, from the celebrated oracle and temple of Jupiter Ammon, with whose worship the Greeks became acquainted through the Cyrenæans. The town of Siwah is in 29° 12′ N. lat. and 26° 17′ E. long., and is about 160 English miles from the sea-coast, and twelve days journey from Cairo. The distances between the temple of Ammon and several of the Egyptian towns are stated by the antients thus: from Memphis it was twelve days journey (Plin., *Hist. Nat.*, v. 5.); from the village of Apis, five days' (Strabo, xvii., p. 799); and from Thebes, ten days' journey (Herod., iv., 181). The whole oasis is about fifteen geographical miles in length and twelve in breadth, but Diodorus (xvii. 50) says that the length and breadth are about 50 stadia, which would only make a little more than five geographical miles. Nearly the whole of the oasis has a fruitful soil, and is watered by many springs of fresh as well as of salt water, the latter of which probably arise from the masses of salt mentioned by Herodotus. The aspect of the oasis is that of an undulating country, and in the north it is surrounded by high limestone hills. The antients speak of three things as remarkable in this oasis: first, a well, called the Well of the Sun, of which the water was warm in the morning and evening, and cold at mid-day (Herod., iv. 181; Diodor., xvii. 50; Lucr., vi. 849, &c.; Pomp. Mela, i. 8); secondly, a large palace of the antient kings of the Ammonians, which was surrounded by a triple wall, and situated in the centre of the oasis (Diodor., xvii. 50); and thirdly, the temple of Jupiter Ammon, which was surrounded by a shady grove. Cambyses made an unsuccessful attempt to take the Ammonium (Herod., iii., 25); and it was visited by Alexander the Great. [ALEXANDER.] In the reign of the Ptolemies and under the Romans the oasis belonged to that nomos or province which was called Libya (Ptolem., iv. 5). In the time of Strabo (xvii., p. 813) the oracle was almost entirely neglected. In the middle ages the Arabs called this oasis Santariah.

The Ammonium, during its most flourishing state in antient times, seems to have been well peopled; and the inhabitants are said to have consisted of three distinct tribes. The southern and western parts were inhabited by Æthiopians, the middle part by the Nasamones, and the north by a nomadic tribe of Libyans. No town however is mentioned in the oasis, but it is stated that its inhabitants lived in villages (Diodor., xxvii. 50). The description which Diodorus gives of the beautiful climate of the oasis, and of its fertility, especially in fruit, is still applicable to it: nearly the whole oasis forms one uninterrupted succession of meadows, fields, and palm-groves; and the gardens produce an abundance of the most delicious fruits. The water however is said to be injurious to camels.

The present inhabitants consist chiefly of Berbers mixed with negroes, and all are very zealous Mohammedans. Since the year 1820 they have been subject to the viceroy of Egypt, to whom they pay an annual tribute of 2000 camel-loads of dates and 10,000 Spanish piasters. Their jealousy of foreigners has frustrated several attempts of Europeans to investigate the interior of the oasis. The principal place in it bears the name of Siwah, and has about 8600 inhabit ants. This, as well as the several other smaller places in the oasis, are built upon eminences, and surrounded by walls to protect them from hostile inroads. The houses are all wretched huts, and the streets narrow and dark.

Ruins of the antient temple of Ammon, as well as of a wall by which it appears to have been surrounded, are still visible. The paintings, sculptures, and hieroglyphics which are still preserved on the walls, are copied and described in the work of Minutoli. There are also ruins of other places, especially in the neighbourhood of the modern village of Shargiah, which probably mark the sites of the antient villages. The Well of the Sun is also near Shargiah, and is still remarkable for its varying temperature. Catacombs cut in the rocks have been discovered in four different parts of the oasis.

In the year 1820 Baron Minutoli undertook a journey to Upper Egypt and the oasis of Siwah; and some years after, his account of it was edited by Tölken, under the title 'Reise zu dem Tempel des Jupiter Ammon und nach Oberägypten,' Berlin, 1824, 4to. This work contains a map of the oasis. In 1827 Tölken published a supplement to this work, in which he endeavours to explain the archæological and mythological points which are mentioned in the work of Minutoli.

SIX CLERKS. The office of Six Clerks is an office of great antiquity connected with the Court of Chancery, proprobably as antient as the Court itself. The number of the Six Clerks was limited to six as long ago as the 12th Rich. II. The history of this office illustrates the mischief of attempting to regulate the supply of legal services to the client. It exhibits an instance of the principles of interference and monopoly destroying two successive classes of officers, in spite of the strongest support which the law and the courts could give to them.

The Six Clerks were originally the only attorneys of the Court. By the common law any person who was impleaded in any of the courts of law was bound to appear in person, unless he obtained the king's warrant, or a writ from Chancery enabling him to appear by attorney, 'by reason whereof,' says Lord Coke (1 *Inst.*, 128), 'there were but few suits.' There are many early statutes still in force enacted for the purpose of empowering the subject to appoint an attorney. The earliest statute is that of Merton (A.D. 1235), whereby it is 'provided and granted that every freeman which oweth suit to the county, tithing, hundred, and wapentake, or to the court of his lord, may freely make his attorney to do those suits for him.' Subsequent Acts extended this privilege to other parties and other courts; but to this day it would appear that by the strict law of the land, except so far as it has fallen into desuetude, persons in good health, in pleas relating to money, are bound to appear in person. None of these statutes however extended to Courts of Equity, but, as far as appears, every person who was desirous of relief, or compelled to defend himself in the Court of Chancery, was obliged to employ one of the Six Clerks as his representative.

In early times great exertions were made to limit the number of attorneys who were allowed to practise in each court. The increase of litigation which accompanied the increase of property was looked on as an evil to be checked in every possible method; and the method most relied on was that of limiting the number of legal practitioners. The well known statute of 1455 (33 Hen. VI., c. 7., which is still in force) may be referred to as an instance. It recites a practice of contentious attorneys to stir up suits for their private profits, and enacts that there shall be but six common attorneys in Norfolk, six in Suffolk, and two in Norwich, to be elected and admitted by the chief-justice. In 1564 a rule was made by the Court of Common Pleas, that every attorney of that court 'should satisfie himself with the suits in the same, and forbear to be towards any causes as plaintiff in any other the Queen's Majestie's courts here at Westminster.' As late as the year 1616 a rule was made, 'that the number of attorneys of each court be viewed, to have them drawn to a competent number in each court, and the superfluous number to be removed.' These various regulations, so far as they were enforced, could only have been detrimental to the public; and as regards the Courts of King's Bench and Common Pleas, they seem not to have been long insisted on. As to the Exchequer, the principle of monopoly was continued in force down to the year 1830, until which time eighteen attorneys only were admitted to practise in it. As a consequence, that court was, before the year 1830, scarcely at all resorted to. Since that time more actions are commenced in it than in any other court. In the year 1632 a new principle was introduced into the Common-Law Courts, and all persons wishing to be attorneys were required to serve an attorney under articles for six years (since reduced to five). The Six Clerks' Office however did not adopt this method until long after. They got over the difficulty by admitting under-clerks, afterwards called sworn clerks, to practise in their names, and they shared in some way or other the profits with them. In 1548 an inquisition was appointed, to inquire into the supposed exactions and abuses of the Court of Chancery, and the fees then payable for the business of this office. A copy of their presentment was printed by order of the House of Commons, 8th February, 1831. It shows that all the fees payable for business done in this office were at that time payable to the Six Clerks; and it contains no allusion whatever to the under-clerks as being in any way known as officers of the court. They seem at that time to have held a position with regard to the Six Clerks, quite analogous to that the solicitors for a long period were under with regard to the sworn clerks, and to have been the real persons who prosecuted the causes. They must have been numerous, as in 1596 an order was made limiting the number that each Six-Clerk should be allowed to have under him. Soon after this the Six Clerks, instead of taking clients according to the clients' choice, agreed to divide the business coming from time to time into court among themselves alphabetically. This arrangement shows that the scheme of a limited number of legalised attorneys for the Court of Chancery had now entirely ceased to operate, and had been converted into a mere legal pretext to enable these officers to tax all who were driven to such Chancery Court for justice. This regulation for dividing the business was, after some years, set aside on petition of the master of the rolls to the crown, as a monopoly and a breach of the liberty of the subject. In 1630 the office of Six-Clerk was, if not a sinecure, at least an appointment of great value. From a ridiculous story told about Sir Julius Cæsar, the master of the rolls, in Clarendon's 'Rebellion' (vol. i., p. 52), it appears that the appointment at that time sold for so large a sum as 6000*l.* About this time the under or sworn clerks, or clerks in court (for all these names apply to them), began to be frequently mentioned in the orders regulating the court, and soon grew into a very important body. The under-clerks were the parties who knew the merits of the different causes, and were interested in getting the work done, so as to gain the fees from the clients. The Six Clerks had begun to sink into the lethargy of sinecurists. Many orders were made to spur them into activity, but all in vain. The following may be instanced — the 10th of Lord Coventry's orders (1635): 'The Six Clerks, who are the only attorneys of this court, ought to inform themselves continually of the state and proceeding of their clients' causes, whereby they may be able to defend their clients, and to give account to the court, as the attorneys in all other courts do, and not leave the care and knowledge thereof upon their under-clerks, who attend not in court; and the clients, and such as follow their cause, are to acquaint their attorneys for that purpose.' Order of 1650: 'Whereas only Mr. Hales, one of the Six Clerks of this court, gave his attendance this morning at the sitting of the court, at the entering into the hearing of the cause wherein Kitchin is plaintiff against Meredith defendant, and the rest of the Six Clerks made default: it is therefore this present day ordered, that such of the six clerks who so made default of their attendance and service to this court, at the beginning of that cause, be fined ten shillings a-piece to the poor, and the usher of the court is to receive the same to the use aforesaid.'

The Six Clerks, in a paper given in by them to the Chancery Commissioners of 1825 (*Rept.*, Appx. B, No. 20), after communicating their present duties, state that 'From the first establishment of the Six Clerks, up to the Rebellion in the reign of King Charles I., many other important duties were attached to their office. During the usurpation however a part of the duties was assigned to certain new officers entitled the sworn clerks, who have ever since continued the execution thereof.' The Six Clerks in this statement have fixed rather too early a date to the legal transfer. Great efforts were made for reform of legal procedure during the Commonwealth. Among others there was an ordinance for abolishing the office of Six-Clerk in 1654, but it terminated, with the other ordinances of the Commonwealth, at the Retoration and the judges endeavoured vigorously to reinstate the Six Clerks in their old position. By an order of Lord Clarendon, of 1665, made 'On taking into consideration the manifold disorders and undue practices which of the late times have crept into the Six Clerks' Office, to the great dishonour of this court, the obstruction of justice, and the damage of the client,' the alphabetical division was re-enacted. 'And because it is very manifest that these misdemeanors and enormities are gotten into the office of the Six Clerks by the liberty and licence which the inferior clerks have of late assumed to themselves,' the numbers were to be limited to twelve under-clerks to each Six-Clerk. It is obvious however that the decrepitude of a rotten constitution rendered these efforts nugatory. In orders about this time the under-clerks are sometimes referred to incidentally as the 'attorneys of the parties,' though it is strongly repeated that 'the Six Clerks are the only attorneys of this court.' In 1668 the Six Clerks submitted to their fate; an order was made fully recognising the under-clerks, and dividing the office-fees between them and the Six Clerks. The Six Clerks, having secured their own monopoly, had, by the year 1688, become the agressors, and had schemed to increase their income by admitting other persons, as well as the sworn or under clerks, to practise in their names. This was a bone of contention for many years. Before 1693 the under clerks had obtained the privilege of filling up all the vacancies in the office by taking articled clerks themselves. From this time the office of Six-Clerk has become a complete sinecure, and the Six Clerks are only mentioned in the court's annals with respect to the fees that they are entitled to demand from suitors, as door-keepers, as it were, to the court. Their business, such as it is, for a long time has been managed by one or two private clerks, employed as clerks to the whole body of Six Clerks; and the Six Clerks have signed the necessary documents for each other, each being at the offices for two months only in the year. The office is virtually abolished by Lord Brougham's Act, 3 & 4 Wm. IV., c. 94, s. 28, which enacts that vacancies shall not be filled up till the number of Six Clerks is reduced to two. Nearly the same story has to be told over again with reference to the sworn clerks. For a long time these under-clerks were the principal solicitors of the court; and until the middle of the last century the chief business of the court was transacted by them without the intervention of a solicitor. The same principle of monopoly has with them led to nearly the results that it did with their titular superiors. A vested right to fees in the various stages of equity proceedings brought about an inattention to business, which has led to the transfer of the prosecution of suits to the solicitors.

In 1693 a new half-official character was given to the articled clerks of the under-clerks. They were legalised under the name of 'waiting clerks.' This new body soon began, as the following extract from an order of the master of the rolls of 1693 will show, to imitate towards their own masters the insolence which the sworn clerks had thirty years before shown to their superiors the Six Clerks:—'Whereas complaint hath been made by the petition of the sworn clerks of this court to the right hon. the master of the rolls, that divers of their under-clerks have of late behaved themselves after a bold, insolent, rude, and disorderly manner in the Six Clerks' Office, as well towards their respective masters as to others the sworn clerks, and to the suitors of the court attending the despatch of their business there, by unmannerly and abusive language, breaking of windows, cutting desks, breaking down seats, throwing stones and other things at the said sworn clerks and their clients, whereby, and by making rude and indecent noises, they often forced them to leave the said office, and caused the same to be shut up in the most usual time of business, and when the court hath been sitting, to the great scandal thereof, and damage of the said sworn clerks and their clients, and contrary to the duty of the said under-clerks, and the antient and laudable usage of the said office: and whereas complaint hath been likewise made to His Honor by petition of the under-clerks that the Six Clerks do take and employ persons to be their waiting-clerks who have not been articled clerks, or ever educated and employed in the said office; and that several of the sworn clerks have and do not only take more than one articled clerk, which they, by the rules and orders of the said court for the government of the said office, ought not to do, but do likewise carry the records out of the said office, and cause the same to be copied at under-rates by persons out of the office, rather than to allow to their under-clerks their due fees for copying thereof.' It was accordingly, amongst other things, ordered 'that no under-clerk in the said office shall from henceforth during the time of his clerkship presume to wear any sword, either in or out of the said office, within the cities of London or Westminster, or the liberties thereof; or to be covered, or wear his hat in the said office, in the presence of any one of the sworn clerks; but that all the said under-clerks shall, during all the time of their respective clerkships, as well in their masters' seats as elsewhere in the said office, be uncovered, and behave themselves orderly, soberly, and with respect towards all the said sworn clerks and suitors of the said court: and in case any of the said under-clerks shall be idle in the said office, out of their masters' seats, they shall, upon the admonition or command of any of the said sworn clerks, immediately repair to their masters' seats, and quietly sit and attend their business there, from seven of the clock in the morning in summer, and eight in the winter, till twelve of the clock at noon, and from two of the clock in the afternoon until such time at night as their respective masters shall think fit.'

There is still another class of workers of a semi-semi-official character, even now not recognised by the court—the sworn clerks' agents. These gentlemen really now perform almost all the remaining duties of the office which the intrusion of the office of solicitor has left to it, except taxing the costs; and are paid (it would appear illegally) by some share of the fees received. The necessity for these agents seems to prove that a monopoly officer cannot work. After so many successive attempts by the court to have each successive class of officers do their duty in person, it is at last in the main done by gentlemen who are mere private persons, hold no official situation, and are liable in point of law to be turned away at any moment.

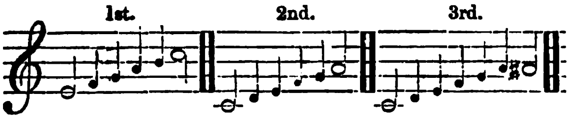
An effort was made on the occasion of the Chancery Commission of 1825 by several eminent solicitors to get the offices of Six-Clerk and clerk in court abolished. It was broadly stated in evidence by a solicitor of celebrity that Mr. S. (a gentleman whose mind had failed him) was 'quite as good a clerk in court after he was a lunatic;' and the expense of the office to the suitor was insisted on. The commission, influenced (as one of their number has lately declared) by Lord Eldon, stated they saw no reason to interfere with these offices; and they have remained to the present day. It is now however condemned by the unanimous voice of the whole profession, and its fall may be shortly expected. At present the client has still to use the Six-Clerk's name as his attorney. He therefore pays his own solicitor for his services; he pays a clerk in court (and his partner, the real working agent) for letting the solicitor get, in his name, to the Six-Clerk for liberty to use the Six-Clerk's name, and he pays the Six-Clerk for this liberty also. Therefore what was once fair emolument has now become plunder. It is mainly to the existence of such legal abuses as have here been pointed out, that we must look to account for the astonishing fact that more suitors annually applied to the Court of Chancery for aid 100 years ago than do now. So little does personal talent affect the office of clerk in court, that an executor of a clerk in court can sell the practice of his testator to another clerk in court, almost with a certainty that not a client will be lost, however mean may be the talents of the purchaser.

The emoluments of the office have long been a subject of speculation among the profession of the law. They were represented by Lord Eldon's commission as causing 'a very trifling expense to the suitors.' The accuracy of this representation was suspected, and orders were made on various occasions by the House of Commons for the Six Clerks and clerks in court to return the amount of their receipts, but the return could never be procured, until, in the year 1840, a solicitor, by a variety of calculations, demonstrated that the amount must be between 58,000*l.* and 63,000*l.* a year. The return at last has been obtained, and it turns out to have been, for the year 1839, 59,967*l.* 6*s.* 9*d.*, with some extra fees received by the Six Clerks not included in the return. (See *Return*, printed by order of the House of Commons, 1840.) The Six Clerks receive only a small amount of the whole sum, about 1300*l.* a year each. One of the clerks in court alone appears to be in the gross annual receipt of above 10,000*l.*

For further information as to this office, the reader is referred to the case 'Ex-parte the Six Clerks,' 3 Vesey's 'Reports,' 519; to the 'Reports of the Commissioners on the Offices of Courts of Justice' of 1816; to the 'Report of 1825 of the Chancery Commission;' to Beames's 'Orders of the Court of Chancery;' and to several recent pamphlets by Mr. Spence, Mr. Field, Mr. Merivale, and Mr. Wainewright; and to a powerful speech on Equity Reform, made in the end of the session of 1840, by Mr. Pemberton, since published in a separate form.

SIXTH, a musical interval, a concord, the ratio of which is 5 : 3. [CONCORD; HARMONY.]

Of the Sixth there are three kinds; the *Minor Sixth*, the *Major Sixth*, and the *Extreme Sharp Sixth*. The first (E, C) is composed of three tones and two semitones; the second (C, A), of four tones and one semitone; the third (C, A♯), of four tones and two semitones. Ex.:—



SIXTUS I. is recorded as bishop of Rome after Alexander I., about the beginning of the second century of our æra, but the precise epoch is not ascertained, and nothing more is known of him.

SIXTUS II. succeeded Stephen I., A.D. 257. He is said to have been by birth an Athenian, and a philosopher of the Academy until he became a convert to Christianity. He suffered martyrdom in the persecution of the Christians under the emperor Valerianus, A.D. 258.

SIXTUS III. succeeded Celestine I., A.D. 431. He endeavoured, though with little success, to settle the dispute between Cyril, bishop of Alexandria, and John, bishop of Antioch, concerning the Nestorians. Several of his letters are contained in Constant's collection. He died in 440.

SIXTUS IV. (Cardinal Francesco della Rovere), a Franciscan monk, succeeded Paul II. in 1471. He greatly enriched his nephews, or sons, according to some, one of whom was afterwards pope under the name of Julius II. He seized Città di Castello from its lord, Niccolò Vitelli, and took Forli, Imola, and other places. He afterwards supported the conspiracy of the Pazzi against Lorenzo de' Medici, and his nephew Cardinal Riario was present in the church when Giuliano, Lorenzo's brother, was assassinated. The conspiracy however failed of its principal object, for Lorenzo was saved, and the conspirators were put to death, including Salviati, archbishop of Pisa, who was one of the leaders. Riario was saved by Lorenzo's interposition, and merely confined for a time. Sixtus, on hearing the news, excommunicated Lorenzo, and all the magistrates of Florence and their abettors, for having hung the archbishop. The clergy of Florence took the part of Lorenzo, and being assembled in convocation or synod held for the occasion, they signed an act of accusation grounded upon depositions and statements of facts proving Sixtus to have been accessory to the conspiracy and the murder of Giuliano. This curious document, the original of which, in the hand-writing of Gentile d'Urbino, bishop of Arezzo, exists in the archives of Florence, is given by Fabroni and Roscoe in their respective biographies of Lorenzo. The expressions used by the clergy of Florence, in speaking of the head of the church, are stronger than any of those used half a century later by Luther and the other reformers. Another document, drawn up by Bartolomeo Scala, chancellor of the republic of Florence, corroborates the statements in the Florentine synod, by giving an historical memorial of all the proceedings of that celebrated conspiracy. Pope Sixtus induced Ferdinand, king of Naples, to join his troops to the papal forces against Florence, but the Florentines braved the storm, until Lorenzo took the bold resolution of proceeding to Naples alone, to plead the cause of his country before King Ferdinand, in which he succeeded. Sixtus, being forsaken by his ally, and alarmed at the same time at the progress of the Turks, who had landed at Otranto, was fain to agree to a reconciliation with the Florentines. In 1482 Sixtus entered into another intrigue with the Venetians, for the purpose of depriving Duke Ercole of Este of his dominion of Ferrara, which he wished to bestow upon Count Girolamo Riario, another of his nephews. This led to a war, in which the king of Naples and the Florentines supported the duke of Ferrara against the pope and the Venetians. The emperor however interposed, threatening to call together a general council of the church, upon which Sixtus thought it advisable to detach himself from the Venetians, and make a separate peace with the duke of Ferrara. He then advised the Venetians to do the same, and as they disregarded his counsel, he solemnly excommunicated his late allies. In 1484 however the Venetians made peace also, and a few days after Sixtus died. He was one of the most turbulent and unscrupulous in the long list of pontiffs.

SIXTUS V. (Cardinal Felice Peretti of Montalto) succeeded Gregory XIII. in 1585. His first care was to purge the city and neighbourhood of Rome of the numerous outlaws which the supineness of his predecessors had encouraged. He resorted to summary means, he employed spies and armed men, and he soon extirpated by the sword and the halter the noxious brood. The name of 'Papa Sisto,' as connected with his summary justice, has continued proverbial at Rome to the present day. Being a shrewd politician, he disliked the overgrown power of Spain, and was not displeased at the staunch opposition which Philip II. received from Elizabeth of England, whom Sixtus however formally excommunicated as a heretic. He embellished Rome with numerous and useful structures among others the present building of the Vatican library (Bocca, *De Sixti V. Edificiis*, in his *Bibliotheca Vaticana*. He published a new edition of the Septuagint, 1587, and one of the Vulgate with improvements, 1590; and he himself edited the works of St. Ambrose, and is said also to have superintended an Italian translation of the Bible, which was condemned by the Spanish Inquisition, between which body and Sixtus there was little sympathy. Sixtus died in August, 1589. His life has been written by Leti, Tempesti, Robardi, and others. As a temporal prince he was distinguished in his age.

SIZAR, a term used in the University of Cambridge for a class of students who are admitted on easier terms as to pecuniary matters than others. These pecuniary advantages arise from different sources in different Colleges, and are of different value. Originally certain duties were required of the students so admitted, approaching to the character of menial, but these have been long discontinued. A similar class of students at Oxford are called Servitors. The word is supposed to be derived from *size*, which is used in the University to denote an allowance of provisions at the college buttery; and that from the verb to *assize*, which is much the same as the modern *assess*, which means *apportion*.

SKATE. This name, as well as the term Ray, is used in England to designate numerous fishes with cartilaginous skeletons, having the body much depressed and more or less approaching to a rhomboidal form. The eyes and temporal orifices are on the upper surface, and the mouth, nostrils, branchial and anal apertures are situated on the under surface of the body; the tail is long and slender, generally furnished with two (analogues of the dorsal fins and sometimes three fins, and usually armed with spines The peculiar form of the skate arises chiefly from the great size and expansion of the pectoral fins; these extend from the head to the base of the tail, and are dilated in or near the middle in such a manner as to give (combined with the pointed snout) that rhomboidal form so peculiar to these fishes. The jaws are as it were paved with teeth, and these approach more or less to a rhomboidal form, and are flat, but in the adult males (at least of many of the species) those nearest the centre assume a pointed form.

The young of the skate, says Mr. Yarrell, are produced towards the latter part of the spring or during summer. They are deposited by the parent fish in their horny cases, like those of some of the sharks; but they are more square in form. These horny cases of the young skates are by some called purses, and on the coast of Cumberland have the name of skate-barrows, from the resemblance they bear to a four-handed machine by which two men carry goods. As the young skate increases in size, the angular parts of the body are curved over.

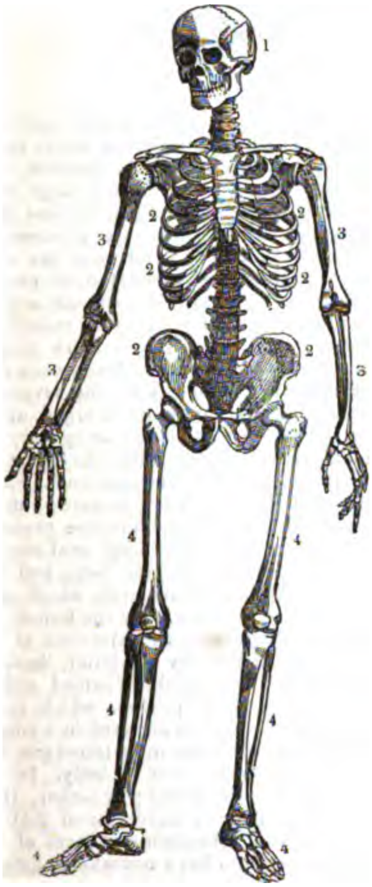
Nine species of skates, or rays, are found on the British coast, the distinguishing characters of which are carefully pointed out in Mr. Yarrell's *History of British Fishes*

SKEEN. [CHRISTIANIA.]

SKELETON (from *σκελλω*, 'I dry'), is the name applied to those harder parts of organized bodies which form the framework upon which the softer tissues are fixed. It is more particularly applied to the collection of bones which in an animal either serve as fixed points for the attachment of the soft parts, or form cavities for enclosing and protecting important organs, or constitute the apparatus of support and the passive instruments of voluntary motion.

The present article will treat of the skeleton of man, as a standard with which to compare those of other animals described in the several articles on natural history and comparative anatomy. On this comparison of skeletons many of the most important facts of the latter science depend; for the bones, being the least destructible of the tissues, are the most convenient organs to examine in the different classes of the higher animals; and in accordance with the rule of the exact adaptation of all the parts of an organized body to each other, the skeleton of each animal affords general indications of the characters of every other organ in its body. And not only so; but each bone, according to the same rule, affords indications of the characters of the rest of the skeleton, and therefore, though less certainly, of the other organs of the body. Hence it is that, by an examination of a part of the skeleton of an extinct animal, geologists are enabled to form very probable suppositions of the form of the whole; knowing by certain marks on the bones, that they served for the attachment of muscles of corresponding form and strength, and that these muscles were adapted for peculiar movements, which again were most probably employed for certain purposes closely connected with the mode of life and the whole adapted organization of the animal.

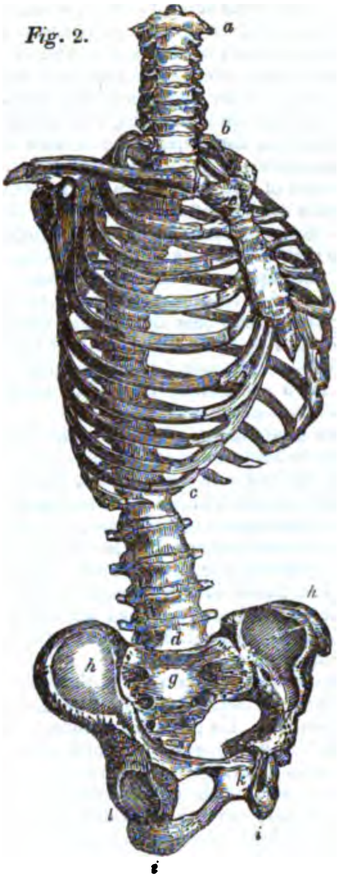
Fig. 1.



The human skeleton is divided into three principal parts: the trunk (2), the head (1), and the extremities (3 and 4). Neither the whole number of bones composing it, nor that in each main division, can be exactly stated, for many which are in early life separated, are subsequently united; but as an approximation, the following enumeration may be adopted:—Cranium, 8; face, 14; internal ears, 8; vertebral column, 24; chest, 26; pelvis, 11; upper extremities, 68; lower extremities, 64: in the whole, 223.

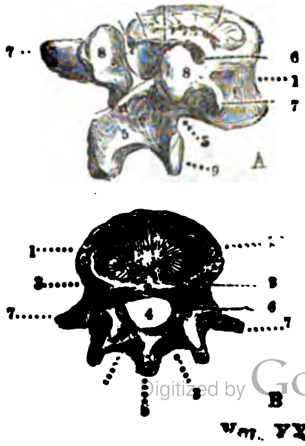
The trunk is composed of the spine or vertebral column (extending from *a* to *d* in the annexed *Fig.* 2), the chest, including the ribs and sternum or breast-bone (*e*), and the pelvis, the circle of bones on which the spine rests. The spine is the column of bones which, in the erect posture, supports the head on its summit (*a*), and rests with its base (*d*) upon the sacrum. It consists of 24 bones, called vertebræ (from *verto*, I turn), because it is their motion upon each other which enables the trunk to be turned round. Of the 24, the 7 upper (*a* to *b*) are called cervical, the 12 middle (*b* to *c*) dorsal, and the 5 lowest (*c* to *d*) lumbar, vertebræ. With the exception of the two first, they are all connected by interposed discs of a very elastic substance, the intervertebral cartilages.

Fig. 2.



The general characters of the vertebræ may be best studied on one from the lumbar region; in which the following parts, common to nearly all of the 24, are well marked:—a body, a ring, a spinous process, two transverse processes, four articulating processes, and four notches. In the annexed plate two lumbar vertebræ are represented: that in the figure A, as seen obliquely from behind, from above, and from the right side; and that in the figure B, as seen from above and behind.

Fig. 3.



The body (1) is a disk of bone with a nearly oval outline, larger above and below than at its middle, and having its greatest dimension from side to side. Its texture is spongy, invested with a thin layer of compact tissue. Its upper and lower surfaces, by which it is affixed to the two adjacent intervertebral cartilages, are nearly flat, and slightly marked by radiating lines. At its posterior border the oval outline is interrupted by a slight concavity (2), which forms a portion of the ring surrounding the spinal marrow, and in which there are several apertures larger than those on the rest of the body, for the exit of the veins from the interior

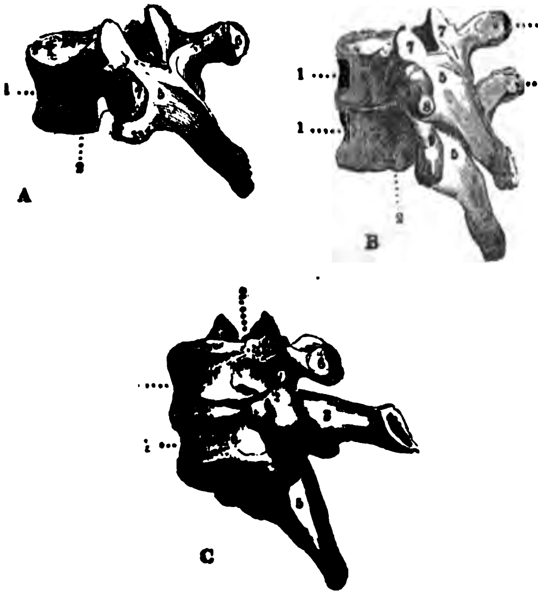
To either side of the posterior part of the body, and near its upper border, is affixed one of the extremities of the arch (3) by which the ring is completed behind. It is composed of two flat laminæ, which spring from the sides of the body, and meet at an obtuse rounded angle in the middle line behind, where they bear the spinous process (5). The space (4) included between the body and these laminæ is called the vertebral foramen; it is occupied by the spinal chord; it is of a somewhat triangular form, and in the lumbar vertebræ is of large size.

Close to the attachments of the laminæ to the body there is in each of their borders a rounded notch (6); and when the vertebræ are applied one on another, these notches form oval holes (the intervertebral foramina, see next figure (8), through which the spinal nerves pass, one pair going out between each two vertebræ. [NERVE.] To the rest of the laminæ are attached the interlaminar ligaments, or ligamenta subflava, bands of very elastic tissue by which the spaces between the adjacent arches are filled up, and the spinal canal completed behind, as it is by the intervertebral cartilages before.

The spinous process (5) is a broad flat quadrilateral portion of bone directed horizontally backwards from the meeting of the laminæ. Its posterior border is thickened, and to it, as well as to the upper and lower borders, are attached strong ligaments binding the spinous process of each vertebra to those next above and below it. The transverse processes (7) project horizontally outwards on either side; they are thin and long, and are enlarged and rough at their ends, to which several strong muscles and ligaments are attached. The articulating processes are flat and oval; each has a smooth surface, by which it is connected with the corresponding part of the next vertebra above or below. The upper pair (8) are set most widely apart, and their articulating surfaces are concave and turned inwards; the lower pair (9) are nearer together, and have their articulating surfaces turned outwards. When the lumbar vertebræ are put together, the lower processes of each are locked within the upper processes of the one next below, so that scarcely any lateral or rotatory motion is in this part of the spine possible.

The dorsal vertebræ, which in the adjacent plate are drawn, as seen in A and B, from behind and from the left side, and in C from before and from the same side, have the same general characters as the lumbar, but are distinguished from them by the following:—

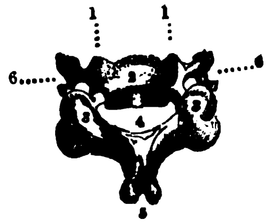
Fig. 4.



The body (1) is small but deep, and longer from before backwards than in any other direction; its general outline is heart-shaped; it has at each border, just in front of the attachment of the laminæ, a shallow depression (2); and when the vertebræ are set together, the depressions on either side of each adjacent pair form one cavity, into which the head of one of the ribs (C 3) is received for articulation. The laminæ are broad and thick; the vertebral foramen is oval and small. The spinous process (5) is long and narrow, and projects obliquely downwards; those of adjacent vertebræ are imbricated at their bases (*Fig.* B). The transverse processes (6) are long and directed backwards as well as outwards; each of them (except those of the two last vertebræ) has a smooth surface in front of its outer extremity, by which it articulates with the tubercle of the corresponding rib. The articulating processes (7), both superior and inferior, are equally wide apart; the former have their smooth surfaces turned backwards, the latter theirs forwards. The notches and foramina are smaller than in the lumbar vertebræ.

The cervical vertebræ, of which one is represented in the adjacent cut, as seen from behind and above, are distinguished by the body (2) being small, broad, and shallow and wider above than below. In its upper surface also it has two elevations (1) between which the lower part of the vertebra next above is received. The laminæ (3) of the arch are long and narrow, and enclose a large somewhat triangular vertebral foramen (4). The spinous process is short and bifurcated. The transverse processes (6) are short, horizontal, and bifurcated; and each has a foramen at its base, through which the vertebral artery passes. The superior articular processes have their smooth oval surfaces directed backwards and inwards, and they receive between them the inferior processes of the vertebra next above, whose articular surfaces are turned in the opposite direction.

Fig. 5.



But these distinctive characters of the several sets of vertebræ are only general: they are merged at the extremes of each set, the lowest dorsal being very like the upper lumbar, and the upper dorsal like the lowest cervical. Some single vertebræ, moreover, have particular characters. The first of the cervical set, or Atlas, is scarcely more than a flat ring of bone with two long transverse processes, two superior articulating processes, with large oval concave surfaces opposed to those of the occipital bone, and two inferior, with large flat horizontal surfaces, which articulate with those of the second vertebra. By the former joint the chief movements of depression and elevation of the head upon the neck are permitted; by the latter, those of rotation. The second cervical vertebra (named axis, or V. dentata) has a large pointed process, which rises from the upper part of its body, and is enclosed in a ring formed by the anterior half of the Atlas, and a transverse ligament passing from one side to the other of its body. In this ring the process of the axis rotates freely; or rather, the Atlas, with the head supported on it, moves round that process, and upon the flat superior articulating surfaces of the axis. The seventh cervical vertebra has a remarkably long spinous process, to which is attached the ligamentum nuchæ, a strong elastic band for the support of the head when inclined forwards, but which, as well as the spinous processes of all the adjacent vertebræ, is much more developed in animals that move horizontally and graze, than in man. This vertebra is also marked by having a small rib-like process in front of its transverse process; it is a rudimental rib, and is analogous to the cervical ribs of serpents and many other animals in whom the chest is more elongated than in man. The first and the three last dorsal vertebræ have each, at the upper borders of the body, surfaces for articulation with the whole head of the corresponding rib. The fifth lumbar has its lower surface cut obliquely upwards to articulate with the top of the sacrum and form the promontory of the pelvis.

Viewed as a whole, the human vertebral column forms a kind of pyramid with its base at the sacrum, and its truncated summit at the head. It is not however regularly pyramidal; for, as seen from the front, it becomes gradually smaller from the base to the fourth dorsal vertebra; then it widens to the seventh cervical, and then again becomes narrower to the second. In the adult it has well-marked curvatures. (See *Fig.* 2.) From the head it is first curved slightly forwards to the last cervical vertebra; then its dorsal portion forms an arch with its convexity backwards and ending at the last dorsal; and then again in the lumbar region it arches forwards to the base of the last lumbar vertebra. These directions of the column have relations to the naturally erect posture of the human body [MAN]: in correspondence with them the bodies of the cervical and lumbar vertebræ, and their intervertebral cartilages, are thicker before than behind, and those of the dorsal thicker behind than before.

The spine serves several offices in the economy. One is that of guarding the spinal marrow, which, with the roots of its nerves, is enclosed in the long canal formed by the superposed rings of the several vertebræ. The spini-cerebrate form of nervous system, which consists of a brain and longitudinal axis, both placed on the same side of the digestive canal, is intimately connected with all the rest of the organization of the animals in which it exists; and being always enclosed in a skull and spinal canal, the vertebral column is taken as the most obvious character of the four classes of animals which have this plan of nervous system. These therefore, namely, mammals, birds, fish, and reptiles, are called vertebrata; and the other portion of the animal kingdom, whatever be the plan of their nervous centres, invertebrata.

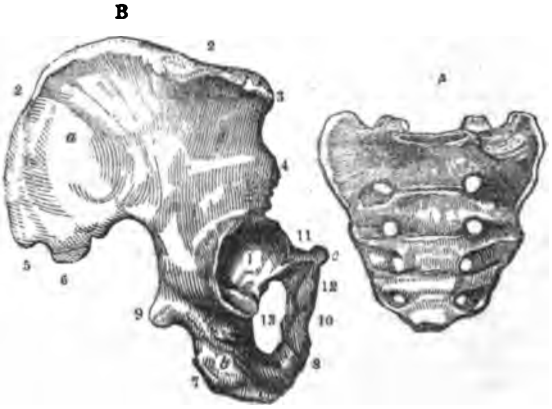
The spine is also the main support of all the rest of the skeleton. The head, the ribs, and the pelvis directly articulate with it; and through the medium of the pelvis and sternum, it suspends both the lower and upper extremities. It is the passive instrument of all the motions of the trunk, and the centre about which each of the limbs as a whole is moved. For these purposes it is adapted by combining firmness with flexibility and lightness. Flexibility is obtained by its being composed of so many pieces separated from each other by layers of elastic tissue; and its strength is secured by these layers, which are at the same time firm bonds of union, and by numerous other strong ligaments passing from bone to bone. In its own movements, extent is combined with security by each vertebra (except the first) having but little motion on those next to it; the larger movements being the result of the combination of a number of such small ones. The directions of the processes and the diverse modes in which they are locked one within another, determine the degrees in which, in each part of the column, the several motions of flexion and extension in all directions, and of rotation, can be performed. The pyramidal form of the whole is adapted to the accumulated weight which the lower vertebræ have to bear. The curvature in the back increases the capacity of the chest. The spinous and transverse processes especially serve for the attachments of muscles of the head, chest, back, shoulders, and pelvis. The elastic cartilages interposed between the bodies break the shock of any violence upon one end of the body, and both they and the interlaminar ligaments tend to keep the spine straight, and so diminish the muscular action necessary to hold the body erect.

The base of the spinal column rests on the top of the sacrum (*Fig.* 2, *g*), which, though commonly described as part of the pelvis, is indeed a continuation of the column, and is composed of five or six rudimental vertebræ, which after about the tenth year become consolidated. The sacrum (*Fig.* 6, A) has a triangular outline, the base being above; and it articulates with the last lumbar vertebra, so as to form an obtuse angle, the promontory, by means of an intervertebral substance and the other parts common to the rest of the vertebral joints. Its anterior surface, which in the erect posture looks obliquely downwards, is concave, and on it are four or five transverse lines, the traces of the divisions between the bodies of the original vertebræ. At each end of these lines are as many holes (the anterior sacral foramina), which give passage to the anterior branches of the sacral nerves. Outside these holes the sacrum has a smooth surface composed of the coalesced transverse processes of its several vertebræ. Along the posterior convex surface, the sacrum presents corresponding traces of its composition. Its upper border is surmounted by two regularly-formed articular processes which are connected with those of the last lumbar vertebra, and leading downwards from these, in converging lines on either side of the middle, is a series of slight elevations, the traces of other rudimental articular processes. Along the middle line are three or four higher ridges, the traces of spinous processes, and between these and the former are on either side four or five foramina, which give passage to the posterior branches of the sacral nerves. These and the anterior sacral foramina already mentioned are analogous to the intervertebral foramina; and they both lead into the sacral canal, which runs through the whole length of the sacrum, and contains the cauda equina, or tuft of the last roots of the spinal nerves. The outline of the sacral canal is triangular; it grows smaller from above downwards, and is closed in behind by a layer analogous to the arches of the regular vertebræ. It is continuous above with the spinal canal, and below is, in the dry bones, open in the middle line, the arch of the last sacral vertebra being deficient; but in the recent subject is closed by dura mater and dense ligament. The sides of the sacrum are thick above, and become gradually thinner below. In the former situation they are marked by large rough oval surfaces, directed backwards and somewhat outwards, by which the sacrum is on either side articulated immoveably with the iliac bones to form the sacro-iliac symphyses. The lower end of the sacrum has a plain oval surface, which is fitted to the upper surface of the first bone of the coccyx.

The coccyx is the lowest part of the whole vertebral column. Its bones form the interior frame of the tail in brutes, but in man are small, short, and not more than four or five in number. The uppermost is by far the largest, and is surmounted by two processes called cornua, the extremities of which are adapted to those of two similar processes by which the sides of the lower end of the sacral canal are bounded. The three or four lower pieces of the coccyx have a somewhat oval outline, and are rather deeper than they are broad. Up to a late period of life they are articulated moveably with thin layers of interposed cartilage.

The sacrum and coccyx form the middle posterior part of the pelvis; its sides and front are formed by the bones called ossa innominata (*Fig.* 6, B). Each of these is in the young subject composed of three parts, which are usually described separately, as the ilium, or haunch bone (*a*), the ischium (*b*), and the pubes (*c*). These three meet at the acetabulum (1), the hemispherical cavity in which the head of the thigh bone is lodged, and of which the ischium forms nearly three-fifths, the ilium somewhat more than one-fifth, and the pubes rather less than one-fifth.

Fig. 6.



The ilium forms the upper broad and expanded part of the pelvis. Its outline is somewhat fan-shaped, and in the greater part of its extent it is flat and thin. That surface which is directed forwards and inwards towards the cavity of the pelvis is slightly concave, and gives attachment to the strong iliac muscle by which the thigh is raised towards the pelvis. Its upper border has a thick strong rim (2), the crista ilii, to which parts of the three broad muscles of the abdomen are attached, and which serves for a fixed point towards which the ribs are drawn down by those muscles in strong expirations. The extremities of this rim, and the anterior and posterior edges of the ilium, into which it is continued, have at either end two strong projections for the attachment of muscles of the thigh, which are named spinous processes. In *Fig.* 6, 3 is the anterior superior, and 4 the anterior inferior spinous process; 5 is the posterior superior spinous process, and 6 the posterior inferior. At the posterior part of the inner aspect of the ilium is a rough oval surface, which is fixed behind that at the back of the sacrum, with which its fore part forms the sacro-iliac symphysis (see *Fig.* 2). From the upper part of this symphysis a line, continuous with that of the top of the sacrum and the promontory of the pelvis, passes in a curve across the lower part of the ilium to the upper and inner edge of the pubes, along which it is continued to the middle line at the symphysis pubis. This line, by which the pelvis is divided into an upper and a lower cavity, is called the brim, and the space it encloses is named the upper strait of the pelvis (see *Fig.* 2). At and just below the brim is the thickest part of the ilium; its inner surface, which is opposite the acetabulum, is smooth, and gives attachment to muscles of the pelvis and thigh. The outer and back surface of the ilium (which is represented in *Fig.* 6, B) forms the haunch, that is, that expansion of bone which is felt above the hip-joint. It is marked by curved lines for the attachment of the strong glutei muscles of the buttock, and of the ligaments connecting it with the sacrum and last lumbar vertebra. At its lowest and narrowest part it swells outwards, and is then suddenly and deeply hollowed, to form the upper part of the wall of the acetabulum. In this cavity it is united with the pubes before, and the ischium behind, by flat surfaces, which in the adult bones are indicated only by slightly elevated lines tending to the deepest part of the cavity.

The ischium is the bone on whose lowest part, or tuberosity, the body rests in sitting. It is described as composed of two principal portions: a body (7), consisting of the tuberosity and the thick strong part above it; and a ramus (8), which passes from the tuberosity obliquely upwards, forwards, and inwards. The upper part of the body is united to the lower part of the ilium, and its outer and anterior surface is deeply hollowed to form the lower and back part of the acetabulum. At its posterior and inner border there is a strong pointed process, the spine of the ischium (9), to which one of the main ligaments of the pelvis, the lesser sacro-sciatic, is attached. Above the spine, the body of this bone and the adjacent posterior border of the ilium as far as its posterior inferior spinous process, are cut out in a crescentic form; they thus form the ischiatic notch, and, with the ligament just mentioned and the outer border of the sacrum, enclose an oval aperture, the great ischiatic foramen, through which there pass from the pelvis to the thigh the pyriform muscle, and the gluteal, ischiatic, and pudic blood-vessels and nerves. Below the spine, another foramen, the lesser ischiatic, is enclosed between the same and another stronger ligament, the great sacro-sciatic, and the lower part of the body of the ischium; through this, together with some vessels and nerves, passes the internal obturator muscle, which, on its way to the femur, winds round a smooth oval surface on the back of the ischium directly below its spine. The posterior thick surface of the body is rough for the attachment of muscles, especially those of the ham-strings which form the greater part of the back of the thigh. From the lowest part of the tuberosity, and forming an acute angle with it, ascends the ramus, which at its anterior extremity (10) unites with the descending ramus of the pubes.

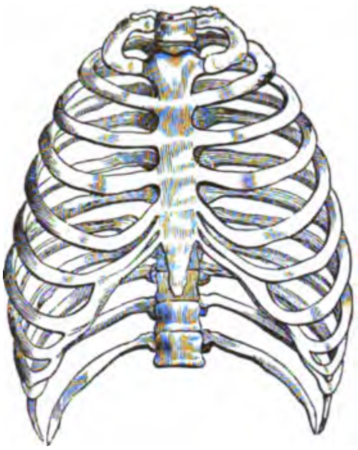
The pubes forms the anterior part of each os innominatum, and is composed of a body (11), and a descending ramus (12). The body is the upper, anterior, and larger part. At its outer extremity it articulates with the ilium just below the anterior and inferior spine, from which it descends in an even gentle curve, over which the iliac and psoas muscles, the chief vessels, and one of the principal nerves of the thigh, pass beneath the crural arch. Its outer end is hollowed to form part of the acetabulum. The horizontal part of the body has a somewhat pyramidal form with three sides. Along its posterior and upper border is the line which forms part of the brim of the pelvis. Near the termination of this line is an elevation, the spine of the pubes, for the attachment of one end of the crural arch, the strong ligament already mentioned, whose other end is fixed to the anterior superior spine of the ilium. The inner ends of the bodies of the two pubic bones are opposed by flat oval surfaces, which, with ligaments and a strong intermediate cartilage, form the symphysis pubis. From below and the side of this, the ramus descends outwards and backwards to meet the ascending ramus of the ischium, with which it forms one flat and thin beam. Between these rami below, the body of the pubes above and on the inner side, and the meeting of the pubes and ischium at the acetabulum on the outer side, is an oval aperture, the foramen ovale or obturatorium (13) which in the recent body is nearly closed by the obturator ligament, and of which the borders, as well as the surfaces of the ligament, give attachment to the two obturator muscles, which thence proceed to the back of the thigh-bone, which it is their office to rotate outwards. The space included between the rami of the pubes and ischia on either side and in front, and the great sacro-sciatic ligaments, passing from both borders of the sacrum and coccyx to the tuberosities of the ischia, behind, is named the lesser aperture or strait of the pelvis. The meeting of the two rami in the middle line makes the angle of the pubes.

The general purposes served by the pelvis are—to support the abdominal viscera, to enclose and guard those in its own cavity, to give insertion to muscles of the abdomen, back, and thighs, and to be such an intermedium between the rest of the trunk and the lower limbs that the latter may move freely and yet firmly support the body. For the three first of these purposes its adaptation is obvious. For the last, the pelvis is fitted by its posterior half forming an arch on whose summit the spine is supported, and whose pillars rest on the heads of the thigh bones. Of this arch the sacrum, impacted between the ilia and held firmly by the ligaments of the symphysis, forms a kind of key-stone, fitted tightly enough to bear, through the medium of the spine, the weight of the trunk and of great additional burdens The pillars of the arch are terminated by the acetabula, which rest on the femora; and the direction in which the weight is thus transmitted from the sacrum to the thighs is that in which the strongest and thickest part of the ilium (in the line of the brim of the pelvis) is placed. Each acetabulum forms part of a sphere hollowed out at the meeting of the three component bones of the os innominatum. Its depth is increased at the upper and back part (where the chief pressure falls) by the swelling out of the ilium; and all round, by the cotyloid ligament, a band of tough fibrous tissue, by which the bone is bordered. It in a measure envelopes the head of the femur, which is fitted into it air-tight, and so closely that even after all the ligaments are removed, they cannot without much force be separated. In the dry bones however the border of the acetabulum is not a complete circle; there is a notch where the ischium and pubes meet at the fore and lower part, to which the round ligament is in part attached. The head of the femur thus moves in the freest manner in the acetabulum by a perfect ball-and-socket joint; and if the thigh-bones be fixed, then it is by the rolling of the pelvis on their heads that the body is swayed *en masse*.

The particular circumstances in the structure of the pelvis which are especially adapted to the erect posture, such as its hollow expanded sides, the oblique direction of its cavity, its width, the strength and position of the tuberosities of the ischia, &c., are described in the article Man. Its relation to gestation and parturition may also be here omitted, except to say that it is in reference to its share in these processes that the pelvis is larger in all its dimensions in women than in men.

The last main division of the trunk is the Chest or Thorax, composed of the dorsal vertebræ behind, the sternum in front, and the 12 ribs and their cartilages on either side. (See *Fig.* 7.) All the ribs articulate with the spine, but only the 7 uppermost on each side have distinct connections with the sternum; these are therefore called True ribs, and the five lower on each side False ribs.—Of these last, the 3 upper have their cartilages united before they reach the sternum; and the two lower, which are sometimes called floating ribs, have short cartilages which are not attached to the sternum at all.

In each of the greater number of the ribs there are a head, a neck, a tuberosity, an angle, a body or shaft, and a cartilage. The head is that part which articulates with the vertebral column. It is larger than the neck, and its articulating surface has a somewhat oval outline, and is divided into two parts by a transverse elevation. This elevated line corresponds to the intervertebral cartilage, to which it is affixed



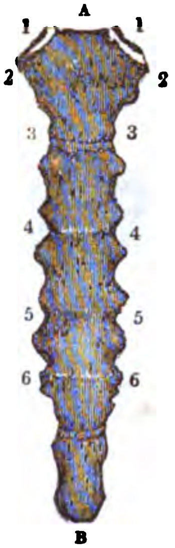
by a ligament. The motion permitted at the joint between the head of the rib and the border of each of the vertebræ next above and below it is not extensive; but it is sufficient to give the body of each rib, which has the relation of a long lever to the joint as a fulcrum, a wide sweep outwards and upwards in the act of deep inspiration. Proceeding onwards from the head, and passing over the neck, which is the smallest and roundest part of the rib, the next object is the tubercle, an elevation on the posterior surface, by which the rib is articulated with the end of the transverse process of the vertebra next below it. Farther outward is the angle, an oblique projecting line at which each rib turns somewhat more upwards and becomes flatter. The remainder of the rib is its shaft. This is thin and flat; its surfaces are both nearly smooth, the outer being slightly convex, the inner as slightly concave; the upper edge is rounded; the lower (which is also directed somewhat outwards) is sharp, and, from the angle inwards, is grooved on its inner aspect, where the intercostal vessels and nerves lie. The end of the osseous part of each rib has a rough surface, to which is adapted one end of the costal cartilage, of which the other end (except in the instances already mentioned) is attached to the sternum. The costal cartilages have each the same general form and direction as the part of the rib to which they are appended; they may be regarded as mere prolongations of the ribs, the purpose of their being cartilaginous instead of bony being that of giving more elasticity to the walls of the chest. Each of them, except the first, is articulated with a slight capacity of motion to a depression on the border of the sternum.

The direction of the body of the rib is first downwards and backwards, forming an arc of a small circle, to the angle, at or near which it seems twisted on itself, and then sweeps round forwards and a little upwards in the arc of a larger circle. The distance from the head to the part at which this change of direction takes place, is greater in the lower than in the upper ribs, and in the same progression is gradually increased the obliquity of the ascent of the cartilages towards the sternum. The length of the ribs and their cartilages together becomes regularly greater from the first, that is, the uppermost, to the seventh or eigthth, the rest become gradually shorter, especially in their osseous parts.

Some of the ribs have particular characters in which they deviate from the general description. The heads of the first, eleventh, and twelfth, have but one articular surface, being each connected with but one vertebra; the first and twelfth have no angles, the second and eleventh scarcely any. The first forms nearly the half of a circle of a very small radius compared with those of the ribs below it; its surfaces are horizontal; the upper is marked by two grooves over which the subclavian artery and vein pass, and by an impression between them to which the anterior scalenus muscle is attached; the lower surface has no groove; the sternal end is very broad; the head is small. The second rib presents characters intermediate between those of the first and those of the true ribs below it.

The Sternum, or breast bone, is single only in the adult; in youth it is composed of at least two pieces (of which the upper (*Fig.* 7*, A) is named manubrium), and in the fœtus of many more. Considered as one bone, its form is elongated, broader and thicker above than below where it terminates in a long narrow process, which is generally cartilaginous, and is named the ensiform or xiphoid cartilage (B). The anterior surface of the sternum is marked by four transverse lines (3, 4, 5, 6) which indicate the divisions between the five principal parts of which it is composed. These marks are repeated on the posterior surface. Along its borders there are (proceeding from above downwards), first, at each of the angles between its upper and lateral edges, a shallow depression (1) into which the extremity of the clavicle is received; then immediately below this an oval depressed surface (2) to which the cartilage of the first rib is fixed; and lastly, along each side six other similar surfaces separated by notches with which the cartilages of the six following ribs articulate. Of these six, the four upper are placed at the ends of the transverse lines; so that each of these ribs articulates at its sternal end with two pieces of the sternum, just as, at its other extremity, it articulates with two vertebræ.

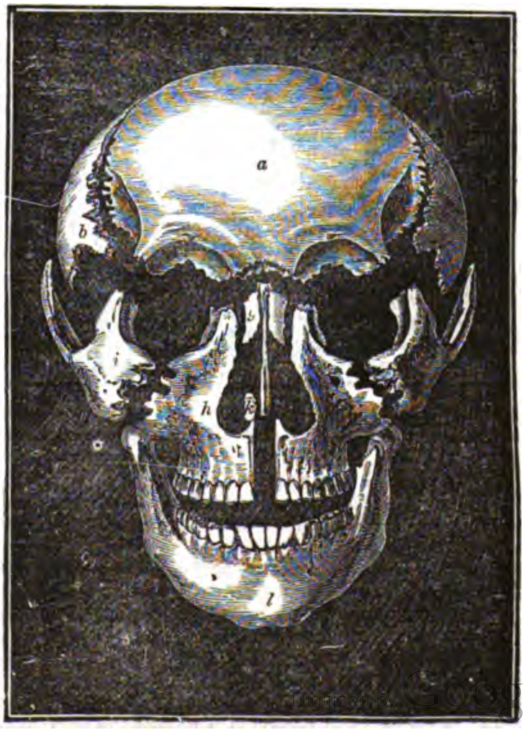
Fig. 7*.



The general structure of the chest, and its adaptation to the movements of breathing, the most important function in which it is particularly engaged, are described in the article Respiration.

The Bones of the Skull are divided into two chief sets,

Fig. 8.



those of the Cranium, or case for the brain, and those of the Face. They are represented in the annexed sketches separated, yet in their natural relative positions, in three different aspects: in *Fig*. 8, as seen from the front; in *Fig*. 9, as seen in profile; in *Fig*. 10, as seen when, after removing the top of the skull, one looks from above upon the bottom of its interior

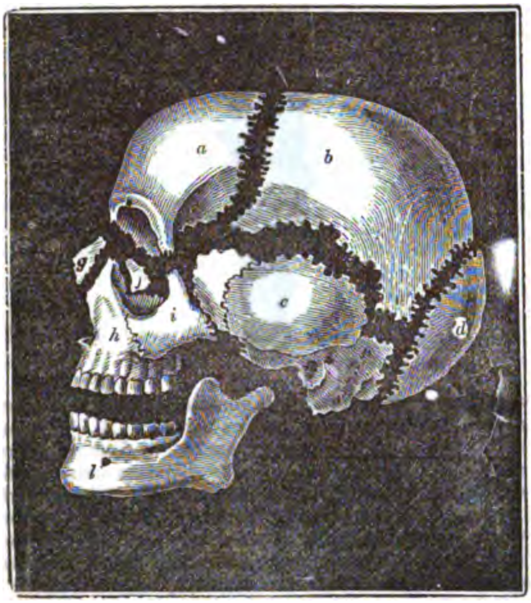


Fig. 9.

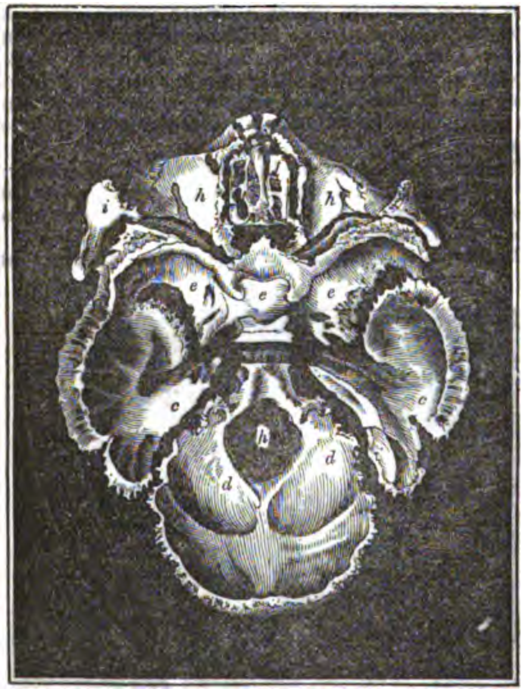


Fig. 10

The Bones of the Cranium are, the Frontal (*a*), the two Parietal (*b*), the two Temporal (*c*), the Occipital (*d*), the Sphenoid (*e*), the Ethmoid (*f*); those of the face are, the two Nasal (*g*), the two superior Maxillary, or upper Jawbones (*h*), the two Palate, the two Malar (*i*), the two Lacrymal (*j*), the two inferior Turbinated, the Vomer (*k*), and the inferior Maxillary (*l*).

The frontal bone (*Fig*. 11, *a*, *b*) forms the forehead and the roof of the orbit. The front or frontal portion is the larger. Its anterior surface, which is represented in *Fig*. *a*, is convex and smooth: it is bounded below by two arched, thick, and rounded borders, separated by a rough notch in the middle line. The borders (1, 1) are called the orbital arches or ridges, and they form the front and prominent part of the orbits. The notch (2) is named the nasal notch; on either side of it are fixed parts of the upper jaw, and in the middle the nasal bones, which rest behind on a process called the nasal spine (3). At the outer extremity of each orbital arch is the external angular process (4, 4), and at the inner extremity the internal angular process (5, 5); the former is articulated with the malar, the latter with the upper jaw and lacrymal bones. Near the internal process is the Supra-orbital Foramen or notch (6, 6), through which the frontal vessels and nerve pass from the orbit to the forehead. Just above it and by its side is a rounded elevation, the frontal protuberance (7), which marks the situation of the subjacent frontal sinuses, air-cavities, between the two layers of which the bone is composed. They vary much in size in different persons, and communicate with the interior of the nose. On either side of the middle line, and extending above the orbital ridge, the surface of the bone is again elevated in the superciliary ridge (8, 8), an arched prominence behind the eyebrow. The rest of this anterior surface is smooth and even, but in different persons its form is as varied as that of any other feature. On either side it terminates rather abruptly with a curved border (9), which forms the front boundary of the Temporal fossa (10), and behind which there is a smooth surface, to which the fore part of the temporal muscle is attached.

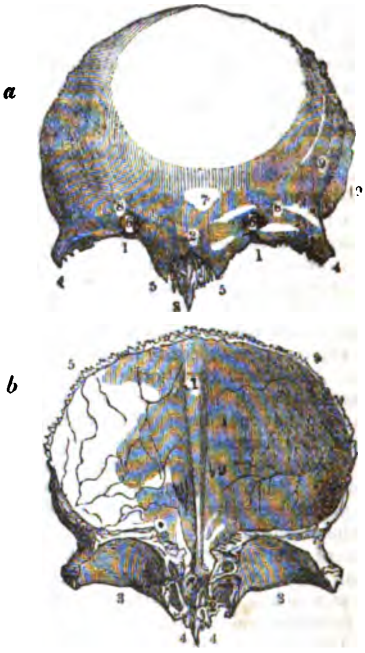


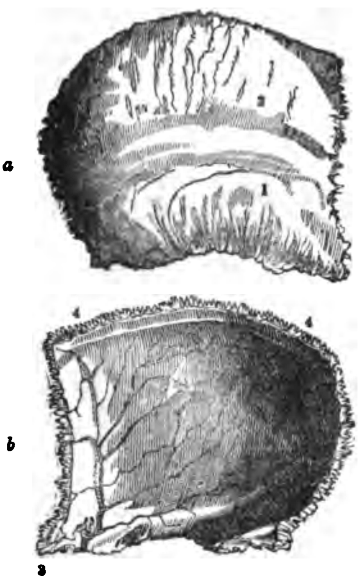
Fig. 11.

The posterior or cerebral surface of the Frontal bone (*Fig*. 11, *b*) is concave. Along the middle line there is a broad groove (1), in which a part of the longitudinal sinus [BRAIN] lies; and at the fore and lower end of this a ridge, to which a process of dura mater called the falx is attached. The ridge ends at a hole named the Foramen cæcum. The rest of this surface is marked by depressions and ridges fitting to the convolutions of the surface of the brain.

The orbital portions (*b*, 3, 3,) of the frontal bone are thin plates extending almost horizontally backwards from the orbital arches. Between their inner borders is a space, the ethmoid notch, into which the ethmoid bone fits, and just anterior to which are the apertures (4, 4) leading into the frontal sinuses. The under surface of each plate is concave, smooth, and even; and has at its outer and fore part a shallow depression, in which the lachrymal gland is lodged, and at its inner and fore part a mark to which the pulley of the trochlearis muscle of the eye is attached. The upper surface is marked in correspondence with the irregularities of the under part of the anterior lobe of the brain, which rests upon it.

The posterior and upper margin of the frontal bone (*b*, 5, 5) is joined by the coronal suture to the two parietal bones; and it is cut obliquely in such a manner that its edges rest upon theirs above, and theirs overlap its below. The lower part of this margin is covered by the alæ of the sphenoid, where they rise into the temporal fossæ. The frontal is usually in the adult only a single bone, composed (as all the bones in the middle plane of the skeleton are) of two equal and similar halves: these are developed separately, and they sometimes remain undivided by a continuation of the sagittal suture which passes from between the two parietal straight down the middle of the frontal.

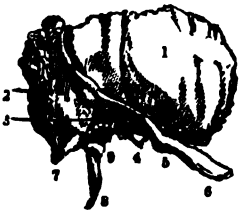
Fig. 12.



The construction of the Parietal bones, which form all the upper and middle part of the skull, is very simple. In *Fig.* 12 at *a* the exterior, and at *b* the interior, of the right parietal is represented. They are quadrilateral, and of nearly equal thickness throughout. The outer convex surface is everywhere smooth, except at its lower border (1), where it is overlapped by the Temporal bone in the squamous suture, and just above this part, where there is a slight arched ridge (2), for the attachment of a portion of the temporal muscle. The inner concave surface has impressions of the cerebral convolutions, and a deep branching groove, which, beginning at the fore and lower angle (3), thence ramifies diffusely. It lodges the middle meningeal artery of the dura mater. [Brain.] Along the upper border is a broad shallow groove (4), which lodges part of the longitudinal sinus, and is continuous with that on the interior of the frontal bone. The borders of the parietal bones are all, except the lower, deeply and irregularly indented; and by the dovetailing of such irregular teeth, they form, with the frontal bone in front, the coronal suture, with the occipital behind, the lambdoidal, and, in the middle line at their own meeting, the sagittal.

The Temporal Bones (*Fig.* 13, as seen from without) are placed in the middle, lateral, and inferior parts of the skull. They present each three distinguishable parts, which in the fœtus are separated: namely, a Squamous portion (1), which forms the middle of the side of the skull; a Mastoid portion (2), which forms the thick protuberance that may be felt behind the ear; and a Petrous portion (not visible in *Fig.* 13, but in *Fig.* 10 marked *c*), which passes from the lower part of the squamous forwards and inwards in the base of the skull. The squamous bone or portion has a roundish form. Its upper edge covers in the lower border of the parietal. Its exterior surface is smooth, and gives attachment to some of the temporal muscle. At the hinder part of its lower border is an oval aperture (3), leading to the meatus auditorius externus [Ear], a passage which goes forwards and inwards to the tympanum in the interior of the petrous portion. Immediately anterior to this, and under the fore-part of the bone, is the Glenoid cavity (4), a deep transversely oval hollow, with which the condyle of the lower jaw is articulated, and behind which is a narrow chink, the Fissura Glaseri, separating it from a strong ridge which runs along the upper surface of the petrous bone. In front of the glenoid cavity is a prominence, which forms its border, the Tuber articulare (5); and from its outer part there proceeds horizontally forwards, as if springing from the tuber and two other slightly elevated lines running backwards, a long narrow portion of bone, the Zygomatic process (6), the enlarged end of which joins a short process of the malar bone to form the zygoma, an arch beneath which the temporal muscle plays, and whose size and strength are generally in direct proportion to those of that muscle, and to the force with which the lower jaw is worked in gnashing with the teeth.

Fig. 13.



Behind the metaus auditorius is the mastoid portion. It is prolonged downwards in a strong conical projection, the mastoid process (7) giving insertion to muscles upon and just above it, and of which the interior is occupied by numerous cells communicating with the cavity of the tympanum. Behind and within the mastoid process is the digastric groove, to which the muscle of the same name is attached; and farther back another more shallow groove for the trachelo-mastoid muscle.

The cerebral surface of the squamous portion has a very obliquely cut and groved upper border, which articulates with the lower border of the parietal bone. On the same surface of the mastoid portion is a deep fossa, which lodges part of the lateral sinus. Both are marked by the impressions of the brain.

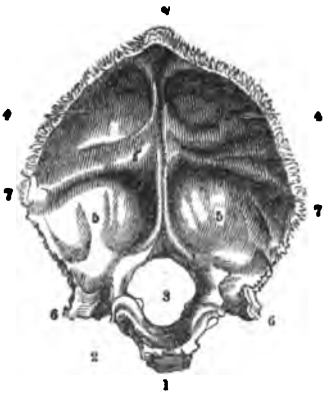
The Petrous process or portion of the temporal bone (*Fig.* 10, *c*), has received its name from the peculiar hardness of its tissue. It has the form of an irregular three-sided pyramid, directed from either side forwards and inwards, and fitting, at the base of the skull, into the angle left between the sphenoid and the occipital bones (*e* and *d*). Its base is affixed to the interior and lower part of the squamous bone; its summit fits in the apex of the angle just mentioned. On its posterior surface the most prominent object is the oval aperture of the meatus auditorius internus, the passage leading to the internal ear, and traversed by the auditory and the facial nerves. On the anterior surface there are a shallow groove leading to a small hole, through which the Vidian nerve and blood-vessels pass, a slight hollow on which the Gasserian ganglion of the fifth pair of nerves lies, and a prominence which indicates the position of the superior semicircular canal of the ear. On the inferior surface, which is placed outside the skull, there are seen, at the posterior and outer border, a deep fossa (the Jugular), in which the upper part of the internal jugular vein is lodged; before and on the inner side of this, and separated from it by a prominent ridge, a large oval aperture, through which the internal carotid artery passes into a tortuous canal, whose other extremity is at the very apex of the bone; between the jugular fossa and the mastoid process a hole, the Stylo-mastoid foramen, through which the facial nerve passes on its way to the face, after penetrating the bottom of the meatus auditorius internus; and just anterior to this, a long-pointed process, the Styloid (8), to which several muscles and ligaments are attached, and whose base is surrounded by an irregular sharp-edged elevation, the Vaginal process (9).

The anterior border of the petrous bone is articulated with the posterior part of the ala of the sphenoid, leaving an intermediate space, named foramen lacerum medium; the posterior border is similarly united with the side of the basilar process of the occipital bone, leaving another space, the foramen lacerum posterius, through which the internal jugular vein and the nerves of the eighth pair pass. Near the angle where the anterior border joins the squamous bone is an irregularly shaped aperture, to which the cartilaginous part of the Eustachian tube is affixed.

The small bones of the internal Ears, and all the other parts of the organ of Hearing, which lie within and near the petrous bone, are already described. [Ear.]

The Occipital Bone (*Fig.* 14 is a view of the internal surface) forms the posterior and lower part of the middle of

Fig. 14.



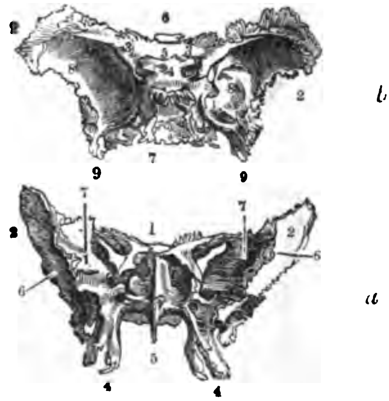
the skull, a portion being at the outer wall and a portion at the base. Its lower and anterior part is narrow, and has a rough surface (1) in front, which is united with the body of the sphenoid bone. Viewing it at its internal surface, it presents, as one proceeds from this surface backwards and upwards, a smooth hollow surface, which gradually widens, and is limited behind by a large oval opening. The surface (2) is that of the Basilar Process, in which the medulla oblongata and pons Varolii [BRAIN] rest; the aperture (3) is the Foramen magnum, through which the medulla passes into the spinal canal, where it is continued into the spinal cord. By the sides of this foramen, near where the basilar process joins the back and expanded part of the bone, there are four foramina, two on either side, the anterior and posterior condyloid foramina, of which the anterior transmit the hypoglossal nerves, on which the motions of the tongue depend, and the latter give passage to veins communicating with the vertebral veins. Opposite the fore part of the foramen magnum the basilar process suddenly widens into the greater portion of the occipital bone, which forms the back of the head. In this part are four large hollows (4, 4, 5, 5), of which the two upper lodge the surfaces of the posterior lobes of the cerebrum, the two lower those of the lobes of the cerebellum. They are separated by two ridges, which bisect each other at nearly right angles. The upper part of that which runs vertically has attached to it a portion of the falx major, and to its lower part is affixed the falx cerebelli; that which runs transversely gives insertion to the back part of the tentorium cerebelli, whose anterior borders are fixed to the upper angles of the petrous bone. By these ridges are broad shallow grooves, which lodge parts of the sinuses of the brain. By the upper half of the vertical ridge is the extremity of the longitudinal sinus, the grooves for which, in the frontal and parietal bones, are already mentioned, and which, at the Internal Occipital spine, where the ridges bisect each other, meets the inferior longitudinal and other sinuses, to form what is named the Torcular Herophili, their common point of meeting. From this there proceed the two lateral sinuses, which run above the transverse ridge on either side, then cross over the posterior inferior angle of each of the parietal bones, then lie for a short distance on the inside of the mastoid portion of the temporal, from which they pass through the foramen lacerum posterius by a special aperture, marked by a deep notch in the border of the occipital bone, near the angle (6), which separates the basilar from the other portion.

The inferior and outer surface presents on the basilar process numerous irregularities, from which the back part of the pharynx is suspended, and into which certain muscles and ligaments of the front of the spine are inserted. The foramen magnum has here an even and grounded border; and by its sides two elevations, each with a smooth convex oval surface, whose larger axis is directed forwards, inwards, and downwards; these are the Condyles, by which the occipital bone articulates moveably with the first vertebra of the spine. Near these also are the outer orifices of the anterior and posterior condyloid foramina, and around them very rough surfaces for the insertion of ligaments and muscles. On the outer surface of the expanded posterior portion of the bone are three ridges, one of which passes from the border of the foramen magnum backwards and upwards in correspondence with the internal vertical ridge, and is crossed on its way by two transverse arched ridges. At the crossing of the upper of these two is a sharp prominence, the occipital spine or protuberance. The two transverse ridges and the spaces below them give attachment to muscles; the spine, to the ligamentum nuchæ. Above the upper ridge the surface is smooth.

The upper and lateral borders (7) of the Occipital bone are deeply toothed, and form the Lambdoidal Suture, with the parietal bones above and the mastoid below. In the course of this suture there occur, more often than in that of any other, insulated portions of bone, of various size and form, called Ossa Wormiana, surrounded by margins toothed as in the regular line of suture.

The Sphenoid Bone (*Fig.* 10, *e*) is placed in the middle of the base of the skull, and has a very complicate form. *Fig.* 15, *a*, gives a front, and *b*, a back and upper view of it. Its principal parts are described as a body (1, 1), two

Fig. 15



Greater Alæ (2, 2), two Lesser Alæ (*b*, 3, 3), and, on each side, two Pterygoid Processes (*a*, 4, 4). The body is the central part, and has somewhat the form of a hollow cube. Chief part of its upper or cerebral surface is hollowed, forming what is called the Sella Turcica (*b*, 4), and lodging the pituitary gland. [BRAIN.] It is bounded at its four corners by bluntly pointed prominences called Clinoid Processes (see *Fig.* 10), to which prolongations of dura mater are attached. Between, and a little in front of the two anterior of these, is a level surface (*b*, 5) on which the commissure of the optic nerves rests, and which has behind a slight elevation, the Olivary process, and in front a pointed one, the Ethmoid spine (*b*, 6) which fits into the Ethmoid bone. The sides of the body slope obliquely downwards towards the great alæ, and the cavernous sinus and internal carotid artery of each side rest against them. The posterior surface (*b*, 7) of the body is rough, and unites with the end of the basilar process of the occipital. The anterior presents the openings of large cells which occupy the whole interior. These are divided by a middle septum (*a*, 5), and are partly closed in by two small portions of bone called Sphenoidal Cornua; where not thus closed, they open into the posterior ethmoidal cells. The under surface of the body is chiefly flat, but has a ridge called the azygous process along the middle line, which fits to the Vomer.

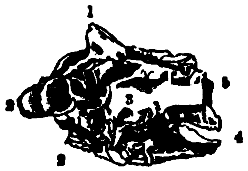
The Greater Alæ (2) are affixed by the sides of the body, and project from it outwards, upwards, and forwards. On each there are three principal surfaces, turned towards the brain, the temple, and the orbit, respectively. The inner or cerebral (*b*, 8) is concave, supports part of the middle lobe of the brain, and presents three particular orifices, namely · the foramen rotundum, near its anterior and inner margin, through which the superior maxillary nerve passes from the Gasserian ganglion of the fifth pair; the foramen ovale, much larger and near the posterior and inner border, through which the inferior maxillary nerve goes from the same ganglion; and the foramen spinosum, near the outer and posterior angle, which transmits the middle meningeal artery. This outer angle (*b*, 9), which fits in between the petrous and squamous parts of the temporal bone (see *Fig.* 10), is named the spinous process. The outer or temporal surface (*a*, 6) is slightly hollowed, and forms part of the temporal fossa, rising up at the lower part of the side of the skull as far as the anterior inferior angle of the parietal bone. At its lower border it turns abruptly inwards at a slight ridge, below which it is continued to the pterygoid processes, and forms part of the zygomatic fossa; its posterior border articulates with the squamous, its anterior with the frontal bone. The anterior or orbital surface (*a*, 7 is flat and smooth, and forms part of the outer wall of the orbit, where it articulates with the malar, frontal, and upper jaw bones.

The Lesser Alæ (*b*, 3, 3) are long, narrow, sharp-pointed processes projecting horizontally outwards from the front and upper part of the body. Internally and behind they bear the anterior clinoid processes, beneath which are the Optic foramina for transmitting the ophthalmic arteries and the optic nerves from the commissure to the orbit. The upper surface of these alæ is flat, and supports part of the brain. The anterior border is articulated with the orbital plates of the frontal bone on either side, and in the middle, where the ethmoidal spine projects, with the ethmoid bone. The posterior border lies in the Fissura Sylvii, between the anterior and middle lobes of the brain. The under surface is smooth: between it and the anterior edge of the great ala is a gap, the foramen lacerum anterius, transmitting nerves and a vein to the orbit.

The Pterygoid processes (*a*, 4, 4) are directed downwards from the under and outer part of the body. On each side there are two lamellæ, an external and an internal; they are long and narrow quadrilateral plates nearly meeting in front, where they articulate with the palate bone, and diverging behind so as to leave a space, in which the internal pterygoid and circumflexus palati muscles are attached. The internal and longer of the lamellæ has at its lowest extremity a hook, the Hamular process, round which, as on a pulley, the tendon of the last-mentioned muscle plays. At the upper part, where the pterygoid processes join the body, is a canal, the Vidian, running from before backwards and transmitting the Vidian nerve.

The Ethmoid Bone (*Fig.* 10, *f*) is situated in the front and middle part of the base of the skull, between the orbits. *Fig.* 16 gives a profile view of it from the left side. It presents six different aspects, and for the most part is of a very light spongy texture. Its upper surface, which is presented to the brain, has in front and in its middle line a strong triangular process, the Crista Galli (1), to which the front of the falx cerebri is attached. The apex of this process is directed straight upwards; the base is continuous below with the perpendicular or nasal plate (2), which divides the Ethmoid bone into two equal lateral halves, and which, with the Vomer, which it joins below, forms the greater part of the septum of the nose. The Crista Galli, sloping downwards and backwards, is gradually lost behind, where the Ethmoid bone receives the spine of the sphenoid. On either side of it is a narrow quadrangular plate (the Cribriform plate), on which the bulb of one of the olfactory nerves rests. Each is perforated by a number of holes through which the branches of the olfactory and another smaller nerve pass to the interior of the nose. In front, and along part of the border of each plate, are the orifices of numerous cells, which, in the entire skull, are closed in by the frontal bone and its orbitar plates, and communicate with the frontal sinuses.

Fig. 16.



The surface of the upper part of each side of the ethmoid bone is formed by a thin smooth quadrilateral plate, the orbitar plate (3), which forms great part of the inner wall of the orbit, and unites above with the corresponding plate of the frontal (leaving two small apertures, the anterior and posterior internal orbitar foramina, for the passage of small nerves and vessels), in front with the lacrymal, below with the orbitar portions of the upper jaw and palate bones, and behind with the sphenoid. Between the orbitar and nasal plates, each half of the bone is formed of cells and folds of very thin lamellæ, which form part of the chambers of the nose, and have the olfactory membrane and nerves spread out upon them. [SMELL.] The principal parts are the middle turbinated or spongy bone (4), a roll of thin bone, which forms the lower border of the cells; and a smaller but similar roll higher up, and confined to the back part, called the superior turbinated or spongy bone (5). Under each roll at its posterior part is a passage to the cells, called respectively the Superior and the Middle Meatus of the nose. The ethmoidal cells communicate in front with the frontal, and behind with the sphenoidal cells or sinuses.

The six bones just described enclose the Brain, forming a cavity whose size, compared with that of the crania of brutes, is one of the most distinguishing marks of the human species. To the protection of the important organs within it, as to their chief office, everything in the structure and arrangement of the bones of the cranium is adapted. Those parts of them which lie exposed to direct external injury are formed of three layers, namely, an outer and inner table, and an intermediate diploe.* The outer table is formed of bone of ordinary compactness, such as is not liable to be cracked by moderate shocks; the inner, of much harder and more brittle bone (whence its name of Tabula vitrea), which may be more easily cracked, but less easily cut or pierced. The diploe is of a soft spongy tissue, calculated to lessen the vibrations that are produced by blows on the outer table, before they reach the inner and more brittle one. The arrangement is thus similar to that by which one might safely enclose a substance liable to injury either from being shaken or cut, within an inner case of hard porcelain, a middle one of soft leather, and an outer one of tough wood.

The formation of the sutures seems to have the same end. The outer tables of the exposed bones have their edges finely dovetailed, and are thus so immoveably held together that none but a violently expansive force exercised at once on the whole interior of the cavity can separate them. The inner tables are simply apposed with a very thin intermediate layer of cartilage; an arrangement which, as Sir Charles Bell (who has written most ingeniously on this subject in his 'Animal Mechanics'), says, is often imitated in works of art, in which tough materials, such as wood, are joined by mutually fitting dentations; and brittle ones, such as glass or marble, by smooth edges and a layer of cement. A similar mode of opposition is seen between all the bones of the skull that are not exposed to direct violence.

The top of the skull presents transversely an arch formed by the two parietal bones (see *Fig.* 8), whose most prominent parts, like those of the frontal, occipital, and others, are stronger and thicker than any others; a circumstance adapted for greater resistance to force, whether applied directly against those parts, or to the summit of the arch from whence it would fall chiefly on them. The strength of this arch is further secured by the lower parts of the parietal bones being held in by the overlapping upper borders of the temporal and sphenoidal bones, other parts of which, passing across the base of the skull, hold the parietal bones, which by pressure from above might be made to start outwards or pushed inwards, as beams hold the walls of a house from being driven either in or out by the weight of the roof. Taking the whole upper part of the skull as a dome, the same strength of resistance to superincumbent pressure is obtained at every part by nearly similar means, especially at at the coronal suture, where, as has been already said, the parietal bones overlap the frontal at the supports of its arch, and are themselves overlapped by it at the summit of their own. In this regard also may be noticed the strength and thickness of the angular processes, and of the orbitar arches extended between them (see *Fig.* 11), which serve as supports for the front of the dome; and the thickening of the bones along the course of the longitudinal and lateral sinuses, resembling groins in masonry.

The relations of the skull to the erect posture, the adaptations of the ethmoid and sphenoid bones to the sense of smell, and the arrangements of the base of the skull in reference to the ear, the several nerves, &c., are considered elsewhere. [BRAIN; EAR; MAN; SMELL, &c.]

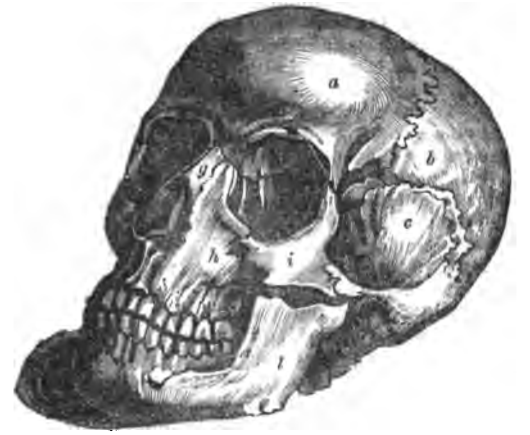
The second chief division of the Skull includes the bones of the Face, the principal of which are represented in *Figs.* 8 and 17.

The Nasal Bones (*Figs.* 8, 9, 17, *g*) form the upper part of the bridge of the nose. They are narrow and quadrilateral; thick above, where they fit into the nasal notch of the frontal bone; broad and thin below. The outer border of each articulates with that of the ascending process of the upper jaw-bone; the inner is in contact with that of the other; the lower are in contact with the cartilages that form the rest of the groundwork of the nose. The anterior sur-

---

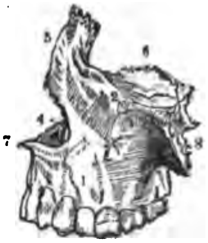
* This arrangement does not exist in either the child or the old person. In the former all the bones are tough and elastic; in the latter the diploe is filled up by hard bone, and the whole cranium is therefore more liable to fracture.

Fig. 17.



face is concave from above downwards, and convex from side to side; the posterior has opposite directions, and in the middle line, where the two bones are in contact, is applied on the nasal spine of the frontal, and the edge of the perpendicular plate of the ethmoid bone.

Fig. 18.

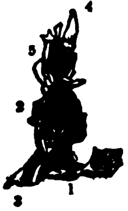


The Superior Maxillary or Upper Jaw bones (*Figs*. 8, 9, 17, *h*) form the greater part of the front of the face. *Fig*. 18 gives a view of the outer part of that of the left side. This surface is bounded below by a narrow border, the Alveolar border or process (1), in which the upper teeth are set in their sockets. Its outline is an elliptical arc, and from it the outer surface ascends to the orbit, of which it forms the inner and great part of the lower margin (2). It is unevenly depressed in two or three places for the attachment of muscles of the face. At the outer part, near the orbit, it presents a rough surface, the Malar eminence (8), by which it is united with the cheek-bone. Below and in front of this is a depression called Fossa canina, and on its inner side, just below the orbital margin, is the Infra-orbital foramen, through which the superior maxillary nerve passes to the face. The anterior border of this external surface first ascends vertically where the two bones are in contact in the middle line (see *Fig*. 8); then is suddenly cut out in a crescentic arch (4) so as to leave between the two the large aperture into the nasal cavities, and then again ascends where the upper maxillary bone unites with the nasal of the same side. This ascending part is called the nasal process (5); its summit is fixed in the nasal notch of the frontal bone; its outer surface looks towards the orbit, is deeply grooved, and with the lacrymal bone, to which its posterior border is attached, forms a channel for the lacrymal duct; its inner surface is directed towards the cavity of the nose, has an oval roughness which is united with the inferior turbinated bone, and above closes some of the anterior ethmoidal cells. Below and behind the malar eminence the surface is excavated to form part of the zygomatic fossa; and above this it swells out and is perforated by numerous foramina, through which the nerves of the upper teeth pass.

The upper, or orbitar, surface (6), consists of a thin plate, forming the floor of the orbit, and presenting a groove which leads to the infra-orbital canal, and a depression for the insertion of the inferior oblique muscle of the eye. The under or palatine surface is rough and concave, and forms part of the roof of the mouth. Its outer border is arched, and bounded by the alveolar process; the inner is straight, and is set against that of the opposite side in the middle line; the posterior is united with the corresponding process of the palate bone. The inner or nasal aspect presents, below, a rough surface by which the bone is united to its fellow on the opposite side, and which is deeper in front than behind. It is surmounted by a ridge which extends from before backwards, and between which and that of the other bone is a narrow groove to receive the vomer. The anterior part of the ridge (7) is called the anterior nasal spine, and close by it is the foramen incisivum, which leads down to the roof of the mouth, and transmits the anterior palatine nerve. On the outer side of the ridge is a concave smooth surface, the upper surface of the palatine process, of which the lower surface forms, as already said, the roof of the mouth. From the outer part of this surface, which forms part of the floor of the nostrils, the bone rises almost vertically towards the nasal spine and the inner edge of the orbital plate, and, at about its middle, presents a large aperture leading into the Antrum Highmori, a cavity occupying the whole interior of the body of the bone.

The Palate bones are placed backward between the superior maxillary and the pterygoid processes of the sphenoid. The lower, horizontal, or palatine portion (1) of each is attached behind the palatine process of the upper jaw, to which it is similar in form, and it completes the back part of the roof of the mouth or hard palate, and of the floor of the nostrils. Its posterior border has the Velum palati [PALATE] attached to it: its under surface presents two foramina, through which the posterior palatine nerves pass. From its outer border a thin plate (2) ascends vertically; where it commences there is, behind, a rough process (3), articulating with and filling up the gap between the pterygoid processes of the sphenoid. (*Fig*. 15, *a*, 4, 4.) The nasal or inner surface of this ascending portion articulates with the inferior turbinated bone, and forms part of the outer wall of the nostrils; the outer surface articulates with the back and inner part of the superior maxillary bone, and forms with it the posterior palatine canal. The upper border has a notch, which, in the entire skull, is completed by the sphenoid bone into a hole, called the spheno-palatine, for the transmission of nerves of the same name: behind it is a triangular process (5), of which one surface articulates with the body of the sphenoid; and before it is another (4), of whose surfaces one closes some of the ethmoid cells, and another forms a small part of the back and floor of the orbit.

Fig. 19.



The Malar or Cheek Bones (*Figs*. 8, 9, 17, *i*) form the most prominent part of the cheeks. The form of each is quadrangular. The front surface is slightly convex, and has small apertures for vessels and nerves: the back covers the front of the zygomatic fossa: the upper surface is the narrowest, and forms part of the floor of the orbit, of which also part of the front border is formed by the upper margin of this bone. By its posterior surface and inner border the malar is united to the upper jaw-bone, as already described; and by its posterior and outer angle to the zygomatic process of the temporal bone (*Fig*. 13, 6), with which it forms the zygoma.

The Lacrymal Bones (*Fig*. 9, *j*) are two small thin lamellæ of bone at the fore part of the inner wall of the orbit. Each of them in some measure resembles a thumb-nail, whence they are also called Ungual Bones. Each is composed of two parts: the anterior is deeply grooved on the surface turned towards the orbit, and contributes to the formation of the lacrymal canal with the nasal process of the upper jaw-bone, with which its anterior margin articulates. The posterior part is flat, and closes those of the ethmoidal cells which lie anterior to its orbital plate. The posterior margin of this part articulates with the ethmoid bone, the upper with the orbital plate of the frontal, and the lower with that of the upper jaw-bone.

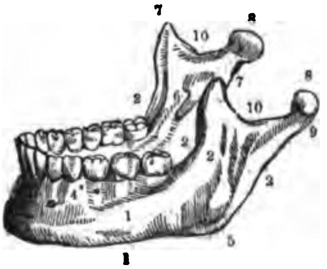
The Inferior Turbinated or Spongy Bones are thin rough lamellæ, whose lower border is rolled up somewhat like a scroll. They lie within the nasal cavities, and, except in being larger, they closely resemble the bones of the same

Google

name which are appended to the ethmoid. They are attached at either end to the inner surfaces of the nasal processes of the upper jaw and palate bones, and, in the middle, to the lacrymal and the lower portion of the orbital plate of the ethmoid bone: upon these they are suspended before the aperture of the Antrum, which, in the entire skull, they nearly conceal. Like all the bones which form part of the cavities of the nose, they are covered by mucous membrane. Beneath their outer concave surface runs the inferior meatus of the nose.

The Vomer (*Fig.* 8, *k*) is a thin quadrilateral plate which forms a considerable part of the middle partition of the nose. Its upper border is the thickest, and is articulated with the azygos process and under surface of the sphenoid bone; the lower border fits into the groove between the ridges in the apposed surfaces of the palatine processes of the upper jaw and palate bones; the anterior joins the vertical part of the ethmoid above, and the cartilaginous part of the septum of the nose below: the posterior is free, and divides the passage from the nostrils into the pharynx behind.

Fig. 20



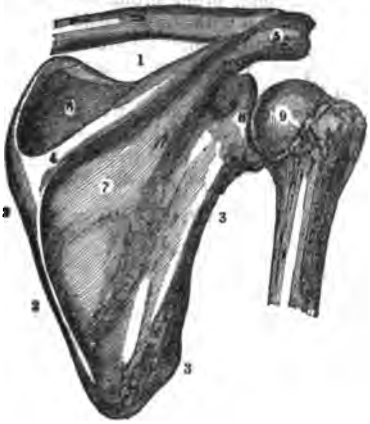
The Inferior Maxillary, or Lower Jaw-Bone (*Figs.* 8, 9, *l*, and *Fig.* 20), has a form something like that of a horse-shoe. It is made up of a body or horizontal portion (1), and a ramus, or ascending portion (2). The former is convex anteriorly, and on its very front presents the prominence which contributes to form the chin (3). This is marked in the middle line by the Symphysis, at which the two portions of which the jaw was first composed are united. On either side of this is a slight depression, the Fossa incisiva; and farther out a hole, the mental (4), through which branches of the inferior dental nerve and vessels pass to the chin. A raised line giving insertion to muscles passes hence obliquely outwards to the upper border; and on the inner surface there is another line corresponding to this, and giving origin to the mylo-hyoideus muscle, from whence it is called the mylo-hyoidean ridge. On the inner surface there are also prominences near the symphysis for the insertion of muscles. The lower border is smooth and rounded; the upper, or Alveolar process, is marked by notches corresponding with the sockets of the lower teeth, which are set in it.

The rami ascend almost vertically from the ends of the two parts of the body. They are broad, flat, and quadrilateral. At the angle (5), where each joins the body, there are on both surfaces rough prominences; the external gives attachment to the masseter, the internal to the internal pterygoid muscle. The internal surface has also, near the end of the mylo-hyoidean ridge, a hole, the inferior dental (6), through which the nerve of the same name passes into the interior of the jaw, from which it again emerges at the mental hole (4). Leading from the dental foramen is a small groove for a branch of the dental nerve. The anterior border of the ramus terminates in a sharp projection, the Coronoid process (7, 7), to which the temporal muscle is attached; the posterior, in a transversely oval process, with a smooth summit, the Condyle (8, 8), which articulates with full freedom of motion in the glenoid cavity of the temporal bone. Below this is the Neck (9), to which the external pterygoid muscle is in part attached; and the space between the condyle and the coronoid process is the Sigmoid notch (10, 10).

The bones of the face serve as a groundwork to many parts whose structures and functions are already described in separate articles; and since, in each case, the parts which the bones take are at the same time considered, an account of their adaptation to the several offices performed by the different portions of the face is not here necessary. Their relations to the features are described in the article MAN.

The last main division of the Skeleton consists of the Upper and Lower Extremities (*Fig.* 1; 3, 4). The upper are composed of the Scapula, Clavicle, Humerus, Radius, Ulna, Carpus, Metacarpus, and Fingers. The scapula and clavicle are analogous to the Ossa innominata in the lower extremities.

Fig. 21.



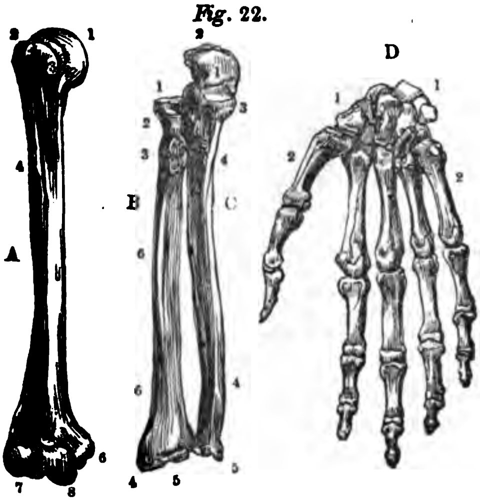
The Scapula, or shoulder-blade, of which, in *Fig.* 21, the back is represented, with parts of the clavicle and humerus, is triangular in its outline, and flat, being formed of two compact layers, and an intermediate diploe, varied in thickness. It has three borders or Costæ, a superior (1), posterior (2), which lies nearly parallel with the spine, and an inferior (3), which is also the longest. They are all thicker than the body of the bone, and give insertion to various muscles moving the shoulder. From the posterior border, about one-third from the upper and two-thirds from the lower angle, there commences a ridge called the Spine (4), which, as it passes along the back of the scapula towards the outer angle, gradually increases in depth, and at its end, projecting beyond and above the angle, bears a strong arched process, called the Acromion (5), which articulates with the clavicle, overhangs the shoulder-joint, and gives attachment to some of its muscles and ligaments. The spine divides the back of the scapula into two parts, of which the lower is much the larger, and which are named, according to their position, Supra- (6) and Infra- (7) Spinous Fossæ. They give origin to muscles of the same names. The anterior surface, or belly of the scapula, is slightly concave, and gives insertion to the subscapularis muscle, for the attachment of whose several parts it is marked by alternate longitudinal elevations and depressions. At the outer angle the bone is terminated by the Glenoid Cavity (8), an ovate surface slightly hollowed, narrower above than below, and with which the head of the humerus (9) articulates with very extensive freedom of motion. Its border is thick, and is rendered deeper in the recent subject by a rim of fibro-cartilage, the glenoid ligament, similar to that which borders the acetabulum. Between this border and the base of the spine the scapula is narrower than elsewhere; and this part is called the Neck. From the superior costa, near this neck, a long and strong curved process, the Coracoid, projects forwards, and gives attachment to several muscles and ligaments; and at its root there is in the superior costa a hole, or a notch, through which the supra-scapular nerve (and sometimes its accompanying vessels) pass.

The scapula is attached to the trunk only through the medium of the clavicle, and by the muscles which connect it to the spine and ribs. It can therefore slide freely on the back of the chest; and, to a certain extent, it follows all the larger movements of the humerus, so that its glenoid cavity and the head of that bone, which have but a small surface of mutual contact, almost always preserve the same relation to each other, and are less likely to be dislocated than they would be if the scapula were more closely fixed.

The Clavicle, or Collar-bone, extends transversely from the notch in the upper angle of the sternum to the anterior and outer margin of the acromion (*Fig.* 21). With both of these its ends are articulated with a moderate extent of mobility; with the sternum, by the apex of a broad triangular surface; with the acromion, by a small flat oval surface on its posterior edge. The Clavicle has nearly the directions of the double-curved line of beauty, being slightly arched forwards at the sternal, and backwards at the scapular, half. At the former it is thick, strong, and triangular; in the latter, broad and flattened. On the upper surface, which lies just under the skin, it is smooth; on the lower it has, near its sternal end, a mark where a ligament fixing it to the first rib is attached; farther out a larger elevation, to which the subclavian muscle is fixed: and near the acromial end, other prominences, to which the ligaments connecting it with the coracoid process of the scapula (which projects just below it) are affixed.

The chief purpose of the Clavicle is to keep the arm at a distance from the trunk for all its outward motions; and in adaptation to this, its length and strength form one of the most characteristic features of the human skeleton.

Fig. 22.



The Humerus, the bone of the upper arm (*Fig.* 22, A), is articulated above with the scapula by a hemispherical smooth portion called the Head (1), which is bounded at its outer and lower part by a narrow groove called the Neck. The axis of the head forms with that of the shaft or body of the bone an angle of about 130°. Close by the neck, the upper and outer part of the shaft is surmounted by two Tuberosities: the larger and posterior (2) has three flat surfaces, to each of which a muscle from the scapula is attached; the lesser (3) gives attachment to the subscapularis muscle. The rest of the upper part of the shaft is round and nearly smooth: but just above the middle of its outer surface is a rough elevation (4), to which the deltoid, the chief muscle of the shoulder, is attached. About half-way down, the shaft begins to be flatter and wider, and at either border of it commence sharp ridges, which, as they descend, become prominent, and which terminate below at the External (5) and Internal (6) Condyles. Each of the Condyles gives insertion to a ligament and several muscles of the fore-arm; the inner is the more prominent, but the outer is the larger. Between the condyles is the inferior articular surface, which is composed of two parts for articulating separately with each of the bones of the fore-arm. On the outer side, just within the external condyle, the surface has a smooth rounded prominence or tuberosity (7), against which the summit of the head of the radius is apposed; more inwards there is a deep groove (8) separated from the tuberosity by a slight ridge, and from the inner condyle by one much more prominent, in which the raised portion of the sigmoid cavity of the ulna moves as in a hinge-joint. This part of the joint is named the Trochlea. Both before and behind it is bounded above by a depression: into that on the posterior surface, which is the deeper, the olecranon of the ulna is received when the fore-arm is extended; and into the anterior, the coronoid process of the same bone, when the fore-arm is much bent.

The Fore-arm contains two bones, the Radius and the Ulna (*Fig.* 22, B, C): the former being that with which the movements of rotation are effected; the latter, that which takes the chief part in flexion and extension. The radius (B), when the palm of the hand is turned forwards, is on the outer side of the arm; and it is the shorter of the two bones. At its upper end it has a circular disk, the Head (1), hollowed on its upper surface, where it articulates with the tuberosity on the lower end of the Humerus (A, 7), and smooth on its circumference, where it is encircled by a ring within which it rotates, and which is formed in part by the ulna, and in part by a ligament. Just below this is the Neck (2), of which the upper part is similarly encircled; and below it, on the anterior and inner surface is a knob, the Tubercle (3), to which the tendon of the biceps, the chief flexor muscle of the fore-arm, is attached. Yet lower, the shaft (6, 6) of the radius becomes three-sided, and as it descends grows wider. At its lowest part it is much expanded, is flattened before and behind, and terminates with a prominent border to which ligaments of the wrist-joint are attached. The posterior and outer surfaces of this lower end are deeply grooved for the passage of tendons: and the latter is prolonged into a blunt-pointed process, the Styloid (4), to which the external lateral ligament is attached. The inner surface has a small smooth cavity, the Semilunar, which articulates with the outer part of the lower head of the Ulna. The terminal surface (at 5) is smooth, somewhat triangular, and slightly hollowed; it articulates with the carpus, and is continuous over the inner border with that which articulates with the ulna.

The Ulna (C) is situated on the inner side of the fore-arm. At its upper and larger extremity it has a broad and deep crescentic notch, the Greater Sigmoid Cavity (1) whose smooth surface is divided into two parts by a middle ridge, and which is received in the trochlea of the Humerus. It is bounded at either end by a sharp process. The upper and posterior is the larger, and is named the Olecranon (2); it forms the rough prominence behind the elbow; and when the arm is extended, its point, which is curved forwards, rests in the fossa at the back of the humerus. The lower and anterior (3) is the Coronoid Process, whose point, when the arm is fully bent, rests in the anterior fossa of the humerus. On the outer side the smooth surface of the great sigmoid cavity is continued over a small oval concave portion of the side of the bone just behind the coronoid process. This is the Lesser sigmoid cavity; upon which the side of the head of the radius rotates, and to whose borders the coronary ligament by which that head is encircled, is attached. The body or shaft (4, 4) of the ulna grows smaller from above downwards, and is for the most part three-sided; its external and sharp margin giving origin to the interosseous ligament, which, being attached also to the opposed margin of the radius, fills up the space between these bones. At its lower end, the ulna becomes nearly cylindrical and then is a little enlarged: at its termination it presents a double articular surface; one, on the end which is nearly circular, and (through the medium of a fibro-cartilage) articulates with part of the carpus; the other, on the outer border, which is narrow and convex, and is received in the semilunar cavity of the radius. The inner border of this lower extremity bears a short and blunt process, the Styloid (5), to which the internal lateral ligament of the wrist-joint is fixed.

The motions of which the Fore-arm is capable are Flexion and Extension, and Rotation on its axis. The two former are effected at the hinge-like joint between the Greater Sigmoid cavity of the Ulna and the Trochlea of the Humerus; the head of the radius moving at the same time forwards and backwards on the lower tuberosity. The elbow affords the best specimen of a hinge-joint in the body, for no lateral motion is permitted in it, the ulna being locked in the groove between the two side-ridges of the trochlea. Rotation, by which also the rotation of the hand is effected, is performed by the upper head of the radius moving round in the ring formed by the coronary ligament and the lesser sigmoid cavity of the ulna; and by its lower head at the same time being carried round on the outer border of the lower head of the ulna. In this movement the ulna is almost fixed, its lower end only being carried outwards as that of the radius is moved far inwards, when in extreme pronation of the hand the two bones are made to cross each other.

The Hand (22, D) consists of the Carpus, Metacarpus, and Fingers. The Carpus (1, 1) is composed of eight small bones arranged in two rows, and so nearly immoveably united by ligaments, that, except in being more elastic, they serve the purpose of a single bony-arch. Those of the first row, which lie nearest to the fore-arm, are (from the outer to the inner side) the Scaphoid, Lunar, Cuneiform, and Pisiform bones: those of the second row, following the same order, are named Trapezium, Trapezoid, Magnum, and Unciform. The three first-named articulate with the radius directly and with the ulna indirectly; the trapezium has a surface of peculiar form, concave from side to side and convex from before backwards, by which the thumb, articulating with it, is permitted to have a very wide extent of motion.

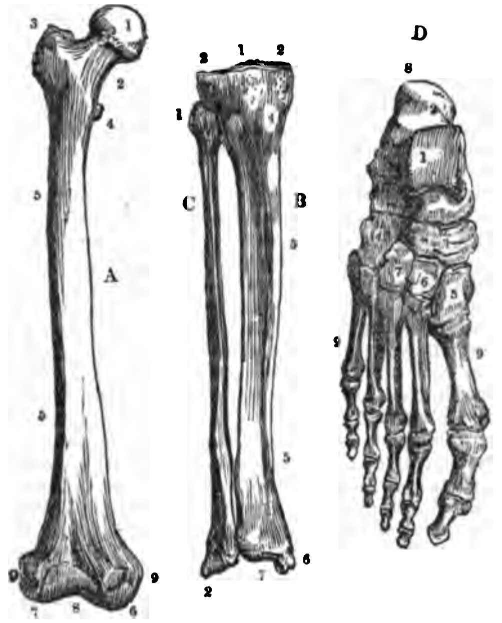
The Metacarpus (between 2 and 2) is composed of five bones, which are called by number according to the order in which they stand; that of the thumb being taken as the first. Each is described as consisting of a body and an upper and lower heads. The form of the upper head is adapted to one or more of the bones of the carpus; that of the lower is in all very convex, and rather narrow. The body is compressed from side to side, and is broader behind than before, and on its dorsal than on its palmar aspect. The first metacarpal bone only has free mobility.

The Bones of the Fingers are called Phalanges. The thumb has two, each of the fingers three. Their form and proportionate sizes are plainly exhibited in *Figure* 22, D. They are articulated with each other, and with the metacarpal benes, so as to permit free extension and flexion, and at the joints between the phalanges and metacarpus there is also permitted a certain extent of lateral motion. At that between the carpus and fore-arm there is a very extensive hinge-like motion of flexion and extension, as well as a wide lateral motion.

The general arrangement of the bones of the human upper extremity is adapted to a far more extensive and varied set of movements than exists in the corresponding member of any other animal; they have all relation to the office of the hand, as an instrument not of support, but of prehension, and that in its most perfect form. In this view they are fully considered in the article MAN.

Each of the Lower Extremities is formed by a Femur, Tibia, Fibula, Patella, Tarsus, Metatarsus, and Toes.

Fig. 23.



The Femur, or Thigh-bone, A, is the largest of the Body. It articulates with the acetabulum of the Os innominatum by its head (1), which forms rather more than half a sphere, and is smooth, except at its summit, where there is a depression for an interarticular ligament. It rests upon a narrower part, the Neck (2), which descends obliquely to the summit of the shaft, and is at its base somewhat expanded. It is here set between two strong processes called Trochanters, by which the shaft is surmounted, and its base is bordered by two oblique lines, named Intertrochanteric, which pass on either surface of the bone, from one to the other Trochanter. The Greater Trochanter (3) is the uppermost, and lies at the outer part of the bone; it is thick, rough, and strong, and gives attachment to the great muscles of the buttock. Behind it is a deep depression, the Digital Fossa, in which the obturator and other muscles to rotate the thigh outwards are attached. The Lesser Trochanter (4) is on the inner aspect of the femur, and also gives a point of insertion for muscles. At the level of the Trochanters the shaft is flattened both behind and before, but below them it is round and nearly cylindrical, till, within one-fourth of its length from the lower end, it expands, and again becomes flattened. The shaft (5, 5) of each femur is directed rather inwards, and is slightly arched forwards; its axis makes, with that of the neck and head, an angle of about 120°; its surface is everywhere smooth, except behind, where there is a prominent line, the Linea aspera, running along the middle, and at either end dividing into two, which above go each to one of the trochanters, and below each to one of the condyles. These condyles are the processes in which the lower expanded part of the femur terminates. The inner condyle (6) is the narrower, and descends lower than the outer (7), which is the broader and stronger. Their articular surfaces are united in front at a concave pulley-like surface (8), over which the patella lies; below it they diverge, and at the back of the femur are separated widely on two very convex prominences, between which there is a deep and rough fossa, in which the Crucial ligaments of the knee-joint are fixed. On the sides of the femur, just above the lower border of the condyle, are eminences, the Tuberosities (9, 9), to which the external and internal lateral ligaments respectively are attached.

The Tibia, or Shin-bone (*Fig*. 23, B), is placed on the front and inner part of the Leg. Its upper part or Head (1) is far larger than any other. Its upper surface is nearly oval, its greatest diameter being transverse; and it presents two slightly concave oval smooth surfaces (2, 2), on which the condyles of the femur rest. Between them is an eminence, named the Spine, which fits in between the condyles, and to which, as well as to rough surfaces before and behind it, the crucial ligaments and semilunar cartilages are fixed. Below and on the sides of the head are Tuberosities on which the lateral ligaments are inserted, and behind the external tuberosity is a smooth surface which articulates with the head of the fibula. In front, and a little below them, is the Tubercle (4), to which the ligamentum patellæ is attached. Below this the body (5, 5) is triangular, and as it descends, becomes smaller: its outer surface is hollowed; its inner, which forms the skin, slightly convex; its posterior rounded. The outer border gives attachment to an interosseous ligament, which fills up the space between it and the opposed part of the fibula: the anterior is sharp and prominent, and is named the Crest. The lower or tarsal extremity is a little expanded, and has a somewhat quadrilateral form. Its outer aspect has a slightly concave surface, which is articulated immoveably with the fibula; the inner is prolonged into a bluntly pointed process, the internal malleolus (6), which has the internal lateral ligament of the ancle fixed to its extremity, and a smooth surface on its outer side, which articulates with the astragalus. The anterior surface of this extremity is smooth where tendons pass over it; the posterior is flat; the lower or terminal surface (7) is quadrilateral and slightly hollowed; it rests on and is articulated with the astragalus.

The Fibula (*Fig*. 23, B) is situated at the outer part of the leg, and is fixed immoveably by the side of the Tibia. It is long, very slender, for the most part three-sided, and enlarged at either extremity. The upper extremity or head (1) is the smaller; it is rounded, and on its upper and inner part has an oval smooth surface, with which it articulates with the outer tubercle of the Tibia; the rest of its surface is uneven, for the attachment of ligaments and a tendon. The lower extremity (2) is longer and more pointed than the upper; it forms the external malleolus, or outer ancle, to whose extremity the external lateral ligament of the joint is attached, and whose inner surface is articulated with the astragalus; behind it is a deep groove, over which the tendons of some muscles of the leg pass to the sole of the foot. Above the malleolus, and on the inner aspect of the fibula, is a smooth surface, where it is united with the tibia.

The Patella, or Knee-pan, has a somewhat triangular outline. Its narrowest part is below, and is fixed by the ligamentum patellæ to the tubercle of the tibia. Its anterior surface is slightly convex, and looks fibrous, being marked by the insertions of the tendons of the extensor muscles of the leg; the posterior is smooth, and divided by a ridge into two parts, of which the outer is the larger, and which are adapted to the pulley-like surface between the condyles of the femur.

The Tarsus is composed of seven bones, namely, the Astragalus (1), Os Calcis (2), Navicular (3), Cuboid (4), Internal (5), Middle (6), and External (7) Cuneiform Bones. These are set together so that they cannot be moved by any slight force, and yet are possessed of considerable elasticity. The Astragalus is that on which, through the Tibia, which rests upon its upper quadrilateral surface, the weight of the body first falls. With the Tibia above, and the two malleoli on either side of it, it forms the ancle-joint, a hinge with a limited lateral motion. Its lower part rests, with two surfaces of contact, on the os calcis, whose hinder prominent part (8) forms the heel; and its anterior portion or head is received in a cavity, formed by the navicular bone in front, part of the os calcis behind, and a very strong ligament below and between them. This cavity is at the summit of an arch which the tarsus and metatarsus together contribute to form, and of which the supports are the os calcis behind and the ends of the metatarsal bones before. It is indeed a double arch, for it has at the sole a concavity, both from before backwards and from side to side; and the strength with which its several parts are joined is so great, that few accidents are rarer than a fracture or dislocation of any of the bones of the tarsus.

The rest of the bones of the Foot, including those of the Metatarsus (9, 9) and the Toes, are in number, arrangement and form very similar to the Metacarpus and the Phalanges of the Fingers. The metatarsal bones however are longer, more slender, and set more closely side by side than the metacarpal; and the Phalanges are all much shorter, and (except the two of the great Toe) smaller. Their movements are in general the same as those of the fingers, but less extensive; neither is there any adaptation for so free a movement of the first toe as of the thumb.

For the remainder of the mechanism of the bones of the leg the article MAN may be again referred to.

There are some supplemental bones of the skeleton, which need but just be mentioned. These are the Sesamoid and the Hyoid bones. The former occur within the substance or in the course of tendons which are much exerted; the patella is the largest of them; the number and existence of the others are not certain, but there are almost always two at the first joints of each of the thumbs and great toes; they are small, oval, or round, and rough on all their surfaces, except that by which they articulate with the bone on which they lie. The Hyoid bone is that on which the larynx is suspended, and the base of the tongue fixed; it is not articulated, except by long ligaments, with any other of the bones, and is described in the articles LARYNX and TONGUE. In relation to many points in this article, those on ARTICULATIONS and BONE may be consulted, as well as those to which distinct references are given.

SKELLEFTEA-ELF. [BOTHNIA.]

SKELTON, JOHN, an English poet of an antient Cumberland family, was born some time in the latter part of the fifteenth century. Very few particulars of his life are known. The first mention of him is in the preface to Caxton's translation of the 'Æneid,' printed in 1490, where he is said to have been lately created poet-laureate in the 'Unyversite of Oxenforde.' This honour was a degree in grammar conferred by universities, and not, as is now the case, an office in the gift of the crown. (Warton, *Hist. Eng. Poetry*, in the account of Skelton; and Malone, *Life of Dryden*, i. 83.) Skelton was ordained deacon in 1498, by the bishop of London, and priest the following year. (*Regis. Savage. Epis. London.*, quoted by Bishop Kennet in his collections; Lansdowne MSS.) He was afterwards admitted to an ad eundem degree at Cambridge and allowed to wear the dress (*habitus*) given him by the king. This we must suppose to have been some badge of royal favour bestowed on him by Henry VII., to whose son Henry VIII. he was tutor, being esteemed so great a classical scholar as to obtain from Erasmus the praise of being 'Britannicarum Literarum Decus et Lumen.' (*Epistle to Henry VIII.*, prefixed to his *Epigrams*, 294, 4to., Basil., 1518.) In 1507 we find from his own statement in his poems that he was rector of Diss in Norfolk and curate of Trompington in Cambridgeshire.

In the reign of Henry VIII., if not during the lifetime of his predecessor, he was appointed orator regius, as he styles himself in the title to several of his poems, being, according to Warton, a graduated rhetorician employed in the service of the king, though whether with any salary does not appear; in one place he is called Reginæ Orator ('Poems'), in a passage referring probably to the battle of Guinegate, 1513.

Skelton became notorious from his coarse and bold invective against Cardinal Wolsey and the clergy in general, but according to tradition his own conduct as a priest was far from being creditable. He was esteemed, observes Wood (*Athenæ Oxon.*), in his parish and the diocese more fit for the stage than the pew or pulpit; he is said to have been suspended by the bishop of Norwich, having been guilty of 'certain crimes, as most poets are. (Wood, *Ibid.*) The crimes alluded to in this passage were probably something more than the mere extravagances of buffoonery; he is accused by Fuller of having kept a concubine, or a wife (according to Delafield, 'Anecdotes of celebrated Jesters, &c., MS. Bodl., quoted by Bliss, *Ath. Oxon.*), a graver offence at that time. The severe attack upon Wolsey in the poem, 'Why come ye not to Court?' drew down upon him the resentment of that great ecclesiastic, who ordered him to be arrested. Skelton took sanctuary at Westminster, under the protection of Abbot Islip, to whom, in 1512, he dedicated the 'Præconium Henrici Septimi.'

He died in this retreat, June 21, 1529, and was interred in the churchyard, with the inscription, 'J. Skeltonus Vates Pierius hic situs est. Animam egit 21 Junii, An. Dom. MDXXIX.'

Skelton was much thought of in his day. We have already quoted the praise bestowed on him, and 'of the like opinion,' says Wood, 'were many of his time. Yet the generality saw that his witty discourses were biting, his laughter opprobrious and scornful, and his jokes commonly sharp and reflecting.' Among the nobility his patron was Algernon Percy, fifth earl of Northumberland, and he has written a long elegy on the death of that nobleman's father.

The chief of his poems are the 'Crowne of Lawrell' and the 'Bouge of Courte,' two cold and tedious allegories; 'Why come ye not to Court?' a satire against Wolsey, and the 'Boke of Colin Clout,' 'Ware the Hawk,' &c., attacks upon the whole body of the church. In other poems Henry VIII.'s foreign enemies, particularly the Scotch, are the victims of his scurrility, or else some private grudge is gratified, as in his abuse of William Lilye the grammarian. Most of his productions are enumerated in Wood's 'Athenæ' (Bliss), who says he wrote '50 several things.' According to Caxton, in the passage quoted above, he translated the Epistles of Cicero, Diodorus Siculus, and various Latin writers.

Skelton has been called original and inventive. He is rather unique; in style there is no known writer throughout our literature to whom he can be compared. His poems, if they deserve the name, present a strange mixture of ribaldry, learning, malice, and buffoonery, unrelieved by any traces of the higher qualities of satire. The structure of his verse is irregular and tuneless; the language, a motley jargon, at once pedantic and barbarous; in the 'Boke of Philip Sparow,' he complains of the rude and unpolished state of his native tongue, to the improvement of which his studied obscurity has certainly not contributed. His Latin compositions are written with comparative elegance.

He appears to have been one of the earliest authors in this country who addressed themselves to the nation at large, rather than to the nobility or to any particular class. Hence perhaps the grotesque combination in his works of classical allusions and phraseology, and of doggrel for the unlettered multitude. That he should have been admired in an imperfectly civilized age and in the dearth of better literature is not surprising, when we consider that in a crisis of great political excitement, such as the Reformation, any metrical compositions are eagerly circulated which embody, however rudely, the feelings and opinions generally prevalent among the people.

In this point of view, regarding them as eminently typical of the bold and unlicensed spirit of his time, we may still be interested by the poems of Skelton. They present moreover a curiously minute picture of the corruptions of the Romish church, to the infamy and downfall of which they probably much contributed, and contain several allusions to passing events which are not without historical value. In the 'British Bibliographer' (iv. 389) there is a full length portrait of Skelton in the dress of his time, copied from the wood-cut in a work of Skelton's in the British Museum, entitled 'A Ryght Delectable Tratyse upon a goodly Garlande or Chapelet of Laurell, by Mayster Skelton, Poete laureat, studyously devysed at Sheryfhotton Castell, &c. Inprynted by me Rycharde faukes,' &c., 1523, 4to. A new edition of the Works of Skelton, with an introductory Life by the Reverend A. Dyce, is announced for publication.

SKEW-BACK, in civil engineering, the course of masonry forming the abutment for the voussoirs of a segmental arch, or, in iron bridges, for the ribs. In the latter case a plate of cast-iron is usually laid upon the stone skew-backs, extending the whole width of the bridge, and forming a tie to the masonry. On account of the expansion and contraction of iron under changes of temperature, the ribs should not, especially in large arches, be fixed to their abutments. The ribs of Southwark Bridge, over the Thames, were originally bolted to the masonry of the piers; but it was found necessary, on this account, to detach them, during the progress of the works.

SKEW-BRIDGE, a bridge in which the passages over and under the arch intersect each other obliquely. In conducting a road or railway through a district in which there are many natural or artificial watercourses, or in making a canal through a country in which roads are frequent, such intersections very often occur. As however the construction of an oblique or skew arch is more difficult than that of one built at right angles, skew-bridges were seldom erected before the general introduction of railways; it being more usual to build the bridge at right angles, and to divert the course of the road or of the stream to accommodate it, as represented in *Fig.* 1, in which *a b* is a stream crossed by the road, the general direction of which is indicated by the dotted line *c d*. In a railway, and sometimes in a common road or a canal, such a deviation from the straight line of direction is inadmissible, and it therefore becomes necessary to build the bridge obliquely, as represented in the plan, *Fig.* 2. Where space and neatness do not require to be considered, an oblique arch may be avoided, either by building the bridge square with the upper passage, and making the span so wide as to allow the stream to pass under it without being diverted; or by building the arch square with the stream, and of sufficient length to allow the upper passage to take an oblique course over it; but either of these is a clumsy expedient, although well adapted for some situations. The arches or tunnels by which the Birmingham railway is conducted under the Hampstead-road and Park-street, near the London terminus, are instances of the latter kind of construction; the length of the arches being such that they present faces square with the line of railway, notwithstanding the oblique direction of the roads over them. A similar case occurs at Denbigh Hall, on the same line, where the railway crosses over the London and Holyhead road at such an angle that the difference of direction is only 25°. In this case a long gallery is constructed under the railway, consisting of iron ribs or girders, resting upon walls built parallel with the turnpike road; the ribs, and consequently the faces of the bridge, being at right angles with it. This gallery is about two hundred feet long and thirty-four feet wide; and by its adoption, the necessity of building an oblique arch of eighty feet span was avoided. The necessity of increasing the span of an arch according to its degree of obliquity, by which the expense and difficulty are materially increased, is illustrated by *Fig.* 3, the ground-plan of an oblique arch across a stream *a b*. Here it is evident that *c g* is the actual span of the arch; although *c d*, the breadth of the stream, would be the span of a straight arch, leaving the same width of passage underneath.

Fig. 1.

Fig. 2.

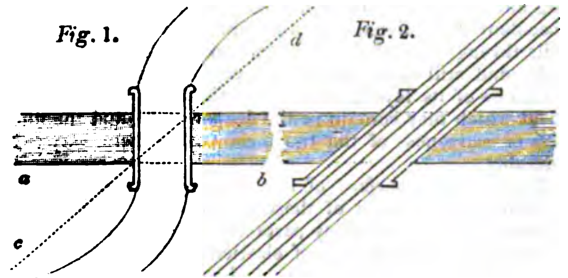
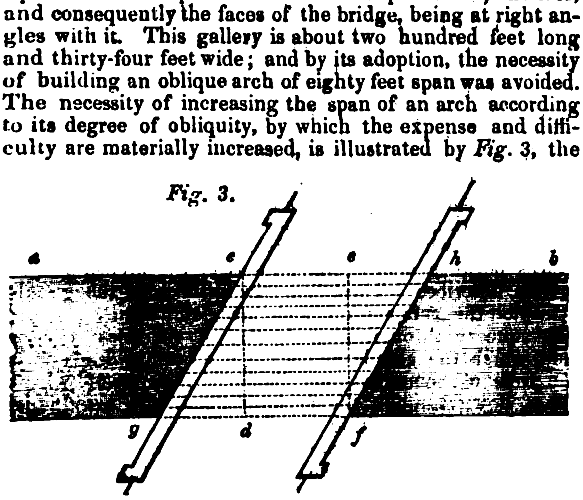
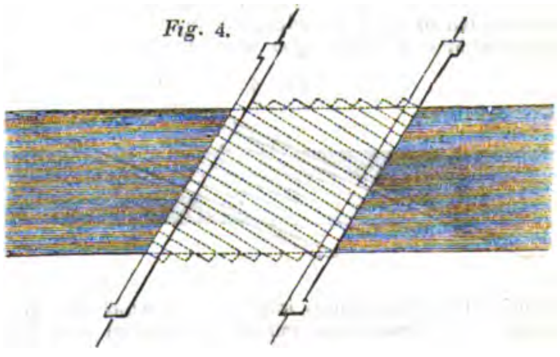


Fig. 3.



Very little is known respecting the origin of skew-bridges. It has been repeatedly asserted that those built by George Stephenson on the Liverpool and Manchester railway were the first erections of the kind; but this is certainly incorrect, there being some of earlier date even in Lancashire. A paper in the 'Transactions of the Institution of Civil Engineers,' vol. i., p. 185, alludes to an oblique arch erected about the year 1530 by Nicolò, called 'Il Tribolo,' over the river Mugnone, near Porta Sangallo, at Florence. It appears however that the principle upon which such bridges should be constructed was too little understood to render an attempt at constructing them on a large scale advisable. The next information the writer has met with on the subject is contained in the article 'Oblique Arches,' in Rees's 'Cyclopædia;' an article which appears to have escaped the notice of modern writers on this branch of engineering science. It is written by an engineer named Chapman, who mentions oblique bridges as being in use prior to 1787, when he introduced a great improvement in their construction. Down to that time, as far as he was informed, such bridges had always been built in the same way as common square arches, the voussoirs being laid in courses parallel with the abutments. How very defective such an arch would be may be seen by reference to *Fig.* 3, in which lines are drawn to indicate the direction of the courses. It is evident that here the portion *c d f e* is the only part of the arch supported by the abutments; the triangular portions *c d g* and *e f h* being sustained merely by the mortar, aided by being bonded with the rest of the masonry. This plan could therefore only be adopted for bridges of very slight obliquity, and even then with considerable risk. About the time mentioned above, Mr. Chapman was employed as engineer to the Kildare canal, a branch from the Grand Canal of Ireland to the town of Naas, on which it was desired to avoid diverting certain roads which had to be crossed. He was therefore led to think for some method of constructing oblique arches upon a sound principle, of which he considered that the leading feature must be that the joints of the voussoirs, whether of brick or stone, should be rectangular with the face of the arch, instead of being parallel with the abutment. Thus the courses, instead of taking the direction shown in *Fig.* 3, were laid in the manner indicated in *Fig.* 4. One of the first bridges built on this plan, the Finlay bridge, near Naas, crossed the canal at an angle of only 39°; the oblique span being 25 feet, and the height of the arch 5 feet 6 inches. Mr. Chapman observes that the lines on which the beds of the voussoirs lie are obviously spiral lines, and to this circumstance may be attributed much of the singular appearance of oblique arches. The Finlay bridge stood well, but the ingenious designer did not think it prudent in any other case to attempt so great a degree of obliquity, although he built several other bridges on the same principle, over the Grand Canal in Ireland, and over some wide drains in the East Riding of Yorkshire. He recommends carrying up the masonry as equally as possible from each abutment, in order to avoid unequal strains on the centering.

Fig. 4.



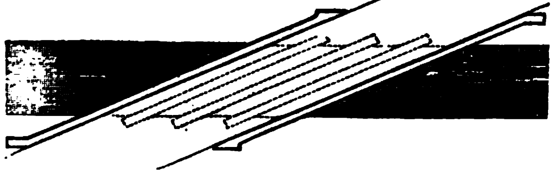
On the Liverpool and Manchester railway, out of rather more than sixty bridges, about one-fourth were built on the skew; one, built of stone, conducting the turnpike-road across the line at Rainhill, being at an angle of only 34°, by which the width of span is increased from 30 feet, the width of the railway from wall to wall, to 54 feet, the width on the oblique face of the arch. Skew-bridges have since become very common, and some have been erected of even greater obliquity. That at Box-moor, on the Birmingham railway, is stated, in Roscoe and Lecount's history of the undertaking, to be unrivalled for obliquity by any other brick arch. Its angle is 32°, the square span 21 feet, and the oblique span 39 feet. There are also brick arches of great obliquity on the Greenwich and Blackwall railways, but with their precise angles we are unacquainted.

The extended use of such structures has led to the promulgation of several methods for forming the voussoirs with accuracy, and disposing them in the most advantageous manner. The common theory, the credit of which is claimed, we believe, both by Mr. Nicholson and Mr. Fox, is that the courses of the stones should form portions of the thread of a square-threaded screw, or rather, of a thread somewhat of the dovetail form; the highest point of each thread, or that in the crown of the arch, being at right angles to the direction of the road. This theory, it is contended by the author of the article 'Skew-Bridge,' in the recent edition of the *Encyclopædia Britannica*, is imperfect; and he intimates that, in the present state of this branch of science, the most perfect way of constructing a skew-arch would be to cut the stones as they are wanted, forming each of them in such a manner 'that two of its opposite sides, or at least the middle parts of these sides, should be as nearly as possible at right angles both to the soffit and also to the direction of the passage over the bridge.' Those who wish for further information on this subject are referred to Nicholson's paper on the *Principles of Oblique Bridges*, presented to the British Association in 1838; the treatises of Messrs. Fox, Hart, and Buck on oblique bridges; and the article just quoted.

From Mr. Buck's treatise it appears that the difficulty of building skew-bridges increases with the obliquity of the angle from 90° to 45°, which is supposed to be the most hazardous angle for a semicircular arch; but that beyond that point, instead of increasing, it rather diminishes, to about 25°, which appears to be about the natural limit for a semi-cylindrical arch. Mr. Buck, whose experience renders his opinion highly valuable, considers that oblique arches of the elliptical form should not be attempted, as they are deficient in stability, more difficult to execute, and more expensive than semicircular or segmental arches.

The construction of skew-bridges of iron or timber is comparatively simple, the ribs or girders of which such bridges are composed being of the usual construction, laid parallel with each other, but the end of each being in advance of that next preceding it. *Fig.* 5 represents the ground-plan of such a bridge, the dotted lines indicating the situation of the ribs upon which the platform is supported. The extraordinary iron bridge by which the Manchester and Birmingham railway is conducted over Fairfield-street, Manchester, at an angle of only 24½°, is a fine example of this kind of skew-bridge. It consists of six ribs, of rather more than 128 feet span, although the width of the street is only 48 feet, resting upon very massive abutments of masonry. The total weight of iron in this bridge, which is considered to be one of the finest iron arches ever built, is 540 tons. It was erected from the design of Mr. Buck, who has constructed several other oblique bridges of great size and very acute angles. Timber bridges, formed of trussed ribs or girders, are built on the same principle. One of very great obliquity, on the Sechill railway, is represented in the second series of Brees's *Railway Practice*. A somewhat similar mode of constructing skew-bridges in brickwork has been introduced by Mr. Gibbs on the Croydon railway. The Jolly Sailor bridge, which crosses over this line near Norwood, consists of four separate ribs of brickwork, each forming an elliptical arch of 50 feet span, with a versed sine of 12 feet 6 inches, supporting a flat viaduct of Yorkshire flagstones. Each of these ribs, which are three feet wide on the transverse face, is built square, so that the brickwork is of the simplest kind; but by making the respective abutments project beyond each other according to the oblique direction of the railway, the ribs, taken collectively, form a skew-arch. In a bridge erected by Mr. Woodhouse on the line of the Midland Counties railway, the same principle is adopted, but the ribs are placed close together, so that no platform of flagstones is required.

Fig. 5.



SKIDDAW. [Cumberland.]

SKIMMER. [Rynchops.]

SKIN. The skin, or derma, is the outer covering of the body; and having to serve at once as a defence for the more deeply seated structures, as an organ of touch, and as an apparatus for secretion, it is one of the most compound of all the tissues.

It is composed of two chief parts:—a vascular basis named Cutis, and a superficial layer named Epidermis or Cuticle, which is not vascular. The cutis is made up for the most part of fibres and laminæ, like those of common cellular tissue. They are much more densely woven near the surface than in the deeper part of the skin: in the former they constitute a very tough and elastic compact membrane; in the latter they are arranged in irregular large cells, which in moderately stout persons are filled with fat, but in the emaciated are collapsed, and form a loose flocculent white tissue. This general form of structure prevails through the whole skin; but in different parts of the body, and still more in different persons, the density and thickness of its layers, the size of the cells, the quantity of fat which they contain in the deeper parts, and the fineness or coarseness of the tissue composing them, vary considerably.

The external surface of the skin presents a variety of wrinkles. The larger of these are produced by the action of muscles, which in many parts throw the skin into folds; others result from its loss of elasticity in old age, and the removal of the fat beneath it; and again others, which are seen most plainly on the palms and the balls of the fingers, and on the corresponding parts of the foot, run in very close parallel arches, and indicate the arrangement of subjacent rows of sensitive papillæ, with which the whole surface of the skin is beset, and which in the parts just named, and in some others, are arranged in regular double lines. In their most developed state, on the balls of the fingers for example, the papillæ are very fine conical processes, standing somewhat obliquely, and so densely set, that their summits form a seemingly smooth surface. On these parts each elevated line which one sees on the surface has beneath it two rows of papillæ; for when looked at closely, each such ridge shows on its summit a little furrow dotted with minute apertures, and which fits into the space between the rows of papillæ. Over the rest of the body the papillæ are much smaller, and are irregularly arranged. Everywhere however they are the most vascular part of the skin, each papilla receiving a distinct loop from the subjacent network of blood-vessels. It is in them also that the greater part of the very numerous nerves of the skin terminate; for though every part of the skin be sensitive, yet the papillæ are so in the highest degree, and are the chief instruments by which the sense of touch is exercised. [Senses; Nerve.] It is through their being so much developed, that the tips of the fingers are adapted for the perception of the finest impressions of the sense; though even they have less delicate perception than the tip of the tongue, on which similar but larger and more pointed papillæ are set.

The chief secretory apparatus of the skin consists of the perspiratory glands, which are disposed over its whole extent, but, like the papillæ, are largest and most numerous in the palms and soles. By looking on the surface of the cuticle covering these parts, one may see, especially on a warm day, or when perspiring freely, a number of minute orifices between and upon the tops of the arched ridges already described. These are the orifices of the glands by which the perspiration is secreted, and sometimes one may squeeze through them a drop of the clear crystal fluid which the glands produce. Each orifice leads to a fine tube of somewhat less diameter than itself, which passes down through the epidermis, and into the deeper parts of the skin, making on its way several spiral turns, and ending in a slightly enlarged closed sac. In the sole each such tube makes from 15 to 20 spiral turns; in the palm, from 6 to 10; in other parts, fewer: in the right hand the spiral turns are made from left to right; in the left, from right to left. There are about 25 of these orifices in a square line of the surface of the tip of the fore-finger; and about 75 in the same space between the bases of the fingers: taking therefore the whole superficies of the body at 14 square feet, it is probable that, as Eichhorn calculated, there are not less than ten millions of these glands scattered through the skin.

It is in them that the perspiration is being constantly formed, though it most generally passes away as fast as it is produced in an invisible vapour, and during health collects in the form of sweat only when it is very rapidly formed, as during active exercise, or when the surrounding atmosphere is already saturated with moisture. The fluid of the perspiration is composed of water, with very small quantities of animal and saline manner, some free lactic acid, nitrogen, and carbonic acid. By thus removing carbonic acid from the blood, the skin is, next to the lungs, the most important and essential excretory organ of the body; some recent experiments have proved that animals prevented from perspiring die of suffocation as certainly, though not so rapidly, as when their respiration is obstructed. The quantity of perspiration secreted amounts to about two pounds in 24 hours; but it is liable to considerable variations, according to the habits of the individual, the state of the atmosphere, the activity of other glands, such as the lungs and kidneys, and other circumstances.

Another secretion from the skin is that of the oily sebaceous matter by which its surface is always kept in a slight degree greasy, so that water adheres to it only in drops, and does not easily soak into the substance of the epidermis. The sebaceous glands by which this secretion is produced, as well as the hair-follicles on which they are almost always attendant, are already described. [Hair.]

The loss of fluid by these secretions from the skin is in some measure compensated by the absorption which it also exercises. It is uncertain how much, if any, of the vapour of the atmosphere around us is thus imbibed; but it is certain that the skin absorbs fluids placed for a short time in contact with it, and this so rapidly, that (especially after long fasting) a perceptible increase of weight is observed after a person has been immersed in a bath. The obstacle to a more constant and considerable absorption of fluid is the nearly impenetrable layer of epidermis; and hence the substances most rapidly absorbed are those which most easily pass through it, such as water, after having been imbibed into its deepest layers, vapours of sulphuretted hydrogen, hydrocyanic acid, &c., oils rubbed upon it, or corrosives which destroy its texture.

Besides its secretions, there are produced from the vessels of the skin materials of which are formed certain appendages for its protection and other purposes, such as the cuticle, the hair, and the nails.

The cuticle, or epidermis, is an insensible and non-vascular membrane, which is laid over the whole of the external surface of the body in a layer, the thickness of which is varied according to the protection required for the well-being of the subjacent cutis. The under surface, which lies next to the cutis, is accurately fitted into all its irregularities, and sends prolongations down into the interior of all its glands and follicles; the outer surface, which is exposed to friction, is comparatively smooth. The epidermis is composed of several layers of cells: of the two layers into which it may commonly in an ordinary dissection be split, the lower is called rete mucosum, or rete Malpighii; the upper and outer, more particularly, epidermis. In the deeper layers the epidermis is composed entirely of minute polygonal cells, adhering by their edges, and containing nuclei and a thin fluid; in the layers nearer the surface are cells of the same kind, but larger and flatter; and those on the very outer surface are dry and scale-like; they have lost almost all trace of form, and becoming loose, are removed by friction at exactly the same rate as, under ordinary circumstances, new cells are produced at the surface next the cutis. Thus the epidermis is subject to constant and rapid change: its cells, as fast as they dry and are removed in the form of scurf [Scurf] from its exterior, being replaced by new ones at its interior; and thus, whatever waste (within certain limits) it is subject to, its thickness is not diminished, but rather, as the waste is increased, so is its thickness, till it attains that degree which is competent to the protection of the subjacent cutis; as any one may see in the palms of his hands, soon after he has begun to occupy himself in a more than usually laborious handicraft.

The epidermis is the seat of the characteristic national colours of the skin, as well as of the colours of freckles and other superficial marks. In dark-complexioned races, especially in negroes, it is very thick, and its cells are filled with minute black or otherwise coloured pigment-granules, many of which also lie loose among them. The thickness of the epidermis in these tribes renders it less penetrable by the rays of heat; and it is hence (and not on account of its colour, which would have an opposite effect) that a negro can bear the exposure of his skin to a degree of solar heat which blisters that of a European.

The hairs are already described in a separate article. The nails are thin laminæ of horny tissue, produced by the cutis on the back of the ends of the fingers and toes. Under each of the more perfect of the nails, such as those of the fingers and the great toe, the cutis has a peculiar structure, called the matrix of the nail, composed of large sharply pointed and very vascular papillæ, which at the root are arranged irregularly, but at the body of the nail are placed in close-set rows or longitudinal ridges. By all this vascular surface the substance of the nail is produced in minute cells, which subsequently coalesce and form the dense, obscurely fibrous, and transparent mass of the body of the nail. The crescentic opaque part at the root of the nail owes its whiteness in part to its own substance, which in the deeper layers is softer and more opaque than in those of the body, and in part to the surface beneath it being less vascular than the rest.

The under surface of the nail is grooved or otherwise marked in correspondence with the matrix, to which it closely fits; the outer surface, exposed to friction, is comparatively smooth, though still it presents traces of the ridges in which, when it was at the under surface, it was formed; for the nails are produced in the same method as the cuticle; as fast as their exposed surfaces or their ends are worn away, they are replaced by layers growing from the matrix; and the whole mass of the nail, growing at once from below its body and from its root, is constantly pushed forwards and thickened, at the very same rate as its free extremity is cut or worn down, and its body thinned by friction.

SKINNER, STEPHEN, M.D., born 1623, died 1667, a skilful physician and a very learned philologist. He was born in London or the neighbourhood; studied in the University of Oxford, where he was a commoner of Christ Church; but the civil war coming on, he left Oxford without taking a degree, and travelled abroad, occasionally remaining some time at the foreign universities. In 1646 he returned to Oxford, and took the usual academical degrees; after which he again went abroad, living in France, Italy, Germany, and the Netherlands; frequenting the courts of princes and the halls of the universities, being highly esteemed both for his learning and his general deportment. He took the degree of M.D. at Heidelberg, and afterwards at Oxford, in 1656. He then settled at Lincoln, where he engaged in the practice of medicine with great success; but his career was short. In the beginning of autumn in 1667 febrile complaints were very prevalent in Lincolnshire, and he among others, was fatally attacked. He died on the 5th of September in that year, at the age of forty-four, to the great regret of his friends, to whom the innocence of his life and the cheerfulness of his disposition had endeared him.

His early decease was a great loss also to the world, for he was applying his vast stores of philological knowledge to the illustration of his native language; and had made no inconsiderable progress in a work which was designed to serve as an etymological dictionary of the language. This manuscript came after his death into the hands of Thomas Henshaw, Esq., of Kensington, who had a disposition to the same kind of studies, and who made additions to it. He also superintended the publication of it, which was effected in 1671, in a folio volume, under the title of 'Etymologicon Linguae Anglicanae.' Dr. Skinner's work has the great disadvantage of having been left unfinished by the author, who, it may be presumed, would have struck out, as well as added, as his knowledge advanced and the general principles of philology became more distinctly perceived by him, which would probably have been the case had he proceeded in his work. As it is, it is to be regarded rather as containing anecdotes of the language than as a systematic body of English etymologies; but it contains numerous valuable suggestions, and many later English etymologists have made use of his labours. The etymological part of Dr. Johnson's Dictionary is almost wholly derived from Skinner and Junius.

SKIPTON. [Yorkshire.]

SKIRRET. [Sium.]

SKODRE'. [Scutari.]

SKORODITE. *Cupreous Arseniate of Iron.* Occurs crystallised and massive. Primary form a right rhombic prism. Cleavage parallel to the primary planes, indistinct. Fracture uneven. Hardness, scratches carbonate of lime, and is scratched by fluor-spar. Rather brittle. Colour bluish-green of different degrees of intensity, also blackish-green, brown, and black. Streak white. Lustre vitreous. Transparent; translucent; opaque. Specific gravity 3·162 to 3·2

Massive varieties, globular, fibrous, radiating.

By the blow-pipe gives arsenical vapours, and fuses into a globule attracted by the magnet. Found in Cornwall, Saxony, near Huttenburg in Carinthia, Brazil, &c.

Analysis by—

Chenevix.		Ficinus.	
Arsenic Acid . .	33·5	Arsenious Acid . . .	31·40
Oxide of Iron . .	27·5	Protoxide of Iron . .	36·35
Oxide of Copper .	22·5	Protoxide of Manganese	4·00
Water	12	Sulphuric Acid . . .	1·54
Silex (matrix) .	3	Lime	2·00
		Magnesia	2·00
	98·5	Water	18·00
		Gangue	1·40
			96·59

It would appear that different substances have in this, as in other cases, been called by the same name. In one analysis we have arsenic and in the other arsenious acid; one contains no oxide of copper, and the other no oxide of manganese. A specimen examined by R. Phillips contained no copper.

SKOVORODÂ (known in the Ukraine under the name of Gregory Sawicz, or Gregory the son of Sava) was born about 1730, of poor parents, in a village near Kiew, where his father was subdeacon or parish clerk. He was admitted at the age of twelve years into the ecclesiastical academy of Kiew, in the capacity of a servant, but was soon allowed to attend the lectures there, in consideration of the talent which he showed. After obtaining the reputation of being the best classical scholar of the place, and in vain soliciting permission to go abroad, he set out on foot, without the knowledge of his superiors, for Pesth, where he commenced the study of the German language, and in six months was able to profit by the lectures. His account of these lectures however shows them to have been very inefficient, and moreover the fame of Wolf was then at its height and attracting students from every part of Germany to Halle. Skovorodâ went to Halle, where he devoted three years to metaphysical and theological studies; and that his country might profit by the advantages which he derived from foreign learning, he made at this time translations from the Homilies of St. Chrysostom, and composed moral fables which have been handed down orally by the inhabitants of the Ukraine, the surest possible test of their popularity. After four years he returned to Kiew, but was not re-admitted into the academy, nor appointed to any post in which his energies might find exercise. Upon this he applied himself to mitigate the persecutions of the United Greeks, concerning whom a few details are necessary.

This sect had arisen in Russia from a kind of politico-religious compact between the Holy See and the sovereign of Russia about the year 1610, for the purpose of reducing Russia under the papal dominion. In order to effect this, the two powers established a medium sect, partly Romanist, partly Greek: the pope sent Jesuits to teach the necessary doctrine; and the emperor Wladislaw, by a power over the consciences of his people which we can scarcely understand, imposed this body of doctrine as the creed of the provinces on the border of Russia and Poland, whose situation had already exposed them to the influences of both parties. The Unites (as the members of the Greek Church who acknowledge the supremacy of the pope are called in Russia) had already appeared in the north of Italy, in Illyria, and Croatia; but nowhere under similar circumstances. In Russia this sect became a sort of rallying-point for the members of both churches, teaching the Russians gradually to confound distinctions of doctrine, and so to think little of the purer faith and system handed down to them by their ancestors. It has existed to the present day, and so late as 1840 the emperor of Russia, by a dispensing power as strange as that which he exercised originally, decreed that the United Greeks should exist no more. But in the reign of Catherine II., under which Skovorodâ lived, the oppression of the inhabitants of the Ukraine (who had lost the privileges guaranteed to them by Peter the Great after the battle of Poltava) had so far spoiled their disposition, as to render them willing in their turn to oppress any one who was weak enough to fear them. The United Greeks, who had from the commencement of the sect lived under the protection of the throne, were selected as the objects of their persecution. The most rational way of checking these persecutions was to destroy the spirit which gave them birth. To this task Skovorodâ applied himself: in the mixed character of priest and minstrel, he proceeded from village to village through his native Ukraine, preaching the words of peace, singing the religious songs which he had composed for them, and inculcating the same truths under the attractive form of fables. Still he constantly refused to head the sect of the Unites, as his object was not to create or foster schism, but merely to give both parties the benefit of his lessons. By this time the influence which he had justly acquired had pleaded strongly in his favour, and the academy conferred on him the vicarage of his native village. In this station he prohibited all rigour against the persecuted Unites, and endeavoured to gain them over by his doctrines, which were enforced by an eloquence unequalled in the pulpit of South Russia. This at the same time gave an impulse to the clergy of the province, which however unhappily ceased with his death. Even when ordered by the synod, he refused to use the means of persecution, and his refusal led to his ejection from the cure which his exertions had so greatly benefited. His occupation being gone, he resolved to indulge a long-felt desire to visit Rome, the nurse of doctors and confessors, and to view her who, in his eyes, had been glorious as the queen of nations. But almost immediately on his arrival in that city he was recalled by the news of fresh persecutions at home; his works however show what an impression Christian rather than Pagan Rome had left on his mind. His return again checked the fury of the opposite parties; but his exertions, though successful, were only working out his own ruin. The jealousy of the court at St. Petersburg could not allow a single individual, in a cause however humane, to stand in the way of its views. He was considered as a rebel, and orders for his apprehension were issued, which he evaded by taking refuge at the country residence of a noble who had often pressed him to become tutor to his son. This sanctuary of feudal power could not be invaded even by the imperial authority, and he might still have lived in a diminished sphere of usefulness, but he died at the early age of forty-eight, and traditions say that he foretold his own death the day before it occurred, and dug his grave in the garden, unwilling to give this last trouble to the friends to whom he thought he had long enough been a burden.

He was the only author in Little Russia who has yet written in prose: his work called 'Symphonon' is a solitary instance of that kind of composition, and it has the advantage over the works written in Great Russia in being formed rather on the antient Greek model than on that of the Latin or German languages, a style of which Lomonossof was the founder. His translations have been already noticed. Some original essays in the Latin and Russian languages, which remain, show much good taste and elegance, with a great extent of reading, qualifications which were little known in his age or country. With the exception of the common songs of war and love, all traditional songs of the present day are attributed by the bandurists (the troubadours of the Ukraine) to Skovorodâ.

The object of this notice is to rescue from utter neglect the name of one who in his exertions resembled Felix Neff (whose name and character have become generally known through the memoir of the Rev. W. S. Gilly), but has still further claims on our notice as the founder of a national literature.

Further details, garnished with all the romantic circumstances with which tradition loves to invest its heroes, may be found in the 'Moskowski Telegraph.'

SKULL. [Skeleton.]

SKUNK. [Weasels.]

SKYE. [Hebrides.]

SKYLIGHT. Including under this term every mode of admitting light into an apartment through its roof or ceiling, we may here briefly notice that particular fashion of skylight distinguished in Gothic architecture by the name of Lantern, though lanterns in Gothic buildings were not so much intended to admit light, as to supply ventilation and the means of escape to smoke. Accordingly their sides were generally left unglazed or open, whence such lanterns were distinguished by the name of *Louvre* (*l'ouvert*); and though no longer required for its original purpose, after fireplaces were introduced, the lantern was still retained as a characteristic feature of the hall, not only in monastic and collegiate, but also in domestic architecture, when that apartment showed itself externally as a distinct portion of the building, being carried up as a small turret rising out of the ridge of the roof. The lantern over the hall of the Middle Temple, London, is an example. Lanterns of this kind appear to have been invariably polygonal in plan, octagonal or hexagonal, and had apertures or windows on all sides. But the term lantern is occasionally used in two other significations: it is applied to the lower part of a tower placed at the intersection of the transepts with the body of a church, which, being open below, forms a loftier portion of the interior, lighted by windows on each side; and again to an upper open story, that is, one entirely filled with windows, on the summit of a tower, and frequently forming a superstructure different in plan from the rest, as at Fotheringay Church, and that at Boston, Lincolnshire, in both which examples the lantern forms an octagon placed upon a square. The upper portion of the tower of St. Dunstan's, Fleet Street, London, may also be described as a lantern.

Of skylights however, properly so called (that is, which are nearly in the same plane as the general surface of the ceiling), or of lanterns intended to light the whole of an interior, without other windows in its side walls, no examples are to be met with in our antient architecture; not but that skylights might be, and probably in some cases have been, introduced into buildings in the Pointed style, without doing violence to its character, by merely perforating some of the compartments and tracery in a groined ceiling. As one instance at least of the kind, we may mention the conservatory that was at Carlton House, which had a roof of fan-tracery, designed after that of Henry VII.'s Chapel, the whole of which was perforated and filled in with glass; but as the ceiling itself was low, and three sides of the building consisted entirely of windows, it conveyed only an imperfect idea of the effect that might be produced in an interior of the kind, if lighted from above only, particularly if the perforated parts of the ceiling were filled in with stained glass.

Notwithstanding both the variety as to design and decoration of which skylights are susceptible, and the picturesque effect produced in an interior where the light falls in from above, so far from having been turned to account for architectural purposes, and studied as ornamental features, skylights have generally been considered and treated as mere shifts and expedients in building, excusable only when resorted to from necessity, and for inferior rooms situated where it was impossible to obtain side-windows. Hence scarcely anything on the subject, hardly the bare mention of skylights, is to be met with in architectural works. In Italian buildings such mode of lighting rooms is almost unknown, even where it recommends itself as being greatly preferable to that by side-windows, and in fact scarcely less than indispensable, as is the case with sculpture and picture galleries, staircases, and libraries; and though, as regards these last, it is not very material whether the light is admitted from the side of the room or from above, the second method is attended with this advantage, that it allows the bookcases to be continued on all sides of the room.

For rooms in general, the plan of lighting them from the ceiling would not be practicable; yet, where suitable opportunity offers, it should be adopted, not only for the sake of variety of effect, but also as affording great scope for ornamental design.

Scarcely anything of the kind occurs in Italian architecture, except it be in the form of a cupola over a central saloon. [Saloon.] Neither is the very best effect usually studied in Italian cupolas and domes, the light being generally admitted partly through small apertures in the concave of the dome itself, or through a mere lantern on its summit, and partly through upright windows in the tambour or cylindrical wall immediately beneath it; instead of being concentrated and diffused through a single large opening, as in the Pantheon at Rome, which, though professedly so much admired, has very rarely indeed been followed as a model by the architects of Italy. The same remark applies to their followers in other countries: so far from studiously availing themselves of opportunities of lighting interiors from above, and varying the means of accomplishing it according to the particular occasion or design, they have rather avoided everything of the kind. Even where it would seem the most direct mode of obtaining light, as in the case where a dome is introduced, the effect that might be so produced is more frequently than not quite neutralised, if not destroyed, by the chief light being derived from lateral windows. Of this we have an instance in St. Stephen's, Walbrook, which, whatever merit it may possess in regard to proportions, most assuredly does not exhibit the most refined taste, the small oval holes in the walls, serving as windows, being in fact so many blemishes in the design. In that and most other examples of the same kind the lantern is so narrow or small in diameter compared with the dome, that it seems as much intended to obstruct as to admit light, and applied rather with a view to external than to internal effect and utility,—as an architectural finish to the outside of the dome, than in order to light the inside of the building.

It seems indeed a strange kind of perverseness, that while lighting interiors entirely from above has been employed not only for picture and sculpture galleries, but also for concert-rooms, lecture-rooms, and other places intended to accommodate an auditory or congregation, it should hardly in any instance have been applied to churches, though by getting rid of apertures in the walls, noises and sounds from the street would be excluded. If the style of the building be Gothic, such mode of course becomes out of the question; for windows in the walls themselves are then essential, being not only characteristic features, but one chief source of decoration, while owing to their being divided by mullions into compartments, and more or less filled up with tracery, the glare of light is properly attempered. With regard to other styles, Grecian or Italian, the case is widely different: in them the windows are internally no better than so many gaps—mere glazed apertures, which, so far from contributing to decoration, have not even any kind of finishing bestowed upon them, neither architrave, mouldings, nor cornices.

The only instance that we are acquainted with of a church lighted entirely from above, without lateral windows, is that of St. Peter-le-Poor, Broad Street, London, which is a rotunda, covered by a cove, and a large circular lantern, whose tambour forms a sort of clerestory, consisting of a continuous series of arched windows, while the ceiling makes a very flat or slightly concave dome. In point of design this example is not particularly tasteful, but the principle deserves attention. Other ideas of a similar nature have occasionally been thrown out, though not carried to the same extent: the centre of the interior of St. Mary Woolnoth's is covered by a square clerestory lantern, having a large semicircular window on each of its sides,—a peculiarity probably forced upon the architect (Hawksmoor) on account of its being desirable to have no windows on the side towards Lombard Street, and it is only to be regretted that any were allowed on the opposite one, as the whole interior would have been materially improved by the omission of them. A more recent instance is that of Hanover Chapel, Regent Street, London, which has what may be conveniently distinguished by the term *lantern-dome*, viz. a dome where the light is admitted neither through a smaller lantern, or other aperture at its apex, nor through windows in a tambour beneath it, but by a series of windows or glazed panels in the lower part of the concave of the dome itself, similarly curved, and therefore narrower at top than below. Taken by itself, this is a very pleasing feature of the interior, but its effect is counteracted by the numerous windows on the sides, which, in addition to being mere plain openings in the walls, destroy all architectural repose, by the spotty cross-lights which they occasion. Under such circumstances, it is to be wished that the architect could not possibly obtain light except from above. Fortunately this is sometimes the case, if not in regard to churches, in other spacious apartments, where it has been turned to more or less account in the design, and the necessity of lighting them, if not immediately from the ceiling, at least through the upper part of the walls, has given rise to new ideas and novel architectural combinations. Soane was, we believe, almost the first who attempted to give importance and decorative character to skylights and *ceiling windows*, or windowed ceilings, as they may be termed, making them ornamental features in his interiors, varied in their design, and producing great diversity of striking effects, occasionally heightened by the light being transmitted through tinted glass, so as to diffuse a warm sunny glow over the apartment. The offices at the Bank of England afford many studies of the kind, while his own house (now the Soanean Museum) shows what he accomplished by a similar mode of treatment upon a very limited scale. It cannot be said that the taste which he otherwise displayed in internal architecture, even in those instances, was the most refined, for it was exceedingly unequal; yet many valuable hints may be derived from what he did in that way, and it seems to have had the good result of inducing others to render such method of lighting interiors highly effective and ornamental.

How very different that which is essentially the same mode in itself, becomes, according as it is treated, may be seen in two examples which resemble each other so nearly in some other respects, that the comparison between them becomes the more instructive, and the contrast the more striking. We have in London two narrow streets of shops, exclusively for foot passengers, covered in above, and consequently lighted through that covering; but while that termed the Burlington Arcade is no more than an ordinary skylight—just what may be seen in a workshop—continued from end to end of the building, the roof of the Lowther Arcade is formed into a series of arches and elegant pendentive domes, each of which terminates in an eye or circular skylight. Somewhat similar to this last, though less ornamental in design, is the roof of the Arcade or Gallery on the west side of the Italian Opera-house.

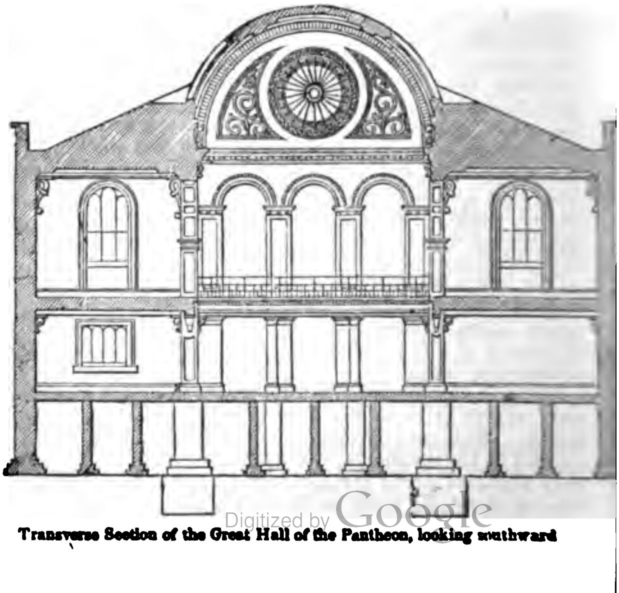
The simplest and most ordinary form of skylight consists merely of a sash or framing fixed into an aperture in a roof or ceiling, in a slanting direction, in order to throw off the rain, and either of one or more planes according to its size or other circumstances. If square in plan, a skylight of this sort is usually composed of four triangular surfaces, like a low pyramid; if oblong, of four sloping planes, after the manner of a *hipped* roof, with a ridge. Sometimes the whole of a room, or other area, is covered by a glazed ceiling of the kind, merely divided into such number of compartments or separate lights as its construction may require, as is the case with a portion of the Corn Exchange, Mark-lane. The effect however then becomes rather that of an open court than a covered hall or room, on which account, convenient as it may be in peculiar cases, it is not at all adapted for apartments generally which may otherwise require to be so lighted, and least of all for such as are intended to be chiefly used by night. Yet where the object is not to admit light into a ceiled room, but merely to exclude the weather from what must else be an uncovered court, such glazed roofs may very properly be applied; and it is rather strange there should be no intention of so covering in the area of the new Royal Exchange, and thereby protecting it from rain and damp.

To attempt to describe all the various forms of skylights and lanterns that have hitherto been employed, would require considerable research for examples of them, and also that plans and other delineations should be given of some of the more complex designs. Such a systematic and complete elucidation of the subject would form an interesting architectural volume. Here, on the contrary, we can merely advert to some of the principal varieties. Those more generally used for picture galleries, libraries, and other apartments of that class, are also the simplest in form, being lanterns, not like those in Gothic architecture, of narrow and straight proportions, but spacious and low, and occupying a considerable surface of the ceiling. The light is admitted through the sides of the lantern, which are mostly filled in with panes of glass, so as to form a window continued on every side, without other divisions than the bars in its frame-work. The sides of the lantern are made either vertical or sloping; by which latter method more light is obtained, the upper ceiling, or that of the lantern, being thereby reduced, as compared with the opening of the lantern itself. Therefore in such cases its sides may be curved, instead of being made merely sloping planes. The upper ceiling should be coffered, or otherwise ornamented in accordance with the lower one, and rather in a greater than in a less degree, both on account of its forming a compartment where decoration is looked for, and because the enrichments bestowed upon it display themselves to greater effect. Where, as will frequently happen, more than one lantern is required, the centre one may be larger, that is, longer than the others, and somewhat loftier also, besides being more or less distinguished from them in its decorations. If a room be coved and also lighted from above, the lantern may occupy the whole horizontal surface, so that its ceiling becomes in a manner that of the room.

Of other forms of lanterns and skylights in picture and sculpture rooms, examples are furnished by those at the British Museum, National Gallery, and Fitzwilliam Museum, Cambridge, some of which are double skylights, a smaller one being raised over the first one. In a small octagon room in the second building there is also an instance of a lantern dome above a square opening in the ceiling; which kind of contrast is the reverse of that shown in one of Soane's buildings, where a square lantern is seen through an oval opening beneath it. Among other novel contrivances, Soane occasionally introduced narrow skylights or glazed panels around the ceiling of a room, not for the purpose of lighting the whole of it, but of obtaining a strong light immediately on the upper part of the walls, and on pictures in that situation, an effect rendered the more striking in consequence of such openings being made above the general level of the ceiling, and therefore in some measure screened from view. At other times he occasionally placed a lantern immediately upon the walls of a room, that is, he carried up the latter above the roof, opening windows in it on every side, immediately below the ceiling.

Somewhat similar to, although also different in effect from, the mode just now pointed out, of admitting light through openings in the border of a ceiling, is that of obtaining it through the cove of a room, as has been done by Barry in the saloon of the Reform Club-house, where the whole of the cove is perforated, and filled in with small panes of cut glass, so as to produce a rich diapered surface throughout. Once adopted, the same idea may be varied in a great number of ways, by making separate apertures, for instance, in the cove, and filling them in with stained glass, so as to produce the effect of painted transparent panels, which effect might be rendered even still more striking by night than by day, by means of lamps or gas-burners placed outside. That the same mode of lighting at night might be applied in other cases is sufficiently obvious.

There are a variety of other modes of lighting rooms from their ceilings, which we have not yet mentioned, and some of which it would be difficult to describe intelligibly by words; we shall therefore merely notice one or two of them in general terms. Of an arched skylight ceiling, divided into compartments by intersecting ribs, an instance is furnished in one of the offices of the Bank of England, built a few years ago by Cockerell, and shown in the 'Companion to the Almanac,' for 1836. The roof of the Pantheon Bazaar, Oxford-street, on the contrary, though also arched, is treated altogether differently; for instead of being glazed along its centre, it has a series of sashes or glazed panels on each side, as shown in the small section of it here given



Transverse Section of the Great Hall of the Pantheon, looking southward

The Waterloo gallery or saloon at Windsor Castle has a lantern ceiling of unusual design, not so much on account of the style of decoration, as of its arrangement and the mode in which the light is admitted. The only other instance we shall add, and it deserves to be noticed for the novelty of the idea, is that of a skylight in a shop at Southampton, forming a dome raised upon four columns, square in its plan, and semicircular in section, and entirely filled in with stained glass of various colours, forming a mosaic pattern in the Alhambra style, executed, we believe, from designs by Mr. Owen Jones.

SKYROS (Σκύρος), an island in the Ægean, lying to the east of Phalasia in Negroponte, and to the west of Psara, but nearer to the former, in 39° 10′ N. lat. and 25° 12′ E. long. The earliest inhabitants were Pelasgians and Carians, according to Nicolaus, quoted by Stephanus Byzantinus (Σκύρος), and Dolopes (Thucyd., i. 98). Homer records the capture of it by Achilles (*Il.*, x. 664), who is said to have been discovered there disguised in female attire before the Trojan war. Theseus was sent into exile to this island, and was murdered by Lycomedes, its king, who became jealous of his popularity. (Pausan., iii. 6.) In 476 B.C. it was taken by Cimon, when the inhabitants were enslaved, and a colony was sent thither from Athens (Thucyd., i. 98), but not in consequence of the oracle which directed the removal of the bones of Theseus, as Pausanias asserts, for the delivery of the oracle and the disinterment did not take place till six or seven years after the capture. It afterwards passed out of the hands of the Athenians, but was restored to them by the peace of Antalcidas, B.C. 386. It was taken by Demetrius Poliorcetes, and again given to Athens, B.C. 196, in the treaty between Rome and Philip of Macedon. (Livy, xxxiii. 30.)

In the division of the Greek empire by Constantine Porphyrogennetus, Scyrus was placed in the Thema Ægæum Pelagus, and in the Synecdemus of Hierocles, in the Provincia Helladis Achaiæ. After the taking of Constantinople by the Latins, it was seized by Andrew and Jerome Gizi. It afterwards formed part of the duchy of Naxos, and finally of the Turkish empire. In 1823 the Skyriotes were among the islanders who renounced their allegiance to the Porte, and repulsed the troops sent against them with great slaughter. This island was however restored at the close of the Greek war to the Turks, by the protocol of 1829.

According to Dapper the bearings of Skyros are as follows:—Ten or eleven leagues to the north of Cap Mantelo, the south-east cape of Eubœa; on the east it is sixteen or eighteen leagues from Lesbos, and the same on the north-east from Lemnos; and on the north-west six or seven leagues from the island of Skopelo. Tournefort states the circumference at sixty miles. On the west side is a large bay, with several islands at the mouth. The harbour here is called Kalamitza by the Greeks, and by the Italians Gran Spiaggia. Opposite to this, on the other side of the island, is Port Akhili. The isthmus between these two points divides the island into two parts; the southern portion is uncultivated, full of high mountains, intersected by deep gullies, and rugged and bare, except at their summits, where they are covered with oak, fir, and beech.

Mount Cocyla, on the east coast, a little to the south of Port Akhili, is 2588 feet high, according to some authorities. At the southern extremity of the island is a port called Trimpouchais, a corruption of Tre Boche, or the three mouths. It is surrounded by wooded hills, and has three entrances, the one on each side being about one-third of a mile in width, and the middle one rather narrower. They are all safe and deep. There is about twenty fathoms water in the centre of the harbour.

The northern division of the island is less mountainous. The town of St. George, on the east coast, covers the north and west sides of a high rocky peak, which terminates abruptly on the sea. On the table summit of this hill are the ruins of a castle built during the middle ages, and many houses, all abandoned, which are used by the inhabitants to keep stores in. The houses of Skyros are flat-roofed, of two stories, the lower of stone, the upper of wood, surmounted by terraces covered with earth. This hill was the site of the antient Acropolis. The remains of Hellenic walls may be traced round the edge of the precipices, particularly at the north end of the castle, and others halfway down the peak, or among the modern houses. The greater part of the antient city lay to the east, near the sea. In this direction there is a large semicircular bastion almost entire. Thence the wall is continued along the slope above the sea as far as a round tower, half of which is still standing. Beyond this are the remains of another tower, and a wall from each connects the city with the sea, like the long walls of Athens and other antient cities. Tournefort (*Voyage du Levant*) makes mention of the ruins of a temple of Pallas near the town. This goddess was worshipped here, as appears from Statius (*Achill.*, i. 285).

In the neighbourhood of St. George is a plain four square miles in extent, which bears corn, grapes, and figs. There is another at Kalamitza, which is also fertile. On the steep ground in the north part of the island madder is grown. The wheat of Skyros equals in quality that of any island in the Ægean. Its productions are, 10,000 barrels of wine in a good vintage, three-fourths of which are exported; 15,000 kila of corn, 2000 of which are exported; 500 kanthars of fasulin; 2000 okes of wax; 8000 okes of honey; 100,000 oranges and lemons; and 400 kanthars of madder. There are a few oxen, and about 15,000 head of sheep and goats, of which 2000 are annually exported. The taxes are 20 purses, paid by 500 families living in St. George. There are three kaiks belonging to the island, and many feluccas built with the fir of the mountains. The oak timber is only used for firewood. (Leake's *Travels in Northern Greece.*) In 1813 Scyros had 12 ships, with an average tonnage of 100; average number of crews 12; of cannon 4. (Pouqueville, *Voyage dans la Grèce.*) The inhabitants are good seamen, and fond of the chase. They retain more antient customs than most of the islanders in the Archipelago, and are attached to the early Greek traditions. The memory of Achilles is still preserved in the name Akhili ('Αχιλλειον). Skyros was much celebrated among the antients for its red and white marble, which, as Strabo informs us, was used at Rome in preference to white marble. (Strabo, 437, Casaub.) There is a bishop, who resides in the deserted part of St. George. His see is dependent on that of Rhodes. Tournefort mentions two monasteries—St. George and St. Dimitri.

SLANDER consists in the malicious speaking of such words as render the party who speaks them in the hearing of others liable to an action at the suit of the party to whom they apply.

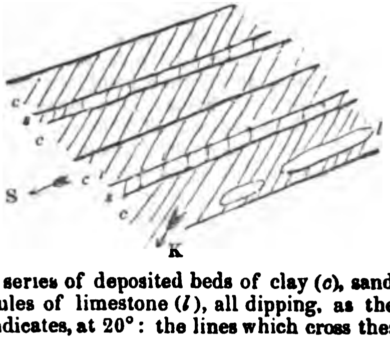
Slander is of two kinds: one, which is actionable, as necessarily importing some general damage to the party who is slandered; the other, which is only actionable where it has actually caused some special damage. The first kind includes all such words as impute to a party the commission of some crime or misdemeanour for which he might legally be convicted and suffer punishment, either by the general law, or by the custom of a particular place, as where one asserts that another has committed treason, or felony, or perjury, &c. It also includes such words spoken of a party, with reference to his office, profession, or trade, as impute to him malpractice, incompetence, or bankruptcy; as of a magistrate, that he is partial or corrupt; of a clergyman, that 'he preaches lies in the pulpit;' of a barrister, that 'he is a dunce, and will get nothing by the law;' of a physician, that 'he is an empiric, a mountebank;' of an attorney, that 'he hath no more law than a goose, bull,' &c., or that 'he is no more lawyer than the devil;' of a trader, that he has failed, or uses deceit in his trade, &c.; or that charge a party with having, at the time being, an infectious disease which prevents his having intercourse with others; or that tend to the disherison of a party, as where it is said of one who holds lands by descent, that he is illegitimate. Where a party is in possession of lands which he desires to sell, he may maintain an action against any one who slanders his title to the lands; as by stating that he is not the owner, or that another has a lease of the lands or is in possession of a mortgage or other incumbrance upon them. With respect to the second class of slander, the law will not allow damage to be inferred from words which are not in themselves actionable, even although the words are untrue and spoken maliciously. But if, in consequence of such words being so spoken, a party has actually sustained some injury, he may maintain an action of slander against the person who has uttered them. In such case the injury must be some certain actual loss, and it must also arise as a natural and lawful consequence of speaking the words. No unlawful act done by a third person, although he really was moved to do it by the words spoken, is such an injury as a party can recover for in this action. Thus, the loss of the society and entertainment of friends, of an appointment to some office, the breach of a marriage engagement caused by the slanderer's statement, are injuries for which a party may recover damages. But he can have no action because in consequence of such statement certain persons, to use an illustration of Lord Ellenborough's, 'have thrown him into a horse-pond by way of punishment for his supposed transgression.'

With respect to both kinds of slander, it is immaterial in what way the charge is conveyed, whether by direct statement, or obliquely, as by question, epithet, or exclamation. But the actual words used must be stated in the declaration, and upon the failure to prove them as stated, the plaintiff will be nonsuited at the trial: it is not sufficient to state the meaning and inference of the words. They will be interpreted in the sense in which they are commonly used, but where they are susceptible of two meanings, one innocent, the other defamatory, the innocent interpretation is to be preferred. Where words are equivocal either in their meaning or their application, a parenthetical explanation may be inserted in the declaration. This is called an innuendo. It may be employed to explain and define, but not to enlarge or alter, the meaning or application of the words spoken. The declaration must state the publication of the words, that is, that they were spoken in the hearing of others, and spoken maliciously. Two cannot join in bringing one action of slander, except in the case of husband and wife, or of partners for an injury done to their joint trade; nor can an action be brought against two, except a husband and wife, where slanderous words have been spoken by the wife. Where an action is brought for slanderous words spoken of a party relative to his office or profession, the declaration must state that he was at the time of speaking the words in possession of the office or engaged in the profession. And where the knowledge of extraneous facts is necessary to show the application of the slander, these should be stated in the introductory part of the declaration.

In answer to an action of slander the defendant may plead that the words spoken were true, or that they were spoken in the course of a trial in a court of justice, and were pertinent to the case; or formed the subject of a confidential communication, as where a party on application *bonâ fide* states what he believes to be true relative to the character of a servant, or makes known facts merely for the purpose of honestly warning another in whom he is interested. (Com., *Dig.*, 'Action on the case for Defamation,' D. 1, &c.)

SLANE. [MEATH.]

SLANEY, River. [WEXFORD.]



SLATE. By some geological writers the laminar structures which prevail in many stratified and in some metamorphic rocks are called slaty or schistose; but, in consequence of the progress of investigation, one of these structures, locally superinduced in deposited strata, which is characterized by planes of cleavage generally meeting those of deposition at considerable angles, is specially called the slaty structure. If, in the diagram below, *c*, *s*, *l*, represent in section a series of deposited beds of clay (*c*), sandstone (*s*), and nodules of limestone (*l*), all dipping, as the arrow S (south) indicates, at 20°: the lines which cross these beds at oblique angles, and are more highly inclined, as in the arrow K = 60°, are the edges of innumerable parallel planes of cleavage, which are continuous through the finely argillaceous beds *c*; more or less twisted in and about the limestone nodules *l*; more or less interrupted by the arenaceous beds *s*, or represented therein by lines more nearly rectangled to the plane of deposition. The law here indicated of the want of coincidence in the planes of cleavage and deposition is almost universally observed in nature. Nearly horizontal strata are crossed by inclined cleavage; highly inclined strata are traversed by nearly vertical cleavage. In strata which dip different ways from an axis or to an axis, the cleavage planes are sometimes found to be parallel throughout the mass on both sides of the axis; and even where strata are variously contorted, they are frequently dissected through a great part or the whole of their mass by cleavage planes passing in one direction. Hence the conclusion is obvious that this slaty structure, this monohedral symmetry (if we may not call it crystallization), is the fruit of a general cause acting subsequently to the deposition and disturbance of the strata, capable of pervading and rearranging the particles so as to polarize and systematize their mutual attractions, but not to fuse them together, destroy their original distinctness, or obliterate the evidence of their original condition. This force was so general, that along many miles of country, as, for example, in the whole Snowdonian chain, one particular direction (north-north-east), in North Devon and Pembrokeshire another (nearly east and west), is found to prevail more or less distinctly in all the rocks; though, as before observed, arenaceous and pebbly beds are least influenced by it, and limestones are unequally and variously affected.

This dependence of the slaty structure on the nature of the rock is sometimes very positively pronounced, as in some classes of rock the cleavage does change and even reverse its inclination where contortions prevail. (This is very observable in some cases of cleavage in the old red sandstone of Pembrokeshire.) On a first view it appears to be equally dependent on geological time, since it is principally among the older strata that it is well exhibited on a large scale; but on this head doubt arises, when we find the Silurian rocks, which are not slaty at Ludlow, become so near Llandovery; the old red-sandstone slaty in Pembrokeshire and not so in Monmouthshire; the mountain limestone shales slaty near Tenby and not so in Yorkshire; the lias shales slaty on the northern slopes of the Alps, but not so in England.

There are then *local conditions* which influence the development of slaty cleavage, and it is essential to a general solution of the problem which this structure involves, that these conditions should be determined. Proximity to rocks of igneous origin has been freely appealed to for this purpose; but this appears an insufficient and not often applicable cause. The most general condition which has occurred to our observation is the fact of remarkable displacement of the strata on one or more anticlinal or synclinal axes; and it is of consequence to this inference to remark that very often, approximately or even exactly, the horizontal edge ('strike') of the inclined cleavage planes coincides with the axis of movement (and therefore with the strike) of the stratification. *Pressure* in some peculiar application appears to us to be indicated by all the phenomena as the grand agent in the production of slaty cleavage. Only one tolerably successful effort has been made experimentally to reproduce this structure by art. Mr. R. W. Fox has caused electrical currents to traverse a mass of moist clay, and has observed in consequence the formation of numerous fissures, more or less similar to slaty cleavage, in planes parallel to the vertical bounding surfaces of the mass, and at right angles to the electrical currents. The exact application of this experiment is not understood. Perhaps however, conjoined with the admission that the great movements of strata, by which apparently slaty cleavage was determined, depended on disturbed equilibrium of internal heat, which might, or rather must, have developed electrical currents, this solitary experiment may be the commencement of a right mode of more extensive inquiry embracing the many circumstances of chemical nature, stratified arrangement, disturbed position, and proximity of igneous rocks, which must all be included in a good theory of slaty cleavage.

For economical purposes there appears little chance of obtaining in the British Islands good *slate* (properly so called) from any but the antient argillaceous strata superposed on mica schist and gneiss, and covered by old red-sandstone or mountain limestone. From these strata in Scotland, Cumberland, Westmoreland, Yorkshire, Charnwood Forest, North Wales abundantly, South Wales, Devonshire, Cornwall, the north and south of Ireland, slates of various value are dug. The thin flagstone of the coal formation in many parts of England and Wales, the laminated sandy limestone of Stonesfield, Collywiston, &c., which are often called slates, and are extensively used in roofing, are all obtained by natural partings parallel to the stratification. True slate is split by wedges from the apparently solid rock along planes often no more discoverable than those of a real crystal. In colour it is purple, blue, green, yellowish, or almost white, or striped across the planes. In some slates (west of Scotland, Ingleton, &c.) crystals of cubical iron pyrites are scattered. Much of the Cumberland slate appears full of fragments (Borrodale), and some contains chiastolite (Skiddaw).

SLAVE, SLAVERY. The word slavery has various acceptations, but its proper meaning seems to be the condition of an individual who is not master of his own actions, and who is also the property of another or others. Such was the condition of the 'servi,' or slaves among the Romans and Greeks; such is still that of the slaves in Eastern countries, and that of the negro slaves in many parts of Africa and America. A mitigated form of this condition exists in the case of the serfs in Russia and Poland, and of a similar class in India and some other parts of Asia. The Russian and Polish serf is bound to the soil on which he is born; he may be sold or let with it, but cannot be sold away from it without his consent; he is obliged to work three or four days in the week for his master, who allows him a piece of land, which he cultivates. He can marry, and his wife and children are under his authority till they are of age. He can bequeath his chattels and savings at his death. His life is protected by the law. The real slave, in the Greek and Roman times, had none of these advantages and securities, any more than the negro slave of our own times; he was bought and sold in the market, and was transferred at his owner's pleasure; he could acquire no property; all that he had was his master's; all the produce of his labour belonged to his master, who could inflict corporeal punishment upon him; he had no right of marrying; and if he cohabited with a woman, he could be separated from her and his children at any time, and the woman and children sold; he was, in short, in the same condition as any domesticated animal. The distinction therefore between the slave and the serf is essential. The villeins of the middle ages were a kind of serfs, but their condition seems to have varied considerably according to times and localities, and in many cases it appears to have been more advantageous. The villani or coloni were in a less dependent condition than the adscriptitii, or than the actual Russian and Polish serfs. This subject however is treated under VILLEINAGE. Servitude of every kind is now abolished in the greater part of Europe. In the present article we treat only of the real slave of antient and modern times.

Slavery, properly so called, appears to have been, from the earliest ages, the condition of a large proportion of mankind in almost every country, until times comparatively recent, when it has been gradually abolished by all Christian states, at least in Europe. The prevalence of domestic slavery constitutes one great difference between antient and modern society. Slavery existed among the Jews: it existed before Moses, in the time of the Patriarchs; and it existed, and still continues to exist, all over the East. The 'servants' mentioned in Scripture history were mostly unconditional and perpetual slaves: they were strangers, either taken prisoners in war or purchased from the neighbouring nations. They and their offspring were the property of their masters, who could sell them, and inflict upon them corporeal punishment, and even in some cases could put them to death. The three hundred and eighteen servants born in Abraham's own house (*Genesis*, xiv. 14) were of this description. But the Hebrews had also slaves of their own nation. These were men who sold themselves through poverty, or they were insolvent debtors, or men who had committed a theft, and had not the means of making restitution as required by the laws, which was to double the amount, and in some cases much more. (*Exodus*, xxii.) Not only the person of the debtor was liable to the claims of the creditor, but his right extended also to the debtor's wife and children. Moses regulated the condition of slavery. He drew a wide distinction between the alien slave and the native servant. The latter could not be a perpetual bondman, but might be redeemed; and if not redeemed, he became free on the completion of the seventh year of his servitude. Again, every fifty years the jubilee caused a general emancipation of all native servants. During the time of their servitude they were to be treated with kindness; 'for the children of Israel are servants unto me,' saith the Lord. 'Both thy bondmen and thy bondmaids which thou shalt have shall be of the heathen that are round about you, of them shall you buy bondmen and bondmaids. Moreover, of the children of the strangers that do sojourn among you, of them shall ye buy, and of their families that are with you which they begat in your land; and they shall be your possession. And ye shall take them as an inheritance for your children after you, to inherit them for a possession, they shall be your bondmen for ever; but over your brethren the children of Israel ye shall not rule one over another with rigour. And if a sojourner or stranger wax rich by thee, and thy brother that dwelleth by him wax poor, and sell himself unto the stranger or sojourner by thee, or to the stock of the stranger's family, after that he is sold he may be redeemed again, one of his brethren may redeem him......And if he be not redeemed in three years, then he shall go out in the year of the jubilee, both he and his children with him.' (*Leviticus*, xxv. 44-54.)

The sources of the supply of slaves have been the same both in antient and modern times. In antient times all prisoners were reduced to slavery, being either distributed among the officers and men of the conquering army, or sold by auction for the benefit of the troops. In very remote times, when the early Æolian and Ionian colonies settled in the islands of the Ægean Sea, or on the coast of Asia Minor, it was a frequent practice with them to kill all the adult males of the aboriginal population, and to keep the wives and children. As however dealing in slaves became a profitable trade, the vanquished, instead of being killed, were sold, and this was so far an improvement. Another source of slavery was the practice of kidnapping men and women, especially young persons, who were seized on the coast, or enticed on board by the crews of pirate vessels; and most vessels were piratical in the earlier ages. The Phœnicians, and the Etruscans or Tyrrhenians, had the character of being men-stealers; and also the Cretans, Cilicians, Rhodians, and other maritime states. Another source was, sale of men, either by themselves through poverty and distress, or by their relatives and superiors, as is done now by the petty African chiefs, who sell not only their prisoners, but often their own subjects, and even their children, to the slave-dealers. The sale of Joseph by his brethren to the Midianite or Arabian merchants, who sold him again in Egypt, is a proof of the antiquity of the practice.

The sequel also shows, that in Egypt, unlike most other countries of antiquity, the life of a slave was protected by law; for Joseph's master, when he had reason to believe him guilty of a heinous offence, did not put him to death, but sent him to prison, there to await his trial, and this inference is confirmed by Diodorus, who, in speaking of the laws of the Egyptians, says, that whoever murdered a man, whether free or slave, was punished with death.

Among the Greeks slavery existed from the heroic times, and the purchase and use of slaves are repeatedly mentioned by Homer. The household of Ulysses was served by slaves, over whom their master had power of life and death. The use of such domestics however was confined, in those early ages, to the houses of the great, who alone could afford the purchase money. As war and piracy became frequent, slaves taken or bought became more plentiful and cheaper, and they were chiefly employed in handicraft and household labours. The labours of husbandry were performed in some instances by poor freemen for hire, but in most places, especially in the Doric states, by a class of bondmen, the descendants of the older inhabitants of the country, resembling the serfs of the middle ages, who lived upon and cultivated the lands which the dominant or conquering race had appropriated to themselves; they paid a rent to the respective proprietors, whom they also attended in war. They could not be put to death without trial, nor be sold out of the country, nor separated from their families; they could acquire property, and were often richer than their masters. Such were the Clarotæ of Crete, the Penestæ of Thessaly Proper, and the Helots of Sparta, who must not be confounded with the Periœci, or country inhabitants of Laconica in general, who were political subjects of the Doric community of Sparta, without however being bondmen. [SPARTA.] In the colonies of the Dorians beyond the limits of Greece, the condition of the conquered natives was often more degraded than that of the bondmen of the parent states, because the former were not Greeks, but barbarians, and they were reduced to the condition of slaves. Such was the case of the Kallirioi or Kallikurioi of Syracuse, and of the native Bithynians at Byzantium. At Heraclea in Pontus, the Mariandyni submitted to the Greeks on condition that they should not be sold beyond the borders, and that they should pay a fixed tribute to the ruling race.

The Doric states of Greece had few purchased slaves, but Athens, Corinth, and other commercial states had a large number, who were mostly natives of barbarous countries, according to the Greek phraseology. The slave population in Attica has been variously estimated as to numbers, and it varied of course considerably at different periods, but it appears that in Athens, at least in the time of its greatest power, they were much more numerous than the freemen. [Athens.] From a fragment of Hyperides preserved by Suidas (*v. ἀπεψηφίσατο*), the number of slaves appears to have been at one time 150,000, who were employed in the fields and mines of Attica alone. Even the poorer citizens had a slave for their household affairs. The wealthier citizens had as many as fifty slaves to each family, and some had more. We read of philosophers keeping ten slaves. There were private slaves belonging to families, and public slaves belonging to the community or state. The latter were employed on board the fleet, in the docks and arsenal, and in the construction of public buildings and roads. Pausanias says that slaves were introduced for the first time among the land forces at the battle of Marathon; but this was, it seems, in the ranks of the Platæans, for the Athenians did not introduce them into their armies till a later period. At the sea fight of Arginusæ there were many slaves serving in the Athenian fleet, and they were emancipated after the battle. Again at Cheronæa the Athenians granted liberty to their slaves who served in the army.

Slaves were dealt with like any other property: they could be given as pledges; they worked either on their master's account or on their own, in which latter case they paid a certain sum to their master; or they were let out on hire as servants or workmen, or sent to serve in the navy of the state, the master receiving payment for their services. Mines were worked by slaves, some of whom belonged to the lessees of the mine, and the rest were hired from the great slave proprietors, to whom the latter paid a rent of so much a head, besides providing for the maintenance of the slave, which was no great matter. They worked in chains, and many of them died from the effect of the unwholesome atmosphere. Nicias the elder had 1000 slaves in the mines of Laurium; others had several hundreds, whom they let to the contractors for an obolus a day each. At one time the mining slaves of Attica murdered their guards, took possession of the fortifications of Sunium, and ravaged the surrounding country. (Fragment of Posidonius's Continuation of Polybius; see Boeckh's *Public Economy of Athens*, b. i.) The thirty-two or thirty-three iron-workers or sword-cutlers of Demosthenes annually produced a net profit of thirty minæ, their purchase value being 190 minæ; whilst his twenty chair-makers, whose value was estimated at 40 minæ, brought in a net profit of 12 minæ. (Demosthenes *Against Aphobus*, i.) The leather-workers of Timarchus brought in to their master each two oboli a day, and their foreman three. The master furnished the raw materials. The price of slaves at Athens varied from half a mina to five and ten minæ a head: a common mining slave, in the age of Demosthenes, cost from 125 to 150 drachmæ. The profits derived from slave labour must have been very high, as the owner had to replace his capital and to obtain the usual rate of interest for his money, which was a high rate, and the slave was only valuable so long as he had health and was able to work. There was also the danger of his running away, especially in war time. Antigenes of Rhodes was the first to establish an insurance for slaves. For a yearly contribution for each slave serving in the army he undertook to make good his price to the owner, in case of his running away.

The antients were so habituated to the sight of slavery, that none of the antient philosophers make any objection to its existence. Plato, in his 'Perfect State,' desires only that no Greeks should be made slaves. The only states of Greece in which no slaves appear to have been introduced were Locris and Phocis, probably by reason of the poverty of the people and the simplicity of their manners.

The Etruscans and other antient Italian nations had slaves, as is proved by those of Vulsinii revolting against their masters, and by the tradition that the Bruttii were runaway slaves of the Lucanians. The Campanians had both slaves and gladiators previous to the Roman conquest. But the Romans by their system of continual war caused an enormous influx of slaves into Italy, where the slave population at last superseded almost entirely that of the free labourers.

The Roman system of slavery had peculiarities which distinguished it from that of Greece. One distinction existed in principle. The Greeks considered slavery to be derived from the law of nature and from permanent diversities in the races of men. (Aristotle, *Polit.*, i.) The Romans admitted in principle that all men were originally free (*Instit.*, i., tit. ii.) by the law of nature (jure naturali), and they ascribed the rights of masters over their slaves entirely to the will of society, to the 'jus gentium,' if the slaves were captives taken in war, whom the conquerors, instead of killing them, as they might have done, spared for the purpose of selling them, or to the 'jus civile,' when a man of full age sold himself. It was a rule of Roman law that the offspring of a slave woman followed the condition of the mother. (*Inst.*, i., tit. 3.) Emancipation was much more frequent at Rome than in Greece: the emancipated slave became a freedman (libertus), but whether he became a Roman citizen, a Latinus, or a Dediticius, depended on circumstances. If the manumitted slave was above thirty years of age, if he was the Quiritarian property of his manumittor, and if he was manumitted in due form, he became a Roman citizen. At Athens, on the contrary, emancipation from the dominion of the master was seldom followed by the privileges of citizenship even to a limited extent, and these privileges could only be conferred by public authority. It is true, that at Rome, under the empire, from the enactment of the Lex Aelia Sentia, passed in the time of Augustus, there were restrictions, in point of number, upon the master's power of freeing his bondmen and raising them to the rank of Roman citizens; still in every age there was a prospect to the slave of being able to obtain his freedom.

The slaves of the Romans were called by the names of servi, servitia, mancipia, famuli, and, as being members of a familia, also familiares. A slave was often called 'puer,' which was sometimes contracted into 'por,' and added to the master's name, as 'Marcipor,' the slave of Marcus. Slaves were not considered members of the community: they had no rights, and were not legally considered as persons, but as things or chattels. They could neither sue nor be sued, and they could not claim the protection of the tribunes. When an alleged slave claimed his freedom on the plea of unjust detention, he was obliged to have a free protector to sue for him, until Justinian (*Code*, vii., tit. 1. 7, 'De adsertione tollenda') dispensed with that formality. Slaves had no connubium, that is, they could not contract a Roman marriage; their union with a person of their own rank was styled contubernium, and cohabitation with another person was not adultery; and even the Christian church for several centuries did not declare the validity and indissolubility of slave marriages. At last the emperor Basilius allowed slaves to marry and receive the blessing of the priest, and Alexius Comnenus renewed the permission. As slaves had no connubium, they had not the parental power (patria potestas) over their offspring, no ties of blood were recognised among them, except with respect to incest and parricide, which were considered as crimes by the law of nature. Though slaves were incapable of holding property, they were not incapacitated from acquiring property, but what they did acquire belonged to their masters. They were often allowed to enjoy property as their own, 'peculium,' consisting sometimes of other slaves, but they held it only by permission, and any legal proceedings connected with it could only be conducted in the name of the master, who was the only legal proprietor. No slave could hold a public office, and if a slave unknown to be such had obtained a responsible office, it was a question among the jurists whether his acts would be valid or null. Until the latter period of the republic, slaves and even freedmen were not admitted into the ranks of the army. In cases of urgent public danger, such as after the defeat of Cannæ, slaves were purchased by the state and sent to the army, and if they behaved well, they were emancipated. (Livy, xxii. 57, and xxiv. 14-16.)

Male slaves were not permitted by law to wear the toga and bulla, nor females the stola, but otherwise there was no fixed distinctive costume for them, and they were mostly dressed like poor freeman, who could not afford to wear the toga. A distinct dress for slaves had been proposed in the decline of the republic, but the proposition was rejected upon some senator adverting to the danger of showing the slaves how much superior in numbers they were to the freemen. Slaves were forbidden the use of horses, carriages, or litters (lecticæ) within the walls of the city

They were not however denied the rights of burial, and numerous inscriptions attest that monuments were often erected to the memory of deceased slaves by their masters, their fellows, or friends, some of which bear the letters D. M 'Diis Manibus,' for according to the Roman principle that slavery was not by nature, but was the effect of law, death was considered as putting an end to the legal distinction between slaves and masters, and the manes of a departed slave might be an object of reverence even to a freeman. Slaves were often buried in the family burying-place of their masters. The 'sepulchretum' or burial-vaults of the slaves and freedmen of Augustus and his wife Livia, discovered in 1726 near the Via Appia, and which has been illustrated by Bianchini and Gori, and another in the same neighbourhood also belonging to the household of the early Cæsars, and containing at least 3000 urns with numerous inscriptions, which have been illustrated by Fabretti, throw much light upon the condition and domestic habits of Roman slaves in the service of great families. [BIANCHINI, FRANCESCO.]

With regard to the classification and occupations of slaves, the first division was into public and private. Public slaves were those which belonged to the state or to public bodies, such as provinces, municipia, collegia, decuriæ, &c., or to the emperor in his sovereign capacity, and employed in public duties, and not attached to his household or private estate. Public slaves were either derived from the share of captives taken in war, which was reserved for the community or state, or were acquired by purchase and other civil process. Public slaves of an inferior description were engaged as rowers on board the fleet, or in the construction and repair of roads and national buildings. Those of a superior description were employed as keepers of public buildings, prisons, and other property of the state, or to attend magistrates, priests, and other public officers, as watchmen, lictors, executioners, watermen, scavengers, &c.

Private slaves were generally distributed into urban and rustic; the former served in the town houses, and the others in the country. Long lists of the different duties performed by slaves of each class are given by Pignorius, 'De Servis et eorum apud Veteres Ministeriis,' Amsterdam, 1674; Popma, 'De Operis Servorum,' ibid., 1672; and Blair, 'An Inquiry into the State of Slavery amongst the Romans,' Edinburgh, 1833, which is a very useful little book. It will be enough here to say, that for all the necessities of domestic life, agriculture, and handicraft, and for all the imaginable luxuries of a refined and licentious people, there was a corresponding denomination of slaves. Large sums were occasionally paid for slaves of certain peculiar kinds, some of which we should consider the least useful. Eunuchs were always very dear; the practice of emasculating boys was borrowed by the Romans from the Asiatics, among whom it was a trade as early as the time of Herodotus (viii. 105): it continued to the time of Domitian, who forbade it; but eunuchs continued to be imported from the East. A 'morio,' or fool, was sometimes sold for 20,000 nummi, or about 160 pounds. Dwarfs and giants were also in great request. Marc Antony paid for a pair of handsome youths 200 sestertia, or 1600 pounds. Martial (*Ep.*, iii. 62) mentions a single handsome youth who cost as much as those two. Actors and actresses and dancers sold very dear, as well as females of great personal attractions, who were likely to bring in great gains to their owners by prostitution. A good cook was valued at four talents, or 772 pounds. Medical men, grammarians, amanuenses, anagnostæ or readers, and shorthand-writers, were in considerable request. With regard to ordinary slaves, the price varied from fifty to twenty pounds, according to their abilities and other circumstances. The lowest legal valuation of a man slave in the time of Justinian was twenty solidi, or about sixteen pounds; and the value seems to have been about the same in the time of Horace (*Sat.*, ii. 7; v. 43). After a victorious campaign, when thousands of captives were sold at once on the spot for the purpose of prize-money, to the slave-dealers who followed the armies, the price sunk very low. Thus in the camp of Lucullus in Pontus slaves were sold for four drachmæ, or two shillings and sevenpence, a head; but the same slaves, if brought to the Roman market, fetched a much higher price. Home-born slaves, distinguished by the name of 'vernæ,' in contradistinction to 'servi empti,' or 'venales,' or imported slaves, were generally treated with greater indulgence by their masters in whose families they had been brought up; and for that very reason, when taken to market, bore an inferior value to the imported slaves, being considered as spoilt and troublesome. The number of slaves born in Roman families appears at all times to have been far inferior to that of the imported slaves. In general the propagation of slaves was not much encouraged by masters, many of whom considered slaves born at home to cost more than those who were imported. Ordinary female slaves were inferior in numbers to the males, and were generally cheaper in the market.

There was a brisk trade in slaves carried on from the coasts of Africa, the Euxine, Syria, and Asia Minor. The island of Delos was at one time a great mart for slaves, who were imported thither by the Cilician pirates. (Strabo, p. 668, Casaub.) The Illyrians procured numerous slaves for the Italian market, whom they bought or stole from the barbarous tribes in their neighbourhood. Thrace was the parent country of numerous slaves, and the selling of children by their parents was an antient practice among the Thracian tribes. (Herod., v. 6.) But the chief supply of slaves was derived from Asia and Africa. In most countries it was customary for indigent parents to sell their children to slave-dealers, and even Roman citizens at times sold themselves or their children through distress. Criminals were also in certain cases condemned to slavery, like the galley-slaves of our own times.

Both law and custom forbade prisoners taken in civil wars, especially in Italy, to be dealt with as slaves; and this was perhaps one reason of the wholesale massacres of captives by Sulla and the Triumviri. In the war between the party of Otho and Vitellius, Antonius, who commanded the army of the latter, having taken Cremona, ordered that none of the captives should be detained, upon which the soldiers began to kill those who were not privately ransomed by their friends.

In the latter period of the empire free-born persons of low condition were glad to secure a subsistence by labour on the estates of the great landowners, to which, after a continued residence for thirty years, they and their families became bound by a tacit agreement under the name of adscriptitii, or adscripti glebæ, and this was one of the sources of the servitude of the middle ages.

The customary allowance of food for a slave appears to have been four Roman bushels, 'modii,' of corn, mostly 'far,' per month for country slaves, and one Roman libra or pound daily for those in town. Salt and oil were occasionally allowed, as well as weak wine. Neither meat nor vegetables formed part of their regular allowance, but they got, according to seasons, fruit, such as figs, olives, apples, pears, &c. (Cato, Columella, and Varro.) Labourers and artizans in the country were shut up at night in a house ('ergastulum'), in which each slave appears to have had a separate cell. Males were kept apart from females, excepting those whom the master allowed to form 'contubernia' or temporary connections. Columella adverts to some distinction between the ergastulum for ordinary labourers and that for ill behaved slaves, which latter was in fact a prison, often under ground, but generally speaking the ergastula in the later times of the republic and under the empire appear to have been no better than prisons in which freemen were sometimes confined after being kidnapped. The men often worked in chains. The overseers of farms and herdsmen had separate cabins allotted to them. Slaves enjoyed relaxation from toil on certain festivities, such as the Saturnalia. [SATURNALIA.]

Every individual master had the power of manumitting his slave, and this he could effect in several forms, by Vindicta, Census, or by Testamentum. All slaves manumitted by a Roman citizen (subject to the conditions above mentioned) became Roman citizens and members of his gens, of which they took the name. They laboured however under several disabilities. They were enrolled in the lowest of the city tribes; they were ineligible to the consulship and other high offices; and they were not generally admitted into the best society. [LIBERTINUS.]

The number of slaves possessed by the wealthy Romans was enormous. Some individuals are said to have possessed 10,000 slaves. Scaurus possessed above 4000 domestic and as many rustic slaves. In the reign of Augustus, a freedman who had sustained great losses during the civil wars left 4116 slaves, besides other property

The Lex Aelia Sentia, as already mentioned, laid various restrictions on manumission. Among other things it prevented persons under twenty years of age from manumitting a slave except by the Vindicta, and with the approbation of the Consilium, which at Rome consisted of five senators and five Roman equites of legal age (puberes), and in the provinces consisted of twenty recuperatores, who were Roman citizens. (Gaius, i. 20, 38.) The Lex Aelia Sentia also made all manumissions void which were effected to cheat creditors or defraud patrons of their rights. The Lex Furia Caninia, which was passed about A.D. 7, limited the whole number of slaves who could be manumitted by testament to 100, and when a man had fewer than 500 slaves, it determined by a scale the number that he could manumit. This Lex only applied to manumission by testament. (Gaius, i. 42, &c.)

In the earlier ages of the Republic, slaves were not very numerous, and were chiefly employed in household offices or as operatives in the towns; and they were generally treated like members of the family, and joined their masters in offering prayers and sacrifices to the gods. (Horace, *Epist.*, ii. 1, 142.) But after the conquests of Rome spread beyond the limits of Italy, the influx of captives was so great, and their price fell so low, that they were looked upon as a cheap and easily renewed commodity, and treated as such. The condition of the Roman slave, generally speaking, became worse in the later ages of the republic than that of the slave at Athens. It is worthy of remark that many of the emperors, even some of the worst of them, interfered on behalf of the slave. Augustus established courts for the trial of slaves who were charged with serious offences, intending thus to supersede arbitrary punishment by the masters, but the law was not made obligatory upon the latter to bring their slaves before the courts, and was often evaded. The same emperor strongly reprobated Vedius Pollio, a Roman knight, for sentencing a slave to be thrown alive into a fish-pond to be devoured by lampreys, and he took the slave into his own household. By a law passed in the time of Claudius, a master who exposed his sick or infirm slaves forfeited all right over them in the event of their recovery. The Lex Petronia, probably passed in the time of Augustus, or in the reign of Nero, prohibited masters from compelling their slaves to fight with wild beasts, except with the consent of the judicial authorities, and on a sufficient case being made out against the slave. Domitian forbade the mutilation of slaves. Hadrian suppressed the ergastula, or private prisons for the confinement of slaves; he also restrained proprietors from selling their slaves to keepers of gladiators, or to brothel-keepers, except as a punishment, in which case the sanction of a judge (judex) was required. The same emperor banished a lady of rank for five years on account of her cruelty to her slaves. Antoninus Pius adopted an old law of the Athenians, by which the judge who should be satisfied of a slave being cruelly treated by his owner, had power to oblige the owner to sell him to some other person. The judge however was left entirely to his own discretion in determining what measure of harshness on the part of the owner should be a proper ground for judicial interposition. Septimius Severus forbade the forcible subjection of slaves to prostitution. The Christian emperors went further in protecting the persons of slaves. Constantine placed the wilful murder of a slave on a level with that of a freeman; and Justinian confirmed this law, including within its provisions cases of slaves who died under excessive punishment. Constantine made also two laws, both nearly in the same words, to prevent the forcible separation of the members of servile families by sale or partition of property. One of the laws, dated A.D. 334, was retained by Justinian in his code. The Church also powerfully interfered for the protection of slaves, by threatening excommunication against owners who put to death their slaves without the consent of the judge; and by affording asylum within sacred precincts to slaves from the anger of unmerciful masters. A law of Theodosius I. authorised a slave who had taken refuge in a church to call for the protection of the judge, that he might proceed unmolested to his tribunal in order that his case might be investigated. After Christianity became the predominant religion in the Roman world, it exercised in various ways a beneficial influence upon the condition of the slaves, without however interfering, at least for centuries, with the institution of slavery itself. Even the laws of the Christian emperors abolishing the master's power of life and death over his slave were long evaded. Salvianus (*De Gubernatione Dei*, iv.) informs us that in the provinces of Gaul, in the fifth century, masters still fancied that they had a right to put their slaves to death. Macrobius (*Saturn.*, i. 11) makes one of his interlocutors, though a heathen, expatiate with great eloquence on the cruel and unjust treatment of slaves. In Spain, in the early period of the Visigothic kings, the practice of putting slaves to death still existed, for in the 'Foro Judicum' (b. vi., tit. 5) it is said that as some cruel masters in the impetuosity of their pride put to death their slaves without reason, it is enacted that a public and regular trial shall take place previous to their condemnation. Several laws and ecclesiastical canons forbade the sale of Christians as slaves to Jews or Saracens and other unbelievers.

The northern tribes which invaded the Western empire had their own slaves, who were chiefly Slavonian captives, distinct from the slaves of the Romans or conquered inhabitants. In course of time however the various classes of slaves merged into one class, that of the 'adscripti glebæ,' or serfs of the middle ages, and the institution of Roman slavery in its unmitigated form became obliterated. The precise period of this change cannot be fixed; it took place at various times in different countries. Slaves were exported from Britain to the Continent in the Saxon period, and the young English slaves whom pope Gregory I. saw in the market at Rome were probably brought thither by slave-dealers. Giraldus Cambrensis, William of Malmsbury, and others accuse the Anglo-Saxons of selling their female servants and even their children to strangers, and especially to the Irish, and the practice continued even after the Norman conquest. In the canons of a council held at London, A.D. 1102, it is said, 'Let no one from henceforth presume to carry on that wicked traffic by which men in England have been hitherto sold like brute animals.' (Wilkin's *Concilia*, i., p. 383.)

But although the traffic in slaves ceased among the Christian nations of Europe, it continued to be carried on by the Venetians across the Mediterranean in the age of the Crusades. The Venetians supplied the markets of the Saracens with slaves purchased from the Slavonian tribes which bordered on the Adriatic. Besides, as personal slavery and the traffic in slaves continued in all Mohammedan countries, Christian captives taken by Mussulmans were sold in the markets of Asia and Northern Africa, and have continued to be sold till within our own times, when Christian slavery has been abolished in Barbary, Egypt, and the Ottoman empire, by the interference of the Christian powers, the emancipation of Greece, and the conquest of Algiers by the French.

With the discovery of America, a new description of slavery and slave-trade arose. Christian nations purchased heathen negroes for the purpose of employing them in the mines and plantations of the New World. It was found by experience that the natives of America were too weak and too indolent to undergo the hard work which their Spanish task-masters exacted of them, and that they died in great numbers. Las Casas, a Dominican, advocated with a persevering energy before the court of Spain the cause of the American aborigines, and reprobated the system of the 'repartimientos,' by which they were distributed in lots like cattle among their new masters. [CASAS, BARTHOLOME DE LAS.] But it was necessary for the settlements to be made profitable in order to satisfy the conquerors, and it was suggested that negroes from Africa, a more robust and active race than the American Indians, might be substituted for them. It was stated than an able-bodied negro could do as much work as four Indians. The Portuguese were at that time possessed of a great part of the coast of Africa, where they easily obtained by force or barter a considerable number of slaves. The trade in slaves among the nations of Africa had existed from time immemorial. It had been carried on in antient times: the Garamantes used to supply the slave-dealers of Carthage, Cyrene, and Egypt with black slaves which they brought from the interior. The demand for slaves by the Portuguese in the Atlantic harbours gave the trade a fresh direction. The petty chiefs of the interior made predatory incursions into each other's territories, and sold their captives, and sometimes their own subjects, to the European traders. The first negroes were imported by the Portuguese from Africa to the West Indies in 1503, and in 1511 Ferdinand the Catholic allowed a larger importation. These however were private and partial speculations; it is said that Cardinal Ximenes was opposed to the trade because he considered it unjust. Charles V. however being pressed on one side by the demand for labour in the American settlements, and on the other by Las Casas and others who pleaded the cause of the Indian natives, granted to one of his Flemish courtiers the exclusive privilege of importing 4000 blacks to the West Indies.

The Fleming sold his privilege for 25,000 ducats to some Genoese merchants, who organised a regular slave-trade between Africa and America. As the European settlements in America increased and extended, the demand for slaves also increased; and all European nations who had colonies in America shared in the slave-trade. The details of that trade, the sufferings of the slaves in their journey from the interior to the coast, and afterwards in their passage across the Atlantic—their treatment in America, which varied not only according to the disposition of their individual masters, but also according to different colonies, are matters of notoriety which have been amply discussed in every country of Europe during the last and present centuries. It is generally understood that the slaves of the Spaniards, especially in Continental America, were the best treated of all. But the negro slaves in general were exactly in the same condition as the Roman slaves of old, being saleable, transferable, pawnable, and punishable at the will of their owners. Restrictions however were gradually introduced by the law of the respective states, in order to protect the life of the negro slave against the caprice or brutality of his owner. In the British colonies, especially in the latter part of the last century and the beginning of the present, much was done by the legislature; courts were established to hear the complaints of the slaves, flogging of females was forbidden, the punishment of males was also limited within certain bounds, and the condition of the slave population was greatly ameliorated. Still the advocates of emancipation objected to the principle of slavery as being unjust and unchristian; and they also appealed to experience to show that a human being cannot be safely trusted solely to the mercy of another.

But long before they attempted to emancipate the slaves, the efforts of philanthropists were directed to abolish the slave traffic, which desolated Africa, wholly prevented the advance in civilization, and encouraged the maltreatment of the negroes in the colonies, by affording an unlimited supply, and making it not the planter's interest to keep up his stock in the natural way. The attention of mankind was first effectually awakened to the horrors of this trade by Thomas Clarkson. His labours, with the aid of the zealous men, chiefly Quakers, who early joined him, prepared the way for Mr. Wilberforce, who brought the subject before parliament in 1788, and although, after his notice, the motion, owing to his accidental illness, was first brought forward by Mr. Pitt, Mr. Wilberforce was throughout the great parliamentary leader in the cause, powerfully supported in the country by Thomas Clarkson and others, as Richard Phillips, George Harrison, William Allen, all of the Society of Friends, Mr. Stephen, who had been in the West Indies as a barrister, and Mr. Z. Macaulay, who had been governor of Sierra Leone, and had also resided in Jamaica. A bill was first carried (brought in by Sir W. Dolben) to regulate the trade until it could be abolished, and this in some degree diminished the horrors of the middle passage. But the question of abolition was repeatedly defeated, until 1804, when Mr. Wilberforce first carried the bill through the Commons; it was thrown out in the Lords, and next year it was again lost even in the Commons. Meanwhile the capture of the foreign colonies, especially the Dutch, during the war, frightfully increased the amount of the trade, by opening these settlements to British capital; and at one time the whole importation of slaves by British vessels amounted to nearly 60,000 yearly, of which about a third was for the supply of our old colonies. At length, in 1805 an order in council prohibited the slave-trade in the conquered colonies. Next year the administration of Lord Grenville and Mr. Fox carried a bill through, prohibiting British subjects from engaging in the trade for supplying either foreign settlements or the conquered colonies. A resolution moved by Mr. Fox, the last time he took any part in public debate, was also carried in 1806, pledging the Commons to a total abolition of the trade early next session, and this was, on Lord Grenville's motion, adopted by the Lords. Accordingly next year the General Abolition Bill was brought in by Lord Howick (afterwards Earl Grey), and being passed by both houses, received the royal assent on the 25th of March, 1807. This act prohibited slave-trading from and after the 1st of January, 1808; but as it only subjected offenders to pecuniary penalties, it was found that something more was required to put down a traffic the gains of which were so great as to cover all losses by capture. In 1810 the House of Commons, on the motion of Mr. Brougham, passed unanimously a resolution, pledging itself early next session effectually to prevent 'such daring violations of the law;' and he next year carried a bill making slave-trading felony, punishable with fourteen years' transportation, or imprisonment with hard labour. In 1824 the laws relating to the slave-trade were consolidated, and it was further declared to be piracy, and punishable capitally, if committed within the Admiralty jurisdiction. In 1837 this was changed to transportation for life, by the acts diminishing the number of capital punishments. Since the Felony Act of 1811, the British colonies have entirely ceased to have any concern in this traffic. If any British subjects have engaged in it, or any British capital has been embarked in it, the offence has been committed in the foreign trade.

The influence of Great Britain was strenuously exerted at the peace in 1814 and 1815, and afterwards at the congress of Aix-la-Chapelle, to obtain the concurrence of foreign powers in the abolition; and with success thus far, that all of them have passed laws prohibiting the traffic, and all, except the United States of North America, have agreed to the exercise of a mutual right of search, the only effectual means of putting it down. As the United States were the first to abolish the foreign trade by law, having passed their abolition act before ours, and as early as the constitution gave congress the power to do so, it is the more to be lamented that they should still refuse a right of search, which France herself has given, and should thus enable slave-traders to use their flag to a dreadful extent. The Duke of Wellington, while ambassador at Paris in 1814, used every effort to obtain from the restored government a prohibition of the traffic; but the West Indian interest, and commercial jealousy of England, frustrated all his attempts, and Napoleon, during the hundred days, on his return from Elba, first abolished the trade by law. The right of search has been most honourably granted by the revolutionary government of 1830. The History of the Abolition is to be found in the work under that title, by T. Clarkson (edition 1834), and the state of the law, as well as the treatment of slaves practically in the colonies, is most fully treated of in a work on that subject by Mr. Stephen. T. Clarkson's other works on the nature of the traffic, which first exposed it to the people of this country, were published in 1787.

The slave-trade was suppressed, but slavery continued to exist in the colonies. In 1834 the British parliament passed an act by which slavery was abolished in all British colonies, and twenty millions sterling were voted as compensation money to the owners. This act stands prominent in the history of our age. No other nation has imitated the example. Slavery exists in the French, Dutch, Spanish, and Portuguese colonies, and in the southern states of the North American Union. The new republics of Spanish America, generally speaking, emancipated their slaves at the time of the revolution. As the slave population in general does not maintain its numbers by natural increase, and as plantations in America are extended, there is a demand for a fresh annual importation of slaves from Africa, which are taken to Brazil, Cuba, Puerto Rico, Monte Video, and, it is said, clandestinely and circuitously, also to Texas. In a recent work, 'The African Slave-Trade and its Remedy,' by Sir T. Fowell Buxton (who, after Mr. Wilberforce's retirement, took a most active part in parliament on the subject of slavery), it is calculated, apparently on sufficient data, that not less than 150,000 negro slaves are annually imported from Africa into the above-mentioned countries, in contravention to the laws and the treaties existing between Great Britain and Spain and Portugal, the local authorities either winking at the practice or being unable to prevent it. But another appalling fact is, that since the slave-trade has been declared to be illegal, the sufferings of the slaves on their passage across the Atlantic have been greatly increased, owing to its being necessary for masters of slave-traders to conceal their cargoes by cooping up the negroes in a small compass, and avoiding the British cruizers; they are often thrown overboard in a chase. There is a considerable loss of life incident to the seizing of slaves by force in the hunting excursions after negroes, and in the wars between the chieftains of the interior for the purpose of making captives. There is a loss on their march to the sea-coast: the loss in the middle passage is reckoned on an average at one-fourth of the cargo; and, besides this, there is a further loss, after landing, in what is called the 'seasoning' of the slaves. At present the Portuguese and Brazilian flags are openly used, with the connivance of the authorities, for carrying on the slave-trade. The Spanish flag is also used, though less openly, and with greater caution, owing to the treaty between England and Spain which formally abolishes the slave-trade on the part of Spain. A mixed commission court of Spaniards and British exists at Havana to try slavers; but pretexts are never wanting to elude the provisions of the treaty. There seems indeed to be a great difficulty in obtaining the sincere co-operation of all the Christian powers to put down the slave-trade effectually, although it is certain that in all but the Portuguese and Spanish settlements the traffic has now almost entirely ceased.

Besides the slave-trade on the Atlantic, there is another periodical exportation of slaves by caravans from Soudan to the Barbary states and Egypt, the annual number of which is variously estimated at between twenty and thirty thousand. There is also a trade carried on by the subjects of the Imam of Muscat, who export slaves in Arab vessels from Zanzebar and other ports of the eastern coast of Africa, to Arabia, Persia, India, Java, and other places. In a despatch, dated Zanzebar, May, 1839, Captain Cogan estimates the slaves annually sold in that market to be no less than 50,000. The Portuguese also export slaves from their settlement on the Mozambique coast, to Goa, Diu, and their other Indian possessions.

By a law of the Korán, which however is not always observed in all Mohammedan countries, no Mussulman is allowed to enslave one of his own faith. The Moslem negro kingdoms of Soudan supply the slave-trade at the expense of their pagan subjects or neighbours, whom they sell to the Moorish traders. There is no likelihood that Mohammedan powers will ever suppress this trade of their own accord.

There is also a considerable internal slave-trade in the United States of North America. Negroes are purchased in Maryland and Virginia, and some other of the slave-holding states, and carried to the more fertile lands of Alabama, Louisiana, and other southern states.

It is maintained by some that the African slave-trade cannot be effectually put down by force, and that the only chance of its ultimate suppression is by civilizing central Africa, by encouraging agricultural industry and legitimate branches of commerce, and at the same time spreading education and Christianity; and also by giving the protection of the British flag to those negroes who would avail themselves of it. It is certain that if other countries will not exert themselves to enforce these laws, the abolition must be postponed to this remote period. The Africans sell men because they have no other means of procuring European commodities, and there seems no doubt that one result of the slave-trade is to keep central Africa in a state of barbarism. We refer for evidence of this, and of the nature of the traffic generally, to the numerous authorities quoted in Sir T. Buxton's book, and to the works of T. Clarkson, and Messrs. Wilberforce, J. Stephen, Brougham, and Macaulay.

The amount of the slave population now existing in America is not easily ascertained. By the census of 1835 Brazil contained 2,100,000 slaves. The slaves in Cuba, in 1826, were, according to Humboldt, about 260,000. In the United States, in 1830, the number of slaves was a little more than two millions. For more precise details we refer to the separate heads of each state, CAROLINA, GEORGIA, VIRGINIA, &c.

Societies for the ultimate and universal abolition of slavery exist in England, France, and the United States, and they publish their Reports; and a congress was held in London, June, 1840, of delegates from many countries to confer upon the means of effecting it. The American Society has formed a colony called Liberia, near Cape Mesurado, on the west coast of Africa, where negroes who have obtained their freedom in the United States are sent, if they are willing to go. The English government has a colony for a similar purpose at Sierra Leone, where negroes who have been seized on board slavers by English cruizers are settled. [SIERRA LEONE.]

SLAVONIA is a province of the Austrian dominions, which, though incorporated with the kingdom of Hungary, is still styled in official documents the kingdom of Slavonia. It is situated between 44° 50′ and 46° 12′ N. lat., and between 17° and 20° 40′ E. long. It is bounded on the west by Croatia, on the north and east by Hungary, and on the south by Turkey. It is separated from Hungary by the Drave and the Danube, from Turkey by the Save, and has the Illowa on part of the western frontier. It consists of two parts, the province of Slavonia, and the Slavonian part of the Military Frontier. The area of the whole is 6600 sq. miles, and the population is 598,800. The province has an area of 3570 square miles, divided into the three counties of Posega, Veröez, and Sirmium, with 348,000 inhabitants. A chain of high mountains coming from Croatia traverses the province. Where this chain enters the province the valleys are narrow, but they gradually become more open towards the middle of the province, and form near Posega a wide plain bounded by lofty mountains, which is called the Posega Valley; but at the eastern frontier of this county, the branches of the mountains again join in one principal chain, which covers all the northern part of the county of Sirmium. This chain is covered with vast forests. The highest points are 2800 feet above the surface of the three principal rivers. The remaining part of Slavonia consists partly of fertile eminences planted with vines and fruit-trees, and partly of beautiful and extensive plains. But as many tracts of land on the Save and Drave are very low, they are subject to be frequently overflowed, and there are several large and small pieces of stagnant water, and extensive marshes. Many of these are presumed to have been formed through neglect, and some have already been drained and cultivated. The country produces corn of all kinds, hemp, flax, tobacco, and great quantities of liquorice. There are whole forests of plum-trees: chesnut, almond, and fig-trees are likewise found, and the white mulberry abounds. Slavonia is rich in useful domestic animals. The horses are of a small race, and sheep are not numerous. Of wild animals, the bear, wolf, fox, pole-cat, and vulture are common. Swarms of troublesome insects are bred in the marshes, and a long continuance of southerly winds sometimes brings locusts from Turkey. The only minerals of which there are considerable quantities are sulphur, limestone, coal, salt, and iron. It may be said that there are no manufactures in Slavonia. The peasant makes all his farming implements—his cart, his plough, &c., and his wife and daughters weave the cloth and knit the stockings for the family. The anonymous author of the 'Geographical and Statistical Description of Hungary, Croatia, and Slavonia,' says that wheat yields 20-fold and sometimes 30-fold, and that one grain of maize yields 2000. In so fertile a country agriculture and the breeding of cattle are the most profitable occupations of the inhabitants. The culture of silk is flourishing. The quantity of wine produced is very large, especially in the county of Sirmium, where the vine was planted in the third century by the soldiers of the emperor Probus: about 560,000 eimer (the eimer is 10 gallons) are produced in one year in that county. The wines, both red and white, are very fiery, but will not keep long, and are therefore not fit for exportation. The export trade is confined almost entirely to the natural productions of the soil, such as corn, swine, and oxen to Austria; tobacco to Italy, France, and Belgium; spirits, distilled from plums, to Hungary, Turkey, and Germany; silk to Ofen; honey, wax, liquorice, gall-nuts, and raw hides to Austria and Italy; pipe-staves and wooden hoops are sent to Hungary; some salt and oil are also exported; and Peterwardein has a considerable trade in fruit.

Religion and Education.—The inhabitants are Roman Catholics and Non-united Greeks; the latter are the most numerous, in the proportion of about five to three. Till 1827, the law excluded Protestants from Slavonia, though it made an exception in favour of those who were settled in the country in 1791. There are now two flourishing Protestant communities in Old and New Panza, consisting of about 3500 persons; and a few Jews, mostly in Peterwardein, and about 300 in Semlin. There are about 30 Roman Catholic schools in the province, and as many in the Military Frontier; and two Roman Catholic gymnasia at Essek and Posega. The Non-united Greeks have an archbishop at Carlowitz, where there is a flourishing lyceum. There is likewise a clerical school at Carlowitz, and another at Pakratz. In the archbishopric there are above 260 national schools.

The earliest known inhabitants of Slavonia were the Scordisci; it was afterwards inhabited by the Pannonians, who were subdued by Augustus. The country was afterwards part of Pannonia Inferior, and was called Pannonia Savia. The emperor Probus, who was a native of Sirmium, did much to improve the cultivation of the country, and caused the first vines to be planted in the year 270. Subsequently, several portions of Slavonia were detached from the Byzantine empire; but Sirmium continued to belong to it, even when the whole country was a prey to the Avari. When the Avari were overpowered, in 796, by Pepin, the father of Charlemagne, the greater part of Pannonia Savia was a desert, and Charlemagne afterwards allowed a Slavonian tribe living in Dalmatia to settle in it. The first settlers were soon followed by others, and the Slavi (or Slavonians) soon became a numerous people, who in the time of the emperor Louis the Pious had their own prince, named Lindewit, subject however to the Franks. In 827 the Bulgarians invaded the country, but were repulsed by the Franks. The Slavonians had indeed been partially converted to Christianity on their first settling, but as they fell into gross ignorance for want of instruction, two brothers, Cyrillus and Methodius, went in 864 to visit the Slavonian tribes in the west, and to instruct them. In the tenth century, the Magyars, having conquered all Pannonia, afterwards subdued Slavonia also; Sirmium however still remained subject to the Byzantine empire, but by degrees became independent, and had its own princes. In 1019 it was again, for a short time, subject to Byzantium, and continued for many years the theatre of war between the Byzantines and the Hungarians; the latter ultimately got possession of it, till it was finally ceded to the Hungarians in 1165. In 1471 the Turks invaded Slavonia for the first time. In 1524 the whole country was conquered by the Turks, to whom the counties of Valpo, Posega, Veröez, and Sirmium were ceded in 1562, and erected by them into a distinct pashalik. It was recovered by the emperor Leopold I., and after having been for a long time the theatre of war, was ceded to Austria by the treaty of Carlowitz in 1699. The country having become almost a desert while under the Turks, numbers of Illyrians were settled in it. In 1690 and the following years the country was placed under a military administration; the inhabitants were exempted from taxes, but were bound to arm themselves, and be always ready for the defence of the country. This military administration was abolished in 1745, but in later times it has been again introduced under a better form, which is chiefly confined to the tract along the Turkish frontier.

The Slavonian Military Frontier (including what is called the district of the Czaikist Battalion, between the Danube and the Theis) has an area of 3030 square miles and 250,000 inhabitants, and is divided into the three regimental districts of Peterwardein, Brod, and Gradiska, and the Czaikist district. [ESSEK; MILITARY FRONTIER; PETERWARDEIN; SEMLIN.]

(*Oesterreichische National Encyclopedie; Statistisch-Geographische Beschreibung des Königreichs Ungarn, Croatien, und Slavonien;* Stein; Hassel; Hörschelmann.)

SLAVONIANS. The Slavonian or Slavic race, which now extends from the Elbe to the Pacific, and from the northern ocean to the frontiers of China, Persia, and the Mediterranean, comprehends about 70,000,000 inhabitants, divided into several nations, who speak various cognate dialects, and live within the dominions of Russia, Austria, Turkey, Prussia, and Saxony. The name 'Slavonian' is deduced from the word *slava*, 'glory,' or *slovo*, 'word.' The advocates of the first etymology support it by referring to the usual termination of Slavonian names in *slav*, such as *Stanislav*, 'establisher of glory;' *Vladislav*, 'ruler of glory;' and *Yaroslav*, 'furious for glory.' Others maintain that the name of Slavonians, which is often written *Slovenie* instead of *Sluvenie*, is derived from *slovo*, 'word,' and that the Slavonians being unable to understand the language of the nations with whom they came into contact, called them *Niemetz*, that is, 'mute,' an appellation which is given to the Germans in all the Slavonian dialects, whilst they called themselves Slovenie, that is, 'men endowed with the gift of the word.' The Byzantine writers changed the appellation of Slavonians into Sclaben or Sclav (*Σκλαβηνοί*, Procopius); and hence the appellation of Sclavonians, adopted by the western authors.

According to Jornandes, the first writer who mentions the Slavonians, they were formerly called Venedi; and Pliny (iv. 13) says that they lived about the banks of the Vistula. Ptolemy places them on the eastern shore of the Baltic, which he calls the Venedian Gulf. This is the oldest account that we have about the country inhabited by the Slavonians; but whence and when they came to these parts is unknown. Jornandes gives the following account of them:—'Dacia is secured by Alps (*i.e.* Carpathian), on whose left side, which from the source of the Vistula runs to the north through an immense extent, the nation of the Winidi have their settlements. Although their names vary in various tribes and places, they call themselves Slavonians and Antæ.' Jornandes also says that this nation was conquered, A.D. 376, by Hermanarik, king of the Goths; and he says in another place, 'These, as we have said, proceed from the same blood, and have three names, Venedi, Antæ, and Slavonians, who for our sins are now ravaging everywhere' (*i.e.* in the Roman empire).

The evidence of Jornandes proves that the Venedi, Antæ, and Sclavini or Slavonians were the same race, although they may have formed separate tribes or nations, as the Bohemians, Poles, and Russians of our days; and we may add that the Slavonians of Lusatia and Saxony are even now called Vendes by the Germans.

The Slavonians appeared on the borders of the empire about A.D. 527, and having invaded the Greek provinces committed terrible ravages. The Imperial legions were defeated by them, and the wall erected by the emperor Anastasius to arrest the savage tribes of the north was forced by the Slavonians, who devastated all the country from the Ionian Sea to the walls of Constantinople. They besieged the capital itself, and nobody dared to encounter them. Belisarius at last succeeded, more by presents than force, in removing this dangerous enemy from Constantinople. After that time they settled on the banks of the Danube, alternately ravaging the provinces of the empire or serving in its armies. The Slavonians were conquered in the sixth century by the Avari, with the exception of those who were settled on the Danube, and who, in the year 581, invaded the empire. The emperor Tiberius, who was occupied at that time with the Persian war, was unable to repel the Slavonians, and he induced the Khan of the Avari to attack them. The power of the Slavonians was destroyed, and they were obliged to submit to the Khan. After that time they served in the wars of their new master, and the Greeks experienced their desperate valour when the Avari besieged Constantinople in 629, on which occasion the Slavonians nearly carried the town.

The Slavonians who inhabited the vicinity of the Baltic remained free, while their brethren of the south were under the yoke of the Avari. This yoke was at last broken by the Slavonians of Bohemia, who rose against their oppressors, and defeated them under the command of a chieftain called Samo, who was chosen king by his grateful countrymen. The emancipation of the Slavonians from the dominion of the Avari was followed by an extension of their possessions. In the seventh century, having concluded an alliance with the emperors of Constantinople, they entered Illyria, and after having expelled the Avari, they founded new colonies under the name of Slavonia, Croatia, Servia, Bosnia, and Dalmatia. The Greek emperors favoured their settling in the Imperial provinces. In the seventh century there were Slavonian settlements on the river Strymon in Thrace, in the vicinity of Thessalonica, and in Moesia, or the modern Bulgaria. Many of them settled in the Peloponnesus, and a considerable number passed into Asia and settled in Bithynia and other provinces.*

From this time the Slavonians are no longer historically known under that general appellation, but they continued to take a prominent part in political affairs under the various denominations by which the nations belonging to that race are distinguished, as Poles, Russians, Bohemians, &c.

The customs, religion, and language of the Slavonian race are still characterised by a family likeness, which is preserved in the numerous nations which have sprung from the same stock, notwithstanding the modifications produced in the respective nations by local circumstances and historical events.

Procopius (*De Bello Goth.*, iii.) gives the following account of the Slavonians: 'The nations of the Slavonians and Antæ do not obey a single master, but live under a democratical government; therefore the gains and losses are common amongst them, and all other things go in the same way. They acknowledge as god and as the lord of all their nation the maker of the thunder, to whom they offer oxen and other sacrifices of every kind. They do not acknowledge fate, and do not even admit its influence on mortal men; and when they apprehend, in sickness or trouble, a speedy death, they vow to God some bloody sacrifice for their health or safety; and believe, when they come out of danger, that they did so in consequence of their vow. They worship also river-nymphs and some other divinities, to whom they offer sacrifices, making at the same time divinations. They live in miserable huts, standing isolated, and they change their settlements. In a battle many of them fight on foot, armed only with a small target and a lance. They do not wear any armour, and they have not even a shirt or a cloak; but they encounter the enemy only in breeches covering the secret parts. They all speak the same very barbarous language, and do not differ much in their exterior. Their complexion is not very white, and their hair is neither fair nor black, but dark. They lead, like the Massagetæ, a rude and wandering life, and they are always dirty. Their mind is neither malicious nor fraudulent, and they preserve, with the simplicity, the manners of the Huns in many things. Formerly the Slavonians and Antæ had the same name; both were called Spori, probably because they live in a scattered manner (sporaden) in isolated huts, and they occupy for that reason a large extent of country. They possess the greatest part of the farther banks of the Danube. According to some they feed their flocks wandering about.'

---

* At the same time Christianity began to spread among them. The sixth synod of Constantinople (A.D. 680) enumerates the Slavonians among the Christian nations.

This description shows that the Slavonians then lived in a state of barbarism. They were inured to every kind of fatigue and privation, and accustomed to all the expedients of a savage warfare. These qualities made them formidable enemies and invaluable allies to the Greeks. They were rapacious, like all savage tribes, but the cruelty with which they were taxed may be partly ascribed to the provocation of the Greeks, who frequently treated their vanquished enemies with great barbarity. But the Slavonians exhibited, notwithstanding their state of barbarism, virtues of the noblest kind, and a mildness of character unparalleled even among the civilised nations of that time. According to the emperor Mauritius, they treated their prisoners with great humanity, and instead of keeping them in servitude like other nations, they always fixed a limit to it, and gave them the choice of paying a ransom and returning to their country, or remaining with them as freemen and friends. A stranger was welcome among them, and hospitably entertained. The houseowner was answerable to all his nation for the safety of the stranger whom he had received; and he who had not preserved his guest from injury drew upon himself the vengeance of his neighbours.

The matrimonial fidelity of the Slavonian wives and husbands is extolled by foreign authors. The wives were complete slaves, as is generally the case amongst uncivilised nations: the widow was burnt on the same pile with her deceased husband, as it was disgraceful to survive him. It is also said that a Slavonian father might destroy a female child, when he was already overcharged with a large family, but he might not put a male child to death; and that the children might put their parents to death, when from old age and infirmity they were a burthen to them. Their chief occupation was agriculture. They seem to have possessed some knowledge of the arts, and they were exceedingly fond of music. The most antient musical instrument of the Slavonians is a kind of lyre called *gusla*, which is still preserved among some nations of their race.

Although the Slavonians who appeared on the borders of the Greek empire were rude and uncivilised, those who lived on the southern shores of the Baltic had towns and enjoyed the advantages of a considerable commerce. Their chief cities were Arcona, on the island of Rügen, which contained the most celebrated fane of their worship, and Vineta, at the mouth of the river Oder. Adam of Bremen, who wrote in 1067, and Helmold, state that all the Slavonians were idolaters, but that no nation was more hospitable and honest than they; that the original form of government was democratical, that the fathers of families had great authority over their wives and children, and that they met together occasionally to consult on the affairs of their community. With the progress of time, and probably also from the necessities created by their coming into contact with more civilised nations, the Slavonians introduced permanent authorities and chiefs. Aristocracies were formed, either by military leaders, or by the more wealthy and cunning persons, who succeeded in establishing an hereditary influence. Many Slavonian communities came under the rule of hereditary chiefs or sovereigns; others elected their chiefs for life; whilst many retained their primitive democratic form, somewhat modified by circumstances. The Slavonian chiefs were called Kral or Krol, which signifies king. Kniaz or Knez, is now employed for prince; Boyar, a warrior, from Boy, fight; Lekh, or noble; Voyevoda, *i.e.* leader of war, perhaps a more modern translation from the Saxon heretog, or German herzog; Pan, in Polish, lord; Zupan, the chief of a district, Zupa. All these dignities, whether hereditary or elective, by no means implied absolute authority, and the persons holding them were always subject to the popular will, which decided on public affairs in the assemblies, which were held in the open air, and called *Viecha* or *Vieche*, probably from the Slavonian word *vieshchat*, 'to proclaim.'

The religion of the antient Slavonians seems to have been different from that of the Teutonic nations. The latest account of the Slavonian idols and pagan rites is given by the German missionaries, who had an opportunity of observing the Slavonians of the Baltic coast, or at least derived information on that subject from eye-witnesses, as well as by some Scandinavian authors.

According to the above-mentioned authors, the Slavonians of the Baltic acknowledged two principles, one of good, and the other of evil. They called the former Biel Bog, or the 'white god,' from whom all that was good proceeded; and the second Cherni Bog, or 'black god,' who was the cause of all evil. This latter was represented in the form of a lion. The most celebrated Slavonian idol, whose temple was at Arcona, was Sviatovid, that is, 'holy sight.' He was held in great veneration by the Slavonians, and even the kings of Denmark, who then professed Christianity, frequently sent him offerings. This idol represented a man larger than life, dressed in a short garment made of many-coloured wood. He had two chests and four heads. He stood with his feet on the ground, held in one hand a bow, and in the other a horn, which was filled once every year on a solemn occasion with mead. Near the idol were placed, as belonging to him, a bridle and saddle, and a sword richly ornamented with silver. His festival was celebrated on a certain day after harvest, when the priest brought out to the assembled multitude the horn which the idol held in his hand, and from the decrease of the liquid poured into it the year before the result of the next harvest was prognosticated. The mead of the last year was poured at the idol's feet, and his horn was replenished, with appropriate ceremonies and prayers. The remainder of the day was spent in feasting; abstemiousness on that day was considered sinful, and the greatest excess in drinking and eating was accounted an act of devotion.

The Slavonians paid a tax to the temple of the idol, and gave him the third part of their booty. There were also three hundred horsemen belonging to the idol, who deposited in his temple all the spoils that they made. These different donations were employed to ornament the temple, or deposited in the treasury, which contained a great number of chests filled with coin, rich stuffs, and other precious things. There was a white horse consecrated to the same idol, which was led and mounted only by the priest. The Slavonians believed that Sviatovid occasionally rode upon this horse, in order to combat the enemies of their faith; and its moving with the right or left foot over lances placed on the ground, decided the most important undertakings. The temple of Sviatovid was destroyed in the twelfth century by Waldemar, king of Denmark. Some German chroniclers believe that Sviatovid was the same as St. Vitus, whom the Slavonians had adopted after having heard of his great miracles; but this is evidently an error founded on the similarity of names.*

There were also several other divinities worshipped by the Slavonian idolaters, such as Porenut, whose idol had four faces, and a fifth on his breast, supposed to have been the god of seasons, from the word *pora*, 'season;' Porevit, represented with five hands; Rughevit, supposed to be the god of war, whose idol had seven faces, seven swords suspended at his side, and an eighth in his hand. All these three were in the island of Rügen, the last asylum of Slavonian idolatry.

This account of the Slavonian deities is founded, as already observed, on the report of writers who had either seen the idols or derived their information from hearsay. The only genuine monuments of Slavonian idolatry which have reached our times are the idols dug up about the end of the seventeenth century in the village of Prillwitz, on the banks of the lake Tollens, in the territory of Mecklenburg. This village is supposed to occupy the site of the Slavonian town of Retra, which was destroyed by the Saxons in the middle of the twelfth century, and was celebrated in its time for its temples and idols. These archæological treasures remained unknown to the learned world till 1771, when Mr. Masch, chaplain of the duke of Mecklenburg, published a description of them with engravings. These antiquities were found in two metal vessels, supposed to have served for sacrifices, and which were so placed that one formed a cover to the other: they had engraved on them several inscriptions, but unfortunately they were both melted for the casting of a bell before they were examined by any person competent to judge of the inscriptions. The contents of these vessels were not only idols, but also several objects employed in the performance of sacrifices. They are all of brass, with more or less admixture of silver. The greatest part of them have inscriptions in Runic characters: one of them however, exhibiting the attributes of autumn, has the Greek inscription ΟΠΩΡΑ. The greater part of these idols have Slavonian names, such as Radegast, Cherni Bog, Zibag, &c. (Bog in Slavonian signifies God); several of them however have Lithuanian names, and must belong to the Lithuanian and Prussian idolaters, who probably sought refuge among the Slavonians from their common enemies the Christians. Both Slavonian and Lithuanian idols correspond to the descriptions given of them by the old chroniclers. The Slavonian divinities usually have more than one head: many of them have on some part of their body either a human face, signifying the good principle, or a lion's head, denoting the evil principle. Many have also the figure of a beetle on them, which might denote an Egyptian origin. They are in general only a few inches long.

---

* The most detailed account of Sviatovid and his worship is given by Saxo Grammaticus.

The chief Slavonian divinities represented by these idols are Radegast, having the head of a lion, surmounted by a bird; Woda, represented as a warrior, perhaps the Scandinavian Odin, &c.

These monuments of Slavonian idolatry present a wide field for investigation, and they prove that the nation with whose religious worship they are connected was not a stranger to the arts. It is difficult to ascertain whether the divinities of Lithuanian and Scandinavian origin, which were foreign to the Slavonians, were adopted by them, or only found an asylum with their worshippers when expelled from their countries by the progress of Christianity.

The eastern Slavonians worshipped Perun, or the god of thunder; Volos, the god of the flocks; Koleda, the god of festivals, whose festival was celebrated on the 24th of December, and it is remarkable that the common people in many parts of Poland and Russia on that account even now call Christmas, Koleda; Kupala, the god of the fruits of the earth, received sacrifices on the 23rd of June, and in many parts of Russia and Poland, St. John, whose festival falls on the same day, is called John Kupala. Dittmar, a German writer, pretends that the pagan Slavonians did not believe in the immortality of the soul; but this statement is sufficiently refuted by several customs and ceremonies which they observed for the repose of the dead.

In the ninth century the Slavonians occupied a large part of Eastern Europe. They extended from the Black Sea along the Danube and to the westward of that river on the shore of the Adriatic, occupying the antient Roman provinces of Pannonia, Dacia, Illyricum, and Dalmatia. The Slavonian settlements reached from the northern part of the Adriatic bordering on the Tyrol and Bavaria to the upper part of the Elbe, and they occupied the country between that river and the Saal, as well as all the right bank of the Elbe, extending over the southern shore of the Baltic from Jutland to the mouths of the Vistula. From the Vistula (with the exception of the coast of the Baltic inhabited by another race) the Slavonians spread over all the country between that river and the Danube. Thus they possessed the countries which now constitute the greater part of the Austrian dominions, Hungary, the provinces bordering on Italy and the Tyrol, Bohemia and Moravia, a great part of Saxony, the March of Brandenburg, Silesia, Pomerania, and the island of Rügen, to which must be added the territory which constituted antient Poland, and a great part of the present Russian empire.

The Slavonian population of Pomerania, Mecklenburg, the island of Rügen, the March of Brandenburg, and of Saxony, on the left bank of the Elbe, was either exterminated or so completely Germanised, that the language of their country is completely superseded by the German; but there are traces of this language being used in official documents in the country about Leipzig as late as the beginning of the fourteenth century. The names of many towns and villages situated in those parts of Germany are evidently of Slavonian origin.

The following are the Slavonian nations now in existence:—

1. The Bohemians and Moravians, who inhabit Bohemia and Moravia, and are scattered in some parts of Hungary and Silesia.

2. The Poles, who inhabit the territory of antient Poland, Silesia, and Prussia.

3. The Muscovites or Great Russians, who have a considerable admixture of Finnish blood, and have become somewhat orientalised by the dominion of the Tartars in Russia. They inhabit the north-eastern provinces of Russia in Europe.

4. The Russians, who are quite distinct from the Great Russians or Muscovites, are divided into Little Russians, who inhabit the antient Polish provinces of the Ukraine, Podolia, and Volhynia, now incorporated with Russia, a part of the kingdom of Poland, Gallicia or Austrian Poland, and some parts of Northern Hungary; and White Russians, who inhabit a part of Lithuania, and chiefly the provinces of Mohilof and Witepsk, which were acquired by Russia at the first dismemberment of Poland, in 1772, as well as a part of the government of Smolensk.

5. The Slovacks, who inhabit the north of Hungary.

6. The Croats, who inhabit the south-west of Hungary.

7. The Illyrians, who inhabit the Austrian provinces of Carinthia, Carniola, and Dalmatia.

8. The Servians, who inhabit Servia, to whom may be added the Montenegrins.

9. The Bulgarians and Bosnians in Turkey, of whom a part have embraced Mohammedanism, while others profess the Christian religion according to the Eastern church.

10. The Syrbes or Wends, who inhabit Lusatia, and whose settlements are about 25 miles from Dresden.

Slavonian Tongue.—It has been observed that Procopius, who described the Slavonians in the fifth century, says that they and the Antæ used the same language, and a similar opinion is expressed about the Slavonians of the eighth century, by Eginhard, the historian of Charlemagne. It is however impossible to admit the perfect universality of the same language among a race composed of so many tribes, and occupying such a vast extent of country. The evidence of the writers above mentioned, who have not transmitted to us any monument of the Slavonian language, and probably did not understand it, cannot be admitted as conclusive, except to prove that all the Slavonians, who were divided into various tribes or nations, could easily understand each other. The truth of this fact cannot be doubted; for notwithstanding the lapse of ages, during which many Slavonian nations have remained completely isolated from several of their kindred populations, and have lived in constant intercourse with nations of an entirely foreign race, their respective dialects preserve a strong similarity, so that a Slavonian inhabiting the shores of the Frozen Sea may frequently understand the language of those who live on the coasts of the Adriatic. This fact is moreover corroborated by the circumstance that the monuments of the different Slavonian languages, though written several centuries ago, exhibit a much greater similarity among themselves than is the case with those languages in our time. We may therefore conclude that at some unrecorded period all the Slavonian race had the same tongue, which began to split into different dialects at the same time when the race, increasing in numbers, began to divide into various tribes; and that the differences among those dialects grew in the same proportion as the surrounding tribes who spoke them became more estranged from each other by physical, political, and religious causes. The Slavonian tongue is generally considered to have an Indian origin, and this supposition is founded on the great number of Sanscrit roots which it contains, as well as on some traces of a similar origin exhibited in the religion of the antient Slavonians, of which the most striking circumstances are the burning of widows on the funeral pile of their deceased husbands, the idol of Sviatovid, represented with four heads, and other resemblances of a like kind. The most antient written Slavonian language is that into which Cyrillus and Methodius translated the Scriptures in the ninth century, and which must have been the dialect of the Slavonians who inhabited the banks of the Danube, for whom this translation was made from the Septuagint, and for which an alphabet, formed on the model of the Greek one, was introduced by the translators.

Although the above-mentioned alphabet was adopted for the translation of the Scriptures, it is impossible to admit that the Slavonians were, previously to their conversion to Christianity, totally unacquainted with the use of letters, and indeed the Bohemian chronicles speak of legislative tables (deski pravodatne) in the seventh century. (Palatzky, *Geschichte von Böhmen*, vol. i., p. 182.) The antient Slavonian name for a wizard (*czarnoknijnik*), signifying one occupied with black books, leads to the supposition that the antient Slavonian conjurors made use of certain writings in performing their incantations. Martinus Gallus speaks of Polish chronicles previous to the introduction of Christianity, which were destroyed by Christian missionaries. Dithmar of Merseburg, who wrote in the eleventh century, positively states that the Slavonian idols had inscriptions on them, a statement fully confirmed by the discovery of the monuments of the antient Slavonian worship found at Prillwitz. It is true that the above-mentioned inscriptions were Runes borrowed from the Scandinavians, and one of them was Greek, which may lead to the conclusion that the Slavonians employed foreign characters, but they tend to show that they were not strangers to the art of writing.

The conversion of the south-eastern Slavonians by Greek missionaries was a circumstance highly favourable to their national language, as the Eastern church left to the newly converted nations the use of the vernacular tongue in the performance of divine service, instead of introducing the Latin, as was the case with the Western church. The conversion of the majority of the Slavonians was effected principally by the exertions of Cyrillus and Methodius. As early as the seventh century a great number of Slavonians has been converted to Christianity, and were followers of the Eastern church. This seems to have been particularly the case with those who had settled within the confines of the Greek empire, whilst those who lived beyond its borders remained either in a complete state of idolatry or exhibited only some individual conversions. Among the Slavonian states of that time, the most important was that of Grand Moravia, which must however not be confounded with the province that now bears this name: it extended over part of Hungary and some adjacent countries, and it was converted, though it appears rather nominally than really, about the beginning of the ninth century, by the missionaries of the West; for the Papal records prove that Moravia about 820-830 was under the spiritual authority of the archbishop of Passau. Nestor, a monk of Kief, one of the oldest Slavonian chroniclers, says that the princes of Moravia sent, about 863, a message to the Greek emperor Michael, stating that their country was baptised, but that they had no teachers to instruct the people and to translate for them the sacred books, and accordingly they requested him to send them men capable of performing such a task. The emperor complied with their request, and sent them the two brothers named Cyrillus and Methodius, natives of Thessalonica, who were distinguished by their learning as well as piety, and possessed a thorough knowledge of the Slavonian tongue.

The missionaries, having arrived in Moravia, translated the Scriptures, or at least a part of them, into the Slavonian tongue of the country; they also invented the letters, which, being called the Cyrillic alphabet, are still used, with some few variations, by the Slavonians who follow the tenets of the Eastern church, who also employ in the performance of divine service the same Slavonian idiom into which the Scriptures were translated, and which is now become the sacred tongue of those nations. Cyrillus and Methodius, having completed the translation, established the worship in the vernacular language, founded schools, and organised everything necessary for the promotion of the Christian religion. They extended their labours beyond the frontiers of Moravia, and converted Bohemia, A.D. 873. It is even supposed that they visited Poland, and there can scarcely be a doubt that their disciples were active in that country.

The apostolical labours of Cyrillus and Methodius took place during the time of those disputes between the patriarch of Constantinople and the pope of Rome which led to the final separation of the Eastern from the Western church. Among many causes of dispute, the dominion over the newly converted Slavonian nations formed an important subject of contention between Rome and Constantinople. Cyrillus and Methodius, although they introduced among their new converts the rites of the Eastern church, and the worship in the vernacular tongue, acknowledged the supremacy of the pope, and not that of the Greek patriarch, as is evident from the approbation of their proceedings, which they sought and obtained from pope John VIII., before whom they were accused of deviating from the line of conduct followed by Roman missionaries in the conversion of pagan nations.

The confirmation granted by pope John VIII. to the national mode of worship introduced by Cyrillus and Methodius, was rather a concession extorted by circumstances, and particularly by apprehension lest the missionaries, in case of refusal, should transfer their obedience from Rome to Constantinople, than a real approbation of the use of the vernacular language in the divine service, a principle considered by the Western church as prejudicial to its polity, the object of which is not only unity of dogma, but also uniformity of ritual; and indeed although some successors of John VIII. assented to the Slavonian mode of worship, they constantly endeavoured to abolish it, or at least to limit its use. This tendency became much stronger when the final separation between the Eastern and the Western churches removed the reasons which the latter had for conciliating the nations that were wavering between the two churches. Rome declared an unrelenting hostility against every ritual which deviated from that which it had established, and the council of Salona, held in 1060, proclaimed Cyrillus a heretic, and his alphabet a diabolical invention. The kingdom of Grand Moravia was destroyed by the pagan Hungarians about the middle of the tenth century, and the Slavonian population either fled to other countries inhabited by their own race, or remained under the yoke of their conquerors, who, having embraced Christianity from the Western church, promoted the papal views as to the Slavonian worship. In Bohemia the same worship struggled for some time against the Roman ritual, till its last stronghold, the convent of Sazava, was abolished in 1094, and the Slavonian books were destroyed by the zealous promoters of the Roman ritual. In Poland, where Christianity was established in 966 by Bohemian priests, when the national mode of worship was still prevailing in that country, and where Christianity had partly penetrated, even before its final triumph, from Moravia and Greece, the same mode of worship struggled for some time against the Roman ritual, and seems to have been continued in some parts as late as the fourteenth century.

The Slavonian service and the use of the Cyrillic letters, which were completely superseded by the Latin worship and letters among the Slavonians who followed the Western church, remained in full vigour among those who belonged to the Eastern church. This was the case with the Servians and other Slavonians of the Danube, the population of Muscovy, and of many provinces of Lithuania and Poland And it is moreover used by the Wallachians, who inhabit Moldavia, Wallachia, and several parts of Hungary, although their language is derived from the Latin and has only a slight admixture of the Slavonic. Several Slavonian nations, which had originally followed the Eastern church, but submitted to the supremacy of Rome after the union of Florence, were allowed to retain the Slavonian liturgy and the use of the Cyrillic letters. The most antient manuscripts written in the Cyrillic alphabet are the gospel of Ostromir, written in 1056, which is preserved at St. Petersburg, and a Sbornik, or collection of religious tracts, of the year 1073, now at Moscow. An inscription in the same letters, preserved in a church at Kief, is supposed to date from the reign of Vladimir the Great. The first printed works with the same characters are a book of prayers, entitled 'Oktoikh,' &c., printed at Cracow in 1491, and another work of a similar description, at Venice in 1493.

Besides the Cyrillic letters, there is another alphabet used by some Slavonian populations of Dalmatia and Illyria, which is called the Glagolite character, and the use of which, as well as of the liturgy in the Slavonian language, has been allowed by the Roman see to these nations. The invention of that alphabet has been ascribed to St. Hieronymus, a native of Dalmatia, but this origin of the Glagolite letters, probably invented by their advocates in order to gain the approbation of Rome, cannot stand the test of historical criticism, as St. Hieronymus lived in the fourth century, being born A.D. 331, in Dalmatia, while the Slavonians settled in that province only in the seventh century. Many Slavonian scholars supposed that the Glagolite alphabet was comparatively a modern invention, and that it was nothing more than the Cyrillic, disguised by some alterations and the addition of superfluous ornaments. This opinion was supported by the circumstance that the oldest monument of the above-mentioned characters was a Psalter written in the thirteenth century, and their invention was considered on that account to be of no earlier date. The same opinion seemed to be corroborated by the fact that it was only in 1248 that Pope Innocent IV. permitted the use of the Slavonian liturgy, and of those letters which they had from St. Hieronymus, to those nations that had still retained them. This theory about the Glagolite alphabet, which was combated by many Slavonian scholars, has been recently overturned by the learned Kopitar, librarian of the Imperial Library at Vienna, one of the first Slavonian scholars of our time. He has proved, from a manuscript written in the Glagolite characters, that the Glagolite character was coeval with the Cyrillic, if it was not more antient. This manuscript, which was long considered to be an autograph of St. Hieronymus, is of a very antient date, and belongs to Count Cloz, in the vicinity of Trento. The lovers of Slavonian antiquity may consult Kopitar, *Glagolita Clotzianus, &c.*, Vienna, 1836.

It has been said that the liturgy in Slavonian with the use of the Glagolite letters was approved by Pope Innocent IV. in 1248. A Slavonian missal was printed in these characters, at Venice, in 1483. In the tenth century, when a revision of the Roman missal and breviary was made by the order of the popes, the same measure was extended to the Slavonian missal, and the congregation *De Propaganda Fide* intrusted that task to a Franciscan monk, Raphael Levakovich, a native of Croatia; but as he was not completely master of the sacred Slavonian tongue, he called to his assistance Terletzki, a Greek bishop of Lutzkn in Poland, who, having subscribed the union with Rome at Brest in Lithuania, in 1576, came to Rome. Terletzki replaced many words which he could not understand, by others employed in the Slavonian liturgy of the Greek churches in Poland and Russia, by which the original text was spoiled. The Slavonian missal thus revised was printed at Rome, 1631-1648. Another revision was made by Rastricius, a Dalmatian clergyman, who spoiled it still more by substituting modern words for those which he could not understand. It was printed in 1688-1706. The third and last revision of the Slavonian missal, published in 1741 1748, was made by Mathias Caruman, a clergyman of Dalmatia, who, having remained for some time at St. Petersburg, and acquired a thorough knowledge of the Russian language, disfigured the missal still more by introducing into it many Russian idioms, so that the missal became less intelligible to the inhabitants of Illyria and Dalmatia, for whom it was designed, than it had been before.

Except the populations of Dalmatia and Illyria, who, as we have just said, have retained the Slavonian liturgy and the use of the Glagolite characters, all the other Slavonian nations which were converted by the Western church adopted the Latin alphabet.

The sacred Slavonian tongue, having been originally the dialect of the Slavonians who inhabited the banks of the Danube, cannot be justly regarded as the mother tongue of all the Slavonian dialects now extant; we shall therefore give its characteristics in speaking of the Slavonian languages in general. It continued to be employed for some time in the composition of sacred books, as well as chronicles among the Slavonian nations who adhered to the Greek church, and particularly the Russians, but we shall have an opportunity of mentioning it hereafter in speaking of the literature of those nations.

General Characteristics of the Slavonian Languages.—The Slavonian languages are distinguished by the richness of their vocabulary, which consists not only in the great number of words, that is, a great quantity of synonymes, but also in the number of inflexions, both at the beginning and the end of words, which gives a facility of creating from one radical word an extraordinary number of derivatives. By the simple prefixing of the letters s, z, v, w, the verb acquires a different signification. The great facility with which the Slavonian languages receive new forms and additions is chiefly owing to their manifold declensions and their numerous tenses and participles, and they excel in that respect all the modern languages of Europe. The declensions, of which there is a great variety, are formed by the inflexion of the termination, and without any articles. The participles possess a great pliability by uniting in themselves the advantage of verbs and adjectives, and denoting as verbal adjectives at once the quality of the thing and the determination of the time, thus saving the use of relatives, as who, which, and prepositions, as after, since. This circumstance gives them a great conciseness, which is increased by the absence of auxiliary verbs. Another advantage of the Slavonian languages is their great facility of compounding words: it is possible to form from native roots all the scientific words which the languages of Western Europe have derived from the Greek and Latin. These languages contain not only diminutives to express small objects, and which are also used as terms of endearment, but likewise augmentatives, to express a thing of a larger size than usual. They have the patronymic which is formed by the addition of *wich*, answering to the Greek *ides*. There are also frequentative and inceptive verbs. The verbs are conjugated without the use of pronouns, which adds considerably to the conciseness of these languages, and the preterits of the third person singular and plural designate the sex by a variation in the last syllable. Many prepositions and much circumlocution of different kinds are saved by the use of the instrumental case corresponding to the ablative. The Slavonian languages have the dual number They have several preterit tenses and many future ones, &c. It may be easily concluded from what we have said of the Slavonian languages that they must possess great expressiveness and energy, and that they are able to represent every object of imagination and of passion, as well as all the higher emotions of the poet and the orator, in a manner not inferior to any modern language, and superior to many; and that they are eminently fit for the translation of the classics. We must also add, that the Slavonian languages possess every sound contained in other languages, except the English *th*.

Russian Language and Literature.—The Russian language may be divided into three dialects. 1. The dialect of Great Russia, or Muscovy, which, since the time of Peter the Great, has been formed into the present literary language of Russia, and is subdivided into the minor dialects of Novgorod, Suzdal, and Rezan. The dialect of Great Russia is distinguished from other Slavonian languages by the admixture of some words and sounds of a Finnish origin, as the population which speak this dialect partly came from some Finnish tribes that were absorbed by the Slavonians. It also contains many Oriental words, which were introduced under the Tartar dominion, but these words have generally their Slavonian synonymes. 2. The dialect of Little or Southern Russia is spoken by the population of the Ukraine, the antient Polish provinces of Volhynia and Podolia, as well as that of Gallicia, or Austrian Poland. It differs from the dialect of Great Russia not only in many expressions, but also in many turns and grammatical forms, which often rather resemble those of the Polish language than the above-mentioned dialect. It is perhaps the softest of all the Slavonian dialects; it is full of picturesque expressions, and its diminutives, used as terms of endearment, have a peculiar sweetness. The national songs and ballads of the population who speak this dialect, are distinguished by great depth of feeling, and their music, although composed by simple peasants, is generally very beautiful. It was cultivated under the dominion of Poland, which continued for many centuries, and it may be regarded as a provincial dialect of that country. 3. The dialect of White Russia is now spoken by the population of the governments of Mohileff, Witepsk, and Smolensk, as well as some adjacent districts. It is less harmonious than the dialect of Little Russia. It is considered by philologists as being of high antiquity, and it was the official language of Lithuania till the latter part of the seventeenth century; the code of that country was originally composed in it.

The present literary language of Russia participates in all the merits of the other Slavonian languages; and it has been enriched by its authors, who have introduced many new words, either from the Slavonian sacred tongue or formed from its own roots. It is more harmonious than many other Slavonian languages, being richer in vowels, a peculiarity which is ascribed to the influence of the Finnish language, which is characterised by an extraordinary softness.

The history of the Russian language and literature may be divided into two great periods, one comprising the time before the reign of Peter the Great, and the other the period since his reign. The first period may be subdivided into three: the time from the introduction of the Christian religion in the tenth century, to the establishment of the dominion of the Tartars in the thirteenth; 2, the time from the dominion of the Tartars, or from the middle of the thirteenth to the middle of the fifteenth century; and the 3rd, from that time to the reign of Peter the Great, or the end of the seventeenth century. The written language of the first period is the Slavonian sacred tongue, into which the Scriptures were translated by Cyrillus and Methodius. The most remarkable author of that period is Nestor, a monk of the cavern convent at Kieff,[*] who was born in 1056, and who is the first chronicler of Russia and the father of Russian history. He was evidently a learned man. He knew Greek, and was acquainted with the Byzantine writers, from whom he translated and inserted into his chronicles several passages. He collected his information from tradition, and possibly from some now unknown records. He was much indebted to the narrative of his fellow monk Ian, who died in 1106, at the age of ninety-one, and was consequently born one year after the death of Vladimir the Great, who died in 1015, and must have known many persons who were witnesses of the great event of the establishment of the Christian religion in Russia by Vladimir in 988-9. Nestor also described many events which happened in his own time. His style is an imitation of that of the Bible, and he often makes the individuals who are the subjects of his history speak in the first person, as is the case in the historical books of the Old Testament. His Chronicle was continued after his death in 1116, by Abbot Sylvester, till 1123. Two other monks continued it till 1203. It has gone through many editions, and it has been often translated. The best translation is the German, with a valuable Commentary, by the learned historian Schlözer, Göttingen, 1802-4, in five volumes. After Nestor's Chronicle, the most remarkable literary monument of that period is the last will, or instructions to his children, of the grand-duke Vladimir, who was surnamed Monomachos, after his maternal grandfather the emperor Constantine Monomachos, and died in 1125. It contains precepts of Christian morality and of government; and it gives us an insight into the state of learning of that period, which seems to have been more advanced among the higher classes in Russia than in Western Europe. He says, when recommending his children to seek for information, 'My father remaining at home, that is, not having travelled, spoke four languages, for which we are praised by foreigners.' These last words imply that the knowledge of foreign languages was common at that time in Russia, but it is impossible to know what those languages were. We may however suppose that Greek was studied by the clergy, who were continually coming from Constantinople to Russia, and that the Scandinavian was cultivated by the higher classes, as the Russian princes, being sprung from a Norman stock, had at that time considerable intercourse with Sweden and Norway. Vladimir married, about 1070, Gida, daughter of Harold, the last Saxon king of England, who had retired to Sweden after the death of her father.

Several theological works of this period still exist. The most remarkable are two Epistles of Nicephorus, metropolitan of Kieff. There is also a description of a Journey to Jerusalem a few years after its conquest by the first crusaders, by a Russian abbot named Daniel. The only extant poetical production of that period is the poem of the 'Expedition of Igor.' It is written in poetical prose, and describes an unfortunate expedition against the nomadic nation of the Polovtzi, or Comanes, by Igor, a petty prince of Novgorod Severrski, in 1182. It contains much fine poetical imagery, and though written at a time when Christianity was completely established, the author introduces into his poem the gods of the Slavonian mythology, which leads to the supposition that the traditions of that mythology still lived in the national poetry. It appears, from the apostrophe to the different princes of Russia, to have been written immediately after the event had taken place which forms the subject of the poem. This precious monument of antient Russian literature was discovered, in 1796, by Count Moossin Pushkin. There have been several translations of it into the present Russian, as well as into Bohemian, Polish, and German. The code of laws given by the grand-duke Yaroslaf to Novgorod belongs to the same period, during which Russia enjoyed comparatively a high degree of civilization, owing to the influence of Byzantine literature, science, and art. Besides Vladimir Monomachos, many other princes and princesses are mentioned as having cultivated and encouraged learning, and libraries are spoken of as containing Greek and Latin manuscripts.

The progress of this civilization was stopped by the invasion of the Tartars, who established a reign of ignorant barbarism in the north-eastern principalities of Russia, and separated them completely from the rest of Europe. The clergy still continued to maintain some intercourse with Constantinople, but the Greek empire was rapidly declining, and the few learned men whom it produced were averse to visit a country which was under the yoke of barbarians. The customs of the country were orientalized, as the inhabitants adopted many things from their Tartar masters. The clergy, who were much favoured by the Tartars, did not take advantage of their position in order to cultivate learning or establish schools. They composed however several spiritual works, and some chronicles in the sacred Slavonian tongue. There are also extant some stories translated from the Greek during that period; as, for instance, of Alexander the Great from Arrian, on the heroes of antiquity, the rich Indies, &c. The popular songs on historical subjects, particularly on the times of Vladimir the Great, are supposed to have been composed during the same period by the people, who solaced themselves during their oppression by the traditions of better times. There were however several authors in this period. Cyprian, metropolitan of Russia, who died in 1406, was a native of Servia, and brought with him to Moscow a great number of Slavonian manuscripts. He composed and translated several spiritual works, and made a collection of Russian laws. Demetrius, probably a monk, translated, towards the end of the fourteenth century, from the Greek, the poem of George Pisides, metropolitan of Nicomedia (who lived in the seventh century), entitled the 'Creation of the World.' This translation was such an uncommon event, that the chronicles of the time mention it as such. The Diaconus Ignatius, who accompanied the metropolitan Pimen on his journey to Constantinople in 1389, left a detailed description of that journey. Sophronius, a clergyman of Rezan, towards the end of the fourteenth century, wrote a poetical description of the invasion and defeat of the Tartars, under Mamay, in 1380. A merchant of Tver, called Nikitin, went, about 1470, to the East Indies, and left a diary of his travels. It neither displays particular talent for observation, nor does it contain much information, but it is interesting, as it shows the route which was then followed by the commerce from Europe to India.

Third Period · from the Termination of the Tartar domination to Peter the Great.—Soon after Muscovy had been liberated from the yoke of the Khans, it begun to have some intercourse with the west of Europe. The marriage of the grand-duke Ivan III. with the Greek princess Sophia Palæologus, who had resided at Rome, contributed greatly to the increase of that intercourse and the progress of civilization in Muscovy. Many Greeks who accompanied the princess Sophia brought valuable Greek manuscripts. The Venetian architect Fioravanti Aristoteles built several churches, the Kremlin, and some other palaces at Moscow. Foreign artists cast cannon and bells, and coined money. Under Ivan's son Vassili the intercourse with Europe increased, and embassies were sent and received from several states. Under Ivan Vassilevich the Terrible (1534-84) a civil and an ecclesiastical code were composed, commercial intercourse was opened with England, and a printing-press was established at Moscow. Boris Godoonoff [GODOONOFF] was a great promoter of learning: he designed to establish at Moscow a university with foreign professors, but this project was defeated by the opposition of the patriarch, who feared that such an institution might be dangerous to the orthodoxy of his church. Boris patronised learned foreigners, and paid an immense sum to the tutor of his son, to whom he was giving a European education. A general map of the Muscovite dominions was also made by his orders. The events which agitated Muscovy after the death of Godoonoff, put a stop for some time to all improvement, but when tranquillity was restored, after the accession of Michael Federovich (1613-45), the course of improvement was resumed. Many foreigners were taken into the service of the Czar, and Greek and Latin schools were established in the house of the Patriarch in 1643. Under Alexey Michaelovich several manufactures were introduced, and a regular communication with western Europe was opened by the establishment of the German post, which carried letters twice a week from Moscow to Riga and Vilna, but there was no such accommodation for the interior. Several foreign books were translated; of which the most remarkable is one on military science, printed at Moscow, in 1644. A German newspaper was regularly translated for the Czar, but his foreign office seems not to have profited much by the information, for the credentials of the embassy which was sent by the Czar, in 1662, to Madrid, were directed to Philip IV., who had died two years before. The number of foreign officers was increased, and some regular troops were formed after the European fashion; but the most remarkable event of that reign is the *Ulojenie*, or code of laws, which was formed by order of the Czar, and printed at Moscow in 1649. The acquisition of Kieff, which possessed an ecclesiastical academy, founded under the Polish dominion [RUSSIAN CHURCH], favoured the progress of learning among the Russian clergy. Under Fedor Alexeyvich (1676-88) a Græco-Latino Slavonian academy was founded at Moscow on the model of that of Kieff. The great map of Russia made under Godoonoff was revised and improved. During the regency of the princess Sophia (1682-89), Prince Galitzin, who was her principal minister, introduced many European refinements and luxuries into his house, and his example was imitated by other grandees.

---

[*] There are at Kieff extensive caves filled with bodies of saints, and known under the name of 'pechera,' or caverns, to which a convent is attached, called after the name of the cavern.

The Slavonian language continued to be used in all ecclesiastical compositions, as well as by the chroniclers, but the common dialect of Moscow began to be adopted in all official acts of the government. At the same time the dialect of White Russia, which was the official language of Lithuania, was penetrating to Moscow, and there are several diplomatic notes addressed by the grand-dukes to foreign princes, which contain an admixture of that dialect, and even many Polish words. In the sixteenth century, and at the beginning of the seventeenth, the works of St. Ambrosius, Augustinus, Hieronymus, and Gregory, as well as the 'History of the Twelve Cæsars,' by Suetonius, were translated into Slavonian. Some tales written in a mixture of the Slavonian and the common dialect of Moscow belong to that period. Joseph, Hegumenos or abbot of a convent at Volokolamsk (died in 1516), became celebrated by his writings and personal exertions against the Jewish sect of Raskolnichi. [RUSSIAN DISSENTERS.] Part of his works were printed in the collection of materials for Russian history, entitled 'Antient Russian Bibliotheca.' His contemporary Gennadius, archbishop of Novgorod, an equally zealous persecutor of the above-mentioned sect, wrote several pastoral exhortations on the same subject. Macarius, metropolitan of Moscow (died in 1564), is the author of the lives of several saints. The annals known under the name of 'Stepennaya Kniha,' that is, the graduated book, were composed under his superintendence, and indeed the authorship has been ascribed to him. They are so called because they are divided into chapters, each of which contains the reign of one sovereign, and is called a grade. Maxim, a Greek monk of the convent of Mount Athos, and a man of great learning, who had studied at Paris, Florence, and other places in Western Europe, came to Moscow by the desire of the Czar Vassili Ivanovich, in order to revise the corrupted text of the sacred books used in Muscovy [RUSSIAN CHURCH], and to arrange the Greek manuscripts which were in the possession of the Czar. It is said that he was astonished at the value and rarity of some of those manuscripts. He made a complete catalogue of them, and presented to the Czar a list of those sacred works which had not yet been translated into the Slavonian tongue. The Czar commissioned him to translate the commentaries on the Psalter, and gave him two translators and two copyists to assist him. After a labour of seventeen months, Maxim presented to the Czar his translation, which was received with much approbation by the metropolitan and all the clergy. He wished to return to his convent on Mount Athos, but he was persuaded to remain at Moscow, in order to revise the text of the sacred books, which had been corrupted by ignorant copyists. He devoted nine years to that important labour, but the favour of the Czar and the reputation which he had acquired excited great jealousy, and created enemies, who accused him of falsely expounding the Scriptures. He was confined in a convent in 1525, where he died in 1536, and his pupils shared his fate. He was engaged till his death in the composition of theological, philosophical, and ethical works; among others, he wrote in Slavonian a dissertation on the utility of grammar, rhetoric, and philosophy, which was an extraordinary performance at that time.

A monk called George composed a Russian chronicle, which reaches to the year 1533. Two merchants, called Korobeinikoff and Grekoff, were sent in 1583 by the Czar Ivan Vassilevich to distribute alms in different holy places of the East for the soul of his son, whom the Czar had murdered in a fit of passion. They visited Constantinople, Antioch, Jerusalem, Alexandria, Mount Sinai, and some other places, and kept a diary of their journey, which has been printed. Prince Kurbski, descended from a branch of the Ruric, or reigning house of Muscovy, and related to the Czar Ivan Vassilevich the Terrible, was born in 1529, and was one of his boyars and principal generals. He distinguished himself at the capture of Kasan in 1553, and in several other campaigns; but in 1564 he was obliged to seek refuge from the tyranny of his monarch in Poland, where he was kindly received by king Sigismund Augustus, who granted him estates. In his exile he devoted himself to literature and learnt Latin. He wrote the reign of the Czar Ivan Vassilevich, and the campaigns in which he himself had taken a part. This work is one of the most valuable contributions to the history of that period. He also wrote several letters to the Muscovite prince, upbraiding him for his tyranny, and proving by the Scriptures and the works of the antients that his conduct was very bad. Ivan Vassilevich answered all these letters, endeavouring to convince Kurbski, particularly by passages of Scripture, that it was he who was in the wrong, and that he had no right in any case to rebel against his sovereign.

In the seventeenth century the following authors deserve notice: Abraham Palitzin, abbot of the celebrated convent of Troytza or Trinity, distinguished himself by his patriotism in the year 1612, and left a description of the siege which the convent sustained against the Poles. Kubassov wrote a chronological universal history, beginning with the creation of the world. Epiphanius Slavinetski, a native of Poland, after having studied at Kieff and other academies, adopted the monastic life in Kieff. He was called to Moscow in 1649, by a boyar of the name of Rtishchef, in order to translate theological works from Greek into Slavonian, and he translated several of the works of St. John Chrysostomus, Gregory of Nazianzus, Basilius the Great, and other fathers of the church, which were printed at Moscow in 1664-65. He also made a complete Greek-Slavono-Latin Dictionary in two volumes, and a Philological Lexicon, or a comparison of passages of the Greek fathers. He was commissioned in 1664 by the Patriarch and the Czar to make a new version of the Scriptures from the Greek into Slavonian, but he was prevented by death from accomplishing that important work. Simeon of Polotsk, a native of that city in Poland, studied in his native country and in some foreign universities, and having become a monk, he went to Moscow in 1667, where he was appointed by the Czar Alexey Michaelovich tutor to his son Fedor. He wrote many poems, which were much praised at the time, although they are no longer readable. He was also the first who introduced the practice of writing sermons for his congregation, which was already usual with the Greek clergy of Poland. It had hitherto been the custom in Muscovy only to read sermons selected from ecclesiastical authors and approved by the patriarch. Sylvester Medveyeff, a pupil of Simeon of Polotsk, and abbot of a convent at Moscow, wrote many polemical works; but being suspected of a tendency to Romish doctrines, he was deprived of his clerical dignity, and confined in a convent; in 1691, being accused of participation in the revolt of the Strelitz, he was executed. He left several poems. Prince Shakhovski lived in the first part of the seventeenth century. Having fallen into disgrace with the Czar Michael Fedorovich, he was confined in a convent, where he composed epistles on religious subjects, of which the most remarkable is an Epistle on the orthodox faith to the highest Shah Abbas, king of Persia and Media, addressed in the name of the high archbishop and servant of God, the most holy Patriarch Philaret Nikitch. In this epistle he expresses his thanks for a relic, a supposed fragment of the garment of Jesus Christ, sent by the Shah to the Czar, and exhorts him to embrace the Christian religion.

The conquest of Siberia brought the court of Moscow in contact with China and some states of central Asia. An ambassador named Baykoff was sent to Pekin in 1654, and returned in 1658; he left a very curious description of his embassy, which has been translated into several foreign languages. A Cossack of Siberia named Petlin explored in 1620 the course of the river Oby, and wrote a description of his journey.

The first attempts at dramatic representations appeared in Russia about the middle of the seventeenth century. They were introduced from Poland by the students of the ecclesiastical academy of Kieff, who were used to perform plays on Scriptural subjects in Polish, Slavonian, and the dialect of Little Russia. They performed these plays during the vacation time in several towns of Russia, and they were finally introduced at Moscow by Simeon of Polotsk, whom we have mentioned. In 1676 German actors performed before the Czar Alexey plays taken from Scriptural history accompanied with ballets. The Princess Sophia, the eldest sister of Peter the Great, was very fond of theatrical amusements, and wrote several dramas, which she performed with her court.

The Second Period of Russian Literature: from Peter the Great to the present time.—It is unnecessary to expatiate on the civilization which Peter the Great introduced into Russia. He established many primary schools in different parts of his dominions, and a military and naval school at St. Petersburg. He sent young Russians abroad to study the various sciences and arts; he took into his service many foreigners of talent, collected books, cabinets of natural history, and got together philosophical instruments. A new alphabet, simplified from the old Slavonian, formed, as it is said, by himself, was introduced; but the language made no great progress from the state in which it had been during the preceding reign, and it was inundated with many foreign words introduced under Peter's reign, who showed perhaps too much predilection to everything foreign. Among the most remarkable authors of his time is Theophan Prokopovich, archbishop of Novgorod, a native of Kieff, but educated in Poland. He wrote many works on divinity, politics, and history, as well as sermons, orations, and some poetry. His works display considerable talent, notwithstanding their barbarous style. He also wrote in Latin, and his style in that language is much better than his Russian. Stephen Javorski, metropolitan of Rezan, a native of Leopol in Poland, and Demetrius, metropolitan of Rostov, a native of the environs of Kieff, who was canonized after his death, wrote many works on theological subjects. Gabriel Bushinski, bishop of Rezan, translated some of the works of Puffendorf and other authors, relating to history and politics. Kopievich, a native of Lithuania, studied in Holland, and passed from the Greek persuasion to Protestantism. He became pastor at Amsterdam. Peter the Great, during his visit to that city having been acquainted with Kopievich, gave him a commission to compose school books and other useful works in the Russian language. Accordingly he wrote and translated many books on several literary and scientific subjects, which were printed at Amsterdam. Prince Chilkoff (died in 1718) wrote an abridged history of Russia, which was used in schools, but has since been superseded by other works. Great service was rendered to primary instruction by Ernest Glück, a Lutheran clergyman of Livonia, who, being taken by the Russians, was employed by Peter the Great in establishing a school at Moscow for the children of burghers. He published many school-books, and among others, the 'Orbis Pictus' of Comenius.

Peter's successor, Catherine I., founded the Academy of Sciences at St. Petersburg, which was projected by her predecessor. Its object was to prepare teachers for public schools, to publish useful works, and to collect all kinds of information about Russia. The imperial physician Blumentrost was appointed president; and many learned foreigners, as De Lille de la Croyere, Bernoulli, Bayer, and others, were nominated members. The academy established a high school for the formation of teachers, caused many scientific treatises to be written, aud promoted geographical discoveries. De Lille de la Croyere accompanied Behring on his expedition in the Pacific Ocean, and died from the hardships of the voyage. A great number of classical authors, Greek and Latin, were translated and published under the superintendence of the academy; but these translations, being made in a language which was not yet formed, and published at a time when they could scarcely find any readers, did not contribute to the progress of literature, and they found few purchasers. The reign of the empress Anna was not favourable to the national literature. The court, which was governed by Biren, imitated everthing that was foreign, and showed the greatest contempt for all that was national. These circumstances had a very unfavourable effect on the national language and literature, although Lomonossoff was preparing a salutary revolution towards the end of that reign. A favourable change took place under the empress Elizabeth, who was a great patroness of science and literature. The Academy of Sciences was enlarged by the addition of a section of arts, and its income increased in 1747, and in 1752 the University of Moscow was established on the proposition of Count Shoovaloff,* a distinguished patron of learning; and it was by the exertions of the same nobleman that the Academy of Arts for painting, sculpture, and architecture was founded. Geographical knowledge was also advanced by the discoveries which some Russian adventurers made in the Pacific.

Among the principal authors of this period was Prince Antiochus Kantemir, son of the hospodar, or reigning prince of Moldavia, who removed to Russia with all his family during the expedition of Peter the Great into that principality. He was born at Constantinople in 1708, and was educated at Kharkoff and Moscow, under the superintendence of a Greek clergyman, and also of his father, who was himself a learned man. Antiochus made such progress, that when he was only ten years old he wrote a Greek panegyric on St. Demetrius, which was read in a church. Owing to his extraordinary talents and high rank he obtained rapid preferment. In 1731 he was nominated Russian minister at London, where he remained till 1738, in which year he was transferred in the same capacity to Paris, where he remained till his death in 1744. He wrote eight satires, which were published at St. Petersburg in 1762; but translated into French during the author's lifetime. His language and versification belong to the old school; but in his satires he displays great power of observation, and such genuine wit, that they are still read with pleasure. He also left a translation of Horace's 'Epistles,' Fontenelle's dialogues on the 'Plurality of Worlds,' and a great many other translations from the classics, as well as from French and Italian writers. Living in constant intercourse from 1731 to 1744 with the first wits of London and Paris, Prince Kantemir's works contain ideas and opinions which belong more to those seats of European refinement than to Russia, and consequently he cannot be considered as truly national. Lomonossoff Trediakowski (Basil), born at Astrakhan in 1703, studied at the university of Paris under Rollin, and travelled in many parts of Europe. In 1733 he was nominated secretary of the academy of St. Petersburg; and in 1745 appointed by a ukase professor of eloquence: he died in 1769. Trediakowski possessed considerable learning, but more industry than talent. He wrote several works on the principles of literary composition, and a great many poems; but his versification is cumbrous, and his language so little pleasing, that the empress Catherine II. enacted, in the humorous code which she made for her own immediate society, that the transgressors of certain regulations should be condemned to read several pages of Trediakowski's poem 'Telemachida,' which was a versified translation of Fenelon's 'Telemachus.' He translated many foreign works, chiefly on history: as an instance of his indefatigable industry we may mention, that after having completed the translation of Rollin's 'Antient History' in 26 volumes, the manuscript was destroyed by fire, upon which he again translated the 26 volumes, which were published at St. Petersburg (1744-67). Tatishcheff (Basil), born of an antient family in 1686, was one of those young men who were sent in 1709 for their education by Peter the Great to different parts of Europe. He acquired a good deal of scientific information, and became thoroughly conversant with the German and Polish languages. On his return home he was employed in many offices of great importance. In 1724 he was sent on a secret mission to Sweden; in 1734 he was invested with the supreme direction of the mines of Siberia; and in 1740 he was appointed governor of Astrakhan. It was there that our countryman Jonas Hanway, who speaks much of him, made his acquaintance. He died in 1750, holding the rank of a privy councillor. During his travels in Russia he diligently collected all kinds of information relating to that country, and acquired a rich store of materials for its history and geography. His principal work is a history of Russia, from the most antient times to the year 1462. He spent thirty years on this work, which was written amidst his multifarious official avocations: it is, in fact, a comparative chronicle; the author having procured several copies of different chronicles, compared them, and made a comment on them by extracts from various foreign authors which related to the same subject. The manuscript of this work was kept for some time in the archives. The empress Catherine II. ordered its publication, which was done under the care of Gerhard Müller, in 1764-74. It is much to be regretted that the chronicles and other materials on which Tatishcheff founded his work were destroyed by fire. He occupied himself with the composition of a complete geography of Russia, and a map of Siberia was made by his exertions, and published by the Academy of Sciences, in 1745, in 20 sheets. He also wrote an 'Historical and Political Lexicon of Russia,' which he completed to the letter L, and which was published in 1793.

---

* Count Shoovaloff is known in French literature by his 'Epître a Ninon, which was ascribed to Voltaire before the real author was known.

Stephen Krashennikoff, professor of botany to the Academy of Sciences (1713-1755), became known all through Europe by his 'Description of Kamtchatka,' which was published at St. Petersburg in 1755. He was sent by the academy, with Steller, to examine this country, where he remained for many years, collecting the information which enabled him to produce a work of considerable merit, and which was translated into several languages.

The creation of a national drama in Russia dates from this reign. This honour belongs to Alexander Soomarokoff (1718-1777). He was educated partly in the house of his father, who was a general officer, and partly in the military school of St. Petersburg. The study of Corneille, Racine, and other French dramatic writers, awakened his talents, and he began to write tragedies about the year 1740, which were performed by the pupils of the military school, in the presence of the empress Elizabeth, who in 1756 nominated the author director of the court theatre. Soomarokoff wrote many tragedies, the best of which is 'The False Demetrius,' which has been translated into French and English, and also several comedies and operas. He was also the author of various minor poems, and numerous essays and dissertations in prose, on various subjects. Soomarokoff enjoyed during his lifetime, and some time afterwards, a great reputation, which has however declined, and his works are now little read. His dramatic productions are all imitations of the French school, and notwithstanding they display considerable talent, they are characterised by great affectation, and his heroes and heroines are never true to nature. His language also is now become obsolete.

Dramatic art in Russia begins with Volkoff, the son of a merchant of Kostroma, who learned German, painting, and music at Moscow. He established, with some other young men, a little theatre at Yaroslav, where they performed the dramas of Demetrius, bishop of Rostov. At St. Petersburg he saw the performances at the Italian court theatre, and he diligently studied its organisation. Having thus improved his knowledge of the dramatic art, he returned to Yaroslav, where, with the assistance of some friends, he established a theatre, which contained a thousand spectators, and of which he was not only director and first performer, but also machinist and painter. Several young men of talent, as Popoff Dmitreski and others, joined Volkoff, whose reputation reached the court at St. Petersburg, where the plays of Soomarokoff were performed by the pupils of the military school. He was invited to court in 1752, and in 1756 an imperial ukase established a Russian theatre, of which Soomarokoff was appointed director, and Volkoff the first actor. He died in the prime of life, in 1763, but the pupils whom he had formed greatly contributed to the improvement of the national drama. Periodical literature also originated under the same reign. The first literary journal, which was entitled 'The Monthly Magazine for Utility and Amusement,' was edited by Gerhard Müller, and all the Russian authors of that time were contributors. In 1759 appeared the 'Industrious Bee,' edited by Soomarokoff.

The reign of Catherine II. was favourable to the civilisation of Russia in many respects. Ambitious of every kind of distinction, she courted the applause of Voltaire and other French philosophers of that school, and these dispensers of reputation extolled the liberal and enlightened sentiments of that princess, notwithstanding her share in the destruction of Poland, and her continual invasions of the Turkish dominions, which were hailed by the same adulatory philosophers as so many steps towards the progress of the civilization of mankind; yet although the execution of Catherine's political schemes of aggrandizement was often stained by great atrocities, Russia is much indebted to her for encouraging literature and learning. The military and naval schools were enlarged and improved. A mining school was established in 1772, and it is still one of the best educational institutions in Russia. The University of Moscow and the Academy of Arts were enriched and enlarged. Several of the most distinguished members of the Academy of Sciences, as Pallas, Georgi, Richkoff, and others, were commissioned to undertake scientific travels in various parts of the Russian empire, and their researches contributed not only to extend the knowledge of that country, but also to the progress of science in general. A Russian Academy which had for its object the improvement of the Russian language was established on the plan of the French Academy, and it published a dictionary of the Russian language, a grammar, and other useful works of a similar description. The Society of the Friends of National Literature and History, established in connection with the university of Moscow, did great service. A commission for the organization of public schools was appointed, and it founded a seminary for teachers at St. Petersburg, one high school and twelve preparatory schools, and published under its superintendence many school-books. New schools, high as well as primary, were opened in several towns of the empire. Institutions for the education of the females of noble and burgher families were founded at St. Petersburg, where a number of pupils are maintained and educated free of expense, while others are admitted on the payment of a moderate sum. There were also established an agricultural society, a surgical school, and other useful institutions.

The Russian language, which is chiefly indebted to Soomarokoff for its improvement, was greatly enriched in this reign by the creation of new words from Slavonian roots, which were substituted for other words of a foreign origin: many new scientific terms also were introduced. Its grammatical construction was better developed, the versification was rendered more harmonious, and the style in general greatly improved by being purified from foreign expressions and idioms, which abound in the works of the authors belonging to the preceding period. Many literary periodicals were started, and some of them were continued with considerable success. The censorship of the press was remarkably liberal, and it seems indeed that Catherine, intoxicated with the flatteries of the French philosophers, entirely overlooked the tendency of their works, which were dangerous to such a government as hers. Many political works, such as those of Montesquieu, Delolme, Hume, Robertson, and Rousseau's 'Contrat Social,' were translated into Russian, and printed. This liberality was also extended to many productions of an immoral and irreligious tendency, and several works of this description, by Voltaire, Diderot, Rousseau, and others, were published in Russia. The effect of such works, in such a state of society as that of Russia, could not be very salutary.

Michael Kheraskoff (1733-1807), curator or supreme director of the university of Moscow, wrote the 'Rossiad,' an epic poem in twelve cantos, which describes the conquest of Kazan; and 'Vladimir, or the establishment of the Christian religion,' also an epic poem, in eighteen cantos. These two productions are considered his best, although they are far from having any real claim to the name of epic. His other poems are, 'The Pilgrims,' in six cantos, a production which displays much entertaining variety, and is written in various metres; 'The Fruits of Science,' a didactic poem; 'The Universe;' and 'The Battle of Chesme,' &c. Kheraskoff also wrote several novels, the subjects of which were taken from Greek and Roman history, and some dramas. The number of his productions, which is more than twenty, attests his great industry, and they show that he had considerable information; but the same praise cannot be extended to his poetical and creative talents. Basilius Petroff (1736-1799) was the son of a clergyman, and was educated in the ecclesiastical academy of

Moscow. He attracted the notice of Catherine II. by an ode on her coronation in 1763, and was appointed a translator of the imperial cabinet, and reader to the empress. He afterwards visited England, where he resided for some time, and after having travelled in other countries, he returned to St. Petersburg, where he was appointed librarian to the empress. The delicate state of his health compelled him, however, to abandon a career in which he might have expected rapid preferment, and he retired in 1780 into the country, where he devoted himself to literary pursuits and agriculture, visiting Moscow every winter, for the sake of the library. As one instance of his industry, we may mention that he learned modern Greek at the age of sixty. A complete edition of his works, in three volumes, was published at St. Petersburg in 1811: they consist of odes written on several solemn occasions, and epistles addressed to different persons. He also made a metrical version of the 'Æneid,' which was published in 1781-86. Petroff's poems are characterised by genuine animation and energy of thought, expressed in a concise and powerful manner, and he would have equalled Lomonossoff if his style had not been so rough; though some of his odes are free from that reproach, and are written in flowing and harmonious verses.

Hippolyte Bogdanovich (1743-1803) was born in the Ukraine, and educated in a school at St. Petersburg. In his fifteenth year, by frequenting the theatre and reading plays, he became so enamoured of the dramatic art, that he addressed himself to Kherashoff, who at that time superintended the theatre of Moscow, and requested to be received as an actor. Kherashoff, who was struck with the talents of the boy, dissuaded him from this design, and taking him into his house, made him continue his studies at the university of Moscow, where he made rapid progress. He was afterwards employed in the foreign department, and was secretary of the Russian embassy at Dresden (1766-68). After his return to St. Petersburg, he continued in the civil service till 1795, when he settled in the country. Bogdanovich began to write poetry when he was seventeen, and when he was twenty he edited a literary periodical called the 'Innocent Amusement:' he displayed considerable talent in several minor poems, particularly by a very successful translation of Voltaire's 'Ode on the Destruction of Lisbon.' His poetical fame was established by his 'Dooshinka,' or 'Little Soul,' an exceedingly successful translation of La Fontaine's 'Psyche.' This poem, which not only equals, but in some respects surpasses the original, is still one of the most popular productions of Russian literature.

Gabriel Derjavin (1745-1816) was born at Kasan, and belonged to a family of Tartar origin, as appears from his frequent allusions to such a descent. He was educated in the military school of the engineers, and served in the army till 1779, when he passed into the civil service. He was governor of Olonetz and then of Tambov (1784-1791), and afterwards successively secretary of state, president of the college of commerce, treasurer of the empire, and finally minister of justice. In 1803 he left the public service, and lived till his death chiefly on his estate of Zvanka, in the government of Novgorod. Derjavin is undoubtedly the first Russian lyric poet, a distinction which he has earned by the boldness of his imagery, the harmonious flow of his versification, and the happy turns of his expressions. He created many new words, and restored several that were either obsolete or considered as unsuitable to a higher style; but although these innovations proved very successful with Derjavin, they produced a contrary effect with his imitators. The faults of his style are frequent inequalities: a sublime passage is followed by lines of a very inferior description, and his imagination hurried him away to the neglect of the rules of art and good taste. Although he flattered the monarch in his poems, many of them contain very bold truths. The most remarkable productions of Derjavin are his 'Ode to God,' which was translated into several languages; 'To Felitza,' a name under which he addressed Catherine; 'On the Death of Prince Meshcherski;' 'The Cataract;' 'The Autumn,' &c.; and a great number of Anacreontica. He wrote also several prose works, but none of them equal his poetical productions. Several of his poems have been translated into English by Dr. Bowring, in his 'Russian Anthology.'

Basilius Kapnist was born in the Ukraine, of a distinguished family of that province, where he possessed large estates. He received an excellent education, and wrote several compositions of considerable merit when he was very young. The Ukraine, which after its separation from Poland had submitted to Russia, on condition that she should preserve all her privileges, which constituted a kind of self-government under the protection of Russia, gradually lost those rights, and was finally converted by Catherine into a Russian province. On that occasion Kapnist wrote an elegy, entitled 'Slavery,' in which he paints in animated colours the calamities resulting from the loss of liberty. He wrote a great number of poems, but his reputation was established by his comedy entitled 'Yabedniki,' that is, the Chicaneries of Law. In 1823 Kapnist died, at a very advanced age, on his estate in the government of Pultava. Kostroff (died in 1796) translated the 'Iliad,' from the original Greek; the 'Golden Ass' of Apuleius; and the Poems of Ossian. He also made some other translations from the French. Bobroff (died in 1810) became chiefly known by his 'Khersonide, or a Summer Day in the Crimea,' which has been translated into English by Dr. Bowring. His poetic style, formed chiefly from a deep study of the best English authors, has much feeling and animation, but he is frequently obscure, and sometimes degenerates into bombast. Neledinski Meletzki is the author of songs and romances, which are characterised by much tenderness and feeling; they are set to music, and are very popular among the ladies of Russia. Barkoff (died in 1768) translated the 'Epistles' of Horace, the 'Fables' of Phædrus, and many other works. He became universally known by his witty poems, which however are disfigured by extreme licentiousness. Prince Dolgoruki wrote epistles and other poems, in a popular style, on philosophical and moral subjects. His works have gone through several editions, the last of which is that of 1819. Chemnitzer was born at Moscow, of German parents, in 1744. He died in 1784, as Russian consul at Smyrna. He wrote fables, which, owing to their great simplicity and natural ease, have acquired a merited popularity, and continue to be read. Dramatic literature was cultivated chiefly by James Kniajnin (1742-91). His talents were formed under the direction and patronage of Soomarokoff, whose daughter he had married. Kniajnin wrote tragedies, comedies, and operas, besides odes, fables, and other minor poems. His principal productions are—'The Clemency of Titus,' 'Dido,' 'Sophonisba,' 'Roslaf,' 'Vladimirk,' and 'Yaropolt,' &c. Some of them are original; others translations or imitations from foreign authors, particularly from Metastasio. His comedies are—'The Boaster,' 'The Odd Fellows,' &c.; his operas, 'Misfortune from a Coach,' 'The Vender of Sbiten' (a national beverage), 'The Miser,' &c. His style is purer and more elevated than that of Soomarokoff, but it is often constrained, and he offends by a continual attempt to be sublime, which frequently degenerates into bombast. Like Soomarokoff, he is also a servile imitator of the French dramatic school. Some of his comedies, and particularly 'The Boaster,' and 'The Odd Fellows,' are clever. They were however surpassed by those of Von Visin, who was born at Moscow in 1745. He studied at the university of his native town, and travelled in several parts of Europe. His comedy of 'Niedorosl,' that is, the Minor, or the Spoiled Child, is an admirable picture of Russian manners in the eighteenth century, and although those manners are fast disappearing, it is still a very popular play. His other comedy of the same kind, entitled 'The Brigadier,' is also a clever performance. Von Visin translated into verse Voltaire's 'Alzire' and Bitaube's poem of 'Joseph.' He also wrote a poetical epistle, addressed to his servants, of a satirical description, which is very popular: it contains some ideas evidently borrowed from the French philosophy of his time, which the author is said to have afterwards much regretted, on account of the mischief which they might produce by their irreligious tendency. He also published many translations and original compositions, which are now forgotten. He died in 1792.

The study of national history was much advanced during this period by the learned researches of foreigners as well as natives. The learned Schlözer, who came to Russia in 1761, was nominated (1765) professor of history at the Academy of St. Petersburg. He remained there till 1769, when he was appointed professor at Göttingen. During his residence in Russia he learned the Russian language, and published some works relating to the history of that country. He continued his researches on that subject at Göttingen. John Stritter, born in 1740, at Stettin in Pomerania, died in 1801, at Moscow. By order of the Academy of Sciences, he collected according to the plan of Schlözer, from the Byzantine authors, the accounts of the different nations which are connected with the history of Russia: they were published in Latin, under the title of 'Memoriæ Populorum olim ad Danubium, Pontum Euxinum, Paludem Maeotidem, Caucasum, Mare Caspium, et inde magis ad Septentrionem Incolentium, à Scriptoribus Historiæ Byzantinæ erutae et digestæ,' 4 vols. large 4to., St. Petersburg, 1771-80, at the expense of the Academy of Sciences. This valuable collection of historical materials was well received by the learned in Europe, and was made use of by Gibbon in his great work. An abridgement of it, made by the author himself, in Latin, was translated into Russian by Svietoff, and published at St. Petersburg (1770-75) in 4 vols. 8vo. Stritter also wrote in Russian a 'History of Russia,' which reached only to the year 1464, and was printed in 3 vols. at St. Petersburg (1800-3), and some historical dissertations also in Russian. Prince Michael Shcherbatoff (born in 1733, died in 1790) from his youth evinced great zeal for the study of national history, and diligently collected materials relating to that subject. The empress Catherine commissioned him to arrange the archives of the cabinet of Peter the Great, and granted him free access to all the libraries and records of the state. He was thus enabled to prosecute his researches for a history of Russia, which appeared in 13 vols. (1770-92), but which reaches only to the reign of the Czar Michael Federovich. It is written in a heavy style, without criticism, and is full of blunders. Many of his errors were pointed out in Boltin's remarks on Lubec's 'History of Russia,' which led to a very angry literary quarrel between Shcherbatoff and Boltin. He was also the author of the following works: 'On the Antient Gradation of Ranks in Russia,' Moscow, 1784; and an 'Historical Account of the Origin of the Russian Princes who are descended from Ruric.' He also edited many important historical documents, such as the 'Diary of Peter the Great.' Boltin (1735-91) contributed by his critical writings to the elucidation of many obscure parts of antient Russian history, although his own writings were not free from error, as was proved by Shcherbatoff. He left in manuscript several historical and philological works, and a translation of the French Encyclopædia to the letter K. Golikoff (1735-1801) was a merchant, but occupied himself in his leisure hours with literature and history, and particularly with the history of Peter the Great. Being engaged with a cousin in the farming of the government revenue from the sale of ardent spirits, he was guilty of some irregularities, for which he was condemned to be imprisoned for life. He was however pardoned in consequence of an amnesty granted in 1782, on the occasion of the installation of the monument of Peter the Great. Golikoff went from his prison straight to the church to thank God for his deliverance, and then to the monument, before which he made a solemn vow to devote the remainder of his life to the glory of the monarch to whom it was erected. He kept his vow, and diligently collected all that was written about Peter the Great in every language, and as he did not understand any foreign tongue, he got translations made at his own expense. He also visited all the towns where Peter had resided, and collected all the traditions relating to him. Catherine, being informed of his exertions, gave him free access to all the public records. The result of his labours was a work entitled 'Deeds of Peter the Great,' in 12 vols., Moscow, 1788-90; and a continuation of that work in 18 vols., completed in 1798, under the title of 'Supplement to the Deeds of Peter the Great.' He also wrote anecdotes of Peter the Great and the Lives of Lefort and Gordon. These works, although written without any criticism, contain very valuable materials for the history of Peter the Great. Nicholas Novikoff (1744-1818) has done perhaps more than any other individual in Russia for the diffusion of literature. He edited several periodicals devoted to literature and education, and he collected numerous historical documents, such as relations of Russian ambassadors sent abroad, official instructions given to government agents, reports of governors of provinces, diaries of private persons, &c., which he published under the title of the 'Antient Russian Bibliotheca,' St. Petersburg, 10 vols., 1770-75; and its continuation in 9 vols., 1786-93. Novikoff established a society for publishing useful books at a cheap rate: he hired the printing-office of the university of Moscow, and introduced into it many improvements. He had foreign works translated into Russian, established booksellers' shops in provincial towns, and the first circulating library in Russia. These efforts to enlighten his countrymen awakened the suspicion of the government, which, being afraid of the French revolution, became much less liberal in its views than it had been before that event, and Novikoff, being accused of promoting the principles of that revolution, was subjected to a severe persecution. His innocence was however recognised under the emperor Paul, who generously rewarded Novikoff for his sufferings. Sergius Pleshcheyeff (1752-1802) was educated in England, and served in the Russian fleet during the campaign against the Turks in 1770 and the following years; passed into the civil service, and rose to the rank of a privy-councillor. Pleshcheyeff wrote the first statistical account of Russia, which was published in 1790, and translated into several languages; and the 'Diary of a Naval Expedition to Syria,' which was sent to assist, against the Turks, the celebrated Ali Bey, who had usurped the government of Egypt. Two French authors have written on the history of Russia, Levesque and Leclerc, both of whom resided in Russia and were conversant with the language, but their works belong rather to French than Russian literature.

The mathematical sciences and natural philosophy were cultivated with considerable success by several members of the Academy of Sciences. Roomovski, born in 1734, of poor parents, learnt mathematics under Euler. He was sent to Selenghinsk (on the frontiers of China) to observe the passage of Venus over the sun's disk, and afterwards made a journey for a similar purpose to Kola in Lapland. He was appointed professor of astronomy to the Academy of Sciences, and successively honoured with other duties connected with public education. Finally he was created in 1803 curator or supreme director of the university of Kazan. He died in 1812. Roomovski was the first who wrote a mathematical school-book in Russian, which appeared in 1760; and he also published translations of Euler's letters on different philosophical subjects, and of the 'Annals' of Tacitus. John Lepechin (1739-1802) studied at St. Petersburg and afterwards at Strasburg, where he took the degree of doctor of medicine. He undertook scientific journeys in several provinces of the Russian empire. His principal work is 'Diary of my Voyage in several Provinces of Russia,' St. Petersburg, 1771-80. He also wrote some minor works on subjects of medicine and rural economy. Nicholas Richkoff (died in 1780) published a 'Diary of Travels in different parts of Russia,' chiefly Asiatic, in the years 1768-71, 3 vols., St. Petersburg, 1772. Oseretzkovski published 'Travels on the Lakes of Ladoga and Onega,' and some other minor works. There were also many learned foreigners employed by the government in scientific travels in Russia.

The eloquence of the pulpit was chiefly cultivated during this reign by Platon Lefshin, metropolitan of Moscow (1737-1812). This learned prelate wrote many sermons, several theological works, and an abridged history of the Russian church. Athanasius, archbishop of Astrakhan, and John Levanda, Archiyerey of Kieff, were distinguished as writers of sermons. The national theatre received a new impulse. It was rendered a public amusement to which every one had admission by paying, whilst formerly it had been exclusively reserved for the court and the upper classes, who received free admission to places, distributed according to their respective ranks. A great number of periodicals appeared during the same period.

The reign of the emperor Paul was distinguished by the foundation of the university of Dorpat, and the agricultural school, the school for military orphans, the institute of the order of St. Catherine for the education of girls, and the placing of all the female educational institutions under the superintendence of the empress Maria, under whose care they remained till her death, and acquired a high degree of prosperity. The emperor Alexander gave a great impulse to the literature, learning, and public education of his country. By his order a new ministry of public education was established in 1802, and intrusted with the supreme direction of all the educational institutions in Russia, with the exception of the ecclesiastical, military, naval, and mining schools. Immediately after its establishment this ministry formed a general plan of public education for Russia, which was approved by the emperor. In consequence of that plan all the Russian dominions were divided into the six following educational districts, viz.: 1, Moscow; 2, St. Petersburg; 3, Vilna; 4, Dorpat; 5, Kazan; 6 Kharkoff· each of these districts had a university, and consequently two now ones, those of Kharkoff and Kazan, were established in 1804-5. The universities were intrusted with the organization and direction of all the schools in their respective districts. A gymnasium, or higher school preparatory for the university, was established in every government; and a school preparatory to the gymnasium, in every circle, besides many primary or parochial schools. The instruction in the university of Dorpat and its department is given in German, which is the official language of the Baltic provinces comprehended in that department. Polish was left to the university of Vilna and its department, which extended over all the provinces dismembered from Poland.

Besides the schools established in consequence of the general plan of public education, many other important institutions of that kind were founded in several parts of Russia; such as the Lyceum at Tzarskoye Selo, in 1811, which has produced several distinguished authors of the present day; the Lycée Richelieu, at Odessa, in 1817; the gymnasium of Yaroslaf, founded by Demidoff in 1805; the Lyceum of Krzemieniec in Volhynia; and some commercial schools, &c. A great number of learned and literary societies were also established in the capitals and other towns of Russia.

The Russian language, which had made great progress in the last ten years of the eighteenth century, attained under this reign a high degree of perfection. Its prose was chiefly formed by the writings of Karamsin, who began to replace the Latin and German construction into which the Russian authors had generally forced their national language, by periods approaching more to the French. But although his style is far more easy and agreeable than that of his predecessors, it often contains foreign turns, and the style of the school of imitators which he created was corrupted by so many Gallicisms, that it frequently appeared to be French written with Russian words. A reaction was produced, chiefly by the work of Admiral Shishkoff, on the antient and modern Russian style, in which he violently attacked those absurd innovations; but although there is much sound criticism in his observations, his zeal for the purity of the national language is sometimes extravagant. This work, which caused a great sensation, created two opposite parties in Russian literature—that of Moscow, which consisted of Karamsin's imitators, and that of St. Petersburg, which adhered to the ideas of Shishkoff, and the animated contest which has been carried on between them has greatly contributed to the improvement of the Russian style. The school of Karamsin became purified from its foreign idioms; and even the style of its founder, in his great work the 'History of Russia,' is far superior to his early productions. The labours of the Russian Academy, which was re-organized in 1816, have also tended to improve the language, the rules of which are determined by the grammar of that Academy, published for the last time in 1802. The imperial manifestoes and other public documents of importance issued since the accession of the emperor Alexander are written in a very good style.

John Dmitrieff (born in 1760) has done almost as much for Russian poetry as Karamsin did for prose. Dmitrieff began at an early age to write poems, several of which were printed in the 'Literary Journal of Moscow,' 1792 and 1793. His works, consisting of odes, epistles, satires, tales, epigrams, &c., have gone through several editions; they are written with great ease and elegance, are full of genuine wit, fine feeling, and good sense expressed in a very happy manner. His life was spent in public service, and he was minister of justice under the emperor Alexander.

Vladislaf Oseroff, a general officer (1770-1816), created by his tragedies a new æra in the dramatic literature of Russia, and threw into the shade all the dramatists who preceded him. Yet although his productions rise immeasurably above those of Soomarokoff and Kniajnin in artistic skill, animation and truth, and situations of high tragical interest, his versification is far from being perfect; it wants ease and harmony, and the structure is too artificial. Oseroff is still the first tragic writer in Russia, and a contemporary writer said that tragedy was born and died in Russia with Oseroff: his chief productions are—'Œdipus in Athens,' 'Demetrius Donskoy,' and 'Polyxena.'

John Kriloff (born in 1768), librarian of the Imperial library at St. Petersburg, is the author of several successful comedies, but his literary reputation rests on his fables, which rival those of La Fontaine, and display all the 'bonhommie' of the French fabulist. They have passed through several editions, and a splendid edition, with a French and Italian translation, was published by Count Orloff, at Paris, in 1825.

Nicholas Gnedich (born in 1784) is the author of a very successful translation, in hexameter verse, of the 'Iliad.' He also translated several tragedies from modern authors, of which Shakespere's 'King Lear' is the most remarkable.

Prince Peter Viazemski (born in 1792) occupies a distinguished place among Russian authors by his epistles and satirical poems, which are written in elegant verse, and display much imagination and true feeling. The few literary essays which he wrote in prose are among the best in the Russian literature. Viazemski lived for some time at Warsaw as a Russian employé. He became intimate with the first literary persons of Poland, and in conjunction with several of them formed a plan for establishing a connection between the Polish and Russian literature by means of reciprocal translations. Circumstances however prevented the execution of this project.

Prince Alexander Shakhovskoy (born in 1771) made metrical versions of several tragedies from the French, and wrote, both in verse and prose, a great number of comedies and vaudevilles, many of which are very popular.

Alexander Pushkin is undoubtedly the first poet of Russia: his character has been given in another place. [PUSHKIN.]

Pushkin was, on his mother's side, grandson of a black called Annibal, who was the son of a groom of Peter the Great, and rose in the Russian service to the rank of a lieutenant-general of engineers. Pushkin, who, with a white complexion, had the features of a negro, was proud of his African origin, and frequently made allusion to it in his poems.

Basilius Jookowski (born in 1783) was educated at Moscow. He was employed in a department of the civil service, but in 1812 he entered the army as a volunteer. He was afterwards appointed professor of Russian literature at the university of Dorpat; then nominated teacher of the Russian language to the grand-duchess, the present empress; poet-laureate, and finally tutor to the grand-duke Alexander, crown-prince of Russia. His poetical reputation was established chiefly by a very successful imitation of the German ballad of 'Leonora,' by Bürger. He translated with equal success several poems from the German, French, and English, and among them Gray's 'Elegy in a Country Churchyard,' Schiller's 'Jeanne d'Arc,' and Byron's 'Prisoner of Chillon.' His original poem, the 'Bard in the Camp of the Russian Warriors,' which he wrote during the campaign of 1812, amidst the turmoil of warfare, presents an animated picture of the life of a camp, and contains some passages of wild and original poetry. Jookowski has also earned the reputation of being one of the best Russian prose writers by his tale called the 'Wood of Mary,' and his translation of 'Don Quixote.' As a translator Jookowski is unrivalled: he adapts his style to that of the original in such a manner that each of his translations appears to have been made by a different person. Notwithstanding the favours of the court, which had been poured upon him, Jookowski preserved great simplicity of manners, and that kindness of heart which induced his friends, before he had become the favourite of fortune, to inscribe under his portrait the following line of Gray—

> 'He gave to misery all he had—a tear,'

taken from his own translation of the poem.

Constantine Batiooshkoff, born at Vologda in 1787, was educated in a private school at St. Petersburg, and served in the army in 1806-9. The severe wounds which he had received induced him to leave the service after the peace with Sweden in 1809; but he re-entered the army in 1812, and left it again in 1816. He was employed in 1818 at the Russian embassy at Naples. Soon afterwards he was attacked by a fit of melancholy, which baffled all medical skill: he tried in vain to counterbalance the effects of the malady by study and literary occupation. When he returned to St. Petersburg, his friends endeavoured to surprise him, by singing one of his finest compositions, accompanied by the harp. This produced a powerful effect on Batiooshkoff, but the contrary of that which was expected; for his mind, instead of recovering, was completely destroyed. In 1836 he was still alive, but in a state of insanity. Batiooshkoff's talent was formed chiefly by the literature of Italy, which he studied and imitated from his early youth. His poetry is distinguished by the great finish of his verses and their harmony, which sometimes remind one of the Italian language. No Russian author has shown so much delicacy, precision, and expressiveness of language as Batiooshkoff, both in poetry and in prose. His chief productions are:—'The Dying Tasso,' an elegy, which may be considered the most classical production in the Russian language, by the depth and truth of feeling, and the eminent art of the composition. All his poetical productions have an elegiac character. He did not compose much; the best of his writings, besides that which we have mentioned, are the 'Russian Captive,' and the 'Phantom,' imitated from the French of Parny. His prose writings, on different literary subjects, are marked by talent and a moral tendency.

John Kosloff, born in 1780, received a good education, and spent a great part of his life among the fashionable circles of Moscow and St. Petersburg: when about forty years of age a severe illness deprived him of the use of his legs, and his consequent retirement from the world directed his mind to literary occupations and developed his talents. Kosloff was already thoroughly acquainted with the languages and literature of France and Italy, and he now devoted himself to the study of English literature. He was doomed to a still severer trial by the loss of his sight. Yet this accumulation of misfortune broke not his spirit, but rather developed his poetical genius. He learnt German, notwithstanding his blindness, in a very short time. His memory was so powerful that he retained all that he ever read; and he translated Byron's 'Bride of Abydos' from memory. He composed and translated many small poems, which are characterised by an extraordinary harmony of versification: the most remarkable are 'The Monk' and 'The Venetian Night.'

Alexander Voyeykoff, born in 1773, translated Virgil, and several poems of De Lille, and wrote a descriptive poem entitled 'Arts and Sciences,' as well as satires, epistles, and other minor poems. He is also known as one of the first literary critics in Russia.

Dionysius Davidoff, a general officer of cavalry, who distinguished himself in the partisan or guerilla warfare during the campaigns of 1812-14, is the author of many fine poems, which being generally written in the midst of the occupation of war, have something inimitably wild and original. Baron Delvig died very young, but left some beautiful songs, and the first attempt towards a history of the arts in Russia. Anna Bunin, born in 1774, in the government of Rezan, received a scanty education, but a natural love for literature overcame all the difficulties of her situation. She was 27 years old when she came to St. Petersburg, where she began diligently to study French, German, and English, as well as mathematics and Russian literature. She soon expended her little means of subsistence; but her first poetical essays, entitled 'The Inexperienced Muse,' were favourably received by the empress Elizabeth, the wife of Alexander, who granted her a small pension; and the poems which she published subsequently obtained such success as to give her competence and reputation. She had the misfortune to be attacked by cancer, which resisted the skill of the best physicians. Supported by the bounty of the emperor Alexander, she came in 1815 to England for medical advice, but without deriving any benefit from it. She returned, after a residence of two years in England, to St. Petersburg, where she continued to linger till death released her from her sufferings, which had lasted seventeen years. Although she was prevented by illness from actively pursuing her literary occupations, she translated twenty of Blair's 'Sermons.'

Among the remaining poets of the present period we may mention Panayeff, author of eclogues; Krukofski, author of some tragedies; Raich; Katenin; and Viskovatoff, the translator of several foreign poems. We shall conclude with one who became celebrated by his talents, his daring spirit, and his tragical end.

Rileyeff acquired great celebrity in Russia and abroad as the chief promoter of the conspiracy against the present form of government in Russia, which ended in a fruitless attempt on the accession of the present emperor, in the beginning of the year 1826. Rileyeff was first known by translating from the Polish some of the historical ballads of Niemcewicz, and he also wrote similar compositions on subjects from Russian history. All these poems, like those of Niemcewicz are animated by a patriotic and liberal spirit. Rileyeff developed his political views chiefly in his tales 'Woynarowski' and 'Nalevayko.' The first is a history of a chief of the Ukraine, nephew of the celebrated Maseppa, who while an exile in Siberia for his share in the attempt of his uncle to liberate, with the assistance of Charles XII., the Ukraine from the oppression of the Czar, relates his adventures to the German Müller, who met with him during his travels in Siberia. The most daring opinions expressed in beautiful verses are put into the mouth of the hero of the tale, although they are accompanied with notes condemnatory of them, or explaining them to be harmless, in order that permission to print them might be obtained from the censors, a stratagem which had the desired effect. The other poem 'Nalevayko' is the history of a hetman of the Ukraine, who was beheaded at Warsaw for a revolt against the Polish dominion. Only fragments of it appeared in the 'Northern Star,' an annual edited by the author and Bestujeff. The most striking is the confession which Nalevayko makes to a priest before raising the standard of insurrection, and the author has predicted his own fate, in an answer which Nalevayko gives to the priest, who represents to him the danger of his enterprise? His answer is as follows, expressed in beautiful verse: 'I know that peril awaits him who first rises against the oppressors of the people. Fate has already devoted me, but say when and where was freedom attained without sacrifices? I know that I shall perish for my native land, and I bless with joy my destiny.'

Rileyeff displayed during his imprisonment and trial, as well as at his execution, a firmness of character which inspired his judges with respect; and he was, according to universal opinion, a victim to his sincere convictions. He was executed in July, 1826, with four other leaders in the conspiracy.

Admiral Shishkoff, who was also president of the Russian Academy, and minister of public education, was distinguished as a prose writer. Besides the dissertation on the old and new Russian style, which has been already mentioned, he was the author of various literary works, and several relating to nautical science.

Alexis Merslakoff, professor of literature at the university of Moscow, is undoubtedly the first literary critic in Russia. He has translated several works relating to the theory of literature, and has written original works on the same subject. The most remarkable are his lectures on literature, which were delivered at Moscow.

Alexander Vostokoff is the author of a Slavonian grammar, and a dissertation on that tongue, which have gained him the reputation of being the first Slavonian scholar in Europe.

Nicholas Grech is the author of a course of Russian literature, a Russian grammar, and a great number of minor compositions, which are inserted in the periodicals, 'The Northern Bee,' and 'The Son of the Fatherland,' which he had edited: he is now one of the first critics in Russia.

Thaddeus Bulgarin, born in 1789, of an antient family in Lithuania, was educated at the military school of St. Petersburg. He served in the Russian guards during the French and Swedish wars; but in 1810 he left the Russian service, and having entered the Polish army of the grand-duchy of Warsaw, he joined the French armies in the campaigns of Spain, Germany, and France, till the peace of 1814. On his return to his native land, he published several compositions in the Polish language, but having gone to St. Petersburg on account of some law business of his family, he was induced by some of his early friends to try his talents in the field of Russian literature. His first attempts were successful, and he established, in 1823, a periodical called the 'Northern Archives,' which contained essays, historical, geographical, and statistical, and continued many years with great success. He is best known by his novel 'Veejighin, or the Russian Gil Blas,' which is a satire on Russian manners; but his pictures, although cleverly drawn, are often overcharged: it has been translated into several languages, and into English. 'The False Demetrius,' an historical novel, contains many good pictures of the manners and customs of Russia and Poland at the beginning of the seventeenth century, and several well-drawn characters; but there is perhaps too much of pure historical narration. Besides 'Mazeppa,' an historical novel, he has published Memoirs of his campaigns in Spain, a large work on Russia, its geography, statistics, history, and literature, and many minor compositions. His works are characterised by great talent of observation, and much wit; and his style is excellent.

Alexander Bestujeff (born in 1795) was educated in a military school, and served as an officer in the life-guards. Being implicated in the conspiracy of Rileyeff, he was de-

Google

graded to the rank of a common soldier, and sent into the interior of Siberia. He was seen there by the German traveller Ermann, to whom he addressed, in French, an exceedingly clever letter, which contributed to obtain his pardon, and he was sent as an officer to the army of the Caucasus, where he was killed, in 1837, in a skirmish with the Circassians. Before his exile Bestujeff edited, with Rileyeff, the first Russian annual, entitled the 'Northern Star,' in which he wrote a very clever sketch of contemporary Russian literature, and several little novels. After he was pardoned, he wrote several novels under the name of Marlinski. In these works he displayed an uncommon talent in describing romantic scenes of a wild character, a power which was developed by the excitement of a constant warfare with the Caucasian mountaineers, in which he spent the last years of his life. His last work is 'Amaleth Beg,' a novel, containing the story of a Circassian chief, and animated sketches of Caucasian scenery. The best Russian novelist is undoubtedly Zagoskin, whose works belong to that branch of the novel to which Scott has given celebrity. His 'Youri Miloslavski, or Russia in 1612,' which has been translated into English, contains an admirable picture of Russian manners in those troubled times, and some exceedingly well sketched characters. His 'Roslavleff, or Russia in 1812,' is considered inferior to the other work: perhaps being obliged to describe scenes relating to a modern event of so much importance, he could not free himself entirely from many personal considerations. The other novelists of Russia are Ooshakoff, Dahl, Prince Odoyevski, Baron Korf, and Massalski, who also has written in Polish. The Russian literature is very rich in translations of foreign novels.

The present literature of Russia is producing many historical works. Ustrialoff has written, by order of the government, a history of Russia for the use of schools. It is certainly an able production, but the fairness of its views may be doubted, as it is a kind of defence of the successive usurpations of Russia on Poland. Polevoy, a merchant of Moscow, published a history of Russia, in which he attacked many of the views that were adopted by Karamsin. Polevoy is well known as the successful editor of a literary periodical called the 'Telegraph.' Polgodin has made some valuable researches into the period of the false Demetrius, the Annals of Plescov, &c.

Berg (died in 1834) published a history of the reign of Michael Federovich (1832), of Alexey Michaelovich (1834), and of Fedor Alexeyevich (1835). Several other special histories relating to Russia have been recently published. The campaigns against the French and the Turks have furnished materials for several works, among which there is one on the war of 1812-14, which was written by a female who had served in that war. Great attention is now paid in Russia to the collecting of materials relating to the national history. A systematic collection of various accounts of Russia, by Artzibashoff, is now publishing at Moscow. A similar work, under the title of the 'Library of Foreign Authors who have written on Russia,' was begun, in 1837, at St. Petersburg, by Semenoff, who promises to furnish the translation of one hundred foreign works on Russia. Several learned men have made successful researches in foreign countries relating to Russian history. Many works on the geography and statistics of Russia have lately been published. The most important of these are—the 'Military Geography of Russia,' by Yasikoff, 1838; 'Contributions to the Knowledge of the Russian Empire and the adjacent Countries of Asia,' is a very interesting work, which was commenced by the Academy of Sciences in 1830, and two volumes have appeared. The work on the Caucasian provinces, by Chopin, 1840, gives many new details on those countries. Many travels in different parts of Russia, as well as abroad, have been recently published.

The study of the Oriental languages is much encouraged in Russia. Besides the Oriental Institute at St. Petersburg, where all the principal languages of the East are taught, and which possesses a splendid Oriental library, numismatic cabinet, and a printing establishment for Oriental publications, there are chairs of Arabic, Persian, and Turkish in all the Russian universities. The university of Cazan, being situated in a country partly inhabited by a Mohammedan population, and having a great intercourse with the East, is specially endowed with the means requisite for Oriental studies. There are chairs of the Arabic,[*] Persian, Turkish, Chinese, Mongol, Armenian, and Tibetan languages, as well as rich collections of Oriental books, manuscripts, and coins. There is also a printing-press for Oriental works, whence the celebrated 'History of the Tartars,' by Abulgazi Khan, and other important works, have issued. The same university has a stipend for fourteen scholars, who devote themselves exclusively to the study of Oriental languages. The ecclesiastical seminary of Irkutsk has a separate class for missionaries among the Mongolian tribes. Japanese is taught in the gymnasium of the same town, and a special school for the Chinese was established in 1835, at Kiakhta.

Joseph Senkowski, a Pole, having completed his education at the university of Vilna, studied the Oriental languages at Constantinople and in Syria, where he resided for some time among the Maronite Christians. Senkowski is one of the most remarkable linguists of his time; he possesses not only a great knowledge of the languages of the East, but also a great familiarity with those of the West; he has published several well written things in the Polish (which is his native language), the Russian, and the French. He is now the chief editor of the 'Encyclopædical Dictionary,' to which he has contributed many valuable articles on Oriental subjects. His works display great learning, and a lively although somewhat satirical humour. Kowalewski, also a Pole, and a pupil of the university of Vilna, is now professor at Cazan. He is distinguished by his great knowledge of the Mongol languages, which he studied for several years among the native populations. He published, in 1838, very valuable extracts from the Mongol literature. The most eminent Chinese scholar of Russia is father Hyacinthus Bichoorin, who was for seven years a pupil of the Russian mission at Pekin, and subsequently for seven other years at the head of that mission. His principal works are—'Researches on Mongolia;' a 'History of the Calmucks,' 1834; and his 'Chinese Grammar,' which is considered to be the best that exists. There are also several foreign Orientalists of great eminence employed in Russia. Many scientific works have been recently published, and an 'Encyclopædical Dictionary' has been commenced. This work seems to have been formed on too extensive a plan, as the fifteenth volume (thick 8vo., printed with small type in double columns) has only reached the beginning of the letter D, the fifth in the Russian alphabet. It contains many well written articles, particularly on Slavonian and Oriental subjects. It contains the most minute details relating to Russia, but many of the geographical articles are too elaborate for a work intended to be popular. This work when completed will make about fifty volumes. The publication has been suspended, owing to the failure of the publisher.

In 1839 there were fifty-three Russian newspapers and periodicals, many of which were devoted to literature and science in general, as well as some special branches, as, for instance, military art, agriculture, technology, mining, &c.

The tendency of the present government is decidedly to destroy the provincial characteristics which are preserved in different parts of the Russian empire, and which had been respected under preceding reigns. We have in another place described the efforts of the Russian government to destroy the Polish language. [POLISH LITERATURE.]

The German nationality of the Baltic provinces (Livonia, Esthonia, and Courland) had been scrupulously respected since their incorporation with Russia. All the official transactions were in German, and the public education, which was under the superintendence of the university of Dorpat, was conducted in the same language, whilst the Russian was only taught like any other foreign language. These privileges are now beginning to be gradually undermined by successive enactments respecting the public education in the Baltic provinces. Not only the acquisition of the Russian language has been imposed on all the pupils in the public schools, but no one can be admitted as a teacher in these schools who cannot show his ability in the Russian language; and those teachers who are already employed are enjoined to acquire a competent knowledge of the Russian.

An Imperial ukase has decreed that from the 10th of December, 1845, no academical degrees shall be conferred by the university of Dorpat on individuals who shall not be able to show in a strict examination a complete knowledge of the Russian language. These measures are evidently preparatory steps for replacing the German language by the Russian in the public schools of the Baltic provinces.

---

[*] A Koran was printed in Arabic at St. Petersburg about the year 1820.

Many new regulations respecting the admission of pupils belonging to the different ranks of society have been lately introduced, and the admission of serfs to the higher schools is stictly prohibited unless they have been previously emancipated.

Polish Language and Literature.—The Polish language is considered to be more flexible and euphonic than the other Slavonian dialects. In conciseness of expression it can scarcely be surpassed by any other language. The nouns have a declension of seven cases, and the verb is equally well developed. The verb also has some delicate shades of distinction as to tenses and genders which do not exist in the Teutonic or Romanic languages. The juxtaposition of numerous consonants gives the language an appearance of harshness, but the consonants are softened in the pronunciation by melting them together. The Polish is the only Slavonian language which contains the nasal sounds like the French *en, on, in*, which are represented by the letters *a* and *e*, undermarked with a ʻ. The Polish language can imitate with great ease the beauties of classical prose, but it has not the same facilities for poetry, as all the words have the accent on the penultimate syllable. It seems to have separated at an early period from the other Slavonian dialects, and owing to the predominance of Latin since the introduction of Christianity, its forms have been moulded into those of that language, although its original purity was not affected by the admixture of foreign words, except in the transient period of a corrupted taste. Of all the Slavonian dialects it comes nearest to the Bohemian language.

Literature.—Learning was introduced into Poland by Christian missionaries, and particularly by Benedictine monks. During the middle ages there were parochial schools in Poland, and the statute of the archbishop of Gnezno, A.D. 1237, ordered that no German masters should teach Latin in these schools, unless they knew Polish. The earliest literary productions that have come down to us are chronicles; and the earliest known annalist is the biographer of St. Adalbert, who is mentioned by Martinus Gallus. Gallus wrote his chronicle between 1110-1115, and is supposed to have been a Frenchman who had settled in Poland. Mathias, bishop of Cracow (died in 1166), wrote a chronicle, which was used in the composition of his Annals by Vincent Kadlubek, also a bishop of Cracow, who died in 1223. Boguchwal, bishop of Posnania (died in 1253), wrote the Annals of Poland to the year 1249, which were continued by Baszko Custos, of the same town, to the year 1273. There are several other annalists of the thirteenth and fourteenth century, but the most celebrated Polish author of that period is the well known Martinus Polonus, whose family name was Strzempski; he is the author of a chronicle of the popes and emperors. He was a Dominican monk, confessor to the pope, and was nominated archbishop of Gnezno, but died on his way to Poland, at Bologna, in 1279. All these chronicles were in Latin. The most antient monument of the Polish language is a hymn to the holy Virgin, attributed to Saint Adalbert (died in 1167). Dr. Bowring has given a translation of it in his specimens of the Polish poets. Some other songs and hymns belong to the same epoch. Vitellio, a Pole, about 1300, wrote a treatise on optics. At an early period the Poles resorted to the foreign universities, and chiefly to Paris and Padua. Casimir the Great laid the foundation of a university at Cracow in 1347, but it seems to have completely fallen into decay during the reign of Louis of Hungary (1370-82). In 1400, Vladislav Jagellon founded, according to the last will of his queen Hedvige, a university at Cracow. This learned establishment, which was honoured with the name of the 'daughter of the Sorbonne,' was at first engaged in teaching divinity and scholastic philosophy; classical learning began to flourish there only in the latter part of the fifteenth century. Gregorius of Sanok, who afterwards died in 1477, as archbishop of Leopol, first explained the text of Virgil. He also boldly attacked the scholastical philosophy, which he called 'somnia vigilantium.' John of Glogov (died in 1509), a professor and canon of Cracow[*], became known through Europe by his works on different parts of the Aristotelian philosophy. He also attempted to establish a system of phrenology. His work 'Quæstiones Librorum de Anima,' printed at Metz in Lorraine, 1501, contains the figure of a head with points indicating the seats of the various intellectual powers. He divides the brain into three compartments· the front, the middle, and the back; each of which is supposed to be the seat of different faculties, as apprehension, imagination, judgment, memory, &c. He admits however the existence of an immaterial intellect, or virtus divina, whilst the other faculties depend on material organs. A treatise by him, 'De Arte Memorativa,' was published at Cracow, 1504. John Stobnitzki, who succeeded John of Glogov in the chair of philosophy, published several treatises on metaphysics, and natural and moral philosophy, as well as on geography. Brudzewski, professor of mathematics at Cracow, published several works on astronomy before the year 1500, and had the honour of being the instructor of Copernicus. James of Kobylin, one of Brudzewski's disciples, wrote a work, celebrated in its time, entitled 'Declaratio Astrologica,' and Martin of Olkusz, who terminated his studies at Cracow, 1459, became afterwards physician and astrologer of Mathias Corvinus, king of Hungary, and assisted Regiomontanus in the composition of his 'Tabulæ Directionum Planetarum.'

King Casimir Jagellon (1446-1492) determined that every superior magistrate should be conversant with Latin and the sciences of that time. He intrusted the education of his children to Dlugosz, who may be considered as the first historian of Poland (1415-80). He was a man of great learning and superior talents, which is proved by the numerous diplomatic missions in which he was employed. He collected the antient chronicles, and formed of them a whole system of history, supplying their deficiencies from different public and private records. His work reaches to the year 1480, in which he died, and it becomes much more detailed and displays better judgment towards the end than in the early part. His Latin is not better than that which generally prevailed at that period. As a proof of his industry we may mention that he learned Russian at an advanced age, in order to profit by the chronicles written in that language. He tells us with sincerity what he believes to be the truth, without sparing the clergy, and this is supposed to be cause why his work was printed so late (1615): it has been reprinted many times. After Dlugosz's death the education of the royal princes was continued by the Italian scholar Buonacorsi, better known under the name of Callimachus Experiens, who published some works in his adopted country.

Augustan Æra of Polish Literature.—The brilliant æra of Polish literature begins with the sixteenth century and extends to the early part of the seventeenth: it may be considered as commencing with the accession of Sigismund I., in 1508. It was during this reign that the human mind received a new impulse from the Reformation, and the translation of the Bible tended in Poland, as well as elsewhere, to improve the national language. Poland was well prepared for this revolution by the Hussite doctrines which had circulated there widely during the preceding century. Sigismund I. was of a tolerant disposition, and his answer to Eckius, the antagonist of Luther, who had sent him the book of Henry VIII. against that reformer, 'Permitte mihi ovium et hircorum rex esse,' shows his opinion on this then all-engrossing subject. By an ordinance in 1539 he established the liberty of the press, but this permission was only required for the royal towns, as the privileges of the nobles prevented the king and the clergy from interfering with anything on their own estates. These privileges, which paralyzed the power of the clergy, facilitated the diffusion of the Reformation, as every noble who had embraced its doctrines gave the Roman Catholic church to a Protestant minister. Under the reign of his son and successor Sigismund Augustus, Protestantism made further progress, and the states, which assembled after his death in 1573, acknowledged the perfect equality of all Christian confessions.

The translation of the Scriptures into the vernacular languages was the first general consequence of the Reformation, and Poland was no exception to this universal rule. Not only did Protestants make great efforts to spread the Scriptures, but the Roman Catholics, in order to counterbalance the influence of the Protestant versions, published their own. The first translation of the Scriptures into Polish was the New Testament, by Seklucyan, a Lutheran version, published in 1552 at Königsberg. It was followed by the

---

[*] For some time it was customary to choose bishops from the professors of the university of Cracow, a circumstance which made the Polish prelates renowned for their learning, and several of them distinguished themselves at the council of Constance (1414-1418) Zbigniev, bishop of Cracow (died in 1453), was celebrated for his learning and virtue by Æneas Sylvius Piccolomini, afterwards Pope Pius III.

New Testament of Scharfenberger, a Roman Catholic version, Cracow, 1556; in 1561 appeared a Roman Catholic version of the whole Bible by John Leopolita, and in 1563 a Protestant version was published at Brest in Lithuania; this last-mentioned Bible, being published at the expense of Prince Radziwill, is also known under the name of the 'Radziwillian Bible.' In 1566 a Socinian version of the New Testament, by Falconius, appeared at Brest; and in 1572 a version of the whole Bible at Zaslav in Lithuania, by Budny, a Socinian; this latter translation is considered exceedingly correct, but the notes which Budny added were of such a character that he was expelled by the Socinians from their congregation as an infidel. In 1577 there appeared at Rakow a New Testament, by Czechowicz, a Socinian; in 1599, at Cracow, the Bible, by Wujek, a Jesuit—this edition, which was accompanied by a copious commentary, is considered canonical. In 1606 appeared at Rakow a New Testament by Smalcius, a Socinian; in 1617, at Cracow, the Bible, by Justus Rabe, a Jesuit; and in 1632, at Danzig, the Bible, by Paliurus, a Protestant. Thus Poland has eleven versions of the Bible and New Testament, which together have gone through more than forty editions. The chief productions of that period were polemical writings, which, although they did not immediately promote the national literature, contributed greatly to the general diffusion of knowledge by obliging the authors of those writings to severe study in order to answer the attacks of their antagonists.

Schools were also generally established by the Protestants; but the most celebrated was that of Rakow, a Socinian academy, which was attended by students of different confessions, and had a reputation all through Europe. The principal theological authors of that period among the Roman Catholics are, Hosius, Novicampianus (Nowopolski), Kuczborski, but particularly the Jesuit Skarga, the most eloquent preacher of that country, and the author of several works against the Protestants, and Sawicki, also a Jesuit, who wrote under the assumed name of Cichovius. Among the Protestants, there were Turnowski, Gregory of Zarnowietz, Dambrowski, Volanus, and John Laski or Alasco, who was invited by Cranmer to assist at the Reformation of the Anglican church.

The national language, having received a new impulse from the translation of the Scriptures, began to be generally cultivated. The first compositions were spiritual hymns and polemical and religious works. Nicholas Rey (1515-1568), having become a zealous Protestant, published a translation of the Psalms, a Postilla or explanation of several parts of the Scriptures, and other works of a religious as well as purely literary character; his style is now obsolete. John Kochanowski (1530-1584) received a superior education at Padua and Paris. On his return to his native country he was much patronised by the king and the first grandees: he rejected all the brilliant offers of preferment both in the church and in civil employment, and settling on his paternal estate, devoted himself to literature. His poetry is still classical, and it breathes a particular sweetness.* He translated the Psalms, the 'Phænomena' of Aratus, the third book of the 'Iliad,' and Vida's poem on Chess. Among his original productions several lyrical poems, but particularly his elegiac lines on the death of his young daughter, are beautiful. He wrote several occasional poems, satires, and the first drama in Polish, on the Greek model, with chorusses. The subject was the dismissal of the Greek ambassadors who came to claim Helena from the Trojans. He also wrote various fragments in prose, and four books of Latin elegies, as well as other poems in the same language, all of which are much admired. His brother Andrew Kochanowski translated the 'Æneid,' which was published in 1590; and Peter Kochanowski made a translation of the 'Gierusalemme Liberata' of Tasso, and the 'Orlando' of Ariosto Szarzynski, a young man (died in 1581), who left some sonnets, hymns, and a translation of a few Psalms, is only second to Kochanowski. Valentine Brzozowski, a Protestant clergyman, published (1554) the first Polish collection of sacred hymns set to music. Mathias Rybinski, also a Protestant clergyman, published a translation of the Psalms which was adopted by the Protestant congregations of Poland. His son John Rybinski wrote some beautiful descriptive poems, one of which is 'Spring.' Zbylitowski was the author of the 'Village,' a didactic poem on rural economy, besides other productions chiefly of a satirical character. Grochowski, Miaskowski, and Klonowicz, are renowned for the beauty of their verses. Szymonowicz or Simonides, who belonged to a burgher family of Leopol (1558), distinguished himself not only by his beautiful Polish eclogues, but acquired a European reputation by his Latin poems. Justus Lipsius called him the Catullus of Poland. From his youth he was known to the great Zamoyski, who attached him to his person, made him the tutor of his son, and liberally provided for his support. Pope Clement VIII., who had been nuncio in Poland, held him in great esteem, and conferred on him the honour of a laurel wreath. His earliest works have gone through several editions; his Latin poems were collected and published at Warsaw in 1772, by the papal nuncio in Poland, Angelo Durini, who bestows on him the appellation of the Latin Pindar. Zimorowicz (died in 1624, at the early age of 25) translated Moschus, and wrote several original idyls. We may add to the Bucolic poets of that time Gawinski and Chelchowski.

The Latin poets of that period, besides J. Kochanowski and Simonides, are the following:—Krzycki, archbishop of Gnesno, and primate of Poland, distinguished himself in diplomacy; and when king Sigismund I. acknowledged as sovereign duke of Prussia, under the suzerainty of Poland, Albert of Brandenburg, the last grand-master of the Teutonic order, who had become a Protestant, Krzycki wrote a pamphlet in defence of that transaction, which was the first legal recognition of the secularisation of a Roman Catholic religious order by its conversion to Protestantism. It was therefore no wonder that the clergy said that his pamphlet was more politic than Catholic. Krzycki corresponded with many eminent scholars of his time, but particularly with Erasmus, who bestowed extraordinary praise on his accomplishments, and particularly on his Latin poetry, which is compared by all competent judges with the best productions of antient Rome. Dantiscus, son of a burgher of Danzig, rose by his services to the episcopal dignity of Varmia, was employed principally on diplomatic missions, and became such a favourite of Charles V. that he was the only foreign ambassador who accompanied him to Spain after the battle of Pavia, A.D. 1525. He died in 1548, at 83 years of age, and left several Latin poems which were much commended by contemporary scholars, and particularly by Erasmus. Janicki, the son of a peasant (1516-1543), was educated by the liberality of Krzycki, and gained a great reputation when only ten years old. He remained a long time at Padua, and in other parts of Italy, and when he was only twenty years old, Pope Clement VII. crowned him with a laurel wreath. His poems are compared by many Polish and foreign authors with those of Tibullus and Catullus: they were collected and published at Leipzig by Böhm, in 1755, with the following title: 'Janitii Poloni Poetae Laureati Poemata,' &c. The best of them are of an elegiac character. The poems of Casimir Sarbiewski are well known to every lover of Latin literature, and he is universally admitted to be the first modern Latin poet. The other Latin poets of that period are Malinski, Szamotalski, Marszewski, and Kobylinski.

We must not omit mentioning a remarkable person, the particulars of whose life are unknown to us, but it appears that he lived for some time at Venice, and was a great friend of Aldus Manutius. His facility of making verses seems to have been extraordinary. He published a program in which he offered to answer on Candlemas-day 1584, in the church of St. Paul at Venice, in verse, any question that was addressed to him on divinity or Aristotelian philosophy. He published at Venice, in Latin, a laudatory poem on Zamoyski, surnamed the Great, to which are appended six dithyrambs in the following languages: on Gideon, in Hebrew; Epaminondas, in Greek; Fabius Maximus, in Latin; Gran Capitan Hernando Gonzales de Cordoba, in Spanish; Marco Antonio Colonna, in Italian; and John Tarnowski, in Polish.

The same period produced many eminent prose writers in the Latin as well as in the native language. The most deservedly celebrated of them is Andrew Modrzewski, who was born in 1506. He early embraced the opinions of the Reformers, although he never publicly joined any of the Protestant confessions which were established during his lifetime. In 1534 he went to Wittemberg, where he completed his studies under the direction of Melanchthon, whose friendship he fully possessed. After having resided in several parts of Germany, he returned to his country, and having become secretary to Sigismund Augustus, gained the unlimited confidence of that king. His most celebrated work is 'De Republica Emendanda,' which was declared by John Justiniani, a celebrated professor of Padua, Peter Martyr, and some other eminent scholars, to be the best political work of that period. It has been translated into German, French, and Spanish; a Polish translation appeared in 1577. The work is divided into 5 books: 1, De Moribus; 2, De Legibus; 3, De Bello; 4, De Ecclesia; 5, De Schola. This last is decidedly of an anti-Roman Catholic tendency. It was published at Cracow in 1551, and at Basel in 1554-1559.

---

* Some of his poetry has been translated into English by Dr. Bowring.

Orzechowski (Orichovius), born in 1512, was a Roman Catholic priest, who, having married a wife, maintained an animated dispute with Rome about the lawfulness of the marriage of priests, and became celebrated over all Europe by the eloquent invectives with which he attacked the papal power. He was afterwards reconciled to the church, and became as zealous an advocate of the papal authority as he had formerly been its opponent. Besides his polemical writings, he wrote several works of a political and historical character. His writings in Latin as well as Polish are distinguished by great beauty of style, but disgraced by extreme violence, which was however perhaps well calculated for producing a momentary effect. Being a zealous advocate for a war with the Turks, he supported his views by pamphlets; he wrote also Annals of Poland, but comprising only a short period. The number of pamphlets which he published on several occasions is about 50: the most remarkable is entitled Chimæra,' which was directed against the opponents of Rome, in which he attempts to establish the temporal authority of the pope.

Goslicki, bishop of Posnania (1537-1601), is the author of a valuable political treatise entitled 'De Optimo Senatore,' Venice, 1588. It was translated into English by Mr. Oldisworth, and published under the title of the 'Accomplished Senator,' in 1733, London. Adam Burski published, in Latin, at Zamosc, 1604, the philosophy of Cicero, entitled 'Dialectica Ciceronis quæ dispersa in scriptis reliquit,' &c., a much esteemed work, which is attributed by many to the great general and statesman Zamoyski, who was an intimate friend and patron of Burski. Moscicki was the author of a treatise on logic, besides many theological works. Gorski published, in 1663, 'Commentarii Artis Dialecticæ;' and left in manuscript several works on history and politics. The Jesuit Smiglecki published a work on logic, which was long used not only in the schools of Poland, but also abroad; it has been often reprinted, and among other places at Oxford. Petrycy published at Cracow, 1605-1618, a beautiful Polish translation of Aristotle's politics, ethics, &c.

The principal historians of this period are Mathias of Miechow (died in 1523), who wrote 'Descriptio Sarmatiarum Asianæ et Europeanæ,' and 'Chronica Polonorum usque ad annum 1504·' both these works had for some time great celebrity, being the first Polish histories which were printed, and they went through several editions in different countries. In the first work he defended his country against the aspersions of Æneas Sylvius, who wrote against Poland out of spite for the loss of the rich bishopric of Varmia, which was refused to him by the king, although granted by the pope. Martin Kromer (1512-89) was the son of a peasant, but rose by his services, chiefly in the diplomatic line, to the dignity of a bishop. He was the author of a work, 'De Origine et Rebus Gestis Polonorum Libri xxx,' Basil., 1555, which has been often reprinted; and 2, 'Polonia, sive de Situ, Populis, Moribus, Magistratibus, et Republicâ Regni Poloniæ Libri Duo,' Basil., 1568, also often reprinted, and among others by the Elzevirs. It is an admirable geographical and statistical sketch of Poland. Herburt, an accomplished lawyer, wrote a history of Poland in Latin, Basil., 1521; it was reprinted several times, and a French translation of it appeared at Paris in 1573. Neugebauer (died in 1618), a native of Prussia, left two works: 1, 'Historiæ Rerum Polonicarum Libri vii.,' Francofurti, 1611; and a continuation of the same work, entitled 'Hist. Rer. Pol. concinnata et ad Sigismundum III. usque Libris x. deducta,' Hanoviæ, 1618. In addition to an historical sketch, these works contain a political and physical description of Poland; they had considerable reputation abroad, although they are in fact nothing better than abridgments of Kromer and some other Polish historians, a fact which the author does not state.

Count Alexander Guagnini was a native of Italy, but having long served in the army of Poland, he was naturalised, and died in that country in 1614. He wrote 'Sarmatiæ Europeæ Descriptio,' Cracow, 1578, which has often been reprinted in the original text, and in Italian in Ramusio's collection, Venice, 1588. Guagnini was accused by Stryikowski, who had served under his orders, of having published his manuscript under his name. This accusation, made by a contemporary author, and not contradicted by Guagnini himself, appeared to be so well founded, that Mitzler, in his collection of Polish historians, printed this work under the name of Stryikowski, without even mentioning that of Guagnini; yet the critical acuteness of the learned Lelewel has disproved the imputation of this gross plagiarism against Guagnini, whose work is composed with much more method and order than that of Stryikowski. This last-named author published in Polish a 'Chronicle of Poland, Lithuania, and Russia,' Königsberg, 1582, and Warsaw, 1766. It is deficient in methodical arrangement, and in historical criticism, and is also disfigured by numerous absurd verses, for the author always describes the most important events in rhyme. Notwithstanding all these defects, it is a valuable work on account of the information which it contains, and which the author collected from traditions, manuscripts, and other sources no longer extant. Stryikowski himself was a very remarkable character (born 1547). He was educated at the university of Cracow, and continued his studies in several universities of Italy and Germany; for some time he served in the army. Having accompanied a Polish embassy to Constantinople, he made a voyage in the Levant, and was taken by pirates, on which occasion he lost his manuscripts, and remained several years in captivity until his family paid his ransom. On his return to Poland, he took orders, and died in 1600 as archdeacon of Samogitia. The anecdotes and traits of his adventurous life, which he sometimes intermingles in his narrative, give a romantic interest to his work. Lucas Gornicki (1520-80), secretary to king S. Augustus, wrote in Polish a history of his country from 1538 to 1572, which was published in 1637. He is also the author of the following works:—'The Road to a perfect Liberty,' 1590; and a 'Dialogue between a Pole and an Italian, on the Liberty, Laws, and Manners of Poland,' published 1616; 'The Polish Courtier, a free translation of the Libro del Corteggiano of Baltazar Castiglioni, adapted to the Polish court and manners of that time;' a Treatise on Orthography, and several translations of classical authors. His style is a pattern of purity and elegance even in the Augustan age of Polish literature.

Martin Bielski (1500-75) wrote, in Polish, a 'Universal History,' Cracow, 1550, which is characterised by the beauty of its style. He is also the author of a treatise on the art of war, and of several biographies of ancient philosophers. His son, Joachim Bielski, also wrote in Polish a chronicle of his country (Cracow, 1597), which in style is equal to the work of his father. Stanislaus Sarnicki published in 1587, at Cracow, 'Annales Polonorum et Lithuanorum Libri viii.' It contains some absurdities relating to the history of the fabulous times and the origin of nations, but the modern part is judiciously written. He was also the author of 'Descriptio Veteris et Novæ Poloniæ,' Cracow, 1585. Reynhold Heydensteyn, a learned lawyer, wrote 'De bello Moscovitico quod Stephanus rex Poloniæ gessit, commentariorum Libri vi.,' Cracow, 1584, which has often been reprinted. It is a very valuable contribution to the history of Poland, and has all the interest of historical memoirs, as the author was a witness of the events which he describes. His son, John Heydensteyn, castellan of Danzig continued the work to the year 1603, from his father's manuscripts, 'Rerum Polonicarum ab excessu Sigismundi Augusti, &c., Libri xii.,' Frankfurt, 1672. Solikowski, archbishop of Leopol (1526-1603), who took an important part in the affairs of his country, was the author of 'Commentarius Brevis Rerum Polonicarum à Morte Sigismundi Augusti,' 1579-1590, Danzig, 1647, a work not devoid of merit. Paul Piasecki, bishop of Przemysl (1583-1649), wrote a history of Europe, from 1572 till 1645, entitled 'Chronicæ Rerum Gestarum in Europa,' Cracow, 1645-48, a work distinguished by the soundness of its political views and great impartiality The author's public career was guided by the principles which he advocated in his work, and his private character was in every respect worthy of praise, yet these very qualities, which give value to his work, brought upon him many bitter enemies, and the Jesuits attacked him violently for having spoken freely of their pernicious influence in Poland, and having called the authors of the Gunpowder Plot in England 'malefactors.' Braun, who wrote a critical work on Polish literature, gives the following judgment: 'This author (Piasecki) told the truth to his countrymen as well as to foreigners; he divulged the intrigues of the papal legate, Annibal of Capua; he discovered the perjury of another legate, Malaspina; he said that the French league had nothing holy but its name; he inveighed against intolerance in Bohemia and Hungary; he raised his eloquent voice in favour of liberty of conscience; he reproached the Jesuits with teaching regicide in the schools of France, and proved the justice of their expulsion from Venice, Bohemia, and England; he brought to light their intrigues at the court of Poland, and maintained that they were the cause of the wars with Sweden, Turkey, Muscovy,' &c. &c.

Among the historians of that period we may mention Bzowski, the continuator of Baronius's 'Ecclesiastical Annals.' He was born of a distinguished family in 1567. Having entered the order of St. Dominic, he was for some time professor of philosophy at Milan, and of divinity at Bologna. On his return to Poland he was made superior of the Dominican convent at Cracow. He went finally to Rome, where he engaged in his 'Ecclesiastical History,' and remained till his death in 1637. The continuation of Baronius, which contains the events from 1198 to 1572, is comprehended in twelve volumes, of which only nine were printed. The work is written with extraordinary research, but it raised much enmity against the author by three circumstances. In the first place, by not having spoken with sufficient respect of John Scotus, surnamed 'Doctor Subtilis,' he offended all the orders which follow the rule of St. Francis; 2dly, having mentioned in a slighting manner a production of St. Hildegarda, he excited the most violent hatred of the Jesuits; and 3dly, the Elector of Bavaria was so angry with him for having written against the emperor Louis IV. of Bavaria, that he ordered his chancellor Hervart to write a refutation of Bzowski, who was ultimately compelled to retract what he had written about the emperor. Bzowski published also a great number of works in Latin, and a few in Polish. Bayle, who gives in his 'Historical Dictionary' a very extensive article on him (under the name of Bzovius), states that it has been remarked of him that it would be no exaggeration to say that Bzowski wrote more works than other persons have read. Lasicki was the author of a history of the Bohemian brethren, and of a 'Treatise on the Samogitian or Lithuanian Mythology.' John Krasinski wrote a description of Poland, entitled 'J. Crassini Polonia,' &c., Bononiæ, 1574: it was written for Henry of Valois (III. of France), when he was elected king of Poland, and contains a political description of that country. It is remarkable for the beauty of its style, and was attributed by Thuanus to the celebrated Sigonius, who was the tutor of Krasinski. This assertion was however proved to be erroneous; Sigonius only induced Krasinski to undertake the work. The celebrated geographer Cluverius (1580-1623), born at Danzig, and partly educated at the court of Poland, belongs also to the authors of that country. We must add to the list of the Polish historians, Paprocki, the author of a genealogical work on the noble families of Poland, published at Cracow, 1578, with many wood-cuts. He also wrote a similar work on Bohemia and Moravia.

Many of the works which have been enumerated were published in the collection of Pistorius, at Basil, 1582, in 3 vols., folio entitled 'Polonicae Historiae Corpus,' &c., and in the Elzevirian collection, 'Rerum Publicarum,' entitled 'Reipublica, sive Status Regni Poloniæ,' &c., Leyden, 1626.

The study of law was not neglected in Poland during this period of its intellectual elevation. A collection of laws was made, containing the code of Casimir the Great (1374), and all the enactments from that time, with the addition of Saxon or Magdeburg law, by which the towns of Poland were governed; this was the work of Raymundus Neapolitanus, and was published, by order of King Alexander I., by the Chancellor John Laski, in 1506, at Cracow. This valuable collection is the only one which obtained a legal sanction. Another collection was published by order of King Sigismund I., at Cracow, 1532; but it never obtained a legal sanction.

James Przyluski was originally a Roman Catholic clergyman, but he embraced Protestantism, and became a public notary of the district of Cracow: he arranged the laws of his country according to the Roman method, 'secundum jus personarum, rerum, et actionum,' Cracow, 1553. This work, although undertaken by order of the king, never obtained a legal sanction, which was mainly owing to the great opposition of the Roman Catholic clergy, on account of the bitter invectives against that body in which Przyluski indulged in his 'Prototypon,' which he had published as a prospectus to his work. John Herburt, castellan of Sanok whom we have mentioned among the historians of his country, published, in 1563, a collection of the laws of Poland in Latin, arranged in alphabetical order. This collection, although never formally sanctioned, was recognised in the courts, and has been reprinted several times. Collections of laws in the national language were published at Cracow in 1560, 1578, and 1581. Stanislaus Sarnicki, already mentioned as an historian, published in Polish a large work, divided into twelve books, on the laws of his country. But the most ample and best collection of the Polish laws, published during this period, is that of Januszowski, Cracow, 1600.

The mathematical sciences and the different branches of natural philosophy were also cultivated with considerable success in Poland during this period. Besides Copernicus, the university of Cracow produced several eminent mathematicians. Martinus of Olkusz (not to be confounded with another mathematician of the same name) received his doctor's degree at Cracow, and became professor of astronomy in the university of that town. This university, being invited by Pope Leo X. to present a project for the reform of the calendar, commissioned Martin of Olkusz to perform this task, which he did in his treatise 'Nova Calendarii Romani Reformatio.' Leo X. signified to the university of Cracow his entire approbation of this work; but the reformation of the calendar was postponed by the important events which agitated Europe, and particularly the church, during Leo's pontificate, and it was not effected till 1583, under Gregory XIII. The change was made however entirely according to the plan proposed by Martin of Olkusz. Although his name was not mentioned on that occasion, an autograph copy of the treatise of Martin of Olkusz has been preserved, and serves as the means of restoring the honour of the reform of the calendar to the real author. He died in 1540.

Stanislaus Grzebski (1526-72) wrote the first work on geometry in Polish, 1566. Peter Slowacki, professor of mathematics in the university of Cracow, assisted in the reformation of the calendar at Rome; and a letter of Pope Gregory XIII., giving great commendation to this mathematician, is still extant; he left almanacs. Broscius, a name Latinized from Brozek (1581-1652), canon of Cracow and rector of the university, was not only deeply versed in the mathematics, but was well acquainted with Greek, Latin, and Hebrew, metaphysics, divinity, medicine, and even music. Besides several works on different subjects, he wrote several mathematical treatises, and a defence of Aristotle and Euclid against Ramus. He was also the author of a severe work against the Jesuits.

Sendzivoy or Sendivogius (1565-1645) acquired a certain reputation over all Europe by his alchemical vagaries. Andreas Mirowski published, in 1596, a 'Theory of Winds;' Willichius, in 1523, a treatise 'De Salinis Cracovianis;' Simou of Lovicz wrote 'De Herbarum Virtutibus,' with figures, 1537; Stephen Falimierz wrote in Polish on different branches of natural history connected with medicine, 1534; Hieronymus Spiczyuski, alderman of Cracow, and physician to King Sigismund Augustus, wrote in Polish a work on animals, plants, and the birth of man, 1534—one part relating to plants, entitled 'Herbarium,' &c., was published with many additions by Siennik, in 1568; the 'Herbarium' of Martin of Urzendow appeared in 1595. But the most remarkable of all the botanical works of that period was that of Simon Sirenski, professor of medicine at Cracow, 'On the Nature and Use of Plants,' Cracow, 1614: it was published at the expense of the Princess Anna Vasa, sister of King Sigismund III., who was a great lover of botany, and left an herbarium, which was collected and arranged with her own hands. The work contains all that was known at that time, and is adorned with many woodcuts. Many authors suppose Zaluzianski, who wrote in the latter part of the sixteenth century his 'Methodus Herbarum,' in which he establishes the sexual differences of plants, a discovery which was neglected till the time of Linnæus, to have been Pole, but it is more probable that he was a Bohemian.

There were several works on rural economy, the breeding of cattle, keeping of fishponds, bees, &c.. the best is 'Hippica,' or a work on horses, by Monivid Dorohostayski, grand-marshal of Lithuania, an accomplished nobleman. This work was published at Cracow, 1603, with many fine engravings.

Works on medicine were published by Wedelicki, Cyprianus of Lovicz, Peter of Kobylin, and others; but the most distinguished physician of the period was Joseph Strut, (1510-1568), who became professor of medicine at Padua, where he acquired a great reputation by reviving the doctrine of Galenus about pulsation, in his treatise 'Artis Sphygmicæ, jam mille duceatos annos perditæ et desideratæ, Libri V., Struthio Posnaniense,' &c., Venet., 1583, a work which makes an epoch in medicine. He wrote a large number of other works: and his renown was such that he was invited to Constantinople by Sultan Solyman, whom he treated with great success. He died as physician of King Sigismund Augustus.

Military science could not be neglected in a country like Poland, which was constantly involved in war. Albert, duke of Prussia, a vassal of Poland, wrote a great work on the art of war, which he dedicated to King Sigismund Augustus, and sent to him, in German and Polish, the manuscript copy: the work has never been printed. John Tarnowski, grand general of Poland, and one of the most eminent soldiers and statesmen whom that country ever produced, published, in his own estate of Tarnow, a treatise entitled 'Consilium Rationis Bellicæ,' 1557. A great work on antient and modern military science in Polish, was published in 1569. Adam Freytag, a native of Thorn, and professor at the Protestant school of Keydany, wrote in German a work on fortification, with many engravings: printed at Leyden by Elzevir, in 1631: it was dedicated to Vladislav prince royal of Poland, and was much esteemed all over Europe.

This is a brief outline of the state of Polish literature during its golden age, which begins with the reign of Sigismund I., 1508, and ends with that of Sigismund III., 1632. We have enumerated the causes of this extraordinary development of the national intellect during that period, which is mainly to be attributed to the prosperous condition of the country, its political importance, the political and religious liberty which did not yet degenerate into licence, and the safety from every kind of oppression enjoyed by its citizens, advantages which attracted to Poland many eminent foreigners, who sought there a refuge from persecutions. The progress of literature and science in Poland was particularly indebted to the exertions of the superior ranks of society, the court, the nobles, and the higher clergy. It is a particular trait which distinguishes this period of Polish civilization, that notwithstanding the bitterness of theological controversy, which divided the country into many parties, there were numerous instances of scientific and literary intercourse, carried on with all the marks of friendship and personal esteem, between individuals who were divided by religious tenets, which they warmly defended by their writings. There are indeed instances of eminent noblemen, and even prelates, patronizing individuals who professed a different faith. But the reign of Sigismund III. wrought a melancholy change in the intellectual condition of Poland. This narrow-minded and bigoted king, during a reign of 40 years, pursued only one object, the extirpation of all the confessions that were opposed to Rome, and the establishment of an undivided papal dominion in Poland. He attained that object by sacrificing every interest of the country; and although the great number of eminent men who were educated during the fortunate reigns of Sigismund Augustus and Stephen Battory counterbalanced for some time the growing evil, the mischievous policy of the king finally prevailed, as those distinguished persons gradually disappeared. Prevented by the laws of Poland, which guaranteed perfect religious liberty to its citizens, from employing open persecution, he, or rather the Jesuits, whose tool he was, advanced this project with great success, by artifice and cunning. Sigismund III. gloried in the nickname of 'the king of the Jesuits,' by whom he was surrounded, and whose patronage was the only road to preferment.

This patronage could only be secured by a display of zeal for the interests of Rome in general, and for those of their order in particular. The king having the distribution of all the chief dignities of the state, and the gift of the starosties, or crown domains, which were granted for life, these advantages were obtained not by services to the country, but by gaining the favour of the Jesuits, whose wealth increased by private donations so rapidly, that in 1627 they had 400,000 dollars (about 100,000*l.* English money) of yearly income. Their colleges spread over all Poland, and at the close of Sigismund's reign they had 50 schools, in which a great part of the children of the nobles were educated. Their riches and the number of their schools went on increasing, for their pupils became the most ardent promoters of their views. The system of education adopted in those schools was calculated not to elevate, but to depress the understanding, and was ably exposed by the learned Broscius, who, although himself a Roman Catholic clergyman, and attached to his church, severely attacked (in a book entitled 'Dialogue of a Landowner with the Parish Priest') the retrograde movement which these priests were giving to the national intellect. Unable to avenge themselves on the author, the Jesuits persecuted the printer, who was at their instigation publicly flogged and banished. There were several Protestant schools in Poland, but some of them were destroyed, as well as the churches of the same confession, by a lawless mob excited by the Jesuits, whose protection insured the impunity of these rioters. The Socinian academy of Rakow, which was celebrated all over Europe, and where pupils belonging to different religions were educated, was abolished by a decree of the diet in 1638, in consequence of two pupils of that school being charged with having thrown stones at a cross. This measure, obtained by the growing influence of the Jesuits, was followed by the abolition of the two remaining Socinian schools, Kisielin and Beresteczko in Volhynia. The Protestant schools, generally supported by voluntary contribution, were unable to enter into competition with those of their antagonists, which had ample endowments. Many of the former schools, deriving their support from the liberality of great families, ceased to exist, or were converted into Roman Catholic establishments, as soon as their patrons returned to the old faith. The consequences of all this were fatal to the national intellect of Poland; and the literature of that country, which produced so many splendid works in Latin and in Polish, can scarcely boast of any production of merit from that epoch to the second part of the eighteenth century, which was the period during which the Jesuits had unlimited power over the national education. The Polish language, which had attained a high degree of perfection during the preceding period, was soon corrupted by an absurd admixture of Latin and barbaric phrases, called 'macaronic,' which disgraced Polish literary productions for more than a century. As the chief object of the Jesuits was to combat anti-Romanists, the principal subject of their instruction was polemical divinity; and the ablest of their students, instead of acquiring information which might enable them to become useful members of society, lost their time in dialectic subtleties and quibbles. The Jesuits, well aware that vanity is the most accessible of human weaknesses, were as prodigal of praise to their partisans as they were lavish of abuse on their antagonists. Thus the benefactors of their order became the objects of the most fulsome adulation, which nothing but the corrupted taste acquired in their schools could have rendered palatable. Their bombastic panegyrics, lavished on the most insignificant persons, were almost the only literature of the country. The censorship was established in 1618, and the first 'Index Librorum Prohibitorum' was published about that time. Not only the progress of literature was arrested by the influence of the Jesuits, but a great number of valuable productions of the preceding period were destroyed by them, in order to obliterate every vestige of heresy. The families and individuals who passed from Protestantism to Romanism surrendered their libraries to the Jesuits, who delivered them to the flames; they even purchased at a high price all books and documents relating to Protestantism, in order to destroy them. Thus although they were unable to exterminate literary productions belonging to a period of religious liberty with the same violence as they did in Bohemia, they destroyed a great quantity of valuable documents relating particularly to the religious history of Poland.

Notwithstanding this melancholy decline of mental cultivation, Poland produced, in the beginning of this period, some few authors of note. Such were Twardowski (1600-1560), author of several descriptive poems in Polish; Bardzinski, translator of Lucan and other Latin authors; Birkowski, a celebrated Roman Catholic preacher; Kochowski, a Latin poet, and author of a history of Poland from 1648 to 1675, in Latin; Rudawski, a history of Poland, 1641-

1660. Starovolski, who died in 1656, at a very advanced age, is the author of a great number of historical and biographical works. Wengierski, a Protestant clergyman, is the author of a history of the Slavonian churches; and Lubieniecki, a learned Socinian, is the author of the 'Historia Reformationis Poloniæ.' Siemienowicz, a native of Lithuania, an officer who served a long time in the Dutch armies under the Prince of Nassau, wrote a work on artillery, entitled 'Artis Magnæ Artilleriæ Pars Prima; auctore Cazimiro Siemienowicz, equite Lithuano, olim Reg. Pol. Artilleriæ Propræfecto,' Amstelodam, 1650. Death prevented the author from publishing the second part; but this work, even in its incomplete state, was considered as classical in all Europe, was translated into French and German, and the military authors of the seventeenth century cited Siemienowicz as the most important authority on all that referred to artillery. To this period belongs also the astronomer Hevelius (1611-1687), a native of Danzig, and alderman of that city, where his works were published. He was liberally supported by John Sobieski, in honour of whom he named a constellation Scutum Sobiescianum. The Protestant high school at Leszno or Lissa, supported by the powerful family of Leszczynski, attracted students not only from Poland, but also from Prussia, Silesia, Moravia, Bohemia, and even Hungary. At a time when the university of Cracow and the Jesuits' colleges in Poland, and the Roman Catholic as well as Protestant schools of Germany, followed the old methods of instruction, which were calculated only to waste the precious time of the pupils, the professors of Leszno dared to open a new road in that important field. Comenius, who acquired celebrity over all Europe by his efforts to improve the methods of education, composed for the school of Leszno his celebrated work 'Janua Linguarum reserata,' which greatly facilitated the acquisition of foreign languages. The same school was honoured by the co-operation of another learned individual, Dr. Johnstone, who acquired a great reputation all over Europe by his works, particularly on natural history. He was born in 1603, at Szamotuly or Sambter, in Grand Poland, of a family descended from the Johnstones of Craigbourne in Scotland, and which like many other Scotch families have settled in Poland. After having received a preparatory education in the schools of his native land, he went, in 1622, to England, and continued his studies there and in Scotland till 1625. He returned thence to Lissa, which he left in 1628, and studied medicine in some of the universities of Germany, and in Leyden, London, and Cambridge. Having returned to Poland, he left it after some time again as tutor of two Polish noblemen, with whom he revisited London and Cambridge, where he received the degree of Doctor of Medicine, after which he continued to travel over other parts of Europe till 1636, when he settled at Lissa. He refused the chairs of medicine which were offered to him in 1642 by the universities of Leyden and Frankfort on the Oder; but the wars which agitated Poland from 1653 to 1660 compelled him to leave that country. He retired to Silesia and remained on an estate which he had purchased, till his death in 1675. His principal works are:—'Thaumatographia Naturalis in 10 classes divisa,' &c., Amsterdam, 1632, 34, 61, and 66; 'Historia Universalis, Civilis, et Ecclesiastica, ab orbe condito ad 1633,' Leyden, 1633 and 34, Amsterdam, 1648; Frankfort, 1678, continued till that year; De Naturæ Constantia,' &c., Amsterdam, 1632; translated into English and published at London, 1657, under the title 'The History of the Constancy of Nature,' wherein, by comparing the latter ages with the former, it is maintained that the world does not universally decay, &c. 'Systema Dendrologicum,' &c., Lissa, 1648; 'Historia Naturalis de Piscibus et Cetis,' Frankfort, 1646; 'De Quadrupedibus, Piscibus, Avibus, Insectis, et Serpentibus,' 2 vols., Frankfort, 1650; this edition is much praised on account of the plates executed by the celebrated Merian; 'Idea Medicinæ Universæ Practicæ,' &c., Amst., 1662-64; Leyden, 1659. 'Hist. Nat. de Insectis,' Frankfort, 1653; 'Hist. Nat. Animalium, cum figuris,' 1657, 2 vols., translated into English and published at Amsterdam, under the title 'A Description of four-footed Beasts, illustrated by copper-plates,' &c. 'Notitia Regni Vegetalis,' Lipsiæ, 1661; 'Dendrographia, seu Hist. Nat. de Arboribus et Fructibus, Syntagma Medicinæ,' Jena, 1674; 'Idea Hygeinæ,' Jenæ, 1674. 'Notitia Regni Mineralis,' Lips., 1661; 'De Festis Hebræorum et Græcorum,' Breslau, 1660; 'Polyhistor, seu Rerum ab Ortu Universi usque ad nostra Tempora, per Europam, Asiam, Africam, et Americam, in sacris et profanis gestarum, succincta et methodica Enarratio,' Jena, 1660. The number of books which Johnstone published, and that of their editions, prove his great talents and learning, as well as the high esteem in which he was held by his contemporaries.

The wars in which Poland became involved under the reign of John Casimir extinguished the remnant of learning in that country, which was overrun by Swedes, Muscovites, Transylvanians, and the revolted Cossacks; and it was also distracted by domestic factions. Leszno was burnt with its school, in 1656, and many learned establishments, private and public libraries, shared the same fate. From that time Poland continued to be agitated by foreign and domestic wars, till it found a momentary interval of repose under the rule of the heroic John Sobieski, whose brilliant victories threw a halo of glory over the declining fortunes of Poland, although they assured no real or permanent advantage to the country. The first part of the reign of king Augustus II., elector of Saxony (elected in 1696), was agitated by the invasion of Charles XII., who dethroned him, and by his misunderstandings with the nation, which were settled by the diet of 1717. The calamities of every kind which had desolated Poland during nearly 70 years, plunged that country into a stupor, and the profound peace which it enjoyed from 1717 to the demise of Augustus III., 1763, except the transient disturbance which took place at his election, deprived it of all its energy. Poland had still a large territory, and preserved its antient institutions, but it was plunged into a kind of intellectual and political lethargy.

There were some individuals, educated chiefly abroad, who deeply felt the moral degradation of their country, and exerted themselves to awake the slumbering energies of the nation. Stanislaus Lesczinski, having been expelled from the throne of his country for the second time in 1733, became sovereign of Lorraine, where his paternal and enlightened rule proved what a misfortune it was for Poland to have lost such a king. He educated many young Polish nobles at Luneville, and made them into useful and patriotic citizens, who greatly contributed to the restoration of learning in their country. The man to whom Poland owes most in that respect was Stanislaus Konarski, who was born in 1700, of a distinguished family. At the age of seventeen he entered the congregation of the Patres Pii; and in his 25th year went to Rome, where he continued his studies for four years. He afterwards travelled through Italy and France, and remained for some time at Paris. On his return to his country he was struck with the miserable state into which it was plunged; and he perceived that among the numerous causes of mischief there was the want of a regular code of laws, and that the existing collection served only to increase the confusion. Resolving therefore to obviate that defect, he collected with great care all the laws of Poland from the time of Casimir the Great to the year 1739, which he published under the title of 'Volumina Legum,' with a learned preface on the legislation of Poland. Having joined the party of Lesczinski during the interregnum of 1733, he followed him to Lotaryngia; but returned to Poland in 1738, and devoted himself to teaching in the schools of his congregation. Being entrusted with the office of the provincial of his order in Poland during the years 1742-3-4, he reorganised its schools, and introduced a better system of instruction. He established a college at Warsaw under his own direction, wherein he educated, with the assistance of the most enlightened members of his congregation, a great number of youths, who became most useful citizens. In his works he attacked not only the corrupt state of literature and of public eloquence, but even dared to point out the vices of the constitution, and particularly the mischief of the 'Liberum Veto.' This brought on him a great number of enemies, but created at the same time many friends and admirers. His house became a point of union for the most enlightened patriots. Konarski refused the episcopal dignity, which had been offered to him several times, lest he might be disturbed in the pursuit of his useful avocation, which he continued till his death, at the age of seventy-three. This enlightened and patriotic clergyman was also a pattern of Christian piety and charity. The impulse which he gave to his congregation of the Patres Pii continued for a long time, and this congregation ranked among its members many eminent authors. Next to Konarski, the two brothers, Andreas Zaluski, bishop of Kieff, and Stanislaus, bishop of Cracow, did great service to learning

Google

in Poland by collecting at their own expense an immense library of 200,000 vols., of which 20,000 were Polish works. The former of them, who possessed extraordinary erudition, particularly in all that related to Poland, was the author of several works. They gave this splendid library to the public in 1745. Many distinguished persons patronised literature, but none so much as the family of the Princes Czartoryski. This powerful family undertook to effect a great and salutary revolution in Poland by transforming the disorderly republic into a well-organised monarchy; and as this could only be done by preparing public opinion for such a change, they sought out and patronised men of superior talents, and such as by their writings exerted or might exert an influence on public opinion. This revival of the national intellect continued to advance, notwithstanding the melancholy circumstances of the country, which lost a great part of its territory by the first dismemberment of 1772. King Stanislaus Poniatowski, although a weak man, and unfit to hold the helm of the state in such troubled times, was an accomplished scholar; and Poland owes him a debt of gratitude for having promoted national education, which is the main cause of that unconquerable spirit of nationality which continues to animate the Poles under the most adverse circumstances. He patronised literary men of merit, admitted them to his intimacy, and invited them regularly one day in the week to his table, where a perfect freedom of speech animated a lively and learned conversation. A board of public education, composed of the most eminent men of the country, was instituted in 1775; and Poland thus set the example of establishing a department for the promotion of the most important object of national welfare. The estates of the order of the Jesuits, which was abolished in 1773, were assigned to the support of schools, which were organized chiefly by the exertions of Count Ignatius Potocki, who formed a complete plan of instruction for the schools preparatory to the universities. By his advice a society for the composition of school-books was instituted, and programs for that object were issued, by which all the authors of Europe were invited to enter into competition for the prizes which were offered. The school-books which were written in consequence of this measure were introduced into the schools. The Institute of Cadets was established under the superintendence of Prince Czartoryski, where the union of a classical and military education produced many distinguished individuals, several of whom, like Kosciuszko and Niemcewicz, reflected honour on their country during the eventful times which preceded its destruction. The universities of Cracow and Vilna, which had fallen into a state of decay, were entirely re-organized and rendered highly efficient, the chairs being supplied with able professors, both natives and foreigners. The libraries and cabinets were also increased by the acquisition of books and instruments.

The Polish clergy participated in the intellectual movement which animated Poland, and the church of that country may claim for many of its members the honour of having greatly contributed to the moral and intellectual progress of the nation. Several individuals who had belonged to the order of the Jesuits distinguished themselves by their literary labours.

Adam Naruszewicz, born in 1733, of an antient Lithuanian family, entered the order of the Jesuits in 1748. He continued his studies at their college at Lyon in France; and on his return to Poland, was professor in the schools of the same order till its abolition. He was created, by King Stanislaus Poniatowski, bishop and secretary of state of Lithuania, and died in 1796. His translation of Tacitus (1772), in the conciseness and energy of the style, is equal to the original. His History of Poland, which contains the period from the establishment of the Christian religion to the death of Louis of Hungary (965-1382), first edition 1780-1786, from vol. 2 to 7, is written in a style equal to his translation of Tacitus, with much impartiality and sound criticism; and it is founded on materials collected with immense research. Death prevented Naruszewicz from completing this work; and the first volume, containing his valuable researches on the state of Poland previous to the introduction of Christianity, was published from his manuscripts only in 1824. Naruszewicz occupies an equal rank as a poet by his satires, odes, eclogues, and many successful translations of the classics, particularly of Horace and Anacreon.

Count Ignatius Krasicki, born in 1734, of a distinguished family, and destined for the church from his earliest youth, received a part of his education at Rome, travelled over different parts of Europe, and, having taken orders, was rapidly advanced, and became bishop of Warmia or Ermeland, an exceedingly rich see, with the title of prince attached to it. The diocese being seized by Prussia at the first dismemberment of Poland, he could no longer take any active part in the affairs of his country, but he continued to render it great services by his literary productions. In 1795 he was created archbishop of Gnezno, and died at Berlin in 1801. Krasicki is the most remarkable, and deservedly the most popular author of Poland. His fables, which all the children in Poland know by heart, are generally so short that they resemble epigrams: they are characterised by great wit, charming simplicity, and a pure morality. His satires may vie with the best productions of this kind in any language, and are written in the most beautiful and easy verses: they are free from every personality; they attack national but not individual foibles. He strictly adheres to the following precept, established by himself in one of his satires: Satire tells the truth, but insults no person: it honours the government, reverences the king, but judges the man.' These satires, although they scourge vice in all its forms, are written in such a tone that they may be safely read by persons of every age and sex, a praise which unfortunately cannot be bestowed on the satires of Naruszewicz. Myszeis, that is, the 'Mouseide,' or the 'War of Cats and Mice,' an heroic-comic poem, full of wit, animated description, and cutting raillery against the national faults. 'Monachomachia,' or the 'War of Monks,' a burlesque poem in six cantos, contains a witty satire on the ignorance and laziness of the religious orders. Yet although the clergy are severely lashed in this poem, the author is never guilty of throwing ridicule on religion. It is related that when the author came on a visit to Frederick II. at Potsdam, he lodged him at Sans Souci, in the same apartments which had been occupied by Voltaire, saying that he should write there something very clever, and it was in that apartment that the 'Monachomachia' was composed. This poem having irritated many persons, Krasicki wrote his 'Antimonachomachia,' in which he attacked the offended parties with so much wit and good satire, that they became reconciled to him. His epic poem, the 'War of Khotzim,' which describes the memorable events of 1621, cannot claim the name of a real epic poem, but it contains many beautiful images, and some passages which may called sublime. He also made an excellent poetical translation of 'Fingal and some other parts of Ossian, which rendered those poems exceedingly popular in Poland, and he wrote a great number of fugitive poems. Among his prose works the most remarkable are 'Podstoli,' which exhibits a virtuous landowner, a work designed to correct the defects of the Polish gentry, and which contains a beautiful picture of the national manners and customs; and a novel entitled 'Doswiadczynski' (that is, The Experienced), of a moral and satirical description. He left several comedies, which were published under the name of his secretary, Mowinski. Bohomolec (died in 1790) wrote the first comedies in Polish, the 'Lives of John Zamoyski and George Ossolinski,' &c., and he edited 'A Collection of National Chronicles.' John Albertrandy, a bishop, born of an Italian parent, devoted his long life (1732-1808) to archaeological studies and historical researches relating to Poland, for which purpose he visited several countries, and particularly Sweden. He left some valuable works on national history, of which the greatest part remain still in manuscript. Wyrwicz was the author of several esteemed historical and geographical works. Wengierski (died in 1787), was a witty and agreeable, but sarcastic poet, whose works are unfortunately tainted with the loose morality of the French school of that age. Kniaznin was a successful writer of odes, eclogues, and fables. Trembecki, who died at a very advanced age (1812), has not written much, but his poems, chiefly lyrical and descriptive, are splendid. The best is 'Sophiofka,' or a poetical description of a celebrated park in the Ukraine belonging to the countess Sophia Potocki. Francis Karpinski translated the Psalms, and wrote eclogues and songs, which are characterised by great simplicity and deep feeling, and have become so popular, that they are sung by the common people in all parts of Poland. Having received, in 1771, an estate from the king, situated in the forest of Bialaveja, a wild part of Lithuania, he remained in that rural retreat till his death in 1825, devoted to literature and to the welfare of his tenantry. He wrote also several other works, and among them an 'Autobiography,' published at Wilna, 1834.

Many literary journals appeared during this period, but the best was the 'Monitor,' which was continued from 1764 to 1784, on the same plan as the English 'Spectator,' from which it contains many translations adapted to circumstances and the national manners.

The political dissolution of Poland in 1795 did not arrest the intellectual movement by which the nation was animated. A number of patriotic citizens founded at Warsaw the Philomathic Society, with the object of promoting science and national literature. The university of Wilna, which was included in that part of Poland that was taken by Russia, received a new and superior organization, and an excellent system of public education was established, under the superintendence of the same university, in all the provinces dismembered from Poland. This was done chiefly by the instrumentality of Prince Adam Czartoryski, as a preparatory measure for the restoration of Poland under the sovereignty of the emperor Alexander, an idea which was suggested by Prince Czartoryski, and which seems to have been fondly cherished for some time by Alexander.

The patriotic exertions of Prince Czartoryski were powerfully supported by those of Count Czacki, who by his exertions established the High School of Krzemienіec, in Volhynia, which has promoted education in a very effective manner in the southern provinces of antient Poland that have been incorporated with Russia. The same Count Czacki is the author of a 'History of the Polish and Lithuanian Laws,' and other justly esteemed works.

Niemcewicz, born in 1765, and educated in the School of Cadets, distinguished himself by his eloquent arguments in favour of the introduction of useful reforms, and the abolition of antient abuses, at the diet, which lasted four years (1788-92), and which established a new constitution, by which the 'liberum veto' was abolished, and the hereditary character of the throne established. In 1794 he fought for the independence of his country as an aide-de-camp of Kosciuszko, was made prisoner with him, and kept in the dungeons of St. Petersburg till the emperor Paul released them both on his accession to the throne. He accompanied Kosciuszko to England and the United States, where he married and remained several years. He returned to his country only after the creation of the duchy of Warsaw in 1807, in order to devote his service to the re-awakened hopes of the national restoration. He filled several important offices, and after the establishment of the kingdom of Poland by the congress of Vienna, he was made secretary of the senate. During the national insurrection of 1830-31, he was created a senator by a decree of the national representation, and died in 1841, as a refugee at Paris, occupied, till his last moments, with literary pursuits tending to patriotic subjects. The numerous works published by this eminent individual are not only written with great talent, but have always a patriotic object. His principal productions are 'Historical Songs of Poland, with Music and Engravings,' a work composed with the view of rendering popular the most important events of the national history, and which has been attended with the greatest success; 'The History of the Times of Sigismund III.,' 3 vols., with engravings; 'A Collection of Memoirs relating to the Ancient History of Poland;' 'Levi and Sara, a Novel in Letters, or a Picture of the Condition of the Polish Jews,' which has been translated into English; 'John of Tenczyn,' an historical novel; 'Fables and Tales in Verse,' distinguished by their beauty, wit, and agreeable versification. He has also translated many poems from foreign languages, amongst others, that of the 'Rape of the Lock,' by Pope. John Sniadecki is equally distinguished by his works on astronomy and on literature; and his brother Andrew, by his works on different branches of natural philosophy. Woronicz (died in 1829, as archbishop of Warsaw) was an eminent poet and a first-rate preacher; but the authors who have exercised the greatest influence on their countrymen, and who enjoy the highest reputation among the Polish writers, are Lelevel and Mickiewicz.

Joachim Lelewel, born at Warsaw in 1786, was educated in his native town. He completed his studies at the university of Wilna in 1809. He became professor of history, at Krzemienietz in Volhynia in 1814, and public lecturer on the same subject at Wilna. In 1816 he was called to the newly created university of Warsaw as professor and librarian, and in 1821 he obtained the chair of history at Wilna. His popularity continued unabated till 1824, when the Russian government, taking the alarm, deprived Lelevel of his chair He retired to his native town, and continued to devote himself to his literary pursuits; but he was elected nuncio to the diet of 1829, and the revolution of 1830 called him to great activity. He was elected member of the supreme executive government, and retired, after the fall of the Polish cause, to Paris, which he was obliged to leave in 1832, at the instigation of the Russian ambassador; he remained for some time in the country-seat of his friend General Lafayette, but was finally obliged to retire to Belgium. The number of his works, which are full of the deepest historical research, is startling. The principal are a 'History of the Nations which inhabited central Europe previously to the tenth century;' 'Researches on the Geography of the Antients;' 'The History of Antient India and of its Influence on the Nations of the West;' 'The Discoveries of the Carthaginians and Greeks in the Atlantic;' besides many other works relating to the history, bibliography, legislation, and diplomacy of Poland. During his exile, he published at Brussels 'Numismatique de l'Europe en Moyen Age;' 'Histoire Numismatique de la Gaule,' &c. Many of his works are translated into German.

Adam Mickiewicz was born at Nowogrodek, in Lithuania, in 1798, of an antient family. He entered the university of Wilna in 1815, and was appointed a few years afterwards teacher in the school of Kowno. His poetical talent developed itself at an early age, but although he became in the course of his studies thoroughly acquainted not only with the beauties of classical poets, but also with those of the modern nations of Europe, his muse chose the hitherto untrodden path of the popular poetry. Mickiewicz perceived the beauties which were contained in the songs, traditions, and tales of the people of Lithuania, and he created from those materials a really national poetry. His ballads and other poems of a similar description, published in 1822, obtained at once a great and deserved popularity throughout all parts of Poland. In 1823, when the Russian government began to oppress the university of Wilna, Mickiewicz, being accused of belonging to a secret patriotic society, was kept for some time in prison, and afterwards sent, with many other young men, into the interior of Russia. His talents, agreeable manners, and high moral qualities inspired the Russians among whom he was placed with the greatest respect, and his exile proved to him a source of triumph, for he was treated with the greatest distinction, and Russians learned Polish in order to read the productions of Mickiewicz, which were translated into their language, and were no less admired by them than by the Poles. Prince Gallitzin, general governor of Moscow, attached him to his person, paid him the greatest attention, and took him to St. Petersburg, where he met with the most flattering reception in the drawing-rooms of that capital. Yet neither the favour of the Russian public, nor the most flattering distinction of the powerful which insured for him a rapid preferment and a situation of comfort and ease, could shake for a moment the patriotic feeling of Mickiewicz, which breathes in all his productions written and published during his residence in Russia. The principal of these productions are, 'Dziady,' that is, 'Ancestors,' founded on the festival of that name, which has been retained from the pagan times to the present day in Lithuania, and the object of which is to propitiate the souls of departed ancestors with meat and drink. This wild and original poem contains many beauties of the first order. 'Grazyna, a tale;' 'Ode to the Youths,' and 'Faris, or the Arabian Horseman,' both splendid compositions; a beautiful English translation of the last appeared in the 'Metropolitan Magazine,' November, 1831. 'The Polish Mother,' is a heart-rending elegy; Conrad Wallenrod,' a tale in verse, from the history of Lithuania, displays great poetical beauties, and is full of patriotic allusions to the present times. It has been translated into several languages, and a fine metrical translation in English by Mr. Catley appeared in 1841, besides one in prose at Edinburgh in the same year by Jablonski. The 'Books of the Polish Pilgrimage,' of which an English translation appeared in 1833, is a pure imitation of the Biblical language, and contains a poetical image of the past of Poland, and a prediction of its futurity. The Abbé de Lammenais took from it the idea of his 'Paroles d'un Croyant.' Both these productions, although full of a deep religious feeling, were condemned by the pope as having a democratic tendency. 'Pan, or Mr. Thaddeus,' a tale in verse, contains an exceedingly clever picture of country-life in Lithuania, and has a great value on account of its truly national character. Mickiewicz, who has been for some time professor of Latin literature at the university of Lausanne in Switzerland, was lately appointed professor of the Slavonic languages and literature at Paris.

Casimir Brodzinski (1791-1835) served in all the French wars from 1809 to 1813, as an officer of Polish artillery, and was afterwards professor of literature at the university of Warsaw. He perceived, even before Mickiewicz, that the songs of the Polish people presented rich materials for a truly national poetry, and in 1811 he published his 'Village Songs.' When Mickiewicz's poems appeared, they created a great sensation, and found not only warm admirers, but also violent antagonists, chiefly amongst the adherents of the French school, who, calling themselves classical, condemned the opposite, or Romantic school; Brodzinski warmly espoused the latter, and contributed greatly to its success by his writings, being one of the best critics in Poland. He left a great number of works on different branches of literature which have not yet been collected: several of his poems have been translated into English by Dr. Bowring. Louis Osinski, who was for a long time director of the theatre at Warsaw, translated several tragedies of Corneille and Racine. Felinski wrote a tragedy called 'Barbara Radziwill,' which, with that of 'Ludgarda,' by Kropinski, are considered the best in the Polish language. The greatest services to the national theatre were however rendered by Boguslawski, who began his dramatic career in 1778, and continued it almost to his death, in 1829. He left about eighty plays, original and translations, and was himself an excellent performer. To the principal authors of this period we may add Kozmian, Madame Hofman, Wenzyk, Morawski, and Odyniec, who made a beautiful translation of Byron's 'Corsair,' and many equally successful ones from Scott, Moore, Southey, &c. Great service was rendered to the Polish language by the Lexicon of Samuel Linde, 6 vols. 4to., Warsaw, 1807-14. It contains not only all the Polish words, with their etymology and quotations from the writers who have employed them, after the manner of Johnson's 'Dictionary,' but also their translation into all the written Slavonian dialects, as well as Latin and German: it is perhaps the most extensive and complete work of its kind.

The unsuccessful insurrection of 1831 was followed by the most melancholy consequences to the national language and literature of Poland. The university of Warsaw was abolished, and its library and collections, as well as those of the Philomathic Society, were transferred to St. Petersburg. The splendid library of Prince Czartoryski at Pulawy shared the same fate. The university of Wilna was also abolished, and the library and museum transferred to Kieff, where a new university was founded. The same was done with many schools. The Russian language was substituted for the Polish in the schools of the antient provinces of Poland incorporated with Russia, where the Polish language was also abolished in judicial proceedings, in which it had been hitherto preserved. Yet notwithstanding these unfavourable circumstances, many Polish works, some of which are of considerable merit, continue to be published. The refugees in Paris have published a great number of books and pamphlets, the most remarkable of which is the 'History of the Insurrection of Poland in 1831,' Paris, 1834, 2 vols., by Mauritius Mochnacki, a young man of eminent talent. Death prevented him from completing this work, which belongs to the most valuable modern historical productions. He had published in Poland a work on the literature of that country in the eighteenth century. Wrotnowski, Pietkiewicz, and Jelowicki have also furnished valuable contributions to the history of the same insurrection. Czaykowski wrote some historical romances not devoid of merit, particularly those which relate to the Ukraine. This country, which literally signifies 'borders,' being on the boundaries of Poland, Russia, and Turkey, was for a long time the scene of many daring adventures, and the abode of a bold and enterprising but lawless race. It furnishes therefore a fine field for romance and poetry; this latter was cultivated with great success by Goszczynski, Malczewski, and Zaleski, whose poems are founded on local traditions, songs, and tales. Padura composed ballads in the dialect of the Ukraine, which frequently unite the wildness of the original poetry of that country with beauties of a higher order. The national songs and traditions of all parts of Poland have been recently collected and published at Warsaw, Wilna, and Leopol, 1833-1840.

Count Alexander Fredro published, in 1839, five volumes of comedies, which are considered the best in the Polish language, and have been performed with great success. His brother, Count Maximilian, produced, in 1837, at Leipzig, several tragedies. Many plays of Shakspere, translated by Holowinski, were lately published at Wilna. Two dramatic poems, although written in prose, and not calculated for the stage, produced a considerable sensation by the boldness of their conception and ideas, as well as the many beautiful images which they contain, and the profound grief of a wounded mind, which revolts against the existing order of things, and of which his country is a victim. One of them, 'Nieboska Komedia,' the 'Not Divine Comedy,' represents a deadly struggle between the old and new ideas which are now agitating the world. The other entitled 'Irydion' represents a young Greek born of a Scandinavian woman, who is with his sister at Rome in its most corrupted time under Heliogabalus, and who devotes all his energies in order to avenge the wrongs of his own and other conquered nations by destroying Rome through a conspiracy of gladiators and barbarians. These productions were published anonymously, but their author is known to be Count Sigismund Krasinski, a young man of great talent, who has written some historical novels. Witwicki, Gorecki, and Slowacki have recently published at Paris many successful minor poems.

Historical researches are not neglected by Polish writers. The history of Slavonian legislation, by Macieyowski, and his Memoirs on the history, literature, and legislation of the Slavonians, produced a great sensation not only among all the Slavonian nations, but among the learned Germans, into whose language they were translated. Kuchavski's work on the most antient monuments of Slavonian legislation, in 1838, was no less successful. Count Edouard Raczynski published a description of Polish and French medals with engravings. He also published at his own expense several inedited memoirs and other historical documents. The same Count Raczynski established at his won expense a public library at Posen, and supported its librarian Mr. Lukaszewicz, in his researches into the religious history of Poland, the result of which was several valuable contributions to the history of the Reformation in that country. Narbutt published in 1837, at Wilna, a detailed history of Lithuania, and many other historical contributions have recently appeared, and several literary periodicals continue to appear in different parts of Poland. We may conclude this article by observing that it is a striking proof that the love of national literature continues unabated in Poland notwithstanding its unfortunate political condition, that many works in the Polish language are frequently published and reprinted at Leipzig, and are excellent speculations.

The sources for the study of the history of the Polish language and literature are—Bentkowski's *History of Polish Literature*, Warsaw, 1814; Ossolinski's *Critical Notices on the History of Polish Literature*, 4 vols.; Juszynski's *Dictionary of the Polish Poets*; Chodyniecki's *Dictionary of Learned Poles*; Wiszniewski's *History of Polish Literature*, of which the first volume appeared in 1840.

Bohemian Literature.—The national literature of Bohemia is older than that of any other Slavonian country, and its monuments extend as far back as the tenth century. The most valuable remnants of antient Bohemian literature were however only recently discovered; they consist chiefly of the so-called *Kralodvorski* (queen's court manuscript), discovered by Professor Hanka in 1817, which contains the fragments of a collection of epic and lyric poems, composed apparently in the thirteenth century. This collection must have been considerable, as the fragments contain only the twenty-sixth and the twenty-eighth chapters of the third book: the loss of the remainder is much to be lamented, as the fourteen songs which have been preserved surpass all similar productions of the middle ages in their poetical beauties, deep and tender feeling, and purity of language; the form in which they are composed is peculiar, and truly national. Besides this collection of poems, there are extant about twenty poetical and more than fifty prose compositions, belonging to the earliest period of Bohemian literature, that is, before the time of John Huss. Dalimil's 'Rhymed Chronicle of Bohemia' was written in 1314; the 'Book of Instruction to his Children,' by the knight Thomas of Sztitny, in 1376; the fabulous poem entitled 'The Council of Animals,' by an unknown author of the same period, is still in general repute; a work on the judicial organization of Bohemia, by the Baron Andreas of Duba, chief-justice of the country, was written in 1402 and a politico-didactic poem by the Baron Smil Flaszka of Richebourg, chief-secretary of state in 1403. To the beginning of the fourteenth century there belong several historical songs, as, for instance, on the battle of Cressy, where king John of Bohemia was killed. Many foreign works were also translated into Bohemian during that period, as, for instance, the 'Alexandreide;' 'King Arthur's Round Table;' the story of 'Tristram;' the 'Travels of Marco Polo,' &c. The emperor Charles IV. king of Bohemia founded the university of Prague, and was a zealous promoter of the national language, of which he was so fond, that he recommended in his golden bull that the electors of the empire should acquire a knowledge of it.

John Huss commenced a new period of literature for Bohemia, as Luther did afterwards for Germany. He introduced that simple and precise orthography of the Bohemian language which is still used, and it is to be regretted that the treatise which he wrote on that subject has not been printed. Huss wrote several pieces in Bohemian hexameters; he revised and corrected the old Bohemian version of the Bible, and left in his native tongue about twenty compositions. The followers of Huss produced an extraordinary number of religious works, and there are still extant many tracts of a polemical, dogmatical, and ascetical nature, written by the several sects of Hussites during the fifteenth century. Many of these tracts, by no means devoid of merit, were composed by common mechanics, peasants, and women. Several of the Hussite religious compositions, which were much valued in the time, are however lost, having been chiefly destroyed by the enemies of that sect. Some of the religious hymns of the Hussites contain high poetical beauties, but in general the national poetry of that period degenerates into a mere rhyming; although the imperfectly preserved poems of Prince Hynek, son of king George Podiebrad (who reigned from 1458 to 1471), are not devoid of merit. But although the poetical literature of Bohemia declined during the fifteenth century, the prose style was developed, as the national language was exclusively used in all public transactions in Bohemia, instead of the Latin. The state papers of Bohemia, and the letters of the Bohemian statesmen during that period, are considered patterns of concise, clear, and energetic language, but unfortunately the Bohemian chancery, towards the end of the fifteenth century, abandoned this fine style, and began gradually to imitate the diffuse pomposity of the Germans. The national language, the study of which was promoted by the University of Prague and the example of the court, acquired a high degree of perfection, and a great superiority over all the Slavonian dialects, which were at that time in an uncultivated state, and without almost any national literature. Owing to this circumstance, its use began to spread over other Slavonian countries, but particularly Poland, the idiom of which country is very similar to that of Bohemia. The Poles also resorted in great numbers to the university of Prague, where they had a separate college.

Besides these religious compositions, the national literature of Bohemia contains other important works belonging to this period. Ziska, the celebrated leader of the Hussites, was also an author. He composed a war-song to animate his soldiers, and military institutions for their use. A work of the same kind, which contains more particulars about the military science of that time, was written by his contemporary the knight Hajek of Hodetin. Venceslav Wilczek of Czenow, an experienced commander, wrote, in the second part of the fifteenth century, a strategic work, which has been recently discovered, and which throws great light on the tactics of the Hussites; but it contains numerous technical expressions, now entirely obsolete, which often render the work unintelligible. The national history was however not cultivated in a manner as it would have been desirable on account of the great events which took place in Bohemia during that period. A collection of the histories of that time was published by Palacky, in his 'Scriptores Rerum Bohem.,' Prague, 1829. A great deal of very interesting information on the geography of several countries, as well as the manners and customs of that period, is contained in the following travels:—Baron Albrecht Kostka of Postupic, to France, 1464; Baron Leon of Rosmittal, over Europe, 1469; the Bohemian brother (a member of a sect of the Hussites) Martin Kabatnik, to the East and Egypt, 1491; and of Baron John Lobkowitz, to Palestine, 1493. Among the political works of that period the most remarkable are those of the governor of Moravia, Baron Ctibor, of Cimburg and Tobitchow (died in 1494), which are characterized by great talent and powerful eloquence; and that of the knight Victorin Cornelius of Visehrad, the eloquence and precision of whose style almost equals the best writers of antiquity. The 'Art of Governing,' by Paul Zidek, canon of Prague, dedicated to King George Podiebrod, is a composition of superior merit, as well as his great encyclopædical work. There are also many works on various branches of economy, and other similar subjects, belonging to this period.

The period from 1520 to 1620 is called by the Bohemians the golden age of their literature, and indeed science, literature, and art were cultivated in Bohemia during that period with much success. Public instruction in Bohemia was in a more flourishing state than in other countries. Prague alone contained, besides three universities, sixteen educational institutes, among which there were several for girls; and parochial as well as higher schools were established over all the country. The Bohemian language attained its perfection, and the number of works of every description published in that language increased very greatly. But notwithstanding this universal diffusion of information, and the great number of native works produced at that period, few of them are of superior merit. Not a single native has distinguished himself in science, although Kepler and Tycho Brahe had for some time the care of the observatory of Prague.

No truly great poetical genius appeared in Bohemia during this period. George Streyc translated the Psalms, and Symon Lemnicki, of Budecz, was the poet-laureate of the emperor Rudolph II. Oratory however acquired during the same period an eminent degree of perfection, and the few productions of that description which have reached us make us regret the loss of the remainder. The 'Memoirs' of Baron Charles of Zerotin, governor of Moravia (1574-1614), and his 'Bohemian Letters,' are still patterns of a finished epistolary style. The next celebrated historian of that period is Venceslav Hajek, of Luboczan (died in 1553), but his 'Chronicle of Bohemia' is rather an historical romance than a trustworthy history. Considerable merit is displayed by the following historians, whose works still remain in manuscript:—Bartosz of Prague, public notary (died in 1544), who depicted in glowing colours the religious disturbances of Bohemia in 1524; and Sixtus of Ottersdorf, chancellor of the old city of Prague (died in 1583), who gives a very circumstantial account of the events that brought about the celebrated bloody diet of 1547. John Blahoslav (died in 1521), the author of a history of the Bohemian brethren; the anonymous author of a Universal History, of which only the first volume, preserved at Stockholm in Sweden in MS., is extant; and finally Vaclav of Brzezan, an excellent genealogist and biographer, whose works are distinguished by clearness of exposition, brevity of style, and deep research. Among the historians of that period whose works were printed were, Daniel Adam of Veleslavin, an industrious and patriotic writer; and the Pole Paprocki, who wrote an account of the noble families of Bohemia and Moravia. Valuable materials are furnished by the travels and adventures in the East of the knight Ulrich, prefect of Wlkanowa, 1546; as well as by the travels of Mitrovic, 1599; and those of Christopher Harant of Palzic, 1608. The other remarkable authors of that period are, Nicholas Konac of Hodislav (died in 1546) one of the superior judges of the country: the bishop of the Bohemian brethren, John Augustus (died in 1572), the cathedral canon of Prague; Thomas Bavorowski, an eloquent preacher (died about 1560); the senator of Prague, Paul Koldin (died in 1589); the linguist Mathias Benesowsky (died in 1587); the eminent classical scholar Abraham of Ginterod; the justice baron of Budova (died in 1621); and the two distinguished religious writers, Martinus Philadelphus Zamrsky (died in 1592), and Gallus Zalansky (died in 1620). Perhaps the most remarkable production of that period is the Bible of Kralic. Baron John Zerotin assembled in his castle of Kralic, situated in Moravia, eight of the most learned men of the Bohemian brethren, who, in the course of fifteen years, made a new version of the Scriptures from the original tongues, with a commentary: the work was published in six 4to. volumes, 1579-1594. No nation at that time could boast of a similar work. The Bible of Kralic was always considered a pattern of a pure, elegant, and correct style: its merits were even admitted by enlightened Jesuits, and it is studied now by all those who wish to write the Bohemian language with purity and correctness.

A melancholy period for the language and literature of Bohemia began with the Thirty Years' War, and particularly from the battle of Weisenberg, when the Palatine of the Rhine, who was elected king of Bohemia by the Protestant party, was defeated by the Imperialists; and the rapidity with which Bohemia fell from a high degree of civilization into an almost barbarous state is unexampled in history. The most distinguished individuals of the nation perished either on the scaffold, or on the field of battle, or from pestilence. Others who were distinguished for talent and superior education left the country; first the clergy and the teachers, then the burghers, and finally the nobles. The places of those exiles could not be easily supplied, and the want of able men was particularly felt in the schools, which were provided with teachers who either distinguished themselves by their zeal for the dominant party, or were employed only for want of better. Crowds of Spanish, Italian, Belgian, and Irish adventurers flocked to Bohemia, and became principal landowners, occupying public places, and giving the tone to society. The Bohemian nationality was morally destroyed. A native Bohemian was, according to the new order of things, synonymous with rebel and heretic. Many natives, in order to avoid suspicion, renounced their nation, Germanised their Bohemian names, and feigned a foreign origin. The emissaries of the Jesuits, who ruled the country, accompanied by soldiers, visited every house in order to take away and to destroy all books suspected of heresy. As it was an admitted principle that all books written from 1414 to 1625 might be heterodoxical, it was no wonder that the emissaries, who did not make a scrupulous examination amongst so great a number, and chiefly their companions the soldiers, committed all Bohemian works to the flames. Some enlightened Jesuits, as Balbinus, protested in vain against this barbarous persecution, which was continued till about the middle of the eighteenth century. The Jesuit Anthony Kenios, who died in 1760, boasted of having burnt about sixty thousand books. It is indeed astonishing that, notwithstanding this destruction, there are any monuments of old Bohemian literature extant. A mental darkness spread over the country was a natural consequence of those proceedings. There were still however some able writers, who had received their education previously to the beginning of the Thirty Years' War. Count Slavata, who died in 1658, wrote in Bohemian a history of his own time, in fifteen volumes in folio: this work has not been printed. The exile Paul Skal of Zhor wrote from 1620 to 1642, first at Lübeck, then at Freyberg in Saxony, a Universal Ecclesiastical History, in ten large folios, filled with a small hand-writing. This work also is still in manuscript; it contains much important information about the ecclesiastical affairs of Bohemia up to the year 1624. Amos Comenius, the last bishop of the Bohemian brethren in his country, was also the last ornament of the national literature.

The emperor Joseph II., by the decrees of 1774 and 1784, ordered the introduction of the German language into all the schools of Bohemia, and the inhabitants were no longer permitted to learn in their national language anything except reading, writing, the catechism, and the elements of arithmetic. This was a severe blow to the Bohemian language and literature, and the more dangerous as the decrees promoted real information, though they established the superiority of German over Bohemian civilization by introducing the exclusive use of the German language in all matters of administration. Yet this measure appears to have awakened the slumbering energies of the nation, and to have stimulated it to new exertions. The first man who raised his voice in behalf of the nationality of his country was General Count Francis Kinsky, who rendered great services to the military organization of Austria, and to the civilization in Bohemia. He advocated the cause of Bohemian nationality in a work written in German in 1774; 'Recollections on an important subject.' His example was followed in 1775 by Pelzel, the author of an excellent history of his country in the national language. In 1779 the government found it necessary to recommend instruction in the Bohemian language in the superior military schools. The awakened intellect of the nation, promoted by the improved system of public education, began to exercise a salutary influence on the study of the national language and on its literature, new original compositions were written; foreign works of merit were translated; and many valuable monuments of the antient literature were brought to light. The following individuals also distinguished themselves in the noble work of regenerating their national literature: Franz Faustus Prochaska, a Pauline monk, 1792-1804; Waclaw Kramerus (died in 1808), who published many excellent popular works; Albert Vincent Parizek (died in 1823), who composed and translated many valuable works for schools and the use of children; and particularly Joseph Dobrowsky, who is justly considered the patriarch of Slavonian literature in modern times, not only by his own countrymen, but by the scholars of all other nations of that race. He was born of Bohemian parents at Gyomar in Hungary, in 1753, and entered the church in 1772, after having received an excellent classical education. He continued his theological study at Prague, and became about 1776 rector of the seminary of Olmütz. He soon however left that place, and became tutor in the family of Count Nostitz. He settled after that time at Prague, and the study of Slavonian became his passion and the object of his life. He was noticed by the first families of the country, who wished to attract him to their circle; but Dobrowsky, fond of independence, was rarely induced to receive any assistance. His habits were of the utmost simplicity, and he travelled a great deal about the country on foot, visiting the most remote corners, in order to observe any antient ruin or monument, or place remarkable for any historical event; and to collect at the same time the remains of national language and history, preserved in the local songs and traditions. Having acquired a considerable reputation in his country, supported by some powerful friends, he made a journey to Sweden in 1792, in order to examine the manuscripts which were carried from Bohemia by the Swedes during the Thirty Years' War. He returned from that country by St. Petersburg and Moscow, where he examined the collections of Slavonian manuscripts. In 1796 he published an account of his literary researches made during these travels. In order to restore his health he went to reside in a country-house of his former pupil Nostitz, and during that time studied botany with so much success, that he was able to write a very clever botanical dissertation. Universally beloved on account of his great learning and the simplicity and honesty of his character, he spent his life among his friends, constantly engaged in the pursuit of his favourite studies, and he kept up a learned correspondence with several of the most eminent scholars of his time. He died at Vienna in 1827, in the 78th year of his age. He left a great number of works, chiefly on Slavonian subjects, the most important of which are, a 'History of the Bohemian Language and Literature,' last edition, Prague, 1818; 'Slavina, a message from Bohemia to all the Slavonian nations,' containing a collection of treatises on Slavonian subjects; on Cyrillus and Methodius, the apostles of the Slavonian nation, &c.: the number of his works on different subjects is about forty.

Francis Tomsa (died in 1814) was the author of some excellent grammars, and several valuable works for popular instruction. There were also Waclaw Stach, John Rulik, the brothers Tham, and several others. This literary movement was shared by the Slovaks of Hungary, who use the Bohemian language; and the principal writers among them who may claim merit for their services to the national language and literature are Leski, Rybay, Tablic, Palkowic, and Roznay.

The labours of the authors who have been enumerated, were chiefly directed to promote education and the national language, and were confined to prose. But the learned clergyman Anthony Puchmayer attempted (1795), with considerable success, to revive the poetry of Bohemia, and he also made his countrymen acquainted with the cognate literatures of Poland and Russia. The example was followed by others, and amongst them chiefly by the brothers Albert and John Negedly, Joseph Rautin, Kranz, Francis Stepniscka, Sebast Hnewkowsky, Francis Swoboda, &c., but particularly Joseph Jungman, professor in the university of Prague. The persevering efforts of these patriotic writers were however, for a long time, unproductive of any important result, as the nobility and the greater part of the more educated classes had become complete strangers to the language of their forefathers. They had therefore to contend with great difficulties; and it is owing only to their unwearied exertions, assisted by some fortunate circumstances, that the national literature of Bohemia begins finally to assume a steady progress in its own country. The year 1818 may be considered as opening a new æra for Bohemian literature, by the publication of the antient national poems, contained in the 'Kraledworsky' manuscript, which has been already mentioned, and which produced a powerful effect on the literature of Bohemia. The establishment of a national museum at Prague, by Count Kolvrat in 1829, has exercised a most salutary influence on the progress of the national intellect. Several decrees of the government, published in 1816-1818, recommended the study of the Bohemian language in the gymnasia of the country; but these decrees were annulled in 1821. Since that time, the language and literature of Bohemia have been advancing with great rapidity. A scientific terminology for all the branches of human knowledge, and which the western languages of Europe have chiefly derived from the Greek, was created from pure Slavonic roots; and the merit of this difficult task belongs to the professors of the university of Prague, Joseph Jungman and John Presl. The poetical diction was much improved by the study of the Kraledworsky manuscript, and the successful imitation of its metre, an improvement which is mainly due to the efforts of the historian Palaly, Schaffarik, and Hanka, the most eminent Slavonian scholars of their time. Many alterations in the Bohemian orthography were introduced according to a plan recommended by Dobrowsky. This innovation was however strongly opposed by several zealous partisans of the antient orthography, and particularly by the professors of the Bohemian language, Negedly at Prague, and Palkowic at Presburg. This difference, although relating to a subject of minor importance, created a violent dispute. The advocates of the new orthography were accused by their opponents of promoting innovations dangerous to religion and morality; and the study of the other Slavonian dialects was considered by some as implying a political tendency to the interest of Russia. Fortunately these absurd accusations vanished before the good sense of the public and of the government, and the Bohemian literature has continued to advance in its development, and to increase in popularity among all classes.

The following is a brief notice of recent Bohemian authors:—Francis Vladislaw Celakowsky, born in 1799, possesses a vigorous and highly cultivated talent, original and thoroughly national. His principal works are:—'Various Poems,' Prague, 2nd edition, 1830; 'Echo of Russian Songs,' ibid., 1829; 'Echo of Bohemian Songs,' ibid., 1830. His productions are considered equal in merit to the best poetical compositions of modern times. Vaclaw Klicpera, born in 1792, has composed more than thirty dramatic works, of which several have obtained great success.

John Kollar, born in 1793, of a Slavonian family in Transylvania, received his preparatory education in his native land. In 1817 he went to study divinity at the university of Jena, where he became passionately attached to the daughter of a clergyman. This love inspired his muse, and in his 'Slavy Dczera' (the daughter of glory), (Ofen, 1824), he expressed his feelings for his beloved Mina, whom circumstances permitted him to marry only in 1835. This production, which established his reputation as the first poet in the Bohemian language, comprises 150 sonnets, of which many contain the description of his love, whilst in others he deplores the fall of several Slavonian nations which had once occupied the shores of the Baltic and the banks of the Elbe. Many of these sonnets may be compared with those of Petrarca, and it is admitted that he has created a new poetical language for the Bohemians. In 1832 these sonnets were republished, with the addition of new ones, which describe the Slavonian heaven and the deeds of the Slavonian heroes received into it, while others depict the Slavonian hell, the abode of the unworthy Slavonians and of the enemies of their race. A great knowledge of the Slavonian history is displayed in these compositions, but this very circumstance renders them on the whole cold and prosaic, notwithstanding many beautiful passages. He has also published a collection of minor poems and songs. In 1819 he became clergyman to a newly created Slavonian Protestant congregation at Pesth, and the great difficulties with which he had to struggle in the discharge of his duty are said to have changed the animated poet into a serious and even morose person. The collection of sermons which he had preached before his congregation, and which he published in 1831, display profound piety and an extraordinary knowledge of the human heart, as well as great beauty of language. He has paid much attention to the schools of his parish, and composed some books for their use. Kollar occupies also a distinguished place among Slavonian philologers and historians. He is the author of 'Dobre wlasnosti narodu Slovanskeho,' *i.e.* 'the good qualities of the Slavonian nation,' Pesth, 1821, and of Researches on the names and antiquities of the Slavonian nation and its branches. He has rendered great service to Slavonian literature by his collection of the national songs of the Slovaks of the Carpathian mountains. Kollar is one of those who have perceived the necessity of an understanding among all Slavonian scholars, in order to promote by their united efforts the progress of their literature, and he made an appeal to them for that object in his work, in 1828, 'O wzajimnosti Slowian,' on the reciprocity of the Slavonians. Kollar's merits as a Slavonian scholar are universally acknowledged, and he is continuing his labours with the greatest success.

J. Langer, born in 1806, is an original writer, but has not had sufficient cultivation. He has written clever national eclogues and tales, and several satirical poems. Charles Machacek, born in 1799, is the author of the best Bohemian comedy, entitled the 'Wooer;' the national opera owes likewise to him the great improvement which it has received since 1822. Charles Schueller, a popular author, wrote the best Bohemian ballads, published in 2 vols., 1823-30. J. N. Stzepanck, born in 1783, director of the national theatre at Prague, is the creator and promoter of the Bohemian theatre, for which he has written 16 volumes of plays. Vincent Zahradnia, a clergyman, born in 1790, has distinguished himself by his fables. Tales and songs have been written by Winarecky, Kamaryt, Chmelensky, Marek, and Swobada, as well as Magdalena Retty, and the nun of St. Elizabeth, Maria Antonia.

Scientific subjects have been treated chiefly by J. Presl, director of the national museum at Prague, born in 1791, who has published several works on different branches of natural philosophy: works of a similar description have also been published by Charles Schadek and Professor Albert Sedlacek. Eminent service has been rendered to the national language by Joseph Jungman, professor of the university of Prague, by his great critical dictionary of the Bohemian language, on which he was occupied more than thirty years; he has published also 'Slovestnost,' *i.e.* 'literature,' Prague, 1820; a history of the Bohemian literature, in 1825; besides many other compositions of less importance. Francis Palacky, born in 1798, is now one of the most accomplished writers of Bohemia; he has published several works on literary subjects, and made a particular study of the national history. The states of Bohemia commissioned him to write a complete history of Bohemia, and settled on him a pension for life, in order to enable him to devote himself entirely to the task: for that purpose he made extensive researches not only in his own country, but even abroad, and particularly in the archives of Italy. The result of his labours is a history of Bohemia, in German, of which two volumes, already published at Prague, bring it down to the extinction of the national dynasty of the Przemyslaidi, 1306. It is founded on original documents chiefly in manuscript.

We shall conclude with a short notice of the most celebrated Slavonian living scholar, Paul Joseph Schaffaric, born in 1795, in Northern Hungary. After having gone through his preparatory studies in his native land, he completed them at the university of Jena, where he applied himself to divinity, metaphysics, general literature, and natural philosophy. His first work was a collection of the national songs of the Slovacks (Slavonians of Northern Hungary), published in 1819. He also translated into Bohemian the 'Clouds' of Aristophanes, and 'Maria Stuart' of Schiller. After his return to Hungary he diligently continued his Slavonian studies, and was appointed professor in and director of the Non-united Greek gymnasium at Neusak, established by the Austrian government for its Servian subjects. He resigned however, in 1825, the direction of that school; but he retained the professorship till 1833. His residence in that place afforded him ample opportunities for the study of the dialects of the Southern Slavonians, Servians, Croatians, and Bulgarians, the result of which was his historico-critical researches on those dialects, which appeared in 1833, at Pesth, in German, under the title of 'Serbische Lesekörner,' &c. He had previously published in the same language a manual of the history of the Slavonian languages and literature, at Ofen, in 1826, which was well received. He also published in German, 1828, at Ofen, 'Researches on the Origin of the Slavonians,' which is a critical and enlarged edition of a similar work published in Polish by Surowiecki. Since 1833 Schaffaric has settled in Bohemia, and prosecutes his literary labours in the language of that country, in which he had published in 1818, conjointly with his friend the historian Palveky, 'Elements of Bohemian Poetry.' His principal work is his 'Slavonian Antiquities,' published in Bohemian, at Prague, 1838, a production distinguished by extensive learning, as well as acute criticism, and which has been received with unanimous approbation by the first scholars of all the Slavonian nations. Since 1838 he has edited the 'Journal of the National Museum of Prague.' He is now employed in collecting the monuments of the Servian and Bulgarian languages of the eighteenth century, and on an extensive history of the literature of all the Slavonian dialects.

Servian Language and Literature.—The Servian language has more resemblance to the Russian than to the Polish or Bohemian languages. It is considered more melodious than any other Slavonian dialect, a circumstance which is ascribed to the influence of the Greeks, by whom the Servians were converted to the Christian religion, as well as to that of the Italians, with whom they had many commercial relations. The dominion of the Turks was also not without influence on the Servian language. It has however preserved all the characteristics of other Slavonian languages. It is spoken by a population of about five millions, and it may be divided, according to Vook Stephanovich, into three dialects: 1, that of Herzegovina (comprehending Montenegro); 2, Razava; and 3, of Sirmia and Slavonia (provinces of Hungary). The Bulgarian language, which is spoken by about half a million of Slavonians, who inhabit Bulgaria and some parts of Macedonia, may also be considered a dialect of the Servian, although it differs in grammatical construction from all the other Slavonian idioms, being the only one which has adopted the article. The Servians, as well as the Bulgarians, make use of the Cyrillic alphabet. Some works, however, which have been recently published in Servia, are printed in the Russian character, with some slight alterations, which are required by the peculiarities of the Servian language. A dictionary of this language, containing more than thirty thousand words, with a German and Latin translation, was published by Vook Stephanovich at Vienna in 1819. The same author published also a Servian grammar (Vienna, 1814), of which a translation, by T. Grimm, with a preface and annotations by Vater, appeared at Berlin in 1824.

The oldest monuments of Servian literature date from the thirteenth century, and are composed in the Slavonian idiom, which was employed in the version of the Scriptures by Cyrillus and Methodius, with some admixture of the language which is now spoken by the Servians. There is a great probability that the Slavonian of the Bible was originally in common use among the population of the present Servia, as it constituted a part of the kingdom of Great Moravia, where the Slavonian version of the Scriptures was made by Cyrillus and Methodius in the ninth century, but that it became by degrees estranged from its original, through the various revolutions to which that country was subject.

The monuments of the Servian literature to which we have alluded are, the 'Rodoslov,' that is, genealogical register, by Daniel, archbishop of Servia, which contains the history of the reigns of the kings Urosh, Dragutin, Milutin, and Dechanski (1272-1336). The manuscript is preserved at the monastery of Mount Athos. The Servian king (czar) Stephen Dushan the Great (1336-56) gave to his nation a code of laws, which bear a purer stamp of the Slavonian character than the laws of any other nations belonging to the same race, and are drawn up in a spirit of great moderation. There are also some religious books of the same period. The defeat of the Servians by the sultan Murad I. destroyed their national independence, and created in their literature a chasm of two centuries.

A new æra for Servian literature was commenced by George Brankovich (born in 1645), who was ambassador of the emperor Leopold I. at Constantinople, but having afterwards fallen into disgrace with the court, died, in 1711, a state prisoner. He wrote in Slavonian a history of the Servians from their origin to the reign of the emperor Leopold I. The manuscript is preserved in the archiepiscopal library at Carlovitz. Many years however elapsed from the death of Brankovich before any other works were added to Servian literature. The archimandrite John Raich (1726-1801) wrote a history of the Slavonians in general, and of the Servians, Khorvates, and Bulgarians, in particular. (four volumes, Vienna, 1792-95). It is composed in the Slavonian of the Bible, but much intermingled with Russian and Servian words.

The Servian was employed as a written language for the first time by Dositheus Obradovich (born in 1739), who, after having spent twenty-five years in different parts of Europe, died in 1811 at Belgrade, where he occupied the post of senator, and was at the same time tutor of the children of the celebrated Servian leader George Cherny. The example of Obradovich was only partially followed by other Servian authors; and it created such confusion in their literature, that among the 400 Servian works which has been published since 1750, only a few are written either in pure Slavonian or Servian, the remainder of them being written in a mixture of the two above-mentioned idioms exhibiting a great variety of orthography and grammatical construction. This mongrel style was strongly combated by Demetrius Davidovich, secretary to Prince Milosh, who edited (1814-22) a Servian gazette and a Servian annual at Vienna. The same object has been successfully promoted by Vook Stephanovich Karadgich, who is the first Servian scholar of the age, and has rendered the greatest services to the language and literature of his country. He was born in 1786, in Servia. At an early period he devoted himself to the noble task of raising his native language to the same degree of perfection which has been attained by other Slavonian tongues, and he has promoted his object without intermission, particularly by his continual travels among all the populations which speak the different dialects of the Servian. After many efforts, he succeeded, with the assistance of Davidovich, in persuading the Servian writers to abadon the Slavonian of the Bible for the exclusive use of their national language. The greatest service which he has rendered to the literature of his country is the collection of national songs which he published at Leipzig in 1823. A German translation of these songs by Mrs. Robinson,[*] under the assumed name of Talvi, appeared at Halle in 1825. Some of these songs had already been known to the public through a collection of them made by the Franciscan monk Casich Miossich, printed at Venice in 1759. The songs however published by Vook Stephanovich were chiefly collected by himself during his travels, and he added to them valuable critical and explanatory notes. These songs, inspired by the splendid scenery of Servia, the patriarchal life of the inhabitants, and the recollections of their eventful history, are considered the finest of all the Slavonian national songs. Full of the wildest romance, they admirably depict scenes of love and war, and express in the most animated manner feelings of a simple and tender, as well as of a glowing and impassioned character. Some of them belong to a period previous to the arrival of the Turks in Europe. Several allude to the seat of the Ottoman empire at Adrianople; whilst many are of a much more recent date, describing the oppression exercised by the Turks, as well as different scenes of intercourse with that nation. The same author published in 1836, at Cettigne in Montenegro, a collection of Servian proverbs, amounting to about 4000, with a preface, containing much valuable information on the Slavonian idioms spoken in the vicinity of the Adriatic; and he edited (1826-38) at Vienna five numbers of a Servian annual, called 'Danitza,' *i.e.* 'the morning star.' Simeon Milutinovich, born at Sarayevo in Bosnia, received some education in the gymnasium at Carlovitz in Hungary; and after having spent the early part of his life among very agitated and trying circumstances, which have perhaps contributed to develop his poetical genius, he received assistance from the Russian government, which enabled him to devote himself to literature. He composed a series of lyrical and heroic poems on subjects taken from the history of the Servian insurrection in 1804-15. These poems, which imitate the tone of the songs published by V. Stephanovich, appeared under the name of 'Serbianka,' at Leipzig, 1826, in 4 volumes, 12mo. He also added some new poetry, published at the same place in 1826 and 1827. All his productions are characterised by a bold originality, warmth of feeling, and a glowing patriotism. Having studied for some time at the university of Leipzig, he retired into Montenegro, where the metropolitan's patronage afforded him the means of pursuing literature. He collected there the national songs of Montenegro and Herzegovia, and wrote a history of Servia during the years 1804-1815. Both these works were published at Leipzig in 1837. Among the other Servian authors we may mention the present vladika, or metropolitan, of Montenegro, who is considered to be a very accomplished poet. Anna Obrenovich, niece of Prince Milosh, has published some works, original and translations.

---

[*] Mrs. Robinson is the wife of the Rev. Edward Robinson, professor and librarian of Andover College, Massachusetts, U. States, and well known as the editor of the 'Biblical Repository,' as well as the translator from German of several works relating to the study of the Scriptures, and the author of a recently published work on Palestine. She is the daughter of Professor Jacob, author of several political works of considerable reputation. Having spent her early youth in Russia, where her father was successively employed (1807-1816) at the university of Kharkoff and at St. Petersburg, she had an opportunity of learning the Russian language. After her return to Germany she devoted herself to literary pursuits. She became acquainted with Vook Stephanovich at Halle, and translated, with his assistance, the Servian songs mentioned in the text. Having married Mr. Robinson in 1828, she followed him to the United States, where she began to write English, and published several excellent articles on Slavonian literature in the 'North American Quarterly Review,' as well as a very valuable work on the same subject in the 'Historical View of the Slavic Languages,' Andover, 1834.

Prince Milosh Obrenovich has done much for promoting the education of his countrymen, having established sixteen schools for the training of teachers, and founded a printing-office at Kragoyevatz, the place of his residence. The Austrian government pays great attention to the education of its Servian subjects, for which purpose it has established gymnasia or higher schools at Karlovitz and Neusatz in Hungary. There are now Servian printing establishments, besides that of Kragoyevatz, at Vienna, Buda, Venice, and at Cettigne, the residence of the metropolitan of Montenegro.

A society for the promotion of Servian literature by giving prizes for the best works has been recently established, under the name of the 'Servian Mother,' and a periodical is published in the same language.

SLEAFORD. [LINCOLNSHIRE.]

SLEEP, the periodical repose of the organs of the senses, and of the greater number of the intellectual faculties and voluntary movements. The above indeed is by no means a satisfactory definition; but it is, as with life, far easier to describe its phenomena than to define its nature.

True sleep is peculiar to the mammalia and to birds; the lower animals, indeed, rest from time to time, and withdraw themselves from the external world, but having no external eyelids, they cannot exclude all influence from without. Fish conceal themselves behind a stone or near the bank of a river, crocodiles hide themselves in the mud, and tortoises creep into holes. The higher animals likewise usually seek out some place of retirement to sleep in, and dispose themselves in a posture which either is maintained with little muscular effort, or is favourable to the preservation of warmth.

The approach of sleep is announced by diminished activity of mind and loss of the power of attention. The senses become blunted to external impressions, and we feel an unconquerable desire for stillness and repose. Our ideas grow more confused, our sensations more obscure, our sight fails us, and if our ears still perceive sounds, they are indistinct, and seem as though distant. The eyelids close, the joints relax, we instinctively assume an easy position, and fall into a sleep, which at first is deep, then soft and gentle, and becomes gradually less sound as the time for waking approaches.

Physiologists are accustomed to distinguish what are termed the organic or vegetative from the animal properties of living beings. By the former are understood development, growth, excitability, &c., those powers in short which are common to plants and animals; by the latter, those properties which are peculiar to animals, such as sensation and voluntary motion. During sleep the organs of vegetative life continue to discharge their functions with scarcely less activity than in the waking state. Their repose is independent of sleep, and occurs at very different times. The heart rests between each pulsation, the muscles of expiration and inspiration are in a state of alternate action and repose, and the peristaltic motions of the intestines have their distinct periods of remission. The pulse and respiration however become slower during sleep, and digestion seems to go on then less perfectly than in the waking state The temperature of the body sinks during sleep, owing to diminished nervous energy, and to the same cause may be ascribed the increased susceptibility of persons to rheumatism and other effects of cold when asleep.

Not only are the functions of organic life little affected by sleep, but even those of animal life are not in a state of complete repose. It would not be possible to make a dead body remain in those postures which we assume when asleep, and our eyelids are not closed except by muscular action. Some animals sleep standing, as the horse; birds do so also, sometimes standing on one leg. When very weary, we sleep even in the most constrained positions; soldiers have been known to sleep while marching, postilions on horseback, and fiddlers at a fair have continued to play even when through weariness they had fallen asleep. The numerous instances of somnambulism on record show how high a degree of activity of the animal functions is compatible with sleep. For remarks on this subject however, as well as on the condition of the senses during sleep, we refer to the article DREAMS.

Animals in general require less sleep than man; thus, for instance, four hours are sufficient for the horse. Those animals whose blood circulates very rapidly, whose motions are peculiarly energetic, and their senses very acute, usually sleep more lightly, and for a shorter time than others. The timid herbivorous animals sleep less, and less profoundly than the bolder carnivora. In man the want of sleep varies at different ages; the new-born infant sleeps almost continually, while persons in middle life can do with less sleep than children or very old persons, and women require less sleep than men. From six to eight hours a-day are usually passed in sleep, but habit exercises a great influence in determining the amount of repose required. John Hunter and Frederick the Great did not sleep for more than four hours daily, while some sluggish persons spend nearly half their time in sleep. In extreme old age much sleep sometimes becomes necessary. De Moivre, when eighty-three years old, was awake only during four hours out of the twenty-four, and Thomas Parr towards the close of his life was almost constantly asleep. Children sleep very soundly, old persons are easily disturbed, men sleep more profoundly than women, and sleep is always sounder after considerable weariness.

There are some conditions which favour the occurrence of sleep. Stout and full-blooded persons, and those of an excitable but easily exhausted frame, require more sleep than such as are thin, or who, though equally excitable, are more energetic, and less easily tired. Abundant food induces sleepiness, and also wine and other stimulants. A class of medicines are known by the name of narcotics, whose peculiar action is to induce sleep. Ease and quiet of mind conduce to it, but the weariness of hopeless grief is likewise followed by sleep. Certain external causes favour sleep, such as the warm bath or friction of the surface of the body. Extreme cold is a powerful and most dangerous narcotic; it induces a sleep from which there is no waking. Such a sleep it was which nearly proved fatal to Dr. Solander when with Sir J. Banks in Tierra del Fuego.

We have not yet noticed one very important character of sleep—its periodical return once in every twenty-four hours. The idle person sleeps as well as the diligent, who has passed his time in exerting his powers of mind or body. Sleep usually occurs at night-time, and we are awake during the day, but the day may become the time for sleep, and night for watching, if a person's occupations so require. Many animals sleep during the day, and watch or pursue their prey at night. We cannot then regard the periodical return of sleep as dependent on the simple alternation of day and night, or merely as the result of bodily fatigue, since it is known that extreme weariness will prevent sleep. The alternation of sleep and waking is essentially connected with something in the nature of animals, to which there are many analogies. The succession of the seasons and of day and night, the ebb and flow of the sea, the daily variations in the electricity of the air, in the rise and fall of the barometer and the regular declination of the magnetic needle eastward and westward, at different hours, illustrate the same law of periodical action which is displayed in the unvarying alternation of sleep and waking. 'We may,' says Professor Müller, one of the most eminent physiologists of the present day, 'regard sleep and the waking state as the result of a species of antagonism between the organic and the animal life, in which the animal functions, governed by the mind, become free to act, while at other times they are repressed by the organic force acting in obedience to a law of creative nature. In sleep, when the animal functions entirely or for the most part cease, the organic processes are almost the only ones which continue, and during that state even the organs of animal life are rendered capable of renewed action by the organising force which proceeds without the consciousness of the animal, though accordant with a well-constituted plan and with reason.'

Little need be said of the uses of sleep. 'Nature's soft nurse,' it invigorates body and mind when worn out by toil, and the occurrence of sleep in the course of a disease is one of the most favourable signs of returning health. After a night's sleep we are nearly an inch taller than before; the intervertebral cartilages, which had been compressed by bearing the weight of the body during the day, having regained their natural form and proportions. The powers exhausted by our intercourse with the external world, recover themselves during sleep, and our senses in the morning are alive to all impressions. It is however preeminently the rest of the brain, which, when fatigued by the constant action of the mind, becomes incapable of continuing that action, just as the eye, if long fixed upon one spot, ceases to perceive any object distinctly.

Since then sleep is not a mere torpor of the system induced by fatigue, long watching, or any external cause, but a natural state whose periodical recurrence is essential to the harmonious performance of our functions, it need excite in us no surprise to find that in certain animals this condition lasts for a long time, even for months; and that in it the activity of the organs of animal life is suspended more completely than in diurnal sleep. To this state the name of

Winter Sleep, or Hybernation, is applied. Hybernation occurs in some mammalia, in all the amphibia, and in some of the molluscous and insect tribes. Birds do not hybernate, and the vulgar notion with reference to the sleep of the swallow in winter is erroneous. Hybernation is either perfect or imperfect. In the former, of which the marmot affords an instance, the lethargy is profound and undisturbed by any sense of thirst or hunger, and the animals do not awake until the period of sleep is completely past. In the latter, intervals of wakefulness occur, during which the creatures rouse themselves and seek for food, as in the case of many insects and spiders, also the hedgehog, bat, and dormouse. The time during which hybernation continues varies much. In some animals it lasts for four months only; in others for five or six; but almost all awake either in March or April. The situations which animals select for hybernation, and the position in which they await it, differ, as might be expected, in accordance with their various habits, but all seem to subserve one great purpose, the preservation of a moderate and equable temperature. Most creatures hybernate in solitude, but some, as the marmot, pass the winter in company.

The approach of winter sleep is not sudden, but it comes on gradually; the activity of the animals diminishing as their sense of hunger grows less keen. In some animals, as in the hedgehog, a diminution or total loss of appetite precedes hybernation for some weeks. When hybernation is perfect, the senses become so completely blunted, that severe wounds and electric shocks are insufficient to rouse the animal.

The phenomena of organic life go on far more sluggishly during hybernation than in diurnal sleep. The pulsations of the heart sink to a fourth or even a tenth of their natural frequency. The respiration becomes slow, intermits frequently and for a long time, or even becomes altogether imperceptible. An animal in this condition, if placed in a pneumatometer, will produce no change in the air which it contains, or may be kept for a considerable time in irrespirable gases without sustaining any inconvenience. The temperature of the body depends on the activity with which respiration and circulation are carried on; hence during hybernation it sinks greatly, and in some animals is not higher than that of the surrounding atmosphere.

Hybernation is not mere torpor from cold; all animals may be benumbed by cold, but those which hybernate are comparatively few in number. A moderately low temperature indeed is favourable to hybernation, but instinct teaches the animals to defend themselves from the cold, and their death results from exposure to its severity. Suspended animation from cold is a morbid state; hybernation and sleep are preceded by similar phenomena, and both terminate alike, after a certain time, in renewed activity.

If, lastly, we inquire what uses are answered by winter sleep, we shall see that it is a provision for the maintenance of life at a season when those animals in which it occurs would be unable to obtain their natural food. It serves likewise for their protection against a degree of cold to which they could not bear to be exposed. Nor is it merely against extreme cold that annual sleep and the instinctive preparations of animals for that condition supply a defence, but extreme heat is followed in some animals by a lethargy similar to hybernation. Thus the Tanrec, or rat of Madagascar, sleeps during the height of summer. Changes in the system generally, and renewed activity of the various functions, follow hybernation, as they do diurnal sleep. It would lead us into discussions beyond our limits, if we were to examine the various peculiarities of hybernating animals, or to inquire into what may be termed the proximate cause of annual sleep.

The revolutions of the seasons produce changes in plants not unlike those which we have just noticed in hybernating animals. There is however a still closer analogy between diurnal sleep and the so-called

Sleep of Plants, a condition first discovered by Linnæus to be general, though some of the phenomena had long been noted in the tamarind-tree, and in some leguminous plants with pinnated leaves, natives of Egypt.

The attention of Linnæus was called to this phenomenon by the following circumstance:—Having sown some lotus seed, he watched the progress of the plants, and at length discovered upon one of them two flowers. When evening came, he could not find the flowers again, and supposed that some one had plucked them. On the following morning he again observed them, and they once more disappeared at evening. He then examined the plants with care, and saw that at evening the leaflets had approached each other, and thus concealed the flowers from view. Struck by this fact, he took a lantern in his hand and visited his flower-beds, when to his surprise he found the appearance of all things changed, and thus discovered the sleep of plants.

As night approaches, flowers close, the leaves of plants become more erect and fold themselves together, while vitality seems to retire from the periphery. Thus during sleep the leaves of the sensitive-plant lose their peculiar sensibility, which retires to the petiole. With the approach of night too an important change takes place in the functions of plants, for instead of exhaling oxygen and absorbing carbon from the atmosphere, as in the day time, their action at night is directly the reverse.

The sleep of plants usually occurs at night time, owing to the withdrawal of the stimulus of light, to which they are subjected during the day. The experiments of De Candolle indeed have proved that by producing artificial day and night it is possible to change the time for the sleep and waking of plants. There must however be some cause of sleep more intimately connected with their organism than the mere withdrawal of light; for not only are there plants which, like certain animals, sleep through the day and are awake at night, but it has been ascertained that the leaves of plants kept constantly in the dark open and close at regular intervals, as during sleep.

Much information concerning sleep and hybernation will be found in Müller's 'Physiology,' translated by Dr. Baly, vol. ii., p. 1410, &c.; in the article 'Hybernation,' by Dr. M. Hall, in the 'Cyclopædia of Anatomy and Physiology;' and in the 'Dictionnaire des Sciences Medicales,' under the word 'Sommeil.'

SLEEP OF PLANTS. [SLEEP.]

SLEEP-WALKING. [SOMNAMBULISM.]

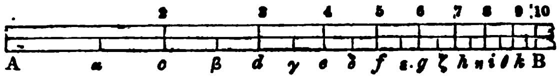
SLESWICK. [SCHLESWIG.]

SLIDE (or SLIDING) RULE. The sliding-rule is an instrument for the mechanical performance of addition and subtraction, which is converted into an instrument for the mechanical performance of multiplication and division by the use of logarithmic scales, instead of scales of equal parts.

This instrument has been greatly undervalued in our country, in which it was invented, and is very little known on the Continent: for though a French work on the subject, published in 1825, which is followed by the writer of a very recent mathematical dictionary in the same language, assures us that in England the sliding-rule is taught at schools at the same time with the letters of the alphabet,

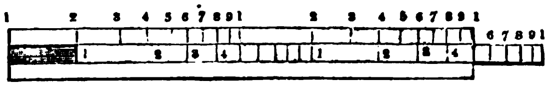
Google

we feel safer in saying that nine Englishmen out of ten would not know what the instrument was for if they saw it, and that of those who even know what it is for, not one in a hundred would be able to work a simple question by means of it. For a few shillings most persons might put into their pockets some hundred times as much power of calculation as they have in their heads: and the use of the instrument is attainable without any knowledge of the properties of logarithms, on which its principle depends.

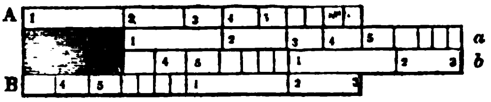


We have before us a logarithmic scale, of which AB, called the *radius*, may stand for the logarithm of 10, 100, 1000, &c.: but if AB should be, say the logarithm of 100, then A*c* is that of 20, A*d* of 30, and so on. If this scale be repeated several times, beginning again at B, and if it be also large enough to be subdivided to a greater extent than can be shown in the diagram, any multiplication can be approximately performed by addition, and any division by subtraction; which may be done with a pair of compasses. That is to say, the figures of the product may be found, exactly or approximately, and the meaning of the figures must be settled from the known character of the result. For example, to find 4 times 15:—First let AB mean the logarithm of 100, then A*a* is that of 15: next let AB mean the logarithm of 10, then A*e* is that of 4. Take A*a* on the compasses, and set it on to the right of *e*; it will be found that the point *g* is attained, directly under 6. But 4 times 15 must be tens; therefore 60 is meant, or 4×15=60. Next to divide 90 by 45: from A*k* take Aδ, or set off Aδ from *k* towards the left. The point *c* will be attained, under 2, which is the quotient. Next to find 7 times 5; set off A*f* from *h* towards the right, and the point γ of the scale following B will be attained, and 35 is the answer. But had it been to multiply 7 by ·5 or 5-tenths, this 35 would have meant 3·5 or 3½. Attempts are made in works professing to explain the sliding-rule to give rules for the determination of the character of the figures in the answer, but without any success. It is all very well for a few chosen examples, but an attempt to do without the book soon shows the insufficiency of rules. If, on a large scale, 653 should be the figures of an answer, common sense, applied to the problem, must say whether it is ·0653, ·653, 6·53, 65·3, 653, 6530, 65300, &c. which is meant. A knowledge of decimal fractions is therefore indispensable.

Now these additions and substractions might be performed by a pair of rulers made to slide each along the other; but whether they are kept together by the hand, or whether the one ruler slides in a groove along the edge of the other, matters nothing to the explanation. The following diagram represents the two rulers in one relative position. Here 1 on the slide is made to match 2 on the fixed ruler, and the instrument is now in a position to multiply by 2, to perform every division in which the quotient is 2, and to work every question in the rule of three in which the ratio of the first term to either the second or third is that of 2 to 1, or of 1 to 2. And here let us observe, that much the best way of beginning to use the sliding-rule is not by working given questions, but by setting the slide at hazard, and learning to read the questions which are thus fortuitously worked.

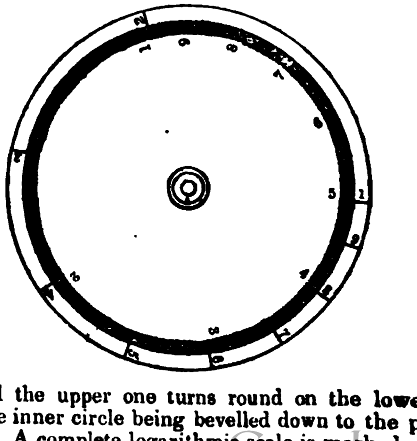


In the cut before us we have the 1 of the slide placed at 2 of the fixed ruler; consequently 6 on the slide comes under what would be 12 of the fixed ruler if the secondary graduations were inserted. Again, 4 comes over 2, and 9 over 45, giving 4 · 2 : : 9 : 4·5, the decimal point being inserted by intuition. To show the sort of results which we obtain from such a slide of 5½ inches radius (or from 1 to 1), we take one of this sort, and throw 1 of the slide at hazard between 225 and 230 on the fixed ruler, a little farther to the right than it is on the preceding diagram; guessing at the interval, it seems 228·5. We detect it more exactly by looking at 5 on the slide, which is hardly visibly in advance of 114 on the scale. As far then as the divisions, aided by our judgment of this interval, inform us, we have 114÷5 =22·85, the truth being 22·8. Again we find 628 (fixed) just over 275 (slide), the 8 being estimated: hence, by the scales we learn that 628÷275=2·285; the truth being 2·2836. Thirdly, we estimate that 1725 (fixed) falls over 757 (slide), and that 276 (fixed) falls over 121 (slide). That is, the ruler informs us that 1725 : 757 : : 276 : 121; the fourth term should be 121·12, as found by computation. We take a larger scale, having 7½ inches of radius, and setting 1 on the slide to 228·5, we find 1725 appears to fall over what we should judge to be 756 rather than 757. Now 1725÷757=2·2787, and 1725÷756=2·2818. Both give on the scales 2·285, so that the advantage is slightly in favour of the larger scale, but not so much as we should have expected. We now try one of 24 inches radius, and setting 1 on the slide to 2·285 on the fixed ruler, we find that 1725 (fixed) falls over 754·7 (slide), the last 7 being estimation. Now 1725÷754·7=2·2857, which gives the advantage again (but not so decidedly as might have been expected) to the large rule. The fact is, that it is rather ease than proportionate accuracy which is gained by the large rules: the preceding results required care and close attention on the 5½-inch rule; were obtained with moderate care on the 7½-inch; and taken off instantly from the 24-inch rule. Moreover, divisions on wood, made in the usual way, do not allow accuracy to increase with the size: if these rulers were divided on brass, and with the precautions taken in astronomical instruments, it would be a very different thing; but after all, the wonder is that the common wooden rules should be so accurate as they are.



The next step in the description is as follows:—It matters nothing whether the second scale be really made consecutive with the first, or occupy any other part of space· provided that when 1 and 1 are brought together on the first scale, 1 and 1 also come together on the second, and that the first slide and its continuation slide equally. We see this in the diagram before us: *a b* is one slide, and A B are two rulers on opposite sides of the groove. When *a b* is pushed home, A and *a* present coinciding scales, as do B and *b*: we should rather say, that the last is not one scale, but the end of one and the beginning of another; the 1 of B and *b* being in the middle. The consequence is, that as long as 1 of the scale *b* is not pushed out so far as to fall out of the groove (which is never necessary, since there is a whole scale on B), there is always the power of reading every result of the multiplication in hand. In the diagram, 1 on *b* is pushed out to 2 on B, and on the upper scales (A and *a*) we see 2×2=4, 2×3=6, 2×4=8, 2×5=10; on the lower (B and *b*), 2×4=8, 2×5=10, 2×6=12, 2×7=14, 2×8=16, 2×9=18, 2×10=20. This modification was invented by Mr. Silvanus Bevan (Nicholson's *Journal*, vol. xlix., p. 187); but thirty years before this Mr. Nicholson (*Phil. Trans.*, 1787, p. 246) had pointed out how to divide the whole radius into four parts, two on each face.

But the most simple plan, and, but for difficulty of dividing, the best, is to make a revolving circle turn upon a fixed one, in which case the scale is its own continuation, as in the following diagram. The two circles have a common



pivot, and the upper one turns round on the lower; the rim of the inner circle being bevelled down to the plane of the lower. A complete logarithmic scale is marked on each circumference, and it will readily be seen that the scales are placed so as to point out multiplications by 2, as in the former instances, and also that the recommencement of the scale begins its continuation. Instead of two circles there might be two thin cylinders, turning on a common axis, the graduations being made on the rim. Twelve or fifteen years ago, an instrument-maker at Paris laid down logarithmic scales on the rims of the box and lid of a common circular snuff-box: one of two inches diameter would be as good an aid to calculation as the common engineer's rule. But either calculators disliked snuff, or snuff-takers calculation, for the scheme was not found to answer, and the apparatus was broken up. There can, we think, be little doubt that when the knowledge of this instrument is extended, and consequently its sale, a pair of well-graduated brass circles will be the form it will take.

The form first proposed by Oughtred (presently to be mentioned) was a modification of the preceding. Instead of two circles, two pointing radii were attached to the centre of one circle, on which a number of concentric circles were drawn, each charged with a logarithmic scale. These pointers would either move round together, united by friction, or open and shut by the application of pressure: they were in fact a pair of compasses, laid flat on the circle, with their pivot at its centre. Calling these pointers antecedent and consequent, to multiply A and B the consequent arm must be brought to point to 1, and the antecedent arm then made to point to A. If the pointers be then moved together until the consequent arm points to B, the antecedent arm will point to the product of A and B.

It will be observed that in every construction the logarithmic spaces are very unequal, those near the end of the scale being small when compared with those at the beginning. This is not so great a disadvantage as might be supposed, for it makes the liability to error increase in nearly the same proportion with the result, so that the *per-centage* of error in the sliding-rule is nearly the same thing in all its parts. For example, the scale going from 10 to 100, the interval from 10 to 11 is to that from 99 to 100 as 207 to 22, nearly in the proportion of 10 to 1. The tendency to absolute error will be inversely as these intervals, or nearly in the proportion of 1 to 10: the tendency to error is therefore about ten times as great precisely when the result estimated becomes ten times as great. Oughtred appropriated two circles to his logarithms of sines, and it would be easy in his construction of the 'circles of proportion,' as he called them, to distribute the scale among different circles in such a manner that the graduations should be nearly equal throughout. But the mathematician will easily see that the most perfect mode of developing this idea would be to lay down the scale on a revolution of a logarithmic spiral, having the pointers joined at its pole. The graduations would then be absolutely at equal distances from each other on the arc of the spiral.

Another modification of the principle of the sliding-rule is as follows:—Let the divisions be all made equal, and the numbers written upon the divisions in geometrical proportion. If this were done to a sufficient extent, any number might be found exactly or nearly enough upon the scale; the only difficulty being that very small divisions do not give room enough to write the numbers. This modification of the principle has been applied in two very useful modes by Mr. MacFarlane. In the first, two cylinders moving on the same axis, on one side and the other of a third, give the means of instantaneously proposing and solving any one out of several millions of arithmetical questions for the use of schools and teachers. In the second, one circle revolving upon another gives the interest upon any sum, for any number of days, at any rate of interest under ten per cent.

The rules for using the sliding-rule, in its most simple form, may be symbolically expressed in the following manner:—

$$\begin{array}{cc|cc|cc|} 1 & B & A & B & A & C \\ A & AB & 1 & B\div A & B & C\times B\div A \end{array}$$

Thus, if 1 on either ruler be brought opposite to A on the other, B on the first ruler is brought opposite to AB on the other. But if the slide be taken out and inverted, we have the following rules:—

$$\begin{array}{cc|cc|cc|} 1 & B & A & B & A & C \\ A & A\div B & 1 & A\div B & B & A\times B\div C \end{array}$$

We now proceed to some of the additions which are frequently made to sliding-rules, premising that we do not describe any one in particular, but refer for detail to the tracts which are afterwards cited. For the extraction of square or cube roots, or the formation of squares or cubes, the following method is adopted:—In the case of squares and square roots, for instance, there is a pair of scales, one on the slide and one on the fixed ruler, of different radii, the radius of one being twice as long as that on the other. for cubes and cube roots the radius of one is three times as long as the other. On the former scale (that of squares and square roots) the rules are now as follows:—

$$\begin{array}{lccc|ccc|} \text{Longer Rad.} & 1 & A & \sqrt{A} & 1 & B & \sqrt{(B:A)} \\ \text{Shorter Rad.} & 1 & AA & A & A & AB^2 & B \end{array}$$

$$\begin{array}{ccc|ccc} A & B & A\sqrt{B} & A & C & A\sqrt{(C:B)} \\ 1 & B^2\cdot A^2 & B & B & BC^2:A^2 & C \end{array}$$

The denomination of the answer, or the place of the decimal point, must be determined by independent consideration, as before: but there is one circumstance to be attended to in every case in which two of the data are to be read on the shorter scale. For example,* suppose it is required to estimate $\sqrt{(2:7)}$. By the second formula, 7 on the shorter scale is placed opposite to 1 on the longer, and 2 on the shorter scale is then opposite to 1693 on the longer. The answer from the scale is then ·1693, to all appearance; but this is not $\sqrt{(2:7)}$, but $\sqrt{(2:70)}$. The place on the longer scale which should give the answer has no slide opposite to it, but only empty groove. But mark where 1 on the shorter scale is opposite to a part of the longer (between 119 and 120), and push the slide in from left to right till the first 1 on the shorter scale comes where the second now is; then look under the second 2 of the shorter scale, we have 534; and ·534 is the true answer as far as the scale will give it. We have taken the most straight-forward plan of reading the rule, and have not space for all the details which are in works on the subject, particularly the method of using the slide of numbers with a scale of numbers above and of square roots below. The following is the general principle applicable to the preceding case:—

It is well known that whereas in common division the place of the decimal point has nothing to do with the significant figures of the quotient; yet in extracting the square, cube, &c. roots, the figures of the root are altered by a change of the decimal point, unless it be changed by an even number of places in extracting the square root, by three or a multiple of three places in the cube root, and so on. In extracting the square root, a number may either have two figures in its first period, or one; thus ·07616 and ·7616 must (in the rule for extraction) be pointed

$$\cdot0\dot{7}6\dot{1}6\dot{0} \quad \text{and} \quad \cdot7\dot{6}1\dot{6}.$$

Let us call numbers *unidigital* or *bidigital*, according as there are one or two significant figures in the first period. Then the application to the sliding-rule is, that on the shorter scale numbers of the same name must be read either on the same radius or with a whole radius intervening, while numbers of different names must be read on different radii. In the scale for the extraction of the cube root, numbers must be distinguished into unidigital, bidigital, and tridigital; and signifying these by their initial letters, and taking the succession UBTUBT, &c., there must be the same relation between the scales on which they are read that there is between the places of their letters in the preceding list. Thus if U be read on one radius, T must either be read on that immediately preceding, or on the next but one. Thus in the preceding question, which we first solved wrongly, we have 2 and 7 to consider on the shorter scale, the pointing of which is—

$$\dot{2}\cdot0\dot{0}0\dot{0} \quad \text{and} \quad \dot{7}\cdot0\dot{0}0\dot{0},$$

and both are unidigital numbers. Bringing 7 on the shorter scale to 1 on the longer, we see that the next 2 is on a different radius; it would do then for 70, or ·7, or ·007, but not for 7. By the process we followed we took not indeed a 2 on the same radius with our 7, but on the next radius but one; and thus obtained the correct answer. These points, and others (such as the meanings of the lines of sines, tangents, &c., annuities, &c., which are found on several rules) can only be mastered by those who are acquainted theoretically with logarithms, trigonometry, &c.; for after all the sliding-rule will not teach the method of working any question, but will only afford aid in computation—in common multiplication and division, to any one; in higher rules, to those who understand their principles. Oughtred, the inventor, kept the instrument by him many years, out of a settled contempt for those who would apply it without knowledge, having 'onely the superficiall scumme and froth of instrumentall trickes and practises:' and wishing to encourage 'the way of rationall scientiallists, not of ground-creeping Methodicks.' A little distinction between that portion of its use which is generally attainable, and that which requires mathematical knowledge, would have been more reasonable.

---

* The reader will not understand this, unless with the scale in his hand. The common carpenter's rule or Bevan's rule will do, in which two consecutive radii are on the shorter scale, and one radius of twice the length on the longer.

On the carpenter's and engineer's sliding-rule are engraved a number of numerals in columns with headings, of which the following is a specimen ·—

	SQUARE.			CYLINDER.		GLOBE.	
	FFF	FII	III	FI	II	F	I
CAST IRON	·0022	·323	3·878	·411	4·935	·0043	7·406

These divisors (called gauge-points) are intended to convert into pounds the weight of a rectangular prism, cylinder, or globe, of cast-iron; the first, on three suppositions, namely, all dimensions in feet, one in feet and two in inches, and all in inches; the second, on the suppositions that the length is in feet and the diameter in inches, and that both are in inches; the third, on the supposition that the diameter is either in feet or in inches. We shall here content ourselves with verifying one of these, say the first of those marked 'cylinder,' which will show the nature of the divisor.

The specific gravity of cast-iron is 7·207, and the content of a cylinder of D *inches* diameter and L *feet* of length is ·7854 × D²L divided by 144, in cubic feet. A cubic foot of water weighs 62·321 pounds avoirdupois; one of cast-iron therefore weighs 62·321 × 7·207; whence the weight of the cylinder is, in pounds,

$$62{\cdot}321 \times 7{\cdot}207 \times {\cdot}7854\, D^2L \div 144, \text{ or } \frac{D^2L}{G};$$

$$\text{where } G = \frac{144}{62{\cdot}321 \times 7{\cdot}207 \times {\cdot}7854}, \text{ or } {\cdot}4082;$$

near enough to ·411 to illustrate our object, but showing that the computer of this divisor used a specific gravity slightly differing from the above. The rule in all the cases is to multiply the three dimensions together, diameters or lengths, and to divide by the divisor given in the table. The term gauge-point, which properly belongs to the part of the scale on which the divisor is marked, has passed to the divisor itself.

The following list of sliding-rules, now on sale in London, contains all or nearly all which can be useful to any one:—

1. Common Engineer's Rule, or Carpenter's Rule in its best form. A double 12-inch rule, a slide of two radii with the same scale on one side, and a scale of one radius of double length on the other, with divisors (sold by all rule-makers). The newest description is Kentish's 'Treatise on a Box of Instruments,' &c., London, 1839.

2. Bevan's Engineer's Rule, 12 inches. Has slides on both faces (which may be exchanged), and serves for squares, cubes, square roots of cubes, &c. There are scales on the backs of the slides and in the grooves, for sines, tangents, inverted numbers, compound interest and annuities at 5 per cent. (Cary, Strand; with an explanatory treatise.)

3. Henderson's Double-Slide Rule, 12 inches. Has two parallel contiguous slides, with scales of numbers fixed above and below, and solves at one operation most sets of multiplications and divisions not exceeding five operations. At the back are tables of divisors for solids. (Jones, Holborn.)

4. Woollgar's Pocket Calculator, 8 inches. The two slides work in either of the grooves: the backs and the grooves have scales of sines, tangents, areas of polygons, circular segments; interest, annuities, certain and for lives, at several rates of interest. An addition may be made by a metal slip, giving the solution of the same questions as the last rule. (Rooker, Little Queen Street; with an explanatory tract.)

5. Woollgar's Pocket-Book Rule, 6 and 8 inches. Two radii, one under the other, as described in the preceding part[*] of the article; a line for sines, and duplicate proportions at the back of the slide. At the bottom of the groove are sometimes inserted lines for finding the relations of right-angled triangles, for cask-gauging, and for cuttings and embankments. (Rooker.)

6. Excise Officer's Sliding Rule, modern form. Sold at the Excise Store-office, and by some of the instrument-makers. The old Excise rule was a thick block, with a slide on each face.

Among separate treatises not yet noted are Flower's, 8vo., London, 1768; Mackay's, 8vo., 2nd edit., London, 1811; do., Leith, 1812; 'Instruction sur la Manière de se servir de la Regle à Calcul.,' petit-in-8vo., Paris et Dijon, 1825; 'The Universal Ready-Reckoner,' by an Idle Gentleman, 12mo., London, 1839; and there is a good deal on the subject in Ingram's 'Concise System of Mathematics,' 12mo., Edinburgh, 1830; and Bateman's 'Excise Officer's Manual,' 12mo., London, 1840.

Between the sliding-rule and the book of logarithms comes the card of four-figure logarithms, published by Messrs Taylor and Walton (explained in the 'Companion to the Almanac' for 1841), to which has very recently been added a similar card for sines and tangents. A sliding-rule which would *in all parts* compete with these tables in accuracy must have a radius of from 8 to 10 feet, and would be unmanageable. At what length the card begins to be more easily used than the rule we cannot determine, but we should suspect that the former would be preferable to a rule of four feet radius. We have found the rule of 24 inches extremely useful in checking the material figures of more minute calculations, particularly when there are many divisions by the same divisor.

The history of the sliding-rule, had it ever been properly given, would be matter for a few lines of our work, in the way of abbreviation and reference. As it is, we have not only to establish the main points, but also to point out a specimen of the manner in which the account of early English science has been written. Harris's 'Lexicon Technicum' (1716) informs us that sliding-rules 'are very ingeniously contrived and applied by Gunter, Partridge, Cogshall, Everard, Hunt, and others, who have written particular treatises about their use and application.' Stone's 'Mathematical Dictionary' (1743) has the same words. Dr. Hutton (*Math. Dict.*, 1815) informs us that they are variously (not ingeniously) contrived and applied by different authors, particularly Gunter, Partridge, Hunt, Everard, and Coggleshall. Other writers repeat this sentence in their own ways, and the summing up is this:—the recognised history of the sliding-rule consists in the names of five persons; all our best English authorities are unanimous in stating that these men 'contrived and applied' sliding-rules, either ingeniously or variously; but to the credit of this century be it spoken, that it was our historian who altered the chronological order, and spelt Coggleshall's name right: had it not been for the research of Dr. Hutton, it might have been Cogshall to this day.

We now go on to something more like history. It is generally stated that Gunter invented the sliding-rule. This is not correct; Gunter neither invented this rule nor wrote about it; and though he was the first (*On the Crosse-staffe*, book i., cap. 6) who used a logarithmic scale, it was in the manner described at the beginning of this article, compasses being used to make the additions and subtractions. Gunter's rule is used up to the present time, under that name, in the navy, without any slides.

The real inventor of the slide was OUGHTRED, who was also the first writer upon it. He was a man who set but little value upon instrumental aids, unless in the hands of those who had previously learned sound principles, which (as we have seen) he himself testifies. In the year 1630 he showed it to his pupil William Forster, who obtained his consent to translate and publish his own description of the instrument, and rules for using it. This was done under the following title: 'The Circles of Proportion and the Horizontal Instrument,' London, 1632; followed, in 1633, by an 'Addition, &c.,' with an appendix, having title, 'The Declaration of the Two Rulers for Calculation.' The following extract from W. Forster's[*] dedication to Sir Kenelm Digby will explain the whole:—

'Being in the time of the long vacation 1630, in the Country, at the house of the Reverend, and my most worthy friend, and Teacher, Mr. William Oughtred (to whose instruction I owe both my initiation, and whole progresse in these Sciences), I upon occasion of speech told him of a Ruler of Numbers, Sines, and Tangents, which one had be-spoken to be made (such as is usually called Mr. Gunter's Ruler) 6 feet long, to be used with a payre of beame-compasses. He answered that was a poore invention, and the performance very troublesome: But, said he, seeing you are taken with such mechanicall wayes of Instruments, I will show you what devises I have had by mee these many yeares. And first, hee brought to mee two Rulers of that sort, to be used by applying one to the other, without any compasses: and after that he shewed mee those lines cast into a circle or Ring, with another moveable circle upon it. I seeing the great expeditenesse of both those wayes, but especially of the latter, wherein it farre excelleth any other Instrument which hath bin knowne; told him, I wondered that he could so many yeares conceale such usefull inventions, not onely from the world, but from my selfe, to whom in other parts and mysteries of Art he had bin so liberall. He answered, That the true way of Art[*] is not by Instruments, but by Demonstration: and that it is a preposterous course of vulgar Teachers, to begin with Instruments, and not with the Sciences, and so in-stead of Artists, to make their Schollers only doers of tricks, and as it were Juglers: to the despite of Art, losse of precious time, and betraying of willing and industrious wits unto ignorance, and idlenesse. That the use of Instruments is indeed excellent, if a man be an Artist: but contemptible, being set and opposed to Art. And lastly, that he meant to commend to me the skill of Instruments, but first he would have me well instructed in the Sciences. He also showed me many notes, and Rules for the use of those circles, and of his Horizontall Instrument (which he had projected about 30 yeares before) the most part written in Latine. All which I obtained of him leave to translate into English, and make publique, for the use, and benefit of such as were studious, and lovers of these excellent Sciences.'

---

[*] The maker of this slide has them of various lengths up to 24 inches.

[*] This man must not be confounded with the Gresham professor of his name; nothing more than his connection with Oughtred is known of him. The one whose name is so much connected with Gunter is Samuel Foster (died 1652), Gresham professor of astronomy.

Oughtred gave his right in the invention (as soon as it was settled to be published) to Elias Allen, a well-known instrument-maker, near St. Clement's church, in the Strand. In walking to and fro from this shop, he communicated his invention to one Richard Delamain, a mathematical teacher whom he used to assist in his studies. This Delamain not only tried to appropriate the invention to himself, but wrote a pamphlet of no small scurrility against Oughtred, which the latter answered in an 'Apologeticall Epistle' fully as vituperative; which epistle was printed at the end of W. Forster's translation. It contains some quantity of biographical allusion, and must not be forgotten by a mathematical historian of the times. W. Forster's work was republished in 1660, by A. H. (Arthur Haughton, another pupil of Oughtred), with Oughtred's consent, but the dedication and epistle were omitted.

The next writer whom we can find is Seth Partridge, in a 'Description, &c. of the Double Scale of Proportion,' London, 1685. He studiously conceals Oughtred's name: the rulers of the latter were separate, and made to keep together in sliding by the hand; perhaps Partridge considered the invention his own, in right of one ruler sliding between two others kept together by bits of brass. Coggleshall's ruler was made in both ways, that is, with the rulers attached and unattached; it appears to have come in at the end of the seventeenth century. Since that time several works have been written, and various modifications of the ruler proposed. Ward (*Lives of Gresham Professors*) is incorrect in saying that Wingate carried the sliding-rule into France in 1624: it was Gunter's scale which he introduced there. In fact the slide was little used and little known till the end of the century. Leybourn, himself a fancier of instruments, and an improver (as he supposed) of the sector, has 30 folio pages of what he calls instrumental arithmetic in his 'Cursus Mathematicus' (1690), but not one word of any sliding-rule, though he puts fixed lines of squares and cubes against his line of numbers in his version of Gunter's scale.

Finding so meagre an account on this matter in publications professedly mathematical, we did not at first think of having recourse to any others. When we had finished the preceding however, we thought of consulting the 'Biographia Britannica,' and there we found, in the middle of a very full life of Oughtred, the whole account of the invention of the sliding-rule, exactly as above, and from the same authorities. On looking at Dr. Hutton's account in the Dictionary, we perceive that he has either used this memoir or some copy of it; but without giving any information on the subject of the present article.

We shall conclude this article by some account of a new species of sliding-rule, invented by Dr. Roget (*Phil. Trans.* for 1815), which would be very useful in the hands of writers on statistics, and would sometimes save much trouble to the mathematician. The slide contains a common logarithmic line of two radii, each 10 inches in length. The fixed ruler has not logarithms, but logarithms of logarithms denoted by its spaces. For instance, reckoning from 10 (remembering that $\log\log 10=0$), the space from 10 to 100 is $\log\log 100$, or $\log 2$, the same space as from 1 to 2 on the slide. And since $\log\log x$ is positive or negative, according as x is greater or less than 10, we have the *logo-logarithms* laid down on the left for numbers less than 10, and on the right for numbers greater. This instrument is constructed by Mr. Rooker (Little Queen Street), and in this manner: 10 is on the middle of the upper ruler, which ends on the right at 10_{10}, or ten thousand millions; and on the left at 1·25. At the extreme right of the lower ruler we find 1·25 again, from which we recede to 1·0025 on the extreme left. The upper and lower rulers are so adjusted that from the end of one to the beginning of the other it is exactly two radii, so that a setting on the upper ruler applies also to the lower, but it may be necessary first to slip the slide a whole radius forwards or backwards, in the manner described in the preceding part of the article. And here again the meaning of the reading on the slide must frequently be determined by common sense applied to the problem.

When 1 on the slide is placed opposite to a on the ruler, we have b on the slide opposite to a^b on the ruler. Or using the preceding rotation—

Rule	a	a^b	a	$\sqrt[b]{a}$	a	$\sqrt[b]{a^c}$
Slide	1	b .	b	1	b	c

The approximations of this rule are equally easy whether applied to fractional or integer exponents, and Dr. Roget justly observes that it gives a much better idea of the rapid increase of powers than simple reflexion. It is so little known even to mathematicians, that we put down some of its results as specimens of its powers. Set 1 on the slide opposite to 3·14 on the rule, and we find for the approximate powers of this number by simple inspection 9·85, 31, 97, 300, 960, 3000, 9500, 29,500, 93,000, &c. The square root is 1·772, the cube root 1·463, the fourth root 1·331, the fifth root 1·257. We must now change the slide, as above directed, so as to put it in connection with the lower scale, and the proceeding roots are 1·215, 1·178, &c. All questions of increase of money, population, &c. are in this manner reduced to simple inspection, and very easy trial gives that approximate solution of exponential equations which the mathematician must find before he applies his more extensive methods. Thus, to form the table of logarithms in SCALE (p. 506) the base of which is $\sqrt[12]{2}$:—Set 12 on the slide opposite to 2 on the ruler, and the table is ready, as far as the instrument will give it. Thus, opposite to 3, 4, 5, &c. we find 19·0, 24, 27·9, 31·0, 33·7, 36·0, &c. almost exactly as in the table cited. It is also worth notice that each division of the upper fixed ruler answers to the hundredth power of the division directly beneath it on the lower fixed ruler. Thus, wishing to know what effect would be produced in 100 years upon a population which increases 3·46 per cent., we set unity to 1·0346 on the lower scale, and find at once 30·025 on the upper ruler, being the number by which the present population must be multiplied.

Mr. Woollgar (to whom we are indebted for much information in this article, and who has made a particular study of the sliding-rule) has carried to a considerable extent the principle of making the slide or the rule (no matter which) bear not the logarithms of the numbers marked on its graduation, but those of the values of a function of those numbers (*Mechanics' Magazine*, No. 849, vol. xxxii.). Let a slide be so graduated that the interval from a given point to the graduation x represents $\log\phi x$. When x is then ascertained (by the common scale, if necessary), the formula $a\phi x$ is immediately deduced from the common scale and the new slide. Nor need there be a new slide: for any scale being laid down in the groove, the common slide, by having its end made to coincide with one or another division of the scale in the groove, may be rendered capable of answering the purpose of a new slide.

Since the above article was written, we have obtained from Paris a circular logarithmic scale in brass, altogether resembling the one figured and described in the preceding part of this article, with the addition only of a clamping screw. This instrument, the scale of which is 4½ inches in diameter, is so well divided that it will stand tests which the wooden rules would not bear without showing the error of the divisions. But here arise disadvantages which we had not contemplated. In the first place, no subdivision can be well made or read by estimation, unless the part of the scale on which it comes is uppermost or undermost, which requires a continual and wearisome turning of the instrument. In the next place, to make the best use of it, and bring out all its power, requires (we should rather say renders worth while) such care in setting and reading, as, unless a microscope and tangent screw were used, makes the employment of the four-figure logarithm card both shorter and less toilsome. For rough purposes, then, a wooden rule is as good; for more exact ones, the card is better. We made a fair trial of both on the tables in SOLAR SYSTEM, and are perfectly satisfied that though the French brass arithmometer did, with great care, bring out the results required, the four-figure card did the work more easily. But, had we wished to abandon two or three units in the last places of figures, there would then have been no doubt that the instrument would have been the easier of the two: but then a straight wooden rule of the same radius would have done quite as well, and been more convenient still. (*Mechanics' Magazine*, No. 949.)

---

[*] Here is the old use of the word art we should now say science. SCIENCE.]

SLIGO, an Irish county in the province of Connaught, extending along the southern shore of that great inlet of the Atlantic Ocean which separates the provinces of Ulster and Connaught, and of which Donegal, Sligo, and Killala bays are subordinate parts. The county is bounded on the north by the sea, on the north-east by the county of Leitrim, on the south-east by that of Roscommon, and on the south-west and west by that of Mayo. Its form is tolerably compact: the greatest length is in a direction nearly east and west, from the junction of the three counties of Leitrim, Roscommon, and Sligo, to the mouth of the river Moy in Killala Bay, thirty-five miles; the greatest breadth at right angles to the length is from the village of Clossibawn, on the Atlantic, to the shore of Lough Gara, thirty-four miles. (*Ordnance Survey*.) The gross area, according to the Ordnance Survey, is 461,753 acres, or 721¼ square miles; of which 12,740 acres, or 20 square miles, are loughs, leaving 449,013 acres, or 701½ square miles, of land. The gross area is about equal to the area of the English county of Worcester. The population, in 1831, was 171,765, which gave nearly 245 inhabitants to a square mile of land. It is the smallest and least populous county in Connaught except Leitrim, but the population is more dense than in any other except Roscommon. Sligo, the county town, is at the bottom of Sligo Bay, in 54° 18′ N. lat. and 8° 25′ W. long., 109 miles in a direct line north-west of Dublin, or 132 miles by the road through Lucan, Leixlip, Mullingar, Longford, Carrick-on-Shannon, and Boyle.

Coast-Line, Bays, and Islands.—The coast from the mouth of the river Moy, at the western extremity of the county, runs north-north-east seven miles in a tolerably direct line, forming the eastern side of Killala Bay, and terminating in Lenadoon Point. From Lenadoon Point the coast runs eastward to Cooanmore Head five miles, and then south-east for as much more, to the neighbourhood of the post-town of Dromore West, at which point it turns to the north-east, and runs twenty or twenty-two miles in that direction to the headland near the small harbour of Clossibawn or Classybaun, the outline being broken in this part by Sligo Bay. From the neighbourhood of Clossibawn the coast runs for about five miles first south, then east to the mouth of the little river Duff, which forms the boundary between this county and Leitrim. Except in Sligo Bay and along the coast eastward from it the shore is rocky. There are cliffs in some places on the shore of Killala Bay, and between Lenadoon Point and Dromore West, and near the entrance of Sligo Bay on each side, and again about the headland near Clossibawn. Off that part of the coast which extends north-eastward from Sligo Bay, distant between three and four miles, is Innis Murray, a small island, about a mile long from east to west. It rises precipitously on every side except just at the east point; and it is highest on the north and west sides (74 to 77 feet), where it faces the open sea. It contains about 209 acres of cultivable land, chiefly pasturage, and is inhabited by about a score families. About two or three miles farther out to sea are the Boabinshy rocks. Sligo Bay is nearly six miles across at the entrance, and about ten miles deep to the town of Sligo. On the south-west side of the entrance is Aughris Head, and on the north-east side is Roskeeragh Point. The bay is divided by projecting headlands into three smaller bays which penetrate inland in an east or south-east direction. The northernmost of these smaller bays is called Drumcliffe Bay: it is useless as a harbour from its being shallow, but has an oyster-bank on its northern shore near Lissadill House, which yields good oysters. The middlemost bay is that at the bottom of which the town of Sligo stands; it is in great part occupied by a large bank called Cummeen Strand, but has a channel navigable up to Sligo town for vessels of small burden. The mouth of this bay is protected by Coney Island (area 388 acres), which stretches across the entrance, and forms a natural breakwater, within which large vessels, which cannot get up to the town, lie at anchor. There is another much smaller island in the bay, called Oyster Island, on which are two lighthouses; and westward from Coney Island extends a reef, on the western extremity of which, the Black Rock, dry at low-water, a lighthouse has been built. There is another still smaller island, Maguin's Island, off the headland between this bay and that of Ballysadere. The southernmost of the three bays, Ballysadere or Ballysadare Bay, forms the æstuary of the Ballysadere river: it is shallow, except just in the channel of the river, by which ships of 100 tons burden can get up to the village of Ballysadere. There are extensive sands or other strands in Killala and Sligo bays, and along the coast eastward of Sligo Bay. A narrow channel in the strand between Sligo Bay and Clossibawn, the mouth of a small rivulet, runs for several miles nearly parallel to the coast, and is known as Milk Haven. Two small islands lie between it and the sea.

Surface and Geology.—The mountains of this county form three principal groups. The Ox Mountains extend from the river Moy at Foxford, in the county of Mayo, north-east to the shore of Ballysadere Bay. The mountains which overspread the counties of Fermanagh and Leitrim extend into this county and occupy the north-eastern border; these form the second group. The third group consists of such portions of the Braughlieve and Curlew Mountains [ROSCOMMON] and the mountains round Lake Gara as are in the county. The Ox Mountains (to which, in the Map of Ireland, published by the Useful Knowledge Society, the name of Slievh Gauff is also given) form a considerable range, about twenty-five miles long and five or six in breadth. They consist chiefly of mica slate, with occasionally granite, hornblende slate, gneiss, and quartz rock; the strata dip rapidly towards the south. The summits have a mean height of 1300 feet above the level of the sea at low-water; on the north-west side they present abrupt rocky peaks, with intervening ravines of no great depth. On the south-east the ascent is more gradual and less rocky. Knock-a-Chree, the highest of the peaks, near the north-eastern termination of the range, is 1778 feet high; it is composed of hornblende slate. Streams are more abundant on the south-eastern slope than on the north-western; and amid the group are two small lakes, Lough Easkey and Lough Talt, the former 607 feet and the latter 455 feet above the level of the sea at low-water. The mica slate, of which the Ox Mountains are composed, extends eastward across the Ballysadere river, and along the south side of Lough Gill into the county of Leitrim, forming a range of hills which may be regarded as a prolongation of the Ox Mountains. At the base of the Ox Mountains the old red-sandstone and conglomerate are observed skirting on both sides of the range the primary rocks, and sinking below the carboniferous limestone, which occupies the lower lands extending on one side to the sea and on the other to the Curlew and other mountains on the border of Roscommon. The strata are generally very distinct; in some places however the conglomerate graduates insensibly into the subjacent quartz rock, especially on the south-east side of the range, where the two formations lie conformably on the inferior beds; but on the north-western slope the conglomerate rests on the outcrop or edge of the older beds. Garnets are found near Lough Easkey in the Ox Mountains.

Of the mountains on the border of Roscommon, the Braughlieve Mountains, which rise in one part 1346 feet above the level of the sea at low-water, belong to the carboniferous group, and the Curlew Mountains, which rise in one part 1062 feet above the level of the sea, to the old red-sandstone group.

The same group (the sandstone) occupies the headland on the north-eastern side of the entrance of Sligo Bay. The rest of the county is occupied by the formations of the carboniferous limestone group. A ridge of mountains west of Lough Gara consists of the yellow sandstone which constitutes the lowest member of this group; but very little of this ridge, if any part of it, is within the county. The lower limestone, the member next above the yellow sandstone, is found at the base of the Curlew Mountains, near Lough Arrow, and yields grey and dove-coloured marble. The mountains on the north-eastern border of the county are formed of the calp and shale division, which is next above the lower limestone, and of the upper limestone, which is the uppermost division of the group. These mountains form part of the mountain district of Fermanagh, Cavan, Leitrim, Roscommon, and Sligo, the limestone of which bears a striking resemblance in character and composition to the mountain limestone of Derbyshire, Cumberland, and the north-west of Yorkshire, and which exhibits in perfection the whole series of formations belonging to the carboniferous limestone and the millstone-grit series of Ireland. In Benbulben, one of the loftiest mountains of the group (1722 feet above the level of the sea), situated several miles north of Sligo, the upper limestone is 500 feet thick. Its upper strata are frequently associated with irregular beds of semi-crystalline brown spar rock, the disintegrated surfaces of which so much resemble ordinary grey sandstone in appearance, that this rock has frequently been mistaken for it. Brown spar of this kind occurs on the summit of the mountain Knockarea, or Knock-na-ree (1057 feet high), which occupies part of the headland that separates Sligo Bay from Ballysadere Bay. The northern face of the mountain Benbulben is nearly perpendicular, while on the south side a more gradual slope leads to the summit, which is a table-land of some extent. The other principal mountains of this north-eastern and eastern group are Trusk More (2113 feet high), Trusk Beg, Ben Weskey, King's Mountain (1965 ft.), Castlegal (1417 ft.), and Culogua Buy (1430 ft.).

This county and the adjacent one of Mayo are traversed by trap dykes unexampled for length, directness, and parallelism. Their direction is nearly east and west. Trachyte, a formation not observed elsewhere in the British Isles, is found on the shore of Killala Bay. (Archdeacon Verschoyle, *On the North Coast of Mayo and Sligo*, in *Geol. Transactions, second series*, vol. v., pp. 149, &c.; Griffiths, *On the Geology of Ireland*, in *Appendix to Second Report of Irish Railway Commissioners*. The heights are from the *Ordnance Survey*.)

Copper and lead mines were formerly wrought in the primary district to which the Ox Mountains belong; but there are not any carried on at present. Garnets abound above Lough Easkey, and asbestos is found to the eastward. The Arigna coal-works are just beyond the boundary of this county. A considerable part of the district extending northward from the foot of the Ox Mountains to the sea is covered with bog; and there is a considerable extent of bog in the southern part of the county, but very little in the part which lies north of the town of Sligo.

Hydrography and Communications.—The western side of the county is watered by the Moy and other smaller streams which flow into Killala Bay, or into the open sea. A stream, called by some authorities the Moy, but in the Society's map the Owengarrow, has part of its course in this county and part in Mayo. It joins what is marked in the Society's map as the Moy, above Foxford. The united stream touches the western border of the county just below the town of Ballina, and forms the boundary of the county of Sligo and Mayo, until it falls into Killala Bay. It is navigable for vessels of considerable burden up to Ballina. Nearly all the rest of the county is drained by the streams which flow into Sligo Bay, of which the most important are the Ballysadere, and the river Sligo or Garvogue, which, flowing from Lough Gill, passes the town of Sligo. The Ballysadere is formed by two streams, the Awinmore and the Arrow or Unshin or Awinshien (the latter flowing from Lough Arrow), which unite near the town of Collooney, and, falling over a ledge of rock which crosses the bed, enter Ballysadere Bay. These rivers are all small, and of little use for navigation.

The lakes are tolerably numerous, and have an aggregate area of 20 square miles. The principal are—Lough Gara, on the southern boundary, 222 feet above the level of the sea at low-water, and having an area in this county of 3684 acres, or above 5¼ square miles; Lough Arrow, in the south-eastern corner, 181 feet above the level of the sea, area in this county 2977 acres, or 4½ square miles; and Lough Gill, on the eastern boundary, 20 feet above the level of the sea, and having an area of 3131 acres, or nearly 5 square miles, in this county, beside a portion in the county of Leitrim. Among the smaller lakes are Lough Talt, or Tait, 455 feet above the sea, and Lough Easkey, 607 feet above the sea, area 168 acres, in the Ox Mountains; and Lough Car, or Glencar, 97 feet above the sea, having an area of 113 acres in this county, and a still larger area in the county of Leitrim, on the north-eastern border. Lough Gill is nearly six miles long from east by north to west by south, and about two miles wide. It is studded with islands, some of them richly wooded, and two of them, Church island (42 acres) and Cottage island (14 acres), inhabited. Lough Arrow, and Lough Gara, nearly as large as Lough Gill, but of more irregular outline, are also picturesque and studded with islands. Lough Arrow affords fine fishing in the spring; Lough Talt, imbedded amid precipices, abounds with trout, and is much frequented in the summer by water-fowl.

The principal roads are the mail-road from Dublin to Sligo, with a branch mail-road to Ballina and Castlebar; and the mail-road from Sligo to Ballyshannon (county of Donegal), from which place it continues to Donegal, Lifford, Strabane, and Londonderry, with a branch road to Enniskillen. The inland traffic to and from Sligo is very considerable, greater than to and from any other town in Ireland, except these six: Dublin, Cork, Belfast, Limerick, Galway, and Waterford. There are a mail-coach daily and another coach three times a week from Dublin to Sligo; a mail-coach daily from Sligo to Castlebar, and one from Sligo to Londonderry; a mail-car daily from Sligo to Enniskillen, and cars from the same town six times a week to Ballyshannon, and twice a week to Ballinacarem, about nine Irish (between eleven and twelve English) miles south of Sligo. (*Appendix to Second Report of Irish Railroad Commissioners.*) The Ox Mountains are traversed by several passes; that through which the Dublin and Sligo mail-road runs presents some very picturesque scenery. The roads on the eastern side of the county are numerous, and those leading to the market-towns are, generally speaking, well laid out and well kept. Much has been done of late years, partly at the cost of the landlords, but in some places much remains to be done. There is scarcely any inland water-carriage, but in the parts about Sligo Bay produce is carried to market by water.

Soil; State of Agriculture; Condition of the People.—A considerable part of the soil, 168,711 acres, is occupied by unimproved bog or mountain; 257,217 acres are under cultivation. In the north the soil is thin and poor, but it improves as we advance southward. The vicinity of Sligo is a plain of great fertility: in the west the soil is light and gravelly, with large tracts of bog. The following particulars, extracted from the *Appendix to the First Report of the Commissioners for inquiring into the State of the Poor in Ireland*, apply to the barony of Carbery, which includes the town and neighbourhood of Sligo, and all that part of the county which lies north of that town, but may probably be taken as applying to most other parts of it.

About one half of the barony is held under resident landlords, the greater part of the remainder under landlords who have agents resident in the barony. About one-half of the land is held under middlemen, but as their leases expire, the landlords are putting down the system. The generality of farms are held under leases; these never exceed 21 years, and the general tendency is to shorten the term. One extensive landowner grants no leases, or scarcely any. The consolidation of small holdings has been actively going on for some years, but the farms are still very small. On the large estate of Sir R. G. Booth there were no farms over 30 acres, not six over 20, and the majority between 5 and 10. In the parish of Drumcliffe, the tithes are levied on holdings which average 3½ acres each; and the holding on the average of the barony is estimated at from 3 to 5 acres: some few have 30, 40, or 50 acres of tillage, and grazing-farms average 80 acres. Want of capital, combined with want of skill and the quantity of ground lost by the numerous and irregular fences, keep down the productiveness of the farms. The people know nothing of artificial manure, and many think of nothing but sea-weed; but the consolidation of farms, and the engagement by some landlords of Scotch agriculturists to instruct their tenantry, will tend to improve the present wretched methods of farming. It is difficult from want of capital, to find persons to occupy large farms, where an attempt is made to form them. Considerable emigration has taken place of late years, especially to the United States: the emigrants have been chiefly persons possessed of a little money, and a considerable number of them have been Protestants. The competition to obtain land is great, consequently rents are so high as to leave the occupier nothing but a bare subsistence. Yet the destitution of a large part of the population has not been any check to improvident marriages, and the distress prevalent among the people has led to occasional outrages, and created a sense of insecurity which has kept capitalists from taking farms when offered them. The 'con-acre' system is very prevalent; but from the superabundant population, many of the labourers occupy less than a rood of land, and some can obtain none.

The usual course of tillage is potatoes followed by two white crops, then potatoes again, after which a few of the larger farmers allow the land to remain fallow; but among the smaller farmers the course is an alternate crop of potatoes and grain. It is only by the help of sea-weed used as manure, which is often carried 20 miles, that the land is enabled to bear this constant exhausting process. Near Sligo, lime and animal manure are used as well as sea-weed. After gathering the potato crop, the land is manured with sea-weed; and in the spring it is ploughed, and the oats, wheat, or barley sown. Very little wheat is sown in November, as, if the season afterwards should prove wet, it does not succeed; besides it is difficult to get the potatoes off the ground in time. 'Some attention is paid to weeding the corn crops during their growth, but the farmers are not aware of the benefit of rolling the land, and there are consequently but few rollers in the barony; they generally defer cutting the corn till it has become dead ripe, by which delay it becomes thick-skinned, and the sample is greatly deteriorated in appearance and in the produce of flour.' But this delay is often the result of the farmer being obliged to do duty-work, or of other causes arising from his poverty. The same cause obliges him to bring his corn early to market, and thus the market at Sligo (from which port large quantities are shipped both to London and Liverpool) is glutted.

Clover and vetches, turnips, and mangel-wurzel may be seen on the demesnes of the proprietors, and some few patches on the lands of the tenantry, among whom the landlords are striving to introduce them. Few of the farmers require any further help than that of their own families, except in the hurried times of spring and harvest, when it is procured either by an exchange of labour or by hiring the smaller occupiers; when more constant help is required, one or two lads are kept. The grazing farmers are generally men of more capital than the tillage farmers, but the pasture-land is commonly poor. The labourers are placed on the worst land in the farm, from which their con-acre is taken. The number of cows kept varies from one to ten. The butter produced in the district is counted only second or third rate at the Sligo market, which itself ranks in London next below those of Cork and Belfast in the quality of its butter. The quantity of butter sold in Sligo market in 1833 was 53,452 firkins, weighing on the average 2 qrs. 15 lbs., of which 4 lbs. 'tret' is allowed; in 1834 the quantity sold was 48,525 firkins. Not many sheep are kept, except by large farmers, and a few by those who hold mountain farms: no improvement has been made in the breeds kept by the farmers, but there has been an improvement in those kept by gentlemen. The large Irish breed, and the mountain breed, which is smaller, are the most common. The farmers keep the Irish cattle; the proprietors and those persons who live near the town of Sligo, the Ayrshire, or a cross between the Ayrshire and the Irish; the latter are coming more and more into use for the dairy. Few cattle are fattened. The houses both of the dairy and tillage farmers are generally very poor, usually consisting of two or at most three rooms, a kitchen and two bed-rooms, one of which serves also for a dairy. The fences are usually dry stone walls or earthen banks. Draining is little attended to.

The average rent of tillage-land and pasture-land together appears to be from 1*l.* 5*s.* to 1*l.* 10*s.*, rising in some places to 2*l.*, and in others falling to 1*l.* Pasturage alone may be considered to average about 15*s.* The rent of con-acre ground varies from 4*l.* to 10*l.* per acre.

Employment is scarce and precarious, and the demand for labour has of late years much diminished, through the decay or removal of the linen-manufacture, the increase of population, and the subdivision of land. Wages have been decreasing; the farmers pay 5*d.* or 6*d.* a day in summer, and 4*d.* in winter, with diet. Gentlemen give 10*d.* a day in summer, and 8*d.* in winter, without diet. Young men boarded in the house receive 4*l.* or 5*l.* a year. Few men earn more than 6*l.* or 7*l.* a year; and of that less than 4*l.* in money, the rest being rent, &c. received in return for labour. It is the con-acre that maintains them. From the miserable insufficiency of their wages to procure proper sustenance, they are unable to do a full day's work. Early and inconsiderate marriages are exceedingly common; labouring men generally marry under twenty, and it is rare to find an unmarried person, of either sex, above thirty years of age. The labouring class, or cottiers, generally rent a cabin with or without a few perches of land: the rent is frequently paid in labour, so many days in the week. A few of them manage to keep a cow; for grass for which, during the summer half-year, they pay 1*l.* 10*s.* or 2*l.* Women can rarely get any out-of-door labour; a few are employed in harvest or hay-making time, and earn 3*d.* or 4*d.* a day. The earnings obtained by flax-spinning are very trifling, not more than a halfpenny a day. Children get no employment except from their parents. Few of the cottiers keep poultry; and only those who hold above half a rood of land have a sufficiency of refuse potatoes to enable them profitably to keep a pig. Herds are sometimes paid in money, sometimes by giving them a cabin and a small plot of grazing-land, with or without a small sum of money.

The cabins of the peasantry are of the most wretched description, built of sods or of loose stones, coated outside with a mixture of clay and mortar, with a clay floor, and a roof formed by laying branches of trees across the rafters, and covering them with sods of turf, over which is laid a thin and inadequate thatching of straw. The greater part are without chimneys, and are not large enough to be divided into apartments: a small pane of glass, kept in its place by mortar or mud, is the usual window; most have a wooden door on hinges, but others have wicker doors, and in a few the doorway is closed by a hanging of straw mats. Most have pigstyes or cowhouses, however wretched; but privies are not thought necessary, even for new houses built for farmers holding 12 or 13 acres of land. The rent of a cabin with a rood of land varies, according to the quality of the soil, from 1*l.* to 2*l.*, or even more. Turf is the ordinary fuel, and constitutes a serious item in the expenditure of a poor family, when they have not liberty to cut it on the estate.

A large portion of the labouring classes never get any food but potatoes with a little salt, and at prosperous seasons milk: those who live near the sea-shore get less milk, but occasionally they have fish. They get commonly three meals a day, but in scarce times only two. Considerable distress prevails yearly between the decay of the old potato-crop and the coming-in of the new, an interval varying from two to eight weeks. The clothing of the peasantry is very miserable, especially of the women and children; the last are at all times in rags. Many cabins have rude bedsteads, but frequently with no other bedding than straw or hay, with a single quilt or sheet of sacking, or perhaps a blanket for the parents and one or two of the younger children; the other children have often nothing but a little old hay. A table, a few stools, and a chest, perhaps with a metal pot and a pair of tongs, compose in the majority of cases the rest of the furniture. Drinking and illicit distilling have much diminished; though in some parts of the county they are still carried on to a considerable extent.

Division, Towns, &c.—The town is divided into six baronies, as follow:—

Barony.	Situation.	Area in Acres. Land.	Area in Acres. Water.	Area in Acres. Total.	Population in 1831.
Carbery or Carbury	N. and N. E.	76,279	2,605	78,884	48,887
Coolavin	S.	25,449	3,708	29,157	8,596
Corran	Central	44,988	640	45,628	17,431
Leyny or Leney	Central and S.W.	120,624	1,062	121,686	32,849
Tirraghrill or Tirerrill	E.	75,199	4,397	79,596	28,736
Tireragh or Tyreragh	W.	106,474	328	106,802	35,266
	Total area	449,013	12,740	461,753	171,765

It contains the county town of Sligo, the market and post towns of Collooney and Ballymote; the market-towns of Coolaney, Tubbercurry, and Easkey; and the post-town of Dromore-West. The principal villages are Ballysadere, Ardnaree, Grange, and Riverstown.

Sligo, the county-town, is situated on the Garvogue or Garvoge river, which flows from Lough Gill into Sligo Bay, not half a mile above its outfal. It is in the barony of Carbury. This town appears to have owed its importance to a castle and monastery of Dominican friars, built here A.D. 242 and 1252, by Maurice Fitzgerald, earl of Kildare, and at that time lord justice of Ireland. The town suffered repeated injuries from the hostilities between the English and the native Irish, and from fire. In the reign of James I. it received a grant of a market and two fairs, and was incorporated and made a parliamentary borough. In the civil war of Charles I. the town was occupied by the parliamentarians under Sir Charles Coote (A.D. 1645). They were however attacked by a strong force under the Roman Catholic archbishop of Tuam, but repulsed the assailants. The archbishop was killed in the retreat; and his papers, which were taken, afforded evidence of the king's private treaty (concluded on his behalf by the earl of Glamorgan) with the Catholics. Sir Charles Coote afterwards abandoned the town, which was occupied by the Catholics, and retained by them to the end of the war. In the civil war of James II. it was taken by the Enniskilleners, who, after repelling one attack, were driven out by the Jacobites under Sarsfield: it was again occupied by the Protestants under Lord Granard.

The river Garvogue makes a bend just at the town, its course changing from west to north and north-west. Part of the town is situated within the elbow thus formed, but the greater part is on the other side (the south and west side) of the stream. The town extends, in all, about a mile from north to south, and nearly as far from east to west. The streets are irregularly laid out; they are paved, but the pavement is in many parts very indifferent, and they are not lighted. The houses are generally respectable, and some of them very superior. There are two bridges; the old bridge below the bend, and the new bridge above it. The left bank of the river, below the old bridge, is lined with quays; these quays have been extended and some warehouses built within the last few years. That part of the town which is on the south and west side of the river is in the parish of St. John; the church is on the south-west side of the town, near the outskirts: it is an antient cross church, with a massive square tower at the west end. The other part of the town is in Calry parish: the church is at the eastern end of the town: it is a modern building, in the Gothic style, with a well-proportioned spire. There are in the town a Catholic chapel (for St. John's parish), and a small Dominican convent, with a chapel attached to it; and meeting-houses for Methodists (two), Presbyterians, and Independents. Just out of the town, on the east side, are the fever hospital, infirmary, and dispensary, all in one enclosure, and a charter-school; these are near Calry church, north of the river: on the opposite bank is the county gaol. The custom-house is on the new quay, just below the town, and not far from it are the police-barracks and the government emigration-office. The town has every prospect of extension and improvement.

The population of the borough, in 1831, was 15,152; viz. 11,411 in St. John's, and 3741 in Calry: the outparts of the two parishes contain a considerable population in addition to the above, viz. St. John's, 2610, and Calry, 2679. There are a few linen and stocking weavers; but the linen manufacture, once very flourishing, is almost extinct, and the linen-hall is unoccupied. There is a large whiskey-distillery on the south bank of the river, above the new bridge, several breweries, with flour-mills, soap-houses, rope-walks, and manufactures of tobacco and snuff, hats, and candles. The trade of the port is very considerable. The exports are chiefly of corn, meal, flour, butter, provisions, and linen yarn; and the imports, West India produce, tobacco, refined sugar, tea, British spirits, wine, flax-seed, tallow, glass and earthenware, coals, iron, timber, and salt. The principal markets for corn and provisions are on Tuesdays and Saturdays, and are well attended: there is a corn and butter market every day: there are five yearly cattle-fairs, and a considerable salmon fishery is carried on in the river just above the town. The estimated value of the exports in 1835 was 369,490*l.*; of the imports, 124,692*l.* The amount of customs duty collected at the port in 1836 was 33,094*l.* 12*s.* 7*d.* gross, or 17,128*l.* 12*s.* 2*d.* net, after deducting repayment of trade vouchers, office expenses and incidental charges: in 1839 the gross amount was 29,530*l.* 2*s.* 3*d.*; the net revenue, 13,743*l.* 11*s.* 7*d.*

The corporation, before the late Irish Municipal Reform Act, consisted of a provost, twelve free burgesses, and commonalty; under that act the borough has been divided into three wards, and has a mayor, six aldermen, and eighteen councillors; the commonalty are now termed the burgesses. The borough has a court of quarter-sessions, which is also a court of record. The municipal borough, as limited by the same act, is much smaller than the parliamentary (and previous municipal) borough, which is bounded by a circular line drawn with a radius of one mile Irish, and having the market-cross as a centre. Sligo returns one member to parliament: before the Union it sent two to the Irish Parliament. The assizes for the county, quarter-sessions for the division, and petty-sessions for the district, are held here. St. John's parish (a rectory) and Calry parish (a vicarage) are included, with the adjacent parishes of Killaspicbrone (rectory and vicarage) and Kilmacowen (rectory and vicarage), in the union of St. John's, Sligo, the gross revenue of which was returned (on the average of three years, ending with 1831) at 945*l.* 13*s.* 9*d.*, the net revenue at 718*l.* 6*s.* 4*d.* There are some ruins of the antient monastery, including three sides of the cloisters, and a portion of the church, the east window of which is of beautiful design and adorned with rich tracery.

Collooney is in that part of the parish of Ballysadere which is in the barony of Tirraghrill or Tirerrill, about seven miles south of Sligo, through Ballysadere. It is a small place, on the right or east bank of the Awinmore (or Owenmore, as it is often written), and consisted, in 1831, of a single street of 90 houses (89 inhabited and one empty), of which about 13 were slated, the rest thatched. The street runs northward to the Awinmore, over which there is a bridge. The population in 1831 was 553. At the southern end of the town are the church, a handsome Gothic building containing some good monuments, the police-barracks, and the market-house; and in other parts of the town a Roman Catholic chapel, a linen-hall, a dispensary, and two schools. Near the town are a large bleach-ground and an oatmeal-mill. The market is on Thursday, and there is one yearly fair. A short distance north-east of the town, at the junction of the Awinmore and Arrow, are the remains of an antient castle. There was a smart skirmish near Collooney (September 5, 1798), between a detachment of the Limerick militia, under Colonel Vereker, and the invading French force, under General Humbert.

Ballymote is in the parish of Emlyfadd or Emlaghfad, in the barony of Corran, about 14 miles south by west from Sligo, by Ballysadere and Collooney. It had formerly a strong castle, built by Richard de Burgo, A.D. 1300, seized by the native Irish in the great civil war of 1641, and retaken by the Parliamentarians, under Ireton and Sir C. Coote, in 1652. The ruins of this building occupy an area 150 feet square; and there are the remains of a Franciscan friary. The town had, in 1831, 140 houses, viz. 124 inhabited, and 16 empty, and a population of 875 It is at the junction of six considerable roads, and is irregularly built. The parish church of Emlyfadd, a good building in the early English style, with a handsome tower and spire, is in the town; and there are a Catholic chapel, a Methodist meeting, police-barracks, a bridewell, and a court-house in which quarter-sessions for the division and petty sessions are held. The linen manufacture, formerly carried on to some extent, is now nearly extinct: there is a weekly market, and there are six yearly fairs.

Coolaney is in Killoran parish, in the barony of Leney, about 10 miles south-west of Sligo, through Ballysadere. It stands on the right or south-east bank of the Awin, or Owen-beg, which joins the Awinmore about two miles above Collooney. There were, in 1831, 68 houses, viz. 58 inhabited, 8 uninhabited, and 2 building; the population was 326. The houses form one street, running nearly north and south, parallel to the river, over which, near the north end of the town, is a bridge. There are a dispensary, a court-house for petty sessions, a police barrack, and a small Baptist meeting-house. There is a weekly market, and there are two yearly fairs. There is a penny post, dependent on the post-office at Collooney.

Tubbercurry, or Tobercurry, is in the parish of Achonry and barony of Leney, about 21 miles south-south-west from Sligo, on the road to Swineford and Castlebar, and 10 or 11 miles from Ballymote. The town had, in 1831, 48 houses, viz. 40 inhabited, 6 uninhabited, and 2 building; the population was 210; there are in the place a neat Episcopal chapel, a Roman Catholic chapel, a police-barrack, and a market-house. The market is on Monday, and there are seven yearly fairs. There is a penny-post, dependent on Ballymote.

Easkey is in Easkey parish, in Tyreragh barony, 27 miles west of Sligo, on the old or coast road to Ballina. It is chiefly on the left bank of the river Easkey, about half a mile from its mouth: it is irregularly laid out, but most of the houses are on the Ballina road; there were, in 1831, 76 houses, viz. 61 inhabited, 14 uninhabited, and 1 building; the population was 289. The church is a neat building, and there are a Roman Catholic chapel and a Baptist meeting-house. There are the ruins of an old church, and in the neighbourhood are the remains of two antient castles, and some other antiquities. The market is on Wednesday, and there are two yearly fairs in the town, beside two others at Rosslee in the parish. Petty-sessions are held once a fortnight in a court-house in the town. Quarter-sessions for the division are also held here.

Dromore West is in the parish of Kilmacshalgan, in the barony of Tyreragh, about 22 or 23 miles west of Sligo, on the road through Ballysadere to Ballina. It stands on the little river Dunneill, which flows into the sea about a mile below the town, and consist of about 20 houses; it has a post-office: a short distance east of the village are the present parish church and the remains of the former one; and a short distance south-west is the Roman Catholic chapel.

Ballysadere is on the river of the same name, just above its outfal in Ballysadere Bay, five miles south of Sligo. It is in the parish of Ballysadere, and just on the boundary of the baronies of Tirraghrill and Leney, which are here separated from each other by the river. That part of the village which is on the right bank is in Terraghrill, the part on the left bank in Leney. The village consists of one main street on the right bank, running down to the bridge, and some houses, irregularly grouped, on the other bank; there were, in 1831, 100 houses, 95 inhabited and 5 empty; the population was 546. It a busy little place; on the river below the village are several mills, and in the immediate neighbourhood are a limestone-quarry and a bleach-green. Vessels of 100 tons can enter the river, and there is some export of corn and meal. There is a small pier, and at the mouth of the river a quay. There are seven yearly fairs, besides others at Tubberscanavin, Carricknagatt, and Collooney, all in this parish. At the mouth of the river on the left bank are the remains of an antient church, and near it the ruins of an abbey.

Ardnaree is in the parish of Kilmoremoy, in Tyreragh barony. It is on the right bank of the river Moy, and forms a suburb of the town of Ballina, which is on the opposite bank. It consists of one principal street running westward down to the bridge, which unites it with Ballina, and of some smaller streets or lanes leading from this; there were, in 1831, 512 houses, viz. 432 inhabited, 64 uninhabited, and 16 building: the population was 2482. The parish church is in the town, and the Roman Catholic chapel is very handsome; it is the cathedral of the Roman Catholic bishopric of Killala. There are the remains of an antient Augustinian abbey or monastery. There are a brewery in the town and a salmon-weir and a flour-mill just above it.

Grange is in the parish of Ahamlish and the barony of Carbury. It consisted, in 1831, of 40 houses, 34 inhabited, 4 uninhabited, and 2 building; the population was 221. It has a Catholic chapel, and near the village are a revenue police-barrack, and one for the county constabulary. There are seven yearly fairs.

Riverstown is partly in Drumcollum or Drumcolumb parish and partly in Kilmacallan, in the barony of Tirraghrill. It had, in 1831, 89 houses, viz. 87 inhabited and 2 building; the population was 421. The parish church of Kilmacallan is in the village, and the Catholic chapel; both are plain buildings. there are a Methodist meeting-house near the village and a police-barrack. There are two corn-mills and two kilns.

Divisions for Ecclesiastical and Legal Purposes.—The county was formed on the division of Connaught into counties by Sir Henry Sidney, lord-deputy of Ireland, under Queen Elizabeth, A.D. 1565. With the exception of two parishes, it is divided among the three dioceses of Elphin, Killala, and Achonry, the chief part belongs to the last. All the parishes of the barony of Carbery, except Rossinver, which is in the diocese of Kilmore and province of Armagh, and all those in the barony of Tirraghrill, except Ballysadere and Killery, the latter of which is in the diocese of Ardagh and province of Armagh, are in the diocese of Elphin; all those in the barony of Tyreragh, in the diocese of Killala; and all those in the baronies of Coolavin, Corran, and Leney, with the parish of Ballysadere, which is partly in Leney, partly in Tirraghrill, are in the diocese of Achonry. From the time of Charles I. the two sees of Killala and Achonry were united; and in 1833 they were, in pursuance of the act of 3 and 4 William IV., united to the see of Tuam. By the same act Elphin is, upon its next avoidance, to be added to Kilmore. All these are in the ecclesiastical province of Armagh. The Roman Catholic dioceses nearly coincide with those of the established church, but Killala and Achonry have continued separate. The Catholic bishop of the diocese of Killala has his seat at Ardnaree, a suburb of Ballina, in this county; and the bishop of the diocese of Elphin has his residence at Sligo. The county contains thirty-seven entire parishes and part of four or five others.

It is in the Connaught circuit: the assizes are held at Sligo, where is the county gaol. Quarter-sessions for their respective divisions are held at Sligo, Ballymote, and Easkey at each of the last two places there is a court-house, and at Ballymote there is a bridewell. The Report of the Inspectors of Prisons as to the general management of the county gaol and the Ballymote bridewell (*Parl. Papers*, 1840) is favourable; but the county gaol has no adequate provision for the adoption of the system of separate confinement. The number of persons committed for trial in 1837 was 154, of whom 107 were convicted, 1 found to be insane, and 46 acquitted: of the convictions, only one was for a capital offence. In 1839, 578 persons were committed, of whom 151 were convicted, 1 found to be insane, and 426 acquitted or discharged without trial: of the convictions, not one was for a capital offence. In both years the number of offenders was below the average of the Irish counties, and in the year 1837 very far below it.

It returns two members to parliament for the county, and one for the borough of Sligo. Before the Union, Sligo borough returned two members to the Irish parliament. The county members are elected at Sligo. The number of voters for the county in 1834-5 was 804; for the borough of Sligo 694.

The county constabulary consisted, on the 1st Jan., 1840 of one county inspector, third-rate; five sub-inspectors, one first-rate and the other four third-rate; six head constables, one first-rate and five second-rate; twenty-three constables, and one hundred and forty-nine sub-constables, of whom one hundred and nineteen were first-rate and thirty second-rate: the whole expenditure for this force in the year ending 31st Dec., 1839, was 9598*l.* 18*s.* 3½*d.* The total amount of grand-jury presentments for the same year was 20,825*l.* 18*s.* 5½*d.*, consisting of the following items:—New roads, bridges, pipes, gullets, &c., 879*l.* 18*s.* 7*d.*; repairs of roads, bridges, pipes, gullets, &c., 6092*l.* 7*s.* 7½*d.*; erection or repair of court or sessions houses, 110*l.* 15*s.* 6*d.*; building or repairing gaols, bridewells, and houses of correction, 127*l.* 5*s.* 3*d.*; all other prison and bridewell expenses, 2943*l.* 3*s.* 4*d.*; police and police establishments, 4020*l.* 8*s.* 8½*d.*; salaries of all county officers, not included above, 2374*l.* 12*s.* 11*d.*; public charities, 3145*l.* 11*s.* 8*d.*; repayment of advances to government, 417*l.* 14*s.* 0*d.*; miscellaneous, not included above, 1413*l.* 1*s.* 3½*d.*; together, 21,524*l.* 18*s.* 10*d.*; from which the sum of 699*l.* 0*s.* 4½*d.* is to be deducted for re-presentments. The county is included in the district of the Connaught lunatic asylum at Ballinasloe, in which it had, in the year ending 31st Dec., 1839, 39 patients, at a charge of 623*l.* 4*s.* 0½*d.* The county infirmary and fever hospital are at Sligo; and there are dispensaries at Ballymote, Carney, Castleconnor and Kilglass, Collooney, Coolaney, Dromore West, Riverstown, Tubbercurry, and St. John's, Sligo.

The number of schools in connection with the National Board on the 31st March, 1835, was 18, with 18 teachers, namely, 13 males and 5 females; and 2663 children, namely, 1571 boys and 1092 girls, on the roll.

History and Antiquities.—In the most antient historical period, this part of Ireland is thought to have been inhabited by the people called by Ptolemy Ναγνάται, Μαγνάται, or Μαγνᾶτοι, Nagnatae, or Magnatae, or Magnati; whose chief town, Νάγνατα, Nagnata, or Μάγνατα, Magnata, called by Ptolemy πόλις ἐπίσημος, 'an eminent city,' is supposed by Sir James Ware to have been near Sligo, though Baxter places it at or near Galway. The Λίβνιος or Λίβοιος ποταμὸς, river Libnius or Liboeus of Ptolemy, is supposed to be the river on which Sligo stands; but the correctness of this opinion depends in a great degree on the identity of Nagnata with the town of Sligo. In the territorial arrangement of Ireland which prevailed both before and for long after the establishment of the English dominion in the island, this part of the country was divided as follows·—

Antient Division.	Modern Division.
Calruidhe, or, more usually, *Calrigia*, apparently the modern parish of Calry, near Lough Gill.	Nearly coinciding with the barony of Carbury.
Dartrigia, also near Lough Gill.	
Kinel Cairbré, whence the modern name of the barony.	
Siol Morey, the neighbourhood of Sligo, more antiently called Crioch Carbury: it was the country of O'Connor Sligo.	
Coranna, whence the modern Corran.	Nearly coinciding with the baronies of Corran and Leney.
Luigne (whence the modern Lenev), a subdivision of Coranna.	Nearly coinciding with the barony of Leney
Gregraria, in the neighbourhood of Lough Gara, the name of which appears to be an element of the designation Gre-grar-ia.	Nearly coinciding with the barony of Coolavin.

This part of Connaught was made the scene of warfare between the descendants and family of Roderic O'Connor (the last monarch of Ireland), in their struggle for the principality of Connaught. Hugh O'Nial, chieftain of Tir-owen, or Tyrone, was defeated near Ballysadere (A.D. 1200) in the attempt to reinstate Cathal Croobhderg, or Cathal of the Bloody Hand, who had been dethroned by his brother or kinsman Carrach, who was supported by the Anglo-Normans under De Burgh or De Burgo. Some of the Anglo-Norman settlers were engaged on the side of Cathal. In 1245 the castle of Sligo was built, and, having been destroyed by the natives, was restored about the beginning of the next century.

The relics of antiquity are numerous. There are many cromlechs and other (supposed) Druidical monuments; and several remarkable caverns, the origin and purpose of which are unknown. Raths, or hill forts, are numerous in all parts of the county; and at Drumcliffe is one of the 'round towers' which have excited so much discussion: it is distinguished by its small dimensions and coarse construction. The ecclesiastical and castellated ruins of a somewhat later date are also numerous: several of the monastic churches have been converted to parochial use.

In the general rebellion near the close of Elizabeth's reign, the royal forces under Sir Conyers Clifford, president of Connaught, were surprised in this county by the natives under O'Ruarc, or O'Rourke, chieftain of Breffney (now Leitrim), and suffered considerable loss. In the rebellion of 1641 the county was occupied by the insurgents, and though Sligo was taken from them (A.D. 1645), and they were repulsed in an attack upon it by Sir C. Coote, they recovered it afterwards, and held it till nearly the close of the war. In the war of the Revolution the county was held by the Jacobites. A body of them were indeed repulsed on their first advance toward Sligo town by the Protestants of Enniskillen; but on their advance with a superior force, they obtained possession of that town. In the French invasion of 1798, a smart skirmish was fought at Colooney between the invading force, under General Humbert, and a body of the Limerick militia, under Col. Vereker.

(*Ordnance Survey of Sligo; Lewis's Topographical Dictionary of Ireland; The History and Antiquities of Ireland*, by Sir James Ware, translated and augmented by Harris; Moore's *History of Ireland;* Gordon's *History of Ireland; Parliamentary Papers.*)

SLING, an instrument with which stones or other missiles may be thrown to a great distance. In its simplest form the sling consists of a thong of leather, or a piece of cord or some woven fabric, both ends of which are held in the hand of the slinger. The stone or missile is placed in the fold or double of the thong, which is made wide at that part, and sometimes furnished with a slit or socket for the purpose of holding it; and the sling is then whirled round to gain an impetus. When a sufficient degree of centrifugal force is thus generated, the slinger allows one end of the thong to escape, and the stone, being thereby released, flies off with considerable velocity. In the hands of an expert slinger, this instrument may be made to project missiles to a great distance, and with surprising accuracy.

The simplicity and portability of the sling, and the facility with which supplies of ammunition for it might be obtained, led to its extensive use among the antients as a weapon of war, as well as for other purposes. Its common use among the Jews is intimated by several passages of Scripture. In the book of *Judges*, xx. 16, we read of 700 men of the tribe of Benjamin, of whom it is stated that 'every one could sling stones at an hair-breadth, and not miss.' At a later period the account of David's conflict with Goliath indicates his familiarity with this weapon; while the subsequent notices in 1 *Chron.*, xii., and 2 *Chron.*, xxvi., distinctly allude to its use as a weapon of offence. Several antient paintings represent the use of the sling at an early period by the Egyptians. Some of these are given by Wilkinson, who says (vol. i., p. 316, &c.),—'The sling was a thong of leather, or string plaited, broad in the middle, and having a loop at one end, by which it was fixed upon and firmly held with the hand: the other extremity terminating in a lash, which escaped from the fingers as the stone was thrown; and when used, the slinger whirled it two or three times over his head, to steady it and to increase the impetus.' In the Greek and Roman armies the light troops consisted in great part of slingers, who were called σφενδονῆται, or *funditores*, from σφενδόνη, and *funda*, the Greek and Latin names of the weapon. The Carduchi, according to Xenophon, annoyed the retreating army of the Ten Thousand by their powerful slings. (*Anab.*, iv. 1, &c.) There are no slingers mentioned in Homer; and the word which usually means sling.(σφενδόνη) occurs only once (*Iliad*, book xiii., line 599), and then not in the sense of sling, but in the primary sense of the word, which means a broad band or bandage. This passage has sometimes been strangely misunderstood. The sling is not mentioned by Herodotus; and it is an error to assign the use of it to the Persians, for which there appears no evidence but a loose expression in Diodorus (xviii. 51), where he speaks of 'Persians, bowmen and slingers, five hundred.' The natives of the Balearic Islands attained the highest reputation for their skill in its management; which is attributed to their custom of teaching their children, while very young, to wield it, and forbidding them, it is said, to taste their food until they had dislodged it from a post or beam by means of a sling. Among the Greeks the sling was used with the greatest expertness by the Achæans and Acarnanians. Besides stones, leaden plummets, cast in moulds, were used as projectiles for the sling. These, which were called *glandes*, or μολυβδίδες, were of an elongated spheroidal form; somewhat resembling that of olives or acorns. They have been often discovered in various parts of Greece, and frequently bear on one side a figure of a thunderbolt, and on the other side either the word ΔΕΞΑΙ (take this), the name of their owner, or some other inscription or device. Some of these were of considerable size, weighing as much as an Attic pound, or 100 drachmæ. Fireballs also have been thrown by slings. Antient Egyptian representations show a small bag, attached to a belt worn over the shoulder of the slinger, for the purpose of holding a supply of stones; and a Roman bas-relief represents a slinger with a supply of stones laid in the folds of his *pallium*, or upper garment, hanging, like the Egyptian bag, upon his breast. Some of the slings used by the antients were managed by more than one cord; one, two, or three being used, according to the size of the missiles to be thrown.

The sling was long used, both as an offensive weapon and otherwise, in England. Strutt observes, 'that it is altogether uncertain whether the antient inhabitants of Britain were acquainted with the use of the sling or not;' but that our Saxon ancestors certainly used it, and seem to have been skilful in its management. Besides the ordinary sling, they used one attached to a staff or truncheon three or four feet long, wielded with both hands. This kind of sling, with which large stones were thrown, appears to have been used principally in sieges and in naval warfare. It is represented in an old drawing, supposed to be by Matthew Paris. Slingers formed a part also of the Anglo-Norman soldiery; and the following lines, quoted by Strutt, show that the sling had not fallen into disuse as a military weapon at the commencement of the fifteenth century. They occur in a MS. poem of that date, entitled 'Knyghthode and Batayle,' which professes to treat upon the duties and exercises necessary for a good soldier. The object of the poet in this passage is to express the destructive effect of stones projected from a sling, even to men cased in armour; and the advantages of the weapon, in being readily carried, and easily supplied with ammunition in any place:

'Use eek the cast of stone, with slynge or honde:
It falleth ofte, yf other shot there none is,
Men harneysed in steel may not withstonde
The multitude and mighty cast of stonys:
And stonys in effecte are every where,
And slynges are not noyous for to beare.'

In alluding to the more recent use of slings for amusement, Strutt mentions a substitute for the ordinary sling, consisting of a stick of ash or hazel, cleft at one end to receive the stone; which was thus held with sufficient force to keep it from falling out, yet not so firmly as to resist the impulse of the slinger. It required, he states, much practice to make the stone fly out at exactly the right time, so as to strike the mark with precision. The use of the sling may now be considered obsolete in this country, not only as an offensive weapon, but even as a means of amusement.

(*Dictionary of Greek and Roman Antiquities*, art. 'Funda;' Wilkinson's *Manners and Customs of the Ancient Egyptians*, first series, vol. i.; Strutt's *Sports and Pastimes*.)

SLINGELANDT, PETER VAN, was born at Leyden in 1640, and became a pupil of Gerard Douw. He imitated very successfully the highly finished style of his master, whom in this respect he frequently equalled. His colouring is perfectly true to nature, and his chiar'oscuro admirable. Various instances are recorded of his extreme patience in finishing his works. It is related by Houbraken, that he was employed three years, without intermission, on a small picture containing portraits of the family of Meerman, and that he devoted a whole month to the finishing of a ruff. When he introduced a dog, a cat, or a mouse, which he often did, he seemed to have made a point of representing every single hair. It was to be regretted that with all this labour his design and composition are in general indifferent, and far inferior in correctness and expression to his master. His works are however highly valued, as among the best of the Flemish school, and are often mistaken for those of Mieris and Gerard Douw. Dr. Waagen, in his account of the galleries in England, mentions very few of this artist's performances: one in Sir Robert Peel's collection; one in the Bridgewater gallery, distinguished, he says, by the incredible minuteness of detail in the execution, in which it even exceeds Gerard Douw, though far inferior to him in other respects; two in the private collection of George IV., which he highly commends, and which have both been ascribed to G. Douw, and sold as his; and one in the collection of the Marquis of Bute, at Luton House, which he says is far more powerful and warm in the tone, and more spirited in the execution, than is usual with him. Slingelandt died in 1691, aged 51.

SLIP, or BUILDING-SLIP, a piece of ground cut in a direction perpendicular to the bank of a river or harbour, so as to form an inclined plane, descending from the general surface of the land at one end, towards the water at the other end. It is frequently paved with stone, and it is entirely covered by a roof, which is supported on lofty pillars of wood. On this plane ships are built, and therefore its length and breadth must exceed those of the largest vessel for which it is intended. Its slope has about 1 foot in height to every 19 feet in length, so that its surface is inclined to the horizon at an angle of about three degrees. Its lower extremity is considerably below the level of high water, and strong gates keep the slip dry till the vessel is about to be launched.

It has been stated in the article SHIP-BUILDING, that during the construction of a vessel, the keel rests upon blocks of wood placed at intervals in line on the slip. Now when the vessel is to be launched, timbers placed side by side, having their upper surfaces worked to a plane, or to a gentle curve with its convexity upwards, and made very smooth, are disposed on blocks which are also laid on the slip, in a line on each side of the keel, parallel to it, and at the distance of a few feet (usually about one-sixth of the vessel's breadth) from it. These two inclined planes are called the *ways*; each extends through the whole length of the slip, and its breadth is about three feet: its slope is rather greater than that of the slip, having 1 foot in height to about 14 feet in length, so that its inclination to the horizon is above 4 degrees. Previously to the ship being launched, a frame of timbers called a *cradle* is constructed for its support; and this, carrying the vessel with it, is allowed to slide upon the ways till the ship floats upon the water; then the cradle, whose parts are kept together and are attached to the ship only by treenails, either falls to pieces of itself or is removed by the workmen. Along the exterior side of each of the *ways* is a riband or ledge of timber raised above 4 inches above the surface, in order to prevent the frame-work which forms the cradle from being, by any lateral pressure, forced off from the plane.

The cradle is formed by laying upon each of the *ways* one long timber called a *bilge-way*, about 12 inches in breadth, and as much in depth, having its lower surface made quite smooth, and upon this another timber, which is capable of being raised a little from the former by means of numerous wedges placed between them at intervals in its whole length. Above these timbers, about the middle of the ship's length, are laid others longitudinally; and near the two extremities are placed stout props of timber in vertical positions, the upper sides of the former and the upper ends of the latter being in contact with the bottom of the hull. Previously to the completion of the cradle the surfaces of the two inclined planes or ways are covered with a thick coating of soap, tallow, and oil; and when, by driving in all the wedges simultaneously, the upper part of the cradle is made to press against the bottom of the ship, so that the weight of the latter is in a great measure taken off from the blocks under the keel, on cutting away those blocks the ship is ready to descend in its cradle to the water. In fact, the ship is then only prevented from sliding on the ways by two short timbers called the *dog-shoars*, which are placed, one on each of the ways, near the head of the vessel at a small angle of inclination to the plane of the ways. Each of these shoars is kept in its inclined position by a short prop called a *poppet* placed under its extremity (that which is nearest to the head of the vessel), and that extremity, which is covered with iron, abuts against a projection on one side of the cradle, while the lower extremity abuts on a *cleet*, which is spiked down to the surface of the way. When the ship is to be launched, the gates of the slip having been opened, and the water suffered to flow in by the rising of the tide, the poppets of the two dog-shoars are knocked away at the same moment, which is nearly that of the highest water; and should the shoars not drop down, on cutting a slender string at the ship's head a heavy mass of lead on each side becomes disengaged, and descending upon each shoar at the same instant, causes both of them to fall. Then the weight of the ship on the inclined planes, aided by a small elevation of her hull, produced by the water which has entered the slip, causes her to descend gradually into the river or harbour.

SLOANE, SIR HANS, Bart., was born at Killileagh, in county Down, on the 16th of April, 1660. Though a native of Ireland, he was of Scotch extraction, his father Alexander Sloane having been the head of a colony of Scots whom James I. settled in Ulster.

While young his health was delicate, and from his sixteenth to his nineteenth year he suffered from spitting of blood. It was however in his youth, and while living at home, that he imbibed a taste for those pursuits in the cultivation of which he afterwards attained such celebrity. As soon as his health would permit, he repaired to London, and during four years which he spent in the metropolis devoted himself to the study of medicine and the collateral sciences. Strafforth, a pupil of the celebrated Stahl, was his instructor in chemistry, and his fondness for botany brought him acquainted with Ray and Robert Boyle. In 1683 he set out for Paris, and during his stay there attended the anatomical lectures of Duverney and those on botany by Tournefort. On his departure for Montpellier he was furnished by Tournefort with introductions to all the celebrated men at that university. Here he passed a year, spending much of his time in collecting plants, and, after having travelled through

Languedoc with the same purpose, returned to London late in the year 1684.

He gave many of the plants and seeds which he had collected to Ray, who described them, and acknowledged his obligations to the donor in his 'Historia Plantarum.' He now settled in London, and the young physician found in the great Sydenham a most valuable friend, who did all in his power to introduce him to practice. In 1685 he was elected a fellow of the Royal Society; and a fellow of the College of Physicians, in April, 1687. His attention had been excited when young by the descriptions of the wonderful productions of tropical climates, and the offer of the appointment of physician to the duke of Albemarle, who was going out as governor to Jamaica, afforded him an opportunity of gratifying his curiosity. He accordingly set sail with the duke on September 12, 1687, and after touching at many of the Caribbee islands, reached Port Royal on the 19th of December in the same year. The death of the duke soon after his arrival diminished Sloane's resources, and compelled him to hasten his return, though he did not leave Jamaica till he had formed in that and the neighbouring islands an immense collection of plants. He arrived in England on the 29th of May, 1689, after a residence in Jamaica of only fifteen months.

The plants which he brought with him amounted to 800 species. Of these he gave his friend Mr. Courten whatever he wanted to complete his collection, and the remainder, with other objects of natural history, formed the nucleus of his museum. Success too attended him in practice. He was appointed physician to Christ's Hospital in 1694, and held the office for thirty years; and in 1695 he married a lady of considerable wealth, Elizabeth, daughter of Alderman Langley, by whom he had four children, two of whom died young, while two daughters survived their parents, and carried their wealth to the noble families of Stanley and Cadogan.

In 1693 he was chosen secretary to the Royal Society; and in 1712 was elected one of the vice-presidents. The Academy of Sciences in Paris had conferred on him the title of a foreign associate in 1708. George I. created him a baronet in 1716, and appointed him physician-general to the forces; he was elected president of the College of Physicians in 1719, and held the office till 1735. In 1727 he was appointed physician to the king; and in the same year had the honour of succeeding Newton in the president's chair of the Royal Society. He had purchased an estate at Chelsea in 1720, and retired thither in 1740, when eighty years old. His time was now passed in entertaining scientific men, and in examining the treasures he had collected. He died, after a short illness, on January 11, 1753, in the ninety-third year of his age.

Sir Hans Sloane was a man of a benevolent and generous disposition, and active in all schemes for doing good. During the thirty years that he held the appointment of physician to Christ's Hospital he never kept his salary, but always devoted it to charitable purposes. He was very active in establishing the dispensary set on foot by the College of Physicians for providing the poor with medical attendance and medicines gratuitously, the opposition to which on the part of the apothecaries called forth Garth's talent for satire; but he was so ready to banish the memory of a quarrel, that when he purchased his Chelsea estate in 1720, he presented the Apothecaries' Company with the freehold of their botanic garden. He did all in his power to promote the formation of the colony in Georgia in 1732, and was one of the founders of the Foundling Hospital, and drew up the plans for the management of the children.

Sir Hans Sloane directed that at his death his museum should be offered to the nation for 20,000*l.*, a sum which he says, in a codicil to his will, dated July 20, 1749, did not amount to a fourth part of its real value. This collection, in the purchase of which by government the British Museum originated, was not altogether accumulated by Sir H. Sloane, but had been greatly increased by the bequest, in 1702, of the museum of his friend Mr. Courten. At the time of his death, Sir H. Sloane's cabinet contained 200 volumes of dried plants, and 30,600 other specimens of objects of natural history, besides a library of 50,000 volumes and 3566 manuscripts. [BRITISH MUSEUM.] His fame however does not rest merely on his collection: he contributed many papers to the 'Philosophical Transactions.' Before he was appointed secretary to the Royal Society, the publication of these Transactions had been suspended for six years; he resumed their publication, and continued to superintend it till 1712. He likewise wrote a pamphlet on sore eyes, which had considerable repute for many years. But his great work was the 'Natural History of Jamaica,' which appeared in two volumes, folio, with many plates, of which the first volume was published in 1707, and the second twenty years after. The first volume contains an introduction comprising a description of the island, its climate, products, and the diseases of its inhabitants, followed by an account of the plants indigenous there and in other of the West India Islands: the trees and animals are described in the second volume. He mentions in his preface that the whole undertaking had been submitted to Ray, and met with his approval, though it did not receive any emendations from him. A small Latin catalogue of the plants of Jamaica had been published by him in 1696, and serves as a sort of index to the large work. Notwithstanding his diligence in studying natural history, Sir H. Sloane appears not to have fully appreciated the benefits of scientific arrangement, and he contents himself in his writings with referring plants to genera and species already known, and made no attempt to improve the very defective classification of that day.

SLO'ANEA, a genus of fine trees of the natural family of Tiliaceæ, named by Plumier in honour of Sir Hans Sloane, a former president of the Royal Society, and well entitled to the compliment from his investigation of the Flora of Jamaica, and from his being the founder of the Chelsea Botanic Garden, as well as a patron in general of science. The genus Sloanea is divided into five sections, each of which may probably form a genus. The leaves are large and alternate, the flowers are large, and the fruit as big as chesnuts. The trees are not known to be applied to much use, with the exception of *S. dentata*, of which the wood is sometimes employed for making canoes of a single piece. The inner bark is astringent, and prescribed in dysentery; the fruit is eaten.

SLOBODE UKRAINE, or the government of the Slobodâs of Ukraine, in European Russia, is one of the provinces of southern Russia, which, after successive invasions from Lithuanians and Mongols, came into the possession of the Czars about the beginning of the seventeenth century. It appears to have been originally tributary to the grand-duchy of Kieff: it formed part of the government of Bielgorod, which was constituted in 1726, and did not obtain its present appellation until 1765. It bore the name of Kharkof in the interval between 1780 and 1796, in which year Paul I. declared that it should be called the government of the Slobodâs of Ukraine. The term *Slobodâ* belongs in Malo-Russia to the villages inhabited by Cossacks, who were formerly organised into regiments, free from all taxes, and had no master but their own will. The tract of land of which we are speaking being almost uninhabited in 1651, the emperor Alexey Michaelowich allowed the Cossacks of western Ukraine to settle in it, and to enjoy the privileges guaranteed to them by Stephen Battory, king of Poland. They then founded five large villages or 'Slobodâs;' and from this circumstance the name is derived.

The government of the Slobodâs of Ukraine is bounded on the north by that of Kursk, on the east by the country of the Don Cossacks, on the south it has the government of Yekaterinoslaf, and on the west that of Poltâva. It contains about 19,000 square miles, 6930 of which are arable land and 2000 forests. The country is generally flat, and the soil fertile, yielding frequently more than five millions chetwerts (3,750,000 quarters) of corn, two millions of which are surplus produce, and may be exported. The forests in this government belong chiefly to the crown; game is scarce, but the forests abound in wolves and foxes.

The population consists of Malo-Russians, Cossacks, Great Russians, German colonists, converted Calmucks, Jews, and Gypsies, and amounts to 1,350,000 (according to an estimate taken in 1835), of whom 35,000 are Cossacks Besides the military population of the Cossacks, there are five colonised regiments of cavalry, who occupy the districts of Chuguyef, Volchansk, Izyum, Kupyansk, and Starobyelsk; the number of districts belonging to this government is eleven, viz. Kharkof, Akhtyrka, Lyebedin, Sumy, Valki, Zmiyef, and the above-mentioned military colonies.

The chief occupation of the inhabitants of Slobode Ukraine is agriculture, although various means have been used by the government and the nobles to draw their attention to manufactures and commerce. The cultivation of mulberry-trees for the production of silk was introduced in the reign of Alexander I., but it does not seem to have been successful. It is probable however that the depressed state of commerce in this government is owing to the badness of the roads and the want of navigable rivers. The only stream which could have been made use of for the purpose of transporting goods is obstructed by corn-mills and hide and tallow factories. This is the Syevernoy Donyetz, the principal river of the government, which, after receiving the Oskol in the neighbourhood of Izyum, falls into the Don. The other rivers are the Vorskla and the Psiol, both falling into the Dnieper, the former of which belongs to the southern districts, and the latter to the northern.

The inhabitants are all of the Græco-Russian church, with the exception of a few Lutherans and some Jews; they belong to the eparchy of the Slobodâs of Ukraine and Kharkof, which was erected towards the end of the last century. This diocese contains 628 churches, seventeen of which are cathedrals, and one monastery and one nunnery.

There were in 1832 thirty schools with 200 masters and 1938 pupils, 133 of whom were girls. These establishments for public instruction are all under the control of the university of Kharkof, which was established in 1805, and has authority over a district comprising the governments of Sloboda Ukraine, Poltâva, Kursk, Orêl, and Vorônetz.

The chief town is Kharkof, founded in 1652. [Charkow.]

The other towns of this government are the following: Akhtyrka, the chief place of the district which bears its name, situated on a small river which falls into the Vorskla; it contains eight churches, one of which attracts a great number of pilgrims from possessing a miraculous image of the Holy Virgin. Sumy, remarkable for its extensive traffic in horses. Chuguyef, on the Psiol, containing 9000 inhabitants, of whom many are converted Calmucks. Izyum, which is a fortified town containing four churches and about 4000 inhabitants; it is situated between the Oskol and the Donyetz, in the extreme south of the government. Slavyansk, in the neighbourhood of which city there are four saline lakes. Besides these towns there are Lyebedin, Volchansk, Zmiyef, Miropoloye, Nyedrigaylof, Krasnokutsk, Zolochef, Kupyansk, and Valki.

SLOE. [Prunus.]

SLOTH. [Ai; Unau.]

SLOW LEMUR. [Stenops.]

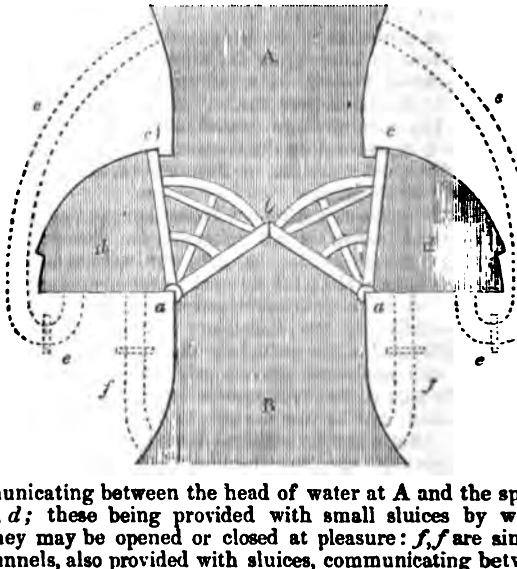
SLOW WORM, one of the English names for the Blind Worm. And see also Orvet; Saurians; Scincoïdians.

SLUGS. [Limax.]

SLUICE. (In Dutch, *Sluis*, in which language it is defined to be ' a mass of masonry and closing doors, to keep water in, or to stop the flow of water. The word *Sluis* occurs in the names of various places in Holland, as Hellevoetsluis.) In a limited sense this name is almost confined to the sliding gates commonly used in mill-streams, ponds, sewers, &c., to retain the water when necessary, or to allow it to escape in any required quantity; such gates being usually raised and lowered by means of a rack and pinion attached to the upper part of the frame in which they slide. In a more extended application of the term, it embraces all kinds of floodgates, flaps, and other apparatus used to stop, collect, or retain water, and to let it off as occasion requires. According to this use of the word, a canal lock may be considered as a double sluice.

Sluices are extensively used in most hydraulic works, and vary much in their construction, according to the purposes for which they are required. In mill-streams they serve to keep back the water when the mill is at rest, and to regulate the supply when it is going. They also act as *wasters*, to allow the surplus water of a reservoir to escape. For these purposes many self-acting sluices have been contrived, to avoid the inconvenience and even danger which might arise from neglect, as well as to save the expense of a sluice-keeper. In Brewster's *Edin. Journal of Science*, vols. ii., iii., and iv., several ingenious arrangements of this sort are described and illustrated; most of which have been successfully used by their inventor, a Scotch gentleman named Thom. Some of these are regulated by floats; and others by the weight of iron cans, so situated as to fill with water when it rises in the reservoir to a certain height, while they are made to empty themselves when it is necessary to close the sluice. In one of the plans for a waster-sluice, the sluice-gate is balanced by a weight, capable of sliding freely up and down in a cylindrical vessel which communicates with the water at the highest required level and has a small pipe from its lower extremity to allow the water to run out as soon as the water in the reservoir sinks below that level. The weight is so adjusted as to hold the sluice-gate closed so long as the cylinder is empty, while it is insufficient to do so when the cylinder is full of water; the useful effect being produced by the difference between the gravity of the balance-weight when suspended in air and in water.

The construction of an ordinary canal-lock has been described in the article Canal, vol. vi., p. 220. It is necessary to make the large gates meet in an angle in the middle of the stream, in order that they may be able to resist the pressure of the water; and as this pressure would render it impossible to open them against any considerable head of water, small sluices are provided, either in the gates or in the masonry of the lock, by which the water may be let in or out at pleasure. In locks exposed to the sea or to a tide river, a double set of gates are sometimes used; one set pointing outwards, to exclude the high tide, and the other inwards, to bear the pressure of the water in the canal when the tide is below it. An admirable contrivance for meeting all the contingencies of such a situation is the *fan-gate* sluice or lock; of which a full description, with engravings, is given in Brewster's *Edin. Journal of Science*, vol. iii. It was invented by Mr. Blanken, of the Netherlands, and has been found completely successful. The subjoined cut will explain the principle of the apparatus, applied merely as a sluice capable of bearing a head of water in either direction; of being opened against a head of water; or of being closed while the current is rushing through. In this diagram *a, b*, and *b, a*, are the sluice-gates, meeting in the centre of the stream, and capable of resisting the pressure of a head of water at A. These gates are pivoted at *a, a*, and are connected, by very strong framing, with the tail-gates *a, c*, which move with them, and fit closely to curved recesses of masonry, *d, d*. The tail-gates are, as shown in the plan, about one-fifth wider than the sluice-gates: *e, e*, are small tunnels in the masonry, communicating between the head of water at A and the spaces *d, d;* these being provided with small sluices by which they may be opened or closed at pleasure: *f, f* are similar tunnels, also provided with sluices, communicating between the water at B and the side spaces *d, d*. If the gates be required to exclude a head of water at A, the tunnels *e, e* are opened, and the water, rushing through them, fills the side spaces to the level of A; the gates being thereby held close. If the head of water to be sustained be at B, the tunnels *e, e* are closed, and those marked *f, f* opened; and then, although the pressure of the water tends to open the sluice-gates, the water rising to the same level in *d, d*, and there acting upon the larger superficies of the tail-gates *a c* keeps them closed. By reversing the use of the tunnels *e, e*, and *f, f*, the gates may be released from pressure in either direction, and therefore be easily opened; while by using them in the order first described the gates may be closed when the stream is rushing through. The illustration given by Brewster is a lock at Gorinchem in Holland,



forming a communication between the tidal river Linge and the canal of Steenenhock. The arrangement resembles that of the above diagram, the chamber of the lock being in the place of B, and its other end being closed by a pair of common gates opening towards the river.

SLUR, in Music, a curved line (⌒) more or less extended, as may be required, drawn over two or many notes. If placed over two notes on the same line or space, it signifies that the second is not to be repeated, though to be held out its due time. When drawn over notes on different degrees, it signifies that they are to be *legato*, *i.e.* tied—played in a smooth blending manner. This character is sometimes called a *bind*, and also a *tie*.

SLUYS (in French, *L'Ecluse*), is a very strongly fortified town in the province of Zealand, in the kingdom of the Netherlands. It is situated in 53° 18′ 30″ N. lat. and 3° 20′ E. long., on a small bay of the German Ocean called the Zwin, at the mouth of the Schelde, and is connected by a canal with the city of Bruges, which is about 15 miles distant. The harbour, which was formerly deep and clean, is not now capable of admitting any but small vessels. It is furnished with sluices (whence its name), by which, in case of a siege, all the surrounding country can be laid under water. It has about 1400 inhabitants. It was taken by the French in 1794.

SMÄLAND. [Sweden.]

SMALL-POX (*Variola*). It is a subject of dispute whether this disease was known to the antients, or whether it has originated at a comparatively recent date. Those who contend for its antiquity refer us to the account of the plague of Athens by Thucydides (ii. 46, &c.), which, they say, is as accurate a description of the leading symptoms of Variola as could possibly be expected from any historian who is not a physician. Those who hold the opposite opinion call in etymology to their aid; the word *pock* or *pox*, they say, is of Saxon origin, and signifies a bag or pouch; the epithet *small* in England, and *petite* in France, were added in the fifteenth century. The term variola is derived from the Latin word *varus*, a pimple, or *varius*, spotted; and, according to Moore, the first authentic passage in which it occurs is to be found in the 'Bertinian Chronicle' of the date 961. The first author however who treats expressly of small-pox is Rhazes, an Arabian physician [Rhazes], but even he confounded it with measles, and these two diseases continued to be considered as modifications of the same disorder till the time of Sydenham. Small-pox, when it occurs naturally, is preceded by the usual premonitory symptoms of eruptive fevers, such as rigors, pains in the back and loins, prostration of strength, loss of appetite, nausea, and sometimes vomiting, and, in young children, frequently convulsions. About forty-eight hours after the commencement of these symptoms an eruption of small, hard, red-coloured pimples makes its appearance about the face and neck, and gradually extends downwards over the trunk and extremities. The primary fever, as it is called, now lessens; but the pimples increase in size, and become converted into whey-coloured pustules with a depression in their centre. On the eighth day they are at their height, and on the eleventh the matter oozes from them and concretes into crusts, which fall off about the fourteenth day, leaving the skin of a brownish-red colour, and studded with slight depressions or pits. As the eruption travels from above downwards, the parts of the body successively attacked by it become affected with swelling, the mouth waters, and the voice is hoarse; when the incrustation has taken place, these symptoms subside, but a secondary fever commences, which is sometimes more severe than that which preceded the outbreak of the eruption. Small-pox, according to its severity, is distinguished by authors into two varieties, the *distinct* and the *confluent*, *variola discreta* and *confluens*. In the former, the pustules are few in number, well formed, and do not touch each other, and the fever is inflammatory, but mild; in the latter, the disease altogether is more violent, the eruption more general, and the pustules, small and unhealthy, run one into another. The fever likewise is greater, and rather of the typhoid character, is not mitigated on the appearance of the eruption, and is much aggravated at its termination; there is delirium, considerable prostration of the vital powers, ptyalism, inflammation of the fauces, and frequently diarrhœa. Petechiæ and an unhealthy exudation from the body often accompany this form of the disease. Among the mucous membranes, the larynx and trachea suffer much, and children often die of suffocation from this cause; the extent of mucous and of cutaneous inflammation however are not always necessarily proportioned to each other Small-pox rarely attacks the same individual more than once, and, like measles and scarlatina, its consequences are sometimes more to be dreaded than the disease itself. During the secondary fever, an intense form of ophthalmia frequently sets in, which rapidly involves all the structures of the eye, and in the course of a few days destroys its entire organization. Although it is not common to have both eyes thus affected, still a large proportion of the blind at our public institutions owe their misfortune to this disease. Pleurisy, consumption, scrofula, obstinate diarrhœa, and a fetid discharge from the ears attended with more or less deafness, are the principal diseases liable to result from a severe attack of small-pox. The immediate cause of this disease is a peculiar miasm or poison received into the system from an individual labouring under the same affection, and it is said to make its appearance in from twelve to fourteen days after exposure to the contagion; when however it is communicated by inoculation, it appears on the seventh or eighth day. Instances are recorded of mothers who were exposed to the infection of small-pox, communicating the disease to the fœtus in utero, without being themselves affected by it; and, what is equally remarkable, women suffering from small-pox during pregnancy, have brought forth healthy children, who did not take the disease till they were inoculated. Small-pox is frequently epidemic, especially in the spring, and, like all other epidemics, those who are first attacked by it suffer the most severely: it is observed also to be greatly influenced by certain conditions of the atmosphere.

Small-pox can be communicated by inoculation with the matter of its pustules, and the resulting disease being rendered milder by this operation, it was formerly much practised to guard the individual against a spontaneous attack; since however the introduction of vaccination by Dr. Jenner, the practice has been deservedly abandoned. Vaccination was supposed by its discoverer to secure the individual permanently and effectually from the contagion of the small-pox; more extended experience has proved, that although it does not always prevent it, yet it so shortens its duration and moderates its violence, that a death from small-pox after vaccination is a rare occurrence. A difference of opinion prevails respecting the character of the eruption which occasionally appears after exposure to variolous infection in persons previously vaccinated. According to many, it is nothing more than chicken-pox; while others affirm that it is really small-pox, although modified by the controlling influence of the cow-pox. The truth appears to be, that 'modified small-pox' resembles the chicken-pox in its mildness and duration, but differs from it in its originating from the 'variolous germ,' and in its power of communicating the true small-pox to others, as well by inoculation as by infection.

The history of the different epidemics of small-pox shows the mortality to be one in four of those attacked who had not been vaccinated; whilst of those who had undergone vaccination the proportion was not one in 450. From the register kept at the Small-pox Hospital in London, it appears that the mortality at this institution is considerably greater than one in four, having averaged during the last fifty years 30 per cent., the extremes being 18 and 41. From the same source we learn that the greatest number of deaths occurs on the eighth day. Of 168 fatal cases, there died in the first week 32; in the second, 99; in the third, 21; and in the fourth and after, 16. The causes of death at these different periods are the following:—1st week, malignant fever; 2nd week, affections of the throat, and consequent suffocation; 3rd week, or during the secondary fever, febrile excitement, mortification of large portions of the integuments, pneumonia, pleurisy, or laryngitis; 4th and following weeks, exhaustion, erysipelas, or some of the diseases before enumerated as liable to result from small-pox. It was formerly supposed that the eruption of variola was not confined to the skin, but invaded also the internal parts; this is not the case, the internal affections are simply inflammatory, and do not partake of the specific character of the cutaneous disease.

No peculiar plan of treatment is required for small-pox; it is that of ordinary fever: cleanliness, free ventilation, an attention to the strength of the patient, and a watchfulness against accidental complications, are the principal points to be kept in view. During the eruptive stage of the disorder, the bowels should be kept moderately open by saline aperients, and the occasional exhibition of a mild mercurial. The temperature of the skin may be regulated by cool air, or by sponging it with tepid vinegar and water; if there should be much unpleasant effluvium from the surface of the body, washing it with a weak solution of one of the chlorides will be found to correct this. It has been recommended by some writers, and has been long a practice in Eastern countries, to pierce the pustules with a fine needle; this procedure, it is said, lessens the violence of the secondary fever, and prevents pitting. M. Serres, with the same object, directs the application of lunar caustic to the pustules on the fourth day. As a general rule, we should say that venesection is not admissible at any period of small-pox; indeed we have no hesitation in affirming that some of the severest consequences of the disease may be averted by a judicious employment of measures of an opposite tendency to blood-letting. The sloughing of the integuments, and the intense ophthalmia, rapidly terminating in entire loss of vision, are eminently connected with an enfeebled and cachectic state of body; and the best mode of averting these evils is to have recourse early to those remedies which are most efficacious in arresting their progress. Hence bark or its preparations, combined with the mineral acids, sarsaparilla, wine, brandy, if the powers are much reduced, and animal food, if the patient can eat it, must be perseveringly administered. It may not be out of place here to mention that the character of the ophthalmia termed *variolous* has only lately been pointed out to the profession by Mr. Marson of the Small-pox Hospital. It had been supposed that the eye was lost in small-pox from one or more of the pustules of this disease forming on the cornea. Mr. Marson has shown not only that this never takes place, but that the loss of vision is attributable to ulceration or sloughing of the cornea, which comes on generally about the eleventh or twelfth day of the disease. The patient is nearly always in a state of great debility, and requires tonic medicines and nutritious diet to give him a chance of escaping from the destructive effects of this ophthalmia.

SMALT is a glass coloured of a fine blue, by means of oxide of cobalt. [COBALT.] When reduced to an impalpable powder, it is employed to give a blue tint to writing-paper and linen.

SMART, CHRISTOPHER, was born at Shepburne in Kent, April 11, 1722. He was educated at Durham and Maidstone schools, and at Pembroke Hall, Cambridge, where he was sent October 30, 1739. Here he distinguished himself by his classical attainments; he was elected a fellow of Pembroke Hall, July 3, 1745. He gained the Seatonian prize for five successive years: the subjects of the prize poems were respectively the Eternity, the Immensity, the Omniscience, the Power, and the Goodness of the Supreme Being. In 1753 he quitted Cambridge on his marriage with Miss Ann Maria Carman, and afterwards resided in London, endeavouring to make a livelihood by trifling literary undertakings. He became engaged in an altercation with Sir John Hill, who criticised his poems, and Smart in revenge published a satire called the 'Hilliad.'

In 1754, in consequence of pecuniary embarrassment and other mortifications, he became deranged, and continued in this condition, with intervals more or less lasting of sanity, till his death, May 18, 1770, in the rules of the King's Bench, where he had been confined in his latter years. Smart translated the Psalms, Phædrus, and Horace into prose; and in 1752 published a small collection of poems, to which he made subsequent additions. His productions have sunk into deserved oblivion. He seems to have been a weak improvident man, not destitute of good qualities, such as gained the favour of several of the nobility, and the friendship of Garrick and Johnson, the latter of whom has written an account of him. His poems were printed in 1791.

SMEATHMA'NNIA, a small but beautiful genus of plants belonging to the natural order Passifloraceæ. It was named by Solander in honour of Smeathmann, a German botanist, who travelled in many parts of Western Africa, and collected plants, especially at Sierra Leone, of which place this genus is exclusively a native. The genus possesses a one-leaved nectarium, which is urceolate and surrounding the base of the stamens. The stamens are numerous, distinct, and seated on a short column with incumbent anthers; the stigmas are peltate and five in number; the capsule is inflated, and four- or five-valved; the seeds are dotted. All the species are upright shrubs, with white, showy, axillary flowers. Three species are recorded, *S. pubescens*, *S. lævigata*, and *S. media*. In cultivation they succeed best in a mixture of loam, peat, and sand. They may be easily propagated by sticking cuttings in the same soil under a bell-glass.

SMEATON, JOHN, was born, according to most authorities, on the 28th of May,* 1724, as Austhorpe, near Leeds, in a house built by his grandfather, and long afterwards inhabited by his family. His father was an attorney, and brought him up with a view to the legal profession. Our information respecting the domestic history of Smeaton is exceedingly scanty; it amounts to little more than that he very early displayed a taste for mechanical pursuits; delighting, it is said, even when a child in petticoats, to observe mechanics at work, and to question them respecting their employments. One of his biographers states that his toys were the tools of men; and that, while yet little more than an infant, he was discovered one day on the top of his father's barn, fixing something like a windmill. But passing over such symptoms of precocity, the evidence of which must always be received with caution, we find him, at the age of fourteen or fifteen, constructing a machine for rose-engine turning, and producing neat ornamental boxes, &c. for his friends. He appears to have been but little older when he cut, in a lathe of his own manufacture, a perpetual screw in brass, according to the design of his intimate friend Mr. Henry Hindley of York, with whom he joined enthusiastically in mechanical pursuits. By the age of eighteen years he had attained much practical skill in mechanical operations, and had furnished himself with many tools for performing them.

About this time, in the year 1742, in pursuance of his father's design, young Smeaton came to London, and attended the courts of law at Westminster Hall; but finding the bent of his mind averse to the law, his father yielded to his wishes, and allowed him to devote his energies to more congenial matters. The next circumstance in his history related by his very brief biographers is his taking up the business of a mathematical-instrument maker, about the year 1750, when he was residing in lodgings in Great Turnstile, Holborn. In 1751 he tried experiments with a machine that he had invented for measuring a ship's way at sea; and in 1752 and 1753 was engaged in a course of experiments 'concerning the natural powers of water and wind to turn mills and other machines depending on circular motion.' From the latter investigation resulted the most valuable improvements in hydraulic machinery. In the construction of mill-work, Smeaton, during the whole of his useful career as a civil engineer, stood deservedly high; and, by his judicious application of scientific principles, he increased the power of machinery impelled by wind and water as much as one-third. The results of these experiments were published in 1759, after he had been able to give them a practical trial; and their value obtained for him the Copley gold medal of the Royal Society in that year. Smeaton had previously, in the year 1753, been made a member of the Royal Society; and he had made some communications to the 'Transactions' even before that date. In 1754 he visited Holland and the Netherlands; and the acquaintance he thus obtained with the construction of embankments, artificial navigations, and similar works, probably formed an important part of his engineering education.

In 1766 Smeaton commenced the great work which, more than any other, may be looked upon as a lasting monument of his skill—the EDDYSTONE LIGHTHOUSE [ix., pp. 268, 269]. Two lighthouses had been erected on the Eddystone or Edystone rock, before the admirable structure of Smeaton; of which the first was swept away in a storm, and the second, which was formed of timber, was destroyed by fire in December, 1755. The immediate re-erection of the beacon being highly important, Mr. Weston, the chief proprietor, lost no time in applying to the earl of Macclesfield, then president of the Royal Society, for advice as to the person who should be entrusted with the difficult task. The previous structures had been designed by non-professional men; and it was felt now, to adopt the language of Smeaton's narrative, that to erect another 'would not so much require a person who had merely been bred or had even rendered himself eminent in this or that given profession; but rather one who from natural genius had a turn for contrivance in the mechanical branches of science.' The earl immediately perceived that Smeaton was the man required, and therefore recommended him. Although a great portion of the lease under the provisions of which the lighthouse had been erected was expired, and their interest in the undertaking was consequently limited to a comparatively short time, the proprietors liberally entered into Smeaton's views respecting the superior advantages of a more durable material than timber; and determined on the adoption of his plans for a stone structure of the greatest possible strength. The cutting of the rock for the foundation of the building was commenced on the 5th of August, 1756; the first stone was landed upon the rock June 12th, 1757; the building was finished on the 9th of October, 1759, and the lantern lighted for the first time on the 16th. During this time there were 421 days' work done upon the rock.

---

* June 18th is the date given in the 'Encyclopædia Britannica;' but no explanation is offered of this deviation from, as far as the writer can ascertain, all other authorities.

Smeaton appears to have been by no means fully employed as an engineer for several years after the completion of the Eddystone lighthouse; for in 1764 he became a candidate for the office of a receiver of the Derwentwater estate, the funds of which were, after its forfeiture in 1715, appropriated to Greenwich Hospital. On the last day of that year, chiefly, as he states in his account of the Eddystone lighthouse, through the friendship of the earl of Egmont and earl Howe, lords of the admiralty, he was appointed to this office. In this engagement he was happy in being associated with Mr. Walton, the other receiver, who took upon himself the management of the accounts, leaving Smeaton at leisure to devote his attention to improvements and to professional engagements. While he held the receivership he greatly improved the estate, the mines and mills of which required the superintendence of such a man to make them of their full value. Increasing business induced him, in 1775, to desire to relinquish this engagement, but he was prevailed on to retain it about two years longer.

Of the many useful works executed by Smeaton, Ramsgate harbour perhaps holds, next to the Eddystone lighthouse, the most prominent place. This work was commenced in 1749, but was carried on with very imperfect success until it was placed under his superintendence in 1774. This harbour, being enclosed by two piers, of about 2000 and 1500 feet long respectively, affords a safe refuge for ships where it was much needed, vessels in the Downs having been exposed to imminent risk during bad weather before it was constructed. Smeaton laid out the line of the great canal connecting the western and eastern shores of Scotland, from the Forth to the Clyde, and superintended the execution of great part of it. To his skill, in all probability, the preservation of old London bridge for many years was attributable. In 1761, in consequence of alterations made for the improvement of the navigation, one of the piers was undermined by the stream to a fearful extent. The bridge was considered in such danger that no one would venture to pass over it; and the engineers were perplexed. An express was therefore sent to Yorkshire for Smeaton, who immediately sunk a great quantity of stones about the endangered pier, and thereby preserved it. The Calder navigation was one of the great works which he successfully accomplished; and he provided with much skill for the effect of the impetuous floods to which that river is subject. The Spurn lighthouse at the mouth of the Humber, some important bridges in Scotland, and many other works of like character might also be mentioned.

About 1783 Smeaton's declining health rendered it necessary for him to avoid entering upon many new undertakings. He then devoted much attention to the publication of an account of the Eddystone lighthouse, which was to have been followed by a 'Treatise on Mills,' and other works embodying his valuable experience as an engineer. The former of these was the only work he lived to complete; and it is a volume of great and permanent interest, detailing in the most minute and simple manner every circumstance worthy of record concerning the history or the construction of the lighthouse. It is dedicated to George III., who had taken much interest in the structure; and in the dedication, in explaining the circumstances which had deferred the appearance of the narrative so long after the completion of the building, the author observes, 'I can with truth say, I have ever since been employed in works tending to the immediate benefit of your majesty's subjects; and indeed so unremittingly, that it is not without the greatest exertion that I am enabled even now to complete the publication.' He had made some progress in this work before 1763; but it appears to have been laid aside for about twenty years, and was not published until 1791. On the 16th of September, 1792, while walking in his garden at Austhorpe, Smeaton was seized with an attack of paralysis; and on the 28th of October he died.

About the year 1771 several friends of Smeaton, engaged in kindred pursuits, formed themselves into a society, which may perhaps be looked upon as the first public recognition of the useful body of men who have since, under the name of Civil Engineers, done so much in developing the resources of this country. Untoward circumstances led to the dissolution of this society previous to Smeaton's death, but steps were taken to re-organize it before that event took place. The new Society shortly took steps for the publication in a collected form of Smeaton's numerous professional reports; but the work was not completed until 1812. It is in three quarto volumes, to which a fourth was subsequently added, consisting of his miscellaneous papers communicated to the Royal Society, &c. The Society alluded to is mentioned in the first volume of the 'Transactions of the Institution of Civil Engineers' as still existing. The introduction to this volume contains a high eulogium on the talent of Smeaton as an engineer. Alluding to the Eddystone lighthouse, it observes, 'This, Smeaton's first work, was also his greatest; probably, the time and all things considered, it was the most arduous undertaking that has fallen to any engineer, and none was ever more successfully executed. And now, having been buffeted by the storms of nearly (now more than) eighty years, the Eddystone stands unmoved as the rock it is built on—a proud monument to its great author. Buildings of the same kind have been executed since, but it should always be borne in mind who taught the first great lesson, and recorded the progressive steps with a modesty and simplicity that may well be held up as models for similar writings. His Reports are entitled to equal praise; they are a mine of wealth for the sound principles which they unfold and the able practice they exemplify, both alike based on close observation of the operations of nature, and affording many fine examples of cautious sagacity in applying the instructions she gives to the means within the reach of art.' The deliberation and caution always exercised in the works of Smeaton are well worthy of imitation; and to this may be attributed the almost unexampled success of his undertakings. So highly was his judgment appreciated, that he has been called the 'standing counsel' of his profession, and he was constantly appealed to by parliament on difficult engineering questions.

His improvements of wind and water mills have been mentioned already. The atmospheric steam-engine of Newcomen was the subject of similar experiments, attended with the like results; although the more important improvements of Watt threw Smeaton's efforts in this way comparatively into the shade. His improvements consisted chiefly in the proportions of the component parts of the machine; yet they effected so great a saving of fuel, that Boulton and Watt excluded them from their ordinary agreement—which was, to receive for the use of their patent right one-third of the coal saved by their machine in comparison with those previously used. The low state of the mechanic arts in England led Smeaton, during the early part of Watt's career, to doubt the possibility of his machines being made with the required accuracy.

Smeaton also introduced many improvements in mathematical apparatus, and had an ardent love for science. He was particularly attached to astronomy, and had an observatory at Austhorpe, where, even during the most active part of his career, he occasionally resided.

In person he was of middle stature, broad and strong made, and of good constitution. His manners were simple and unassuming. His temper was warm, but not overbearing; and his social character unimpeachable. Very little is recorded of his private history; but his daughter, Mary Dixon, in a letter prefixed to his 'Reports,' gives a pleasing account of his character as a husband, parent, and friend. He was by no means grasping or avaricious, as many anecdotes related of him seem to show. The empress Catharine of Russia was at one time very desirous of engaging his services, and offered him his own terms: but the princess Daschkaw, by whom the request was communicated, found him to be, as she said, a man who had no price.

The principal authorities consulted for this article are a short memoir by Smeaton's intimate friend Mr. Holmes, a watchmaker, then residing in the Strand, which was published separately in 1793, and appeared also in the 'European Magazine' and the 'Annual Register' for that year; and the memoir prefixed to his 'Reports.' Some particulars have been gleaned also from his own 'Narrative' respecting the Eddystone lighthouse.

SMELL. The essential part of the organ of smell consists of the expansion of the olfactory nerves, the first or most anterior of the nerves from the brain, whose minutest branches are distributed just beneath the mucous membrane of part of the nose.

In man the framework of the nose is formed in part of bone and in part of cartilage. Of that part which is prominent on the face, the upper portion only is formed of bone, consisting of the nasal bones in the middle, and the nasal processes of the superior maxillary bones on each side. The lower and lateral portions, termed the Alæ, which bound the nostrils, are formed chiefly of cartilage. The nasal cavities, to which the nostrils lead, extend to the forehead above and to the pharynx behind; they are separated from each other by a middle partition. They are bounded on each side, in front, by the nasal bone and the meeting of the septum and alæ; above, by the cribriform plate of the ethmoid bone; below, by the palatine processes of the upper jaw and palate bones; behind, by the body of the sphenoid bone; on the inner side by the septum; and on the outer by the ala, by the ascending plates of the upper jaw and palate bones, the lacrymal, and the orbital plate of the ethmoid bone, and the internal pterygoid processes of the sphenoid, between which is the aperture from the nose into the pharynx. Within these cavities there hang, on each side, the three turbinated bones, the spaces above and within which are occupied by the fine cells and laminæ of bone forming the ethmoidal cells, which communicate with the frontal, maxillary, and sphenoidal sinuses.

Of these complicated cavities, the several parts of which are described in the article SKELETON, a small portion only is devoted to the sense of smell. The rest is subservient either to respiration, the passage through the nose being that by which in most animals the air passes to the lungs, or to the voice, of which the cells and the several sinuses near the nose seem destined to increase the resonance. All the surfaces within the nose are covered by a layer of thin, tough, and very vascular mucous membrane, the Schneiderian membrane, whose structure is simple, possessing neither papillæ, villi, nor glands, and which secretes in every part a small quantity of clear viscid mucus.

The olfactory nerves descend from the under surfaces of the olfactory bulbs [BRAIN] through the foramina of the cribriform plate of the ethmoid bone. They are very numerous, and are densely distributed in bundles and tufts in the mucous membrane covering the upper part of the septum, the under surface of the cribriform plate, and the inner surfaces of the superior and middle turbinated bones, and of the cells immediately adjacent to them.

The human organ of smell is less developed than that of other mammalia, in most of whom the turbinated bones, and all the parts to which the olfactory nerves are distributed, are much larger and more complicated in their form. In birds also the extent of the surfaces of these parts is proportionally much greater than in man, in correspondence with the greater acuteness with which they smell. In fish the nose is merely a depression, without any aperture into the pharynx; the olfactory membrane lining it has its surface extended by being developed in numerous folds and tufts. The closure of the nasal passage behind is one of the most constant of the characters distinguishing fish from amphibia, in the majority of which also there are not mere tufts of membrane, but well-developed turbinated bones, with the mucous membrane spread out upon them. In invertebrata the organs of smell are not clearly known, though there is little doubt that some of them exercise the sense.

All that is necessary for the perception of an odour is that the scented particles (without undergoing any such changes as light does in arriving at the retina, or sound on its way to the auditory nerve) should come in contact with the surface under which the olfactory nerves lie, with the force of rather more than an ordinary inspiration. If the medium containing the odour be at rest, or be only gently forced against the membrane, no impression is produced.

In different animals the sense of smell is adapted chiefly to that class of substances on which they feed. The carnivora, for example, have an acute sense of the odour of animal substances, but, so far as we can discern, none for that of vegetables; and, on the other hand, herbivora are as clear in their perception of the latter, and as nearly insensible to the former. Man, as his food is mixed, so also is his sense of smell adapted to both classes of substances, though for each less acute than that of the animals that feed exclusively on the one or the other. In the choice of food, which is the main object of the sense of smell, man generally, though almost unconsciously, and animals always, exercise the precaution of smelling, and they instinctively form a judgment according to the impression received. In eating also, much of that which is commonly attributed to the sense of taste depends on the odour of the food carried from the mouth to the nose. In eating cinnamon, for example, or any similar aromatic substance, if we close the nostrils, we perceive no flavour, and, except for the stinging of the tongue, might imagine ourselves eating a tasteless wood. And, in like manner, we often mistake for those of odour the impressions made by substances on the nerves of common sensation with which the lining membrane of the nose is abundantly supplied; for example, in smelling ammonia, vinegar, and other acrid substances, the impression which we regard as their odour is compounded of that and of the irritation of the nerves of common sensation; and the nose of an animal whose olfactory nerves are destroyed is hardly less sensible to this latter irritation than that of one in which the nerves are entire. Facts of this kind have led to the error of supposing that the olfactory are not the only nerves of smell; they only prove that the sense of smell has a more limited range than is commonly supposed. The same substances, ammonia and the like, which irritate the common sensitive nerves of the nose, act in the same manner on the eye or any equally delicate part; but in the nose alone is this irritation accompanied by any peculiar sensation of odour by which one such substance can be distinguished from another. This perception of odour, independently of irritation, is the proper function of the olfactory nerves, which are thus strictly nerves of peculiar sensation, of the same class with the optic, auditory, and gustatory. [NERVE; SENSES.]

SMELTING. [IRON—*Manufacture and Trade.*]

SMERDIS. [CAMBYSES; DARIUS.]

SMILA'CEÆ, a small natural order of plants belonging to Lindley's Retose group of Monocotyledons. There has been much difference of opinion amongst botanists with regard to the position of Smilax in the natural system, as well as the number of genera that ought to be admitted into the order Smilaceæ. Lindley has placed two genera, Smilax and Ripogonum, in this order, which possesses the following characters:—Flowers hermaphrodite or diœcious; calyx and corolla confounded; inferior six-parted; stamens six, inserted into the perianth near the base, seldom hypogynous; ovary three-celled, the cells one- or many-seeded; style usually trifid; stigmas three; fruit a roundish berry; albumen between fleshy and cartilaginous; embryo usually distant from the hilum. They are mostly herbaceous plants, with a woody stem, and a tendency to climb. Their leaves are reticulated. This last character separates the order from Liliaceæ and its allied orders, with which it otherwise closely agrees.

Smilax is found in most parts of the world, especially in Asia and America. For the principal properties of the order see SMILAX.

SMILAX, a genus of plants which gives its name to the natural family of Smilaceæ. The name occurs in Greek authors, as Theophrastus and Dioscorides, and is applied to several different kinds of plants, as the yew-tree; a species of Phaseolus or Convolvulus (*σμίλαξ τραχεῖα*), is Smilax aspera, which belongs to the present genus. Smilax is characterised by having a six-leaved corol-like perianth, with six stamens inserted into their base; the anthers are linear and fixed by the base; ovary three-celled; ovules solitary, in each cell affixed to the apex; style very short; stigmas three, spreading; berry one- to three-celled, one- to three-seeded; seeds globular; testa membranaceous, whitish; hilum large and coloured; albumen cartilaginous; embryo very small, remote from the hilum. The species form evergreen climbing shrubs, of which a few are found in temperate, but the majority in warm and tropical regions of both hemispheres, extending south to New Holland, and north to Japan, North America, and the south of Europe. The species have fibrous or tuberous roots; stems often prickly; leaves alternate petiolate; cordate or hastate, nerved, reticulate, venose, conchiferous stipules between the petioles; flowers sessile on a globular receptacle; subcapital pediculate and umbellate.

Though the original species (S. aspera) of this genus is an inhabitant of the south of Europe, those now most celebrated for yielding the different kinds of Sarza or Sarsaparilla are natives of South America. But S. aspera still continues to be employed for medicinal purposes in the south of Europe, where it is called Sarsaparilla Italica, but there is no truth in the statement of its being the plant yielding Indian Sarsaparilla, which is Hemidesmus indicus. Another celebrated species is the *Smilax China*, which has a tuberous root abounding in fecula, and therefore probably useful as a demulcent, though the Chinese esteem it invigorating, and ascribe to it other virtues. It is remarkable that two Indian species, which, like the Chinese species, have tuberous roots, should be called in Silhet *hurina-shook-China* and *gootea-shook-China*. These are *Smilax glabra* and *S. Lanceæfolia*, and their roots cannot be distinguished from the China root, or *Chob. chænea*, as it is called in India. A similar species is common in the southern parts of North America, and has been called *Smilax pseudo-China*, though there is reason to believe that more than one species may be confounded under this name. *S. glycyphylla* is a New Holland species, which has received its specific name from the sweetish taste of its leaves, and has been called Sweet Tea from its employment in the form of infusion, and is probably alterative and diaphoretic, as well as slightly tonic. Though the genus Smilax contains about one hundred species, few others require notice except those yielding the medicinal Sarsaparilla. It is probable that some of the species found in the Old World will be discovered to be possessed of virtues equal to the American species. Some of the Indian species have been sent by Dr. Gibson, superintendent of the East India Company's botanic garden near Poonah, to the Medical Board of Bombay, for trial in the hospitals of that presidency.

SMILAX (*Medical Properties of*). Though, according to Dr. Hancock, but one species of this rather extensive genus yields the genuine sarsaparilla, it is quite certain that the roots of many are collected, and pass under that name in commerce. The species which, according to him, furnishes the true root is a native of Guayana, growing on the elevated lands of the Rio Juniquen at Unturana and Caraburi. Most species of smilax are provided with spines, which has given origin to the first half of the name in the Spanish language, *zarza*, a bramble, and *parilla*, a vine, from its climbing or turning habit. The former is adopted as its familiar name in the London Pharmacopœia. The same work indicates S. officinalis (Humbt., *Nova Genera et Species*, i, 271) as the source of the officinal article. The different kinds of sarsaparilla are better known by the course they follow in their progress towards European consumption, than by their botanical history. In describing them it seems best therefore to adopt their commercial names.

1. Jamaica or Red Sarsaparilla. This occurs in bundles formed of the root alone, folded in a roundish mass, about a foot or more in length, and four or five inches broad. Each bundle is formed by the roots and rootlets (fibrillæ, or beards, as they are technically termed), without any portion of the rhizoma (or chump) or of the aerial stem. The roots are long, slender, about the thickness of a small quill, with a dark-brown furrowed or wrinkled bark. The bark is thick, easily separable from the ligneous part beneath. The ligneous part is of a light red, which assumes a deeper hue when moistened. It is easily split longitudinally, and has a whitish centre or medulla, containing more or less starch. But for the absence of medullary rays and of nodi, this root might be taken for the twigs of an Exogenous plant, to which the structure of the Smilaceæ approximates in several other points. A transverse section exhibits the cuticle and epidermis, which are separated from the inner or ligneous circle by a zone of cellular tissue; then the duramen, which presents the cut or open extremities of numerous ducts; and lastly, the medulla, or pith, in the centre. The duramen, though porous, is of a denser texture than that of the Honduras sarza. The taste is at first sweetish or slightly mucilaginous, then nauseous, resembling ipecacuanha, but not very acrid or bitter. No variety of sarza has any odour, but dirty or unwashed specimens have a faintly earthy smell.

The powder is a light reddish-brown, which, when triturated with water and tincture of iodine, changes to a blue, but of a less intense depth than the Honduras sarza, indicative of a smaller proportion of starch in the former.

According to Mr. Pope (*Trans. Medico-Chir. Society*, xii., p. 349), 'the whole medical efficacy resides in the bark; and the root, deprived of its cortical part, contains only pith and tasteless woody-fibre.' The tasteless character of the wood renders this statement very probable. He further says: 'The cortical part gives out nearly the whole of its virtues by cold infusion in distilled water, very readily to lime-water or water slightly impregnated with caustic alkali; and that boiling distilled water extracts all its virtues.' He deems the quantity of extract yielded by any specimen the criterion of its excellence. Judged by this standard, the Jamaica sarza is manifestly the best. His experiments have been confirmed by those of Mr. Battley, and by Thubeuf, the latest inquirer, who from six pounds of Jamaica sarza obtained 22½ ounces of extract, while a similar quantity of Lisbon sarza yielded only 13⅛ ounces, and of Honduras sarza 14 ounces.

Jamaica sarsaparilla is the produce of the Spanish Main, and thence sent to Jamaica, to be forwarded to Europe. Some has been recently cultivated in that island, but it is of inferior quality. The smilax officinalis (Humbt.), which is conjectured to be the parent plant of the wild root, grows in New Granada, on the banks of the Magdalen river, near Bojorque.

2. Lisbon, Para, or Brazilian Sarza.—The term Lisbon sarza was also bestowed on the sort just described, for as Lisbon sarza was till lately most esteemed, the former on its first introduction was vended under that name. The true Lisbon sarza is the produce of smilax siphilitica, which grows both in New Granada, on the river Cassiquiare, between Mandacava and San Francisco Solano, and in Brazil, on the Yupura and Rio Negro, by which last name it is sometimes designated. (Martius, *Reise*, iii., pp. 1213, 1280.) The Indians collect it all the year round, dry it over a moderate fire, and tie it into bundles with the flexible stem of a plant called Timbotitica. To prevent its being attacked by insects, they hang it up at the gables of the houses, and sometimes gently smoke it.

It is shipped from the Brazils, mostly from Maranham, in large bundles, weighing each about one hundred pounds, which are generally remodelled in Europe, especially in Holland, and reduced to small parcels of from one and a half to two pounds weight, the roots being cut clean off at each end, and made fast with paper and string. These bundles have a neat appearance externally, but the interior is filled up with the chumps and other rubbish. The fibres vary in thickness from that of a straw to that of a crow-quill, with little beard, and fewer longitudinal wrinkles than the Jamaica sarza; the colour, a light, sometimes a dirty greyish yellow, or reddish-brown colour, internally white; the cortical part mealy, including a thin cellular layer, which, with the duramen, is also white. Taste at first insipid, but on prolonged mastication a sort of acrid guttural taste, without bitterness, is experienced. This kind contains more starch than the Jamaica variety, and yields a paler infusion.

3. Honduras Sarza was the kind first introduced into medical practice, a circumstance which still leads many persons to prefer it. It generally comes over in very large bundles, weighing from one hundred to one hundred and fifty pounds, but sometimes in small round bundles. Each piece has the chump and the numerous roots proceeding from it. The chump is often two inches thick, woody, hard, and insipid. The roots are from two to four feet long, mostly thicker than those of the Jamaica or Lisbon kinds. The outer part is a dirty greyish yellow, sometimes verging to brown or reddish. The cortical part is very easily separable from the ligneous; between the epidermis and the duramen is a thick white amylaceous layer, whence a large quantity of flour or starch falls when the piece is broken across; hence the term *mealy*, applied to this variety. A transverse section exhibits a great many cut extremities of ducts, which run parallel, and are so continuous, that air can be blown from one end to the opposite of a considerable piece. This kind has no odour, and the taste is at first merely starchy and insipid, but at last acrid and guttural. The rhizoma (or chump) is altogether tasteless. The fibres and the bark are rendered black by iodine; while the rhizoma is not affected by this re-agent. The

decoction of the roots is changed to an intense blue by a solution of iodine.

4. Vera Cruz Sarza is not common in the English market, but is occasionally sold under the name of Lisbon sarza. It is the produce of smilax medica (Schlecht), which grows abundantly on the eastern slope of the Mexican mountains. Externally the fibres are more furrowed than the Jamaica. The transverse section is denser in the young roots, and it is not mealy; there is little beard. The chump is always attached. It yields a deep-coloured decoction, which is unchanged by a solution of iodine. The sarsaparilla of the Caracas of French writers is deemed to be the Vera Cruz sort.

5. A kind called Lima Sarza is brought in considerable quantity to this country, and greatly resembles Jamaica sarza, for which it is said by Dr. Pereira to be extensively sold, and from which it differs chiefly in yielding a less quantity of extract.

It is manifest that the S. Sarsaparilla (Linn.), which is a native of the southern states of the American Union, yields none of the article used at present in Europe, though it may yield a portion of what is used in the United States.

It is difficult to distinguish these different kinds of sarza by mere physical characters, but chemical tests furnish a ready and certain criterion.

Kinds.	Iodine, action of, on substance.	Infusion.			Decoction.	
		Colour.	Sesquichloride of Iron.	Tincture of Galls.	Colour.	Iodine.
Jamaica .	Turns it black, but the powder, rubbed with water and tincture of iodine, becomes blue.	Brownish-red.	Is rendered turbid but not deepened in colour.	No effect.	Clear deep reddish-brown.	Colour deepened, but not rendered blue.
Honduras	Tincture of iodine turns the roots, but not the chump, black. The powder, with water and iodine, is intense bluish-black.	Deep reddish-brown.	Scarcely affected.	No effect.	Deep brown, but not clear when cold.	Turned intensely blue.
Lisbon .	As the foregoing.	As the above.	As the above.	No effect.	Light brown.	Rendered blue.
Vera Cruz	Turns it brown, the thicker pieces rather blackish-blue.	Light brown.	More deepened.	No effect.	Deep coloured.	Scarcely affected.

'A strong decoction of Honduras sarza forms a copious precipitate (starch) on the addition of alcohol.' (Pereira.)

Besides the above-described varieties, the produce of different species of smilax, there are numerous spurious or false sarsaparillas, some from known, others from unknown sources. Italian sarza is the root of Smilax aspera, the only species native of Europe. It is a very worthless kind, and owes its reputation to a mistake by which it was considered to be the source of the Indian sarza, a truly valuable root, but which is the produce of an asclepiadeous plant, Hemidesmus indicus. German sarsaparilla consists of the rhizoma of one or more species of Carex, C. hirta and C. arenaria. It may easily be distinguished from the genuine by the numerous nodi, which are absent from the smilax. The chemical analyses of sarsaparilla furnish little practical guidance, from its not being recorded what kind was submitted to examination. The investigation, in 1834, by Thubeuf (*Journal de Pharmacie*, xx., p. 682), gave as its composition,—a crystalline substance (*Salseparine*, supposed to be identical with *pariglin* of Palotta, *smilacin* of Folchi, and *parallinic acid* of Batka), a colouring matter, a resinous matter, ligneous matter, starch, chloride of potassium, nitrate of potash, fixed aromatic thick oil, and waxy substance. A volatile oil is mentioned in some of the analyses; it probably exists only in young roots, and in the older is converted into resin. Berzelius procured only one ounce from 100 pounds of the root.

The active properties are mostly due to the salseparine the resin, and, when present, to the volatile oil. The more acrid and bitter any specimen of sarza is, the better.

The virtues of sarsaparilla are the subject of much diversity of opinion; many practical men deeming it very useful, while others consider it nearly worthless. This difference seems owing partly to its being employed in different diseases by the one set, from those in which it is used by the other, and still more to inherent differences in the particular root used. It is collected at all seasons of the year, and in all stages of its growth, circumstances which cannot fail to influence its qualities; as young roots gathered before the flower appears must differ greatly from old roots gathered after flowering. But a more important cause of difference exists in the mode of preparing it for administration. The long period enjoined in the 'London and Edinburgh Pharmacopœias' for boiling the root is most injurious, and in reality the order is never obeyed by any of the chemists or druggists who have obtained a reputation for their preparations. They either use water of a temperature far below that of boiling, or perfectly cold water, as ordered by the Dublin Pharmacopœia, and recommended by all the most eminent Continental pharmaceutists. The powder is not thus injured, but its bulk and taste are obstacles to its full employment. The compound syrup of the latest edition of the American Pharmacopœia is a most excellent form as an addition to some of the watery preparations.

The curative powers of sarsaparilla are often very much heightened by combination either with alkalis, especially lime-water, or in other cases with acids, particularly the nitric. When properly prepared, and administered in suitable cases, no one can doubt the efficacy of sarsaparilla. From the high price of it, and the great consumption of it, attempts have been made in many of the great hospitals to dispense with it or discover a cheaper substitute, but without success. In the worn-out or debilitated systems so common in the patients by whom these establishments are crowded, its utility is daily manifested. This is partly owing to the care taken to procure the best kinds, and partly to the appropriate use made of it, for the sake of economy. It is chiefly used in chronic, syphilitic, rheumatic, gouty, and cutaneous diseases. Its most obvious action is diaphoretic, but if the patient be kept cool, diuretic. In cases where an acid is indicated, the Hemidesmus indicus, which is possessed of a natural acid (hemidesmic acid), will be found a useful substitute for the artificial preparations.

If any European plant ever prove a proper substitute for sarsaparilla, it will be the Tamus communis, or black bryony of our hedges, the root of which, when scraped and applied externally as a poultice, rapidly promotes absorption of effused blood. This is well known to bruisers, gypsies, and others, who to remove ecchymoses of the eye apply a poultice of this root, and generally remove the blackness in twelve or twenty hours. (Tyrrell *On the Eye*, vol. i., p. 200.)

SMILIS. [SCULPTURE.]

SMI'LIUM, Dr. Leach's name for a genus of pedunculated *Cirripeds*, distinguished from *Pentelasmis* by the number of its valves, and from *Scalpellum* by its hairy pedicle. Pieces thirteen, all smooth; ten in pairs, lateral and subtriangular; two anterior dorsal and ventral in curved and triangular; one posterior dorsal and linear pedicle hairy.

Example, *Smilium Peronii*.

SMITH, SIR THOMAS, was the eldest of the three sons of John Smith, of Saffron-Waldon, who appears to have been a gentleman of some distinction in the county, since he served the office of high-sheriff for Essex and Hertford in 1538. His son Thomas was born at Saffron-Walden, on the 28th of March, 1514, or 1515, most probably in the latter year.

In 1526 he was entered of Queen's College, Cambridge, of which he became a fellow in 1531. It is said to have been after this that, incited by the example of Dr. John Redman, who had just returned from the Continent an accomplished Greek scholar, he made himself master of that language in about two years; and the story is commonly told so as to imply that the study of Greek was till now unknown at Cambridge. But this is incredible; and indeed Smith's own relation of the methods he took to reform the prevalent mode of reading Greek at the University shows that some acquaintance with the language, though perhaps not a very exact or profound acquaintance, was previously general among the students. In 1535 he was appointed to read the public Greek lecture; and it was while holding this office that, in conjunction with his friend Cheke, he introduced the improved mode of pronouncing the Greek letters, of which he has given an account and defence in his tract entitled 'De Recta et Emendata Linguæ Graecæ Pronuntiatione,' first printed in 4to., at Paris, in 1568, and afterwards, along with the 'Disputationes' of Cheke, the 'VII. Epistolæ' of Bishop Gardener (who espoused the cause of the old pronunciation), and other writings on the same subject, in Henry Stephen's collection entitled 'De Linguæ Graecæ ac Latinæ Vera Pronuntiatione Commentarii Doctissimorum Virorum,' 8vo., 1587.

In 1536 Smith, now one of the most distinguished members of the University, was chosen public orator, and for some years he discharged the duties of that office with great applause. But in 1539 he left England, and remained abroad for two or three years, during which time he visited France and Italy, and took his degree of doctor of the civil law at Padua. After his return home, having taken the same degree at Cambridge in 1542, he was appointed king's professor of law in that University, and he seems to have continued to reside at Cambridge during the remainder of the reign of Henry VIII., although he is stated to have taken at least deacon's orders, and to have held in the church both the rectory of Leverington in Cambridgeshire and the deanery of Carlisle. His father had been long attached to the new doctrines in religion, and he had himself been brought up in the reformed faith from his childhood.

The accession of Edward VI. however was the great turning point in the history of this learned and able man. He was immediately taken into the family of the lord-protector Somerset; and, besides being made one of his masters of requests, was appointed to the two lucrative places of Provost of Eton and Steward of the Stannaries. In addition to his classical erudition, Smith had distinguished himself by his acquirements both in the pure mathematics and in such physical and experimental philosophy as was then known. We have already seen him figuring as a professor of law and as a clergyman: in 1548 he appears in a new professional character, having been that year made secretary of state and knighted. The same year he was sent to Brussels on an embassy to the emperor Charles V. There is some reason to suppose that on the fall of his patron Somerset he lost his place of secretary; but if so, he was soon restored to it; for in April, 1551, he was sent in that capacity on the embassy to Henry II. of France, to treat of a marriage between King Edward and that king's daughter.

When the crown passed to Mary, Sir Thomas Smith was deprived of all his employments and preferments; but having conducted himself with prudence, he was not further molested, and was even allowed a pension of 100*l.* a year. On the accession of Elizabeth, he was immediately restored to his deanery, and he was soon also recalled to public employment. In 1559 he was one of the commissioners sent to France by whom a peace was concluded between the two countries; and being again sent thither in 1562, he continued to reside abroad till 1566. He was also employed on another mission to France in 1567. Then he resided for some years at his seat in the country, till he was recalled to court in 1571; and being admitted of the privy council, was soon after appointed assistant secretary of state under Burleigh. In 1572 he once more went over in a diplomatic capacity to France; and while he was abroad he was nominated by the queen Chancellor of the Order of the Garter. In June that same year, on Burleigh's promotion to the place of lord treasurer, Smith succeeded him as secretary of state; and this office he held till his death on the 12th of August, 1577. He died possessed of considerable landed property, which, as he left no issue, though he was twice married, descended to the family of one of his younger brothers. A natural son whom he had was killed in Ireland in 1573.

Besides his Latin treatise on the pronunciation of Greek, already mentioned, Sir Thomas Smith is the author of another tract, entitled 'De Recta et Emendata Linguæ Anglicæ Scriptione,' printed along with that in 1568. But his most remarkable work is that entitled 'The English Commonwealth,' in three books, first published in 1584, and several times reprinted since; and in a Latin translation executed by himself, forming one of the small volumes of the collection of the 'Respublicæ.' Some shorter performances of his are given in the appendix to his Life by Strype, which also contains accounts of his unprinted writings. [STRYPE, JOHN.]

SMITH, ROBERT, D.D., an English mathematician, who was born in the year 1689: the place of his birth and the manner in which he was educated are not known; but it appears that from his youth he applied himself diligently to the study both of pure mathematics and of the physical sciences. In the early part of his life he was appointed tutor to the duke of Cumberland, and he subsequently received the title of master of mechanics to the king. He was a cousin by his mother's side of the celebrated Roger Cotes, and the two young men were intimately connected by friendship as well as by blood; they pursued their studies in each other's society, and their united labours were directed to the advancement of the Newtonian philosophy in this country. Mr. Cotes, who was Plumian professor of astronomy at Cambridge, dying in 1716, Mr. Smith, then M.A., was immediately afterwards appointed to succeed him: in 1723 he was made LL.D.; and in 1742, on the death of Dr. Bentley, he was appointed master of Trinity College. In 1722 he published, under the title of 'Harmonia Mensurarum,' and with a valuable commentary, several tracts on philosophical subjects which had been written by his relative and friend; and in 1738 he brought out, in two vols. 4to., his great work, entitled 'A Complete System of Optics,' which he dedicated to the Right Hon. Ed. Walpole. Such a work was then much wanted: it contains, besides a full development of the several different branches of the science, a considerable number of applications of the subjects to astronomy and navigation; but it is considered as rather deficient in perspicuity and arrangement. It was translated into French in 1767.

Dr. Smith undertook to correct and publish Cotes's 'Lectures on Hydrostatics and Pneumatics;' and this work, which came out in the year 1737, was enriched with a great number of notes, explanatory and illustrative of the subjects. A second edition of it was published in 1747. In the following year he published in one volume, 8vo., a treatise entitled 'Harmonics, or the Philosophy of Musical Sounds;' and of this work a second edition appeared in 1758. This learned man, of whose life so little is known, was in 1718 admitted a fellow of the Royal Society, and was intimately acquainted with most of the scientific men of his time. He died at Cambridge in 1768, and in the seventy-ninth year of his age, having been a liberal benefactor both to the University and to Trinity College; and having bequeathed two annual prizes, each of 25*l.*, for students who, being bachelors of arts, should have made the greatest progress in mathematics and natural philosophy. The two bachelors who gain these prizes are designated by the name of Smith's prizemen.

SMITH, ADAM, the only child of his parents, was born at Kirkaldy, June 5th, 1723, a few months after the death of his father, who was comptroller of the customs at that place. He was brought up with great tenderness by his surviving parent, and sent to the grammar-school of his native town. From 1737 to 1740 he pursued his studies at the university of Glasgow. Being designed for the Church of England, he left Glasgow, and proceeded as an exhibitioner on Snell's foundation to Balliol College, Oxford, where he spent seven years. Mathematics and natural philosophy, with antient and modern languages, were his favourite studies at this University. Having abandoned the idea of taking orders, he returned to Scotland: and in 1748 went to reside at Edinburgh, where, for the next three years, he read lectures on rhetoric and belles-lettres, under the patronage of Lord Kames. In 1751 he was elected professor of logic in the university of Glasgow; and in the following year was appointed to the chair of moral philosophy, which he filled for the next thirteen years. The third division of his lectures included various subjects, which he subsequently so ably treated in the 'Wealth of Nations.' His talents in the chair have been highly praised, and his lectures were generally delivered extempore. During his residence at Glasgow, he published his 'Theory of Moral Sentiments:' the first edition appeared in 1759; and the sixth, which contains considerable additions, shortly before the author's death. The fundamental principle of this work is, that sympathy forms the foundation of morals; that 'the primary objects of our moral perceptions are the actions of other men; and that our moral judgments with respect to our own conduct are only applications to ourselves of decisions which we have already passed on the conduct of our neighbours.' (Dugald Stewart.) This theory being now little thought of, it is unnecessary to enter into further details. To the second edition of the above work was prefixed a dissertation on the origin of languages, which was afterwards published separately, under the title of 'Considerations concerning the First Formation of Languages, and the Different Genius of Original and Compounded Languages.' It is praised rather for its ingenuity than the soundness of its conclusions. In 1763 Mr. Smith resigned his professorship, in consequence of an invitation to accompany the Duke of Buccleugh on his travels. The university of Glasgow conferred upon him the honorary degree of LL.D., a title which he never assumed in private life. He left London with his noble pupil in January, 1764, and proceeded to Toulouse, where they resided eighteen months. They next visited various parts of the South of France, spent two months at Geneva, and came to Paris at the end of 1765, where they remained ten months; and after an absence of nearly three years, returned to England. At Paris Mr. Smith became intimately acquainted with Turgot, Quesnay, Necker, D'Alembert, Helvetius, Marmontel, and other distinguished persons. Had Quesnay lived, it is said that the 'Wealth of Nations' would have been dedicated to him. Soon after his return to England, Smith proceeded to Kirkaldy, where, with the exception of occasional visits to Edinburgh and London, he resided until 1766, engaged in his great work. He mixed with the best literary society of both capitals, and was on terms of intimate friendship with Hume. When Johnson visited Scotland, he and Smith met, and Johnson rudely attacked the latter on account of his intimacy with the great historian. The interview between them is described in the *Edinburgh Review*, No. 145, p. 51. The 'Wealth of Nations' appeared early in 1766. To the third edition (1784) the author made several additions; but the fourth edition (1789) contained no alterations of any kind. The two following years after the first appearance of the work were spent in London. In 1788, through the influence of the Duke of Buccleugh, Mr. Smith was appointed one of the commissioners of customs for Scotland, on which he removed to Edinburgh, where he spent the remaining thirteen years of his life. When this appointment took place, he was in his fifty-fifth year; and it has frequently been regretted that his time was not devoted to more profitable labours, for though the duties of his office were not onerous, they were sufficient to distract his attention. He had collected materials for publication, which, with the exception of some detached essays published by his executors, were destroyed by his orders a few days before his death, as he had never found time to arrange them for the press. The closing years of his life were spent tranquilly in the society of a small circle of friends, who generally supped with him every Sunday. His mother resided with him until her death in 1784, a loss which he severely felt; and a maiden cousin, who had always superintended his domestic concerns, died four years afterwards. In 1787 he was elected rector of the university of Glasgow. He did not linger long after his domestic bereavements, but died in July, 1790, aged 67. He was never married.

The private character of Adam Smith has been fully given by his friend Dugald Stewart, in the account of his 'Life and Writings,' which is prefixed to more than one edition of the 'Wealth of Nations.' His disposition was amiable and benevolent; his manners artless and simple, and in society he not unfrequently exhibited instances of absence of mind. Dugald Stewart says:—'He was certainly not fitted for the general commerce of the world, or for the business of active life.' His acts of private charity were on a scale much beyond what might have been expected from his fortune. The medallion by Tassie gives an exact idea of his profile and the general expression of his countenance.

The 'Wealth of Nations,' or, to give the title correctly, the 'Inquiry into the Nature and Causes of the Wealth of Nations,' is the work on which the fame of Adam Smith will permanently rest. It overthrew the errors of the mercantile theory, that money was wealth; those of the agricultural theory, that land was the only source of wealth; and established the principle that the true source of wealth was labour. Hobbes, in 1651 ('Leviathan,' chap. 24), had briefly glanced at the importance of labour in conferring value upon things; Locke, in 1689 ('Essay on Civil Government'), went further, but was evidently not fully aware of the importance of the principle which he elucidated. Mr. McCulloch, in his 'History of the Rise and Progress of the Science of Political Economy up to the publication of the Wealth of Nations,' thus sums up what Adam Smith has done for this science:—'In the "Wealth of Nations" (he says) the science was, for the first time, treated in its fullest extent: and the fundamental principles on which the production of wealth depends, were established beyond the reach of cavil and dispute. In opposition to the French economists, Dr. Smith has shown that *labour* is the only source of wealth, and that the wish to augment our fortunes and to rise in the world is the cause of wealth being saved and accumulated. He has shown that labour is productive of wealth when employed in manufactures and commerce, as well as when it is employed in the cultivation of the land. He has traced the various means by which labour may be rendered more effective; and has given a most admirable analysis and exposition of the prodigious addition made to its powers by its division among different individuals, and by the employment of accumulated wealth, or capital, in industrious undertakings. Dr. Smith has also shown, in opposition to the commonly received opinions of the merchants, politicians, and statesmen of his time, that wealth does not consist in the abundance of gold and silver, but in the abundance of the various necessaries, conveniences, and enjoyments of life. He has shown that it is in every case sound policy to leave individuals to pursue their own interest in their own way; and that, in prosecuting branches of industry advantageous to themselves, they necessarily prosecute such as are at the same time advantageous to the public. He has shown at great length, and with a force of reasoning and amplitude of illustration that leaves nothing to be desired, that the principles of the mercantile or exclusive system are at once inconsistent and absurd; and that every regulation intended to force industry into particular channels, or to determine the species of commercial intercourse to be carried on between different parts of the same country, or between distant and independent countries, is impolitic and pernicious—injurious to the rights of individuals—and adverse to the progress of real opulence and lasting prosperity.'

Adam Smith's errors lean towards the theories of the French economists. Some principles he overlooked; others he did not duly appreciate. Many of the theories which he controverted have now become obsolete, yet the manner in which he has investigated them will always please and instruct. Still it is not safe for the student to read him without a guide. The best edition of the 'Wealth of Nations' is that by Mr. McCulloch, either in 4 vols. 8vo. or 1 vol. 8vo.: it contains useful foot-notes, and at the end several original dissertations on subjects which were not so well understood half a century ago.

The 'Wealth of Nations' is divided into five books; but the arrangement of the subject is not on the whole considered judicious. In the first and second books the circumstances which determine the price of commodities, the rate of wages and profits, and the rent of land are discussed. The third book treats of the probable progress of a country in which individual and national industry were unimpeded by restrictions, and shows the 'natural progress of opulence.' The causes which had produced the then existing policy of different European countries are pointed out. In the fourth book the mercantile and agricultural systems are examined. The fifth book relates to revenues of the state, the principles of taxation, and the effect of national debts. There are several long digressions on various branches of the subject.

SMITH, JOHN STAFFORD, a composer of great eminence, was born about the year 1750, in Gloucester, of which cathedral his father was organist, and by whom he was prepared for his final instructions in music under Dr. Boyce. At an early age he was appointed one of the Gentlemen of the Chapel-Royal; and on the decease of Dr. Arnold, in 1802, became organist of the same. In 1805 Dr. Ayrton resigned to him the mastership of the Children of the Chapel, an office which he relinquished in 1817, when he withdrew from all his professional engagements, and enjoyed a moderate but well-earned independence till his death, which took place in 1836.

At the age of twenty-three Mr. Smith gained a prize-medal from the Catch-Club, for a composition which had nothing to recommend it but that kind of grossness so much admired in 'the good old times;' but the following year produced his fine glee for four voices, 'Let happy lovers fly where pleasures call,' on which a similar medal was much more properly bestowed. The same honour was with equal discrimination conferred, in the three succeeding years, on his glees, 'Blest pair of Syrens,' 'While fools their time in stormy strife employ,' and 'Return, blest days.' He obtained in the whole eight of these honourable distinctions; but his very delightful glees, 'Let us, my Lesbia, live and love,' and, 'As on a Summer's day,' missed the reward due to their merits. Mr. Smith was also author of a madrigal, 'Flora now calleth forth each flower,' a work which may compete with anything of the kind extant. He published, between the years 1777 and 1785, five collections of glees, a volume of anthems, *Musica Antiqua*, and *Antient Songs of the Fifteenth Century*, the two last of which bear indisputable evidence of his industry and research, and now form a part of every good musical library.

SMITH, JOHN RAPHAEL, son of a respectable landscape-painter, who, from the place of his residence, is commonly known as Smith of Derby, was born about the middle of the last century. His father, Thomas Smith, has been stated to be one of the first artists 'who explored and displayed the charming scenery of his native country.' Several of his pictures were engraved by Vivares. Bryan states that he died in 1769. He intended to make an artist of his eldest son Thomas, who had given early indications of inclination towards painting, and apprenticed the subject of this notice to a linen-draper. Time however proved that he was mistaken in his selection, for Thomas never advanced beyond mediocrity, while John Raphael forsook the counter, and became eminent as a mezzotinto engraver and also as a painter. Very little is recorded of his history, and the few circumstances which are narrated are conflicting. It appears however that he was in full practice as an artist in London about 1778. He executed many beautiful engravings from pictures by Sir Joshua Reynolds, and several from his own. Among the latter are whole-length portraits of Charles James Fox and Earl Stanhope. Latterly Smith devoted himself chiefly to the production of slight crayon portraits, which he executed with great facility. Dayes, a contemporary artist, observes, 'The number of slight heads he has painted at a guinea are incalculable; one of the family told me he had done as many in one week as brought him forty pounds, and each of them I know he could finish in an hour.' While residing in London, he became a publisher and printseller; but during the latter years of his life he travelled about the country a good deal as a portrait-painter. He died in March, 1812, in his sixtieth year, according to a brief notice of his life and works in vol. iv. of the 'Library of the Fine Arts,' or in 1811, according to Bryan, and was buried at Doncaster. Unhappily his habits and character were not such as to excite respect. He was much given to low sports and practices; even pugilism has been mentioned among the debasing amusements to which he was addicted. With a taste for such pursuits, it is not surprising to find him on intimate terms with Morland, whom he assisted in bringing into notice.

SMITH, SIR JAMES EDWARD, celebrated as the purchaser of the collections and library of Linnæus, and founder of the Linnean Society, was born at Norwich, on the 2nd December, 1759. He is described as having extreme mental susceptibility, and a delicate constitution, whence he was much under the care of his mother, from whom he imbibed his taste for flowers. His father was a man of cultivated mind, and had no doubt considerable influence in forming his son's mind, especially as his education was domestic, with the assistance of masters from Norwich. This town has long been remarkable for the fondness of its inhabitants for flowers, introduced, it is believed, by the Flemish weavers, who took refuge in England from the tyranny of the Spaniards in their own country. Hence it has probably happened that botany has been a favourite pursuit in Norwich, and that so many botanists have been produced there, as may be seen in Smith's 'Biographical Notice of Norwich Botanists,' as well as in some of our living botanists. Mr. Smith was intended for some mercantile calling, but from his love of science was induced to study medicine, for which purpose he proceeded to Edinburgh in 1781, and obtained in 1782 Dr. Hope's gold medal for the best botanical collection. After his arrival in London, he happened to be breakfasting with Sir Joseph Banks, from whom he learnt that the whole of the collection of books, manuscripts, and natural history of Linnæus had been offered him for one thousand guineas, but that he intended to decline it. The young student of medicine determined upon becoming himself the purchaser, though without funds for the purpose. His father, though at first refusing, afterwards consented to the purchase. The collection arrived here in twenty-six cases, in 1784, and cost 1088*l.* 5*s.* The ship conveying it had just sailed when the king of Sweden, Gustavus III., who had been absent in France, returned home, and sent a vessel to the Sound to intercept its voyage, but happily it was too late. On the death of Sir James, this celebrated collection was purchased by the Linnean Society, and forms a part of their valuable stores of natural history.

A number of circumstances appear thus to have determined the future course of Sir James's life. Though he took up his residence in London, with the intention of practising his profession, it seems never to have seriously occupied his attention. Two years after he became possessed of the collections of Linnæus, he made a tour through Holland, France, Italy, and Switzerland, of which he published an account. He obtained his medical degree at Leyden. In the year 1788, with the assistance of Sir Joseph Banks, Dr. Goodenough (Bishop of Carlisle), and some others, the Linnean Society was founded, and Dr. Smith elected its first president. In 1792 he was employed to teach botany to Queen Charlotte and to the princesses. He continued to reside in London until 1796, when he removed to Norwich, but paid a yearly visit of two months to London, when he gave a course of lectures on botany at the Royal Institution. On the 28th July, 1814, Dr. Smith was knighted by the prince regent at a levee, when he presented a copy of the 'Transactions' of the Linnean Society. The honour was conferred on him as institutor and president of the Society. In the year 1818 Sir James became a candidate for the chair of botany at Cambridge, but not being a member of the University, nor of the Church of England, he was not considered eligible by the authorities of the University. His health began to decline five or six years previous to his death, which took place on the 17th March, 1828.

The public will be chiefly interested in his works. Of these a full list is given in the Memoir of his Life and Correspondence, published by his widow. These are numerous, but those by which he will be principally known and remembered are, 'English Botany,' in thirty-six volumes, with 2592 coloured figures by Mr. Sowerby; 'The Latin Flora Britannica,' three volumes, and especially 'The English Flora,' in four volumes; also 'Flora Græca,' from Dr. Sibthorp's materials, and the 'Prodromus Floræ Græcæ.' He was also author of the botanical articles and of the botanical biography in Rees's 'Cyclopædia,' from the letter C, which have always been much valued, and of numerous papers in the 'Transactions' of the Linnean Society.

Sir James Smith was moreover esteemed as a man of a kind heart, amiable dispositions, and pure moral habits. His correspondence displays great warmth of friendship towards him on the part of numerous distinguished individuals. His purchase of the Linnean collections, and his devotion to the science of botany for so many years, had considerable influence in spreading a taste for and in extending the cultivation of that science. In his exclusive attachment to the artificial classification of Linnæus in preference to the natural method, in favour of which Linnæus has expressed himself in the strongest terms, he preferred that which was valuable for a time, to that which, as perfected, becomes fitted for all times.

SMITH, ANKER, who received his unusual name by way of fanciful allusion to his being an only son, the *hope* of his parents (*anker* being an old way of spelling anchor), was born in London in 1759. He was educated in the Merchant Taylors' School, and was articled, in 1777, to his uncle, Mr. John Hoole, a solicitor. The unusual neatness of his writing led Mr. Hoole to try his skill at drawing with a pen. He therefore copied two line engravings in pen and ink; and so admirably was the second executed, that James Heath is said to have mistaken it for a print. In consequence of this indication of talent, young Smith was articled to an engraver named Taylor, in the year 1779, but he quitted him in 1782, by which time he had surpassed his instructor. He then became an assistant of James Heath, in whose name he executed many works, among others, the Apotheosis of Handel, which is said to be entirely his own. About the year 1787 Smith received his first independent employment as an engraver, being then engaged upon the plates to illustrate Bell's edition of the 'British Poets.' About the same time he was introduced by Hoole, the translator of Tasso (who was brother to the gentleman of that name before alluded to), to Alderman Boydell, by whom he was commissioned to engrave Northcote's picture of the Death of Wat Tyler. For this engraving he was, in 1797, elected an associate of the Royal Academy.

The engravings of Anker Smith are much esteemed for their beautiful execution and correct drawing; although, from the circumstance of his working much for book publishers, his name is less known than it deserves to be. His private character was unimpeachable; and his modesty, piety, and correct judgment secured him many friends. In 1791 he married. He died of apoplexy, in June, 1819, leaving his widow, four sons, and a daughter. Of his sons, the second, named Frederick William, who became a pupil of Chantrey, gave great promise of eminence in the art of sculpture, but died in 1835, at the age of thirty-eight years; and the two younger, who still survive, have embraced that of painting. Mr. Smith had several sisters, one of whom was mother to W. C. Ross, Esq., miniature-painter to her present majesty.

SMITH, JOHN THOMAS, for many years keeper of the prints and drawings in the British Museum, was the son of Nathaniel Smith, formerly a sculptor, and afterwards a well-known printseller in Great May's Buildings, St. Martin's Lane. Nathaniel Smith had been when young the playfellow of Nollekens; and they had learned drawing together. In August, 1755, Smith was placed with Roubiliac, the sculptor; and about 1759 and 1760 he and Nollekens, who had become a pupil of Scheemakers in 1750, obtained some of the best prizes of the Society of Arts. Nathaniel Smith, who gained many prizes from the Society, carved three of the heads of the river-gods which adorn the arches of Somerset House, from designs by Cipriani. The friendship existing between him and Nollekens occasioned the subject of this article, who was born on the 23rd of June, 1766, to be very early noticed by the eccentric sculptor, who, while he was yet a boy, used to take him to see various parts of London, pointing out curious vestiges of antiquity, and thus probably exciting that peculiar taste by which Smith was subsequently rendered eminent. His mother dying in 1779, young Smith was invited to the studio of Nollekens, to whom his father was then chief assistant. After enjoying this privilege for three years, during which time he had much practice in drawing, he became a student at the Royal Academy. About this time he made pen-drawings in imitation of the etchings of Rembrandt and Ostade, and these, through the introduction of Dr. Hinchliffe, then bishop of Peterborough, obtained a liberal offer from Sherwin, in consequence of which Smith became a pupil of that skilful engraver. For some years after being with him, Smith was chiefly engaged as a drawing-master.

He married at the age of twenty-two years, and soon afterwards commenced the publication, in numbers, of his first work, the 'Antiquities of London and its Environs,' a collection of representations of houses, monuments, statues, and other interesting remnants of antiquity; unaccompanied by letter-press descriptions, but having short accounts, with references to Pennant and other writers, engraved under each subject. This work was commenced in January, 1791, and completed in 1800; the whole series consisting of ninety-six plates of a quarto size. A complete list of the subjects is given in Upcott's 'Bibliographical Account of the Principal Works relating to English Topography,' vol. ii., p. 886. While this was in course of publication, Smith brought out his 'Remarks on Rural Scenery,' a thin quarto volume, illustrated with twenty etchings of cottages, some of which are very prettily executed.

Smith's next work for the illustration of the early architecture of the metropolis was his 'Antiquities of Westminster,' comprising the old Palace, St. Stephen's Chapel, &c., and containing engravings of 246 topographical objects, of which, at the time of its publication (1807), 122 were no longer in existence. This series of engravings is comprised in 38 plates and six wood-cuts, of which a particular account is given by Upcott, vol. ii., p. 835, *et seq.* 'This task,' it is observed by Mr. Smith's biographer, in the 'Gentleman's Magazine,' 'appears to have been determined on in the year 1800; when, on occasion of the Union with Ireland, it becoming necessary to remove the wainscoting for the enlargement of the House of Commons, some very curious paintings were discovered, on the 11th of August.' 'The next day,' the narrative proceeds to inform us, 'Dr. Charles Gower and Mr. Smith visited the paintings. Mr. Smith immediately determined to publish engravings from them; and, permission being obtained, on the 14th he commenced his drawings. It was his custom to go there as soon as it was light, and to work till nine o'clock in the morning, when he was obliged to give way to the workmen, who often followed him so close in their operations as to remove in the course of the same day on which he had made his drawing, the painting which he had been employed in copying that very morning.' Antiquaries will long esteem the name of John Thomas Smith, were it only for the service he rendered in snatching these curious paintings from complete oblivion. The plates of the 'Antiquities of Westminster,' which comprise coloured copies of several of these paintings, are accompanied by descriptions of considerable length, a great part of which were written by J. Sidney Hawkins, F.S.A.; although, owing to a misunderstanding which led to the publication of much angry correspondence, portions of which are often bound up with the work, it was completed by Smith alone. A disastrous fire at Bensley's printing-office destroyed 400 copies of this work, and 5600 prints, occasioning a loss to Mr. Smith which he estimated at 3000*l.* In 1809 appeared sixty-two additional plates to the above work, forming a second volume, but without any description, or even a list of subjects. The latter however has been supplied by Mr. Upcott, in the work above alluded to, vol. ii., p. 839, &c.

These works were followed by another, in imperial 4to., entitled 'Ancient Topography of London,' the publication of which was commenced in October, 1810, although it was not completed until 1815. This, which is considered Smith's best work, contains 32 plates, very boldly etched, in a style somewhat resembling that of Piranesi, and accompanied by descriptions of the buildings represented. The author intended to extend it somewhat further, but never did so. In 1816 Mr. Smith received his appointment as keeper of the prints in the British Museum; and in the next year published his 'Vagabondiana, or Anecdotes of Mendicant Wanderers through the Streets of London,' illustrated with about thirty portraits, and with an introduction by Mr. Douce.

The last literary production of Mr. Smith was the amusing but not very honourable or trustworthy book entitled 'Nollekens and his Times,' which appeared in 1828, and soon ran through three editions. Smith was an executor to Nollekens, and was disappointed in not being a legatee. He therefore wrote under the influence of excited feelings, and made a discreditable use of the free access he had for so many years enjoyed to the home and studio of Nollekens. Still, although the work contains much that should not have been published, and is distinguished by a degree of high colouring which greatly impairs its veracity, it contains many curious anecdotes of artists and other distinguished men with whom Smith had come in contact in the course of a long and rather eventful life. He left in manuscript materials for a history of his own life and times, which has not yet been published. He had also collected much matter towards an account of the parish of St. Paul, Covent Garden, and for a work which he intended to call 'Walks through London;' but he did not live to complete any of these works, having died of inflammation of the lungs, after only a week's illness, March 8th, 1833, in his 67th year. His wife, a son, and two daughters survived him. Mr. Smith is stated to have been of kind disposition, and inclined to encourage young artists. In his attention to the duties of his office he was exemplary; and his fund of anecdote rendered him a very amusing companion. There is a portrait of him engraved by Skelton, from a drawing by Jackson. (*Gent. Mag.*, vol. 103, part i., p. 641, &c.)

SMITH, WILLIAM, LL.D., author of the first geological map of England and Wales, born 23rd March, 1769, at Churchill, in Oxfordshire, died 28th August, 1839, at Northampton, where a tablet is intended to be erected by subscription to his memory.

The life of this distinguished ornament of English geology is full of events which illustrate the power of a vigorous intellect and patient disposition in conquering the difficulties which sometimes impede the prosecution of science; but we propose in this brief notice merely to state a few of the circumstances which justify his admitted claim to be entitled 'father of English geology.'

Previous to the year 1791, Mr. Smith had made observations on the various sorts of land, as depending on different kinds of rocks; had compared, for example, the red marls and lias of Warwickshire with the oolitic soils and strata of Gloucestershire; but in 1791, being employed to make careful surveys of collieries and mines in Somersetshire, he found, on descending the pits and comparing the underground sections with the surface features, evidence of a 'constancy in the order of superposition' of strata, much more extensive and practically and analytically demonstrated than was ever stated or admitted before. Reflecting on this circumstance, he resolved to examine if the strata thus regularly superposed were equally or approximately coextensive in the limited district of Somersetshire and the bordering counties, in which his labours were then confined. He found by abundant investigation and levellings in separate valleys, that generally the edges of the strata above the coal were continuous on the surface, their plane surfaces declining into the earth in one direction, viz. toward the east or south-east; but that the strata of coal lying beneath the red marl were not 'conformed' in their inclination to the rocks above. This 'unconformity' he represented by a large working section of Pucklechurch colliery in Gloucestershire.

In his investigations, which, as engineer to the Somerset Coal Canal, he made for the purpose of setting out the line and letting the works, it became difficult always to recognise and discriminate the rocks which were to be cut through, on account of the great mineral resemblance between some of these and their accidentally displaced positions. Searching for marks to aid these distinctions, Mr. Smith was quickly led to perceive the constancy with which certain classes of organic remains accompanied only particular layers or strata. By collecting these fossils, and placing them in relative order, as they were found lying in the earth, he was soon able by their aid to 'identify' the strata near Bath; to declare, regarding all these stratified rocks, that they had each formed 'successively the bed of the sea,' and contained each the remains of the creatures which then lived and died. These remains were different in different strata, because at successive times the forms of life had changed, and because of the influence on life of the different mineral constitution of the sea's bed; but they were generally identical in distant parts of the same strata.

With these ideas clearly established, Mr. Smith, in 1794, was enabled, by one long journey through great part of England and Wales, to generalise the propositions, and to commence, as an obvious consequence of such views, a 'Geological Map of England and Wales,' and a 'Table of Superposition of the Strata.' This table was drawn up in 1799; a map on a small scale was coloured in 1801; and the author promised in that year a valuable volume to accompany documents so new and important. The originals of these documents are fortunately preserved. It would be painful to speak of the discouragements and difficulties which Mr. Smith had to overcome before, in 1815, on a large and handsome scale, appeared the 'Delineation of the Strata of England and Wales,' with an interesting memoir. These difficulties were often generated by his own unmeasured zeal in prosecuting his favourite science. To it all the considerable profits of a successful profession were freely devoted; and not even in later years, when he had to suffer the consequences of such devotion, was he ever known regret this inconvenient profusion.

After giving to the world 21 geologically-coloured maps of English counties, many valuable sections, and two unfinished volumes on Organic Remains, Mr. Smith was for many years lost to science till drawn from his retirement by the Geological Society of London, which, in 1831, awarded to him the first medal placed at their disposal by the bequest of Wollaston, 'in consideration of his being a great original discoverer in English geology; and especially for his being the first, in this country, to discover and to teach the identification of strata, and to determine their succession by means of their imbedded fossils.'

In 1835 he received the degree of LL.D. in Trinity College, Dublin, and during a few years he enjoyed a pension of 100*l*. At his death, a vast mass of unpublished papers, many of which are of uncommon merit and bear on practical applications of geology, constituted his whole property. (Fitton, in *Edinb. Review* for 1817; Sedgwick, *Address to Geol. Soc.*, 1831; *Magaz. of Nat. History*, 1839.)

SMITH. Several English artists of this name may be briefly mentioned. JOHN SMITH, a contemporary of Kneller, after whom he engraved many portraits, was by far the best mezzotinto engraver of his time. His works are very numerous, and comprise not only portraits, but historical and miscellaneous subjects also. The 'Biog. Univ.,' without referring to any English authority, gives 1654 as the date of his birth, and 1719 as that of his death; and several other works state that he died in 1720. The writer has however seen a print with his name, bearing the date 1721. From Dallaway's edition of Vertue's 'Catalogue of Engravers,' it would appear that there were two engravers of this name, father and son; but this statement rests, as far as we know, on no other authority. A note in the work referred to mentions a collection of 574 engravings by these artists. Of the more eminent John Smith (if there were really two) there is a portrait by Kneller. Strutt mentions an indifferent portrait engraver named JACOB SMITH, who was living in 1730, and executed portraits of Sir Isaac Newton and Sir Hans Sloane, each of which consisted of a single spiral line; and GABRIEL SMITH, who died in 1783, and excelled in the chalk style of engraving. He lived for some time in Paris, but was a native of London, where, according to the 'Biog. Univ.,' he was born in 1724. SAMUEL SMITH, a landscape engraver, surpassed by few, if by any, lived in the latter half of the eighteenth century. He engraved a beautiful plate of Wilson's 'Niobe,' which is now in the National Gallery; the figures were put in by Sharpe. He also did the landscape to Sharpe's 'Holy Family,' after Sir Joshua Reynolds, and some engravings from Loutherbourg. As he worked much for other engravers, his name is comparatively unknown. We have been unable to find the date of his birth or death, and know nothing of his history excepting that he never married. WILLIAM SMITH, born 1707, died 1764; GEORGE SMITH, born 1714, died 1776; and JOHN SMITH, born 1717, died 1764, were three brothers, natives, it is commonly stated, of Chichester, although Pilkington mentions Guildford instead of that place. The first painted chiefly portraits, and the others principally landscape. Although apparently self-taught, they attained a respectable standing in their profession.

SMITH, JOHN. [VIRGINIA.]

SMITHIA, a genus of plants of the natural family of Leguminosæ, named in memory of Sir James Smith, founder and long president of the Linnean Society.

The genus Smithia consists of small plants with inconspicuous flowers, but the leaves are remarkable for their apparent sensibility on being touched, in which they resemble the sensitive plant. The genus is nearly allied to Æschynomene and to Lourea. The calyx is bipartite, the corol papilionaceous, the stamens in two equal bundles, the legume transversely articulated, plicate, and enclosed within the calyx. The species are found in warm parts of the world, as in New Holland and the plains of India, in the rainy season. As the periodical rains extend also to the Himalayan Mountains, and produce considerable uniformity of temperature and moisture, so a delicate Smithia is found at considerable elevations, as S. ciliata, figured by Dr. Royle in his 'Illustr. of Himalayan Botany,' from the lofty Mountain of Kedarkanta.

SMITHFIELD. [LONDON.]

SMOKE, the vapour arising from substances in a state of combustion. In its more extended sense the word smoke is applied to all the volatile products of combustion, which consist of gaseous exhalations charged with minute portions of carbonaceous matter, or soot; but, as often used in reference to what are called smoke-consuming furnaces, the term is frequently employed to express merely the carbonaceous matter which is held in suspension by the gases. It is important to bear this distinction in mind, as it involves a fact which appears to have been sometimes overlooked, namely, that however completely the soot may be destroyed, and the smoke be thereby rendered invisible, it still remains necessary to provide means of free exit for the deleterious gaseous matter which is evolved from the burning fuel.

The matters to be noticed under this head resolve themselves into two classes—such as effect the removal of smoke, especially from open fire-places; and such as bear upon the purification of smoke, either by consuming the carbonaceous matter, or by separating it from the more volatile gases.

Removal of Smoke; Cure of Smoky Chimneys.—The action of an ordinary chimney in conveying the smoke from a fire situated at its lower extremity is very simple. The air in the chimney, being rarefied by the heat, becomes lighter in proportion to its bulk than the surrounding atmosphere, and therefore rises, its place being supplied by fresh air forced in at the lower end by the pressure of the comparatively heavy cold air outside the chimney. A constant rising current is thus created, the force of which is sufficient to carry up with it any light bodies, such as the particles of soot which escape from the fire. The intensity of this current, or in ordinary language, the strength of the draught, depends much upon the height of the chimney; for it is evident that the higher a chimney is, within reasonable limits, the greater must be the difference between the weight of the column of hot air which it contains, and that of a column of cold air of equal elevation; and that the force with which the cold air enters the bottom of the chimney will be proportionate to the amount of such difference. It is also evident that the hotter the air in the chimney is kept, the more rapidly it will rise, and that it is therefore advisable to build chimneys in warm and sheltered situations, and to construct them of materials which will not readily part with the heat they may acquire. Hence chimneys act better when built in stacks, or when in the interior of a house, than when single, or when outside the walls, and it is especially desirable to avoid erecting them in situations exposed to cold north winds.

The circumstances which impede the proper action of chimneys, and occasion the annoyance of smoke in houses warmed by common open stoves, have excited the attention of many individuals, and form the subject of several treatises. Franklin analysed the subject very judiciously, and published a pamphlet, entitled 'Observations on the Causes and Cure of Smoky Chimneys,' in which he enumerated nine different causes, and suggested means for the cure of each. This little work, from which most of the following remarks are condensed, was originally printed in Philadelphia, but has been republished in England. The causes, with the remedies recommended by Dr. Franklin, are as follow:—

1. The want of a free supply of air to the bottom of the chimney. It is of little consequence how spacious the room may be into which the chimney opens, if the access of fresh air to the room be cut off. As the hot air escapes from the top of the chimney, its place must be filled by fresh air taken from the room. But if the entrance of the external atmosphere be prevented, every chimney-full of air abstracted from the room lessens the density of what remains, so that the draught will decrease until the air in the chimney and that in the room are of equal density, when it will cease altogether, and the smoke will no longer ascend. The case here supposed—that of the *entire* exclusion of fresh air from the room, never occurs in practice; but the same results are produced in a less degree wherever the means of access for the external air are insufficient for the supply of the chimney—a circumstance of frequent occurrence in new houses, where the carpenter's work is true and close. This inconvenience can only be remedied by providing openings for air commensurate to the demands of the fire. The area of the openings required for this purpose may be ascertained by opening a door or window just so far as to enable the smoke to pass off freely; and their situation should be chosen with reference to the comfort of the inmates, so as to avoid as far as possible any current of cold air passing through the room. Whenever it is practicable, the best situation for them is near the top of the room, and over the fire-place; because the entering air is then warmed by the warm air which rises to the top of the room, and becomes pretty generally diffused. In building new houses such an arrangement may be readily effected, and the air-passages may be conducted by the sides and back of the fire-place, so as to warm the air previous to entering the room. In other cases the object may be attained by leaving a window a little open at the top, or by long narrow openings above the window or immediately beneath the cornice. In either case Franklin recommends the fixing of a little inclined shelf just below the opening, to conceal it from view, and to direct the air towards the ceiling. Another plan occasionally resorted to is the use of a pane of glass in the window, hinged to the frame at its lower edge, and capable of being opened more or less as required; wings or side-pieces of glass being added to prevent the air from entering sideways. Sometimes, in lieu of one pane of glass, a number of strips of plate-glass, so arranged as to resemble a Venetian blind, are used; these being so placed as to throw the air upwards, by which means also the risk of rain beating in is avoided. The common ventilator, or *whirligig*, answers the same purpose, and diffuses the air in some degree by its rapid revolution, which is occasioned by the action of the current upon its inclined vanes; but it has the disadvantage of being unsightly, and also that of making a noise. It has been proposed to supply a chimney with air by passages opening immediately into its lower extremity; but any such arrangement, by diminishing the rush of air from the apartment, destroys the best safeguard against the entrance of smoke into the room.

2. Many chimneys smoke because the opening at the lower end is too large. The size of the opening should be proportioned to the height of the chimney; for while a small opening to a tall chimney increases the draught to an improper degree, and causes a wasteful consumption of fuel, a large opening to a short funnel will allow the smoke to escape into the room; because all the air required by the chimney may enter at one side of the opening, leaving the other side free from current, and therefore allowing the smoke to puff out. In such a case the draught is weakened by the coldness of the air which enters the chimney at such a distance from the fire as to be very little affected by it. This defect must be remedied by contracting the opening; and the necessary degree of contraction may be ascertained by covering the top or sides of the opening with boards until the smoke ceases to enter the room. Stoves are now made in such a form that a contracted opening is not necessarily mean in its appearance; the marble top and sides of the fire-place being of handsome dimensions, while the opening is contracted by ornamental iron-work. This fault in construction is still very common.

3. The third cause of defective action mentioned by Dr. Franklin is the funnel or chimney being too short. The same effect is produced when, as in some ill-contrived houses, the flue from an upper story is turned into one from a lower room; for in such a case, when a fire is burnt in the upper stove, the only available length of chimney, as far as draught is concerned, is that between the point of junction and the top of the funnel, because there is free access for air at the point of junction, from the lower part of the main flue. In like manner the length of the main flue can only be counted from the bottom to the point where the collateral chimney joins it, and brings in a supply of air. The inconvenience of such an arrangement may be somewhat diminished by a contrivance for closing the collateral flue when not in use. The shortness of a chimney may sometimes be rendered harmless by contracting the entrance, so that all the air entering it shall be highly heated, by passing immediately over the fire; but for kitchen chimneys, where large openings are indispensable, our author recommends the erection of two additional funnels, one on each side of the original one; each funnel having a distinct opening of moderate size, and those at the sides being provided with slides, so that one or both might be closed when not in use. One advantage claimed for this plan is, that the stack of three chimneys may be safely carried up to a greater height than a single funnel could be.

4. Different chimneys in the same house occasionally overpower each other. If we suppose two stoves, each having a distinct chimney, in a room without a sufficient supply of air from without, we may conceive that one fire

becoming stronger than the other, may overpower it, and obtain a supply of air down the chimney of weakest draught; the descending current of course blowing the smoke of the weaker flue into the room. Precisely the same effect will take place if the stoves are in different rooms, provided their be, owing to the opening of the doors, a communication between them. This will account for the common case of a parlour chimney smoking whenever the room-door is opened, although it may act properly when the room is closed, and thereby cut off from the effect of the kitchen chimney. The proper cure for this is the same as for the first-mentioned cause of smoking. If every room have a free supply of air from without, there will cease to be any probability of the chimney of one apartment overpowering that of another.

5. The next cause of failure in the action of a chimney arises from the situation of the house. If a house stand under the brow of a hill, or in the vicinity of a much higher building, the wind, passing over the higher obstacle, appears to beat down into the chimneys of the sheltered house, and so to prevent the exit of smoke. This may sometimes be remedied by raising the chimney, and in other cases by means of a cowl, or turning-cap, the opening of which always turns from the wind. The ordinary cowl is turned by means of a vane attached to its upper part; but one patented in 1831 by Mr Pollard is turned by wheels set in motion by the action of the wind upon the oblique vanes of a rotatory flyer; the apparatus resembling that used on a large scale for turning the upper part of a tower windmill. In the 'Mechanic's Magazine,' vol. xxiv., p. 121, is a description of a cowl in which the end opposed to the wind is not solid, but concave or funnel-shaped, and terminating in a small pipe. By this arrangement the wind passes through the centre of the cowl, and is supposed to assist in carrying away the smoke. The plan is stated to have proved successful in some cases that had been deemed incurable. Many other contrivances for the same purpose have been used, but only one other will be adverted to here. It consists of a square box placed on the top of the chimney, each side of which consists of a door, hinged at one edge, and connected, by means of an iron rod, with the door on the opposite side of the box or cowl, in such a way that when one door is closed by the force of the wind, the opposite one opens, and allows the smoke to escape. This simple apparatus, which is stated to be in common use at Glasgow, is described and represented in Hebert's 'Engineer's and Mechanic's Encyclopædia,' vol. i., p. 367. Franklin recommends, when a house is built in the immediate vicinity of a hill that is likely to produce the effect above described, that the doors should be made in the side nearest the hill, in order that the wind entering them may counterbalance the pressure in the chimneys, and so lessen its injurious effect.

6. Chimneys occasionally smoke from a cause just the reverse of that last described. This occurs when the chimneys are low, and stand between the wind and a high building, or neighbouring edifice, so that the air is dammed up, as it were, round about them. This case appears to be a very difficult one to deal with; for, owing to the pressure of the atmosphere resisting the escape of the smoke in every direction, cowls are of very little use. Raising the chimneys appears to be almost the only alternative.

7. Another cause of smoking is the injudicious arrangement of the door or doors of a room. If the door be on the same side as the fire-place, and occasion it to smoke by sending a current across the front of the stove, either it must be altered so as to open in the opposite direction, or a screen must be used between it and the stove.

8. Smoke is sometimes blown down a chimney which is out of use. This arises from the circumstance that a stack of chimneys usually maintains a more uniform temperature than the surrounding air. So long as their temperature exceeds that of the external atmosphere, though it may be in a very trifling degree, there is an *upward* current through them; but when, as in the middle of the day, the air generally becomes warmer than that in the chimneys, the current moves *downward*, carrying with it smoke that may happen to be passing over, or escaping from a neighbouring flue. A plate or register, closing the bottom of the chimney when out of use, obviates this inconvenience. It is also very useful in affording ready means of regulating the draught of the chimney, and thereby economising fuel, and avoiding unnecessary currents of air through the room.

9. Lastly, chimneys which under ordinary circumstances perform very well, occasionally smoke in consequence of the passage of a strong wind over them, which the force of the rising vapour is insufficient to cope with. Franklin states that in Venice it was customary to make the top of the flue funnel-shaped, with a view to facilitate the escape of the smoke under such circumstances; but that where he lived a different practice prevailed,—that of reducing the opening at the top to a long narrow slit. Probably a cowl might be of use in such a case.

Although Franklin states that he found smoke generally tractable, when dealt with in a proper way, and that he could make it escape in almost any direction he chose, he met with some very puzzling cases. In one instance where a chimney resisted all appliances, it was discovered that, owing to the irregular settlement of the brickwork, it had a large fissure which admitted the cold air. In another case a chimney on which several experiments had been tried, proved to be choked up by the building of birds' nests. Similar instances still occasionally baffle the *smoke-doctor;* but most smoky chimneys may be accounted for by one of the above causes, and remedied by the means suggested.

Consumption or Purification of Smoke.—The nuisance occasioned by the smoke of coal-fires has formed a subject of complaint from the earliest times in which mineral fuel was extensively used; and the great increase of steam-engine and other furnaces, consequent on the extension of manufactures, has afforded, of late years, additional ground for attempts to abate the nuisance. Such attempts are important, not only for the purification of the air, but also for the economy of fuel; since the matter which gives smoke objectionable density and colour is unconsumed fuel in a finely divided state. It appears therefore that if a supply of air could be thrown into a fire in such a way as to occasion the combustion of the carbonaceous matter, the result would be that a greater amount of heat would be obtained from a given quantity of fuel, at the same time that the nuisance of smoke would be abated. But while this is true in theory, and almost every scheme brought forward for the, so-called, consumption of smoke lays claim to great advantages on the score of economy, it seems that no important saving has yet been effected in practice. Even an act of parliament, passed in consequence of the Report of a Select Committee appointed in 1819 and 1820, 'to inquire how far it may be practicable to compel persons using steam-engines and furnaces in their different works, to erect them in a manner less prejudicial to public health and public comfort,' though it has afforded the means of removing the nuisance in some instances, has failed to relieve our manufacturing towns generally from the murky exhalations of furnace-chimneys, notwithstanding the recorded opinion of the committee that the object sought after—an efficient means of destroying smoke—had 'been satisfactorily and effectually obtained.'

It may be observed that the quantity of smoke emitted from furnace-chimneys varies much with the state of the fire; being greatest when a mass of fresh fuel is thrown on, and least when the fire has burned clear, or the fuel is fully ignited. Attention to this circumstance, on the part of the stoker, will greatly diminish the nuisance; because if he throw on the fresh fuel in a thin layer, it will the sooner become perfectly ignited; and, by laying it in the fore part of the furnace, the dense smoke arising from it has to pass over that part of the fire which is in a state of more perfect combustion, and is thereby in a great measure consumed. Many of the contrivances introduced or suggested as smoke-consuming furnaces act on these principles; arrangements being adopted to insure the right feeding of the fire without much attention on the part of the firemen. In the apparatus of Mr. Steel, for instance, which is fully described and represented in the Report of the Parliamentary Committee of 1819, the fuel is supplied in a constant stream, by means of an inclined hopper; the quantity of coal supplied in a given time, and the size of the pieces, being regulated by means of a grooved roller; while it is distributed all over the furnace by the motion of the grate itself, which is of a circular form, and turns on a central pivot. A similar method of feeding the fire is adopted in Brunton's patent apparatus, of which an account will be found in the same Report. In some furnaces of the more usual form a similar object is aimed at by inclining the grates, or making portions of them moveable.

It is usually stated that the first important attempt made in this country for the combustion of smoke was that of Watt, who obtained a patent in 1785 for a method of constructing furnaces in such a way as to cause 'the smoke or flame of the fresh fuel, in its way to the flues, or chimney, to pass, together with a current of fresh air, through, over, or among fuel which has already ceased to smoke, or which is converted into coke, charcoal, or cinders, and which is intensely hot; by which means the smoke and grosser parts of the flame, by coming into close contact with, or by being brought near unto, the said intensely hot fuel, and by being mixed with the current of fresh or unburned air, are consumed or converted into heat, or into pure flame, free from smoke.' Since that time innumerable plans have been brought forward for introducing the necessary supply of air to the furnace; but while many of them accomplish the purification of the smoke as completely as could be desired, they are generally found either to increase the consumption of fuel, or to weaken the draught of the furnace. If the air admitted to the furnace be cold, it diminishes the heat of the fire; and if hot, expense is incurred in heating it, whether this be effected by a separate fire or by passing the air in pipes through the chimney. Without pretending to enumerate the plans that have been tried, even within the last few years, allusion may be made to the experiments of Mr. Chanter, especially as applied to the use of coal in locomotive engines. Most railway companies are required, by their acts of incorporation, to avoid the emission of smoke from their engines; and this is usually done, at great expense, by the use of coke. The plain of Mr. Chanter, which has been tried with great promise of success, consists in the introduction of a *deflector* dipping into the burning fuel, which compels the smoke from the crude coal to pass through a mass of burning coke, which is supplied through a small door, and conducted at once to the back of the furnace. By this means three parts of coal may be used to one of coke, with very little risk of much smoke.

Another mode of destroying smoke, which appears to answer the purpose very completely, is by injecting steam into the furnace. The plan has been tried by several individuals; but the apparatus which has attracted most notice is that of Mr. Iveson, in which the steam is thrown into the fire in several minute jets, from a fan-shaped distributor in the fore part of the furnace. The steam not only destroys the smoke, but also greatly increases the intensity of the fire; so much so, indeed, as to sanction the supposition that the steam is decomposed, and that its component gases are consumed. Thus the necessity for a large chimney is obviated, it being only necessary to provide a small passage for the escape of the gaseous products of combustion. Experiments on the same furnace, with and without the injection of steam, indicate a saving of fuel to the amount of thirty-three per cent.; the consumption in five hours being respectively 558 and 812 lbs. As a drawback from this saving, the plan requires, in a steam-engine furnace, about one-tenth of the steam generated, and in other furnaces renders necessary the erection of a small boiler. It is proposed, in high-pressure engines, to make use of the waste steam for the purpose of injection. A patent was obtained in 1838, by Mr. Chappé, for the use of a stream or shower of hot water thrown into the furnace in the same way.

Besides the numerous plans for the combustion of smoke, various methods have been tried on a limited scale for conducting it to a distance from the buildings in which it is formed, by means of subterraneous channels; and for condensing it by means of a shower of water, so that the sooty matter might be conveyed away by the sewers. Some interesting experiments on the purification of the noxious smoke emitted from copper-smelting furnaces, are detailed in Gill's 'Technical Repository,' vol. iv., p. 1, &c. Without offering any opinion as to the means best adapted for the purpose, it may be observed that some simple and economical method of destroying the nuisance of smoke, from private houses as well as from factories and steam-vessels, would tend greatly to the salubrity and cleanliness of large towns, and will probably soon be introduced.

SMOKE-JACK, an apparatus believed to be of German origin, by which the rising current in a chimney, acting upon the inclined vanes of a wheel fixed in the funnel, gives motion, through a train of wheels, to any matter which is hung before the fire to roast. This contrivance is now almost superseded by jacks impelled by the descent of a weight or the uncoiling of a spring. The smoke-jack appears to be of early origin; for it is stated in the fourth edition of the 'Encyclopædia Britannica,' on the authority of Messinger, that it is represented in a painting at Nürnberg, which is known to be older than 1350.

SMOLENSK, a government of the Russian empire, was acquired by Russia from Lithuania in 1654. It is situated between 53° 12′ and 56° 30′ N. lat., and between 30° 20′ and 35° 20′ E. long., and is bounded on the north-west by Pskow, on the north-east by Twer, on the east by Moscow, on the south-east by Kaluga and Orel, on the south by Czernigow, on the south-west by Mohilew, and on the west by Witepsk. The area is 20,000 square miles, and the population 1,200,000.

The country is an undulating plain, broken only by low hills. The soil is clay, mixed with sand and black mould. Some parts are very fertile, and all well repay the expense of cultivation. The country forms an elevated table-land, and a part of the Alauman Hills extends into it from the north-west, and contains the sources of several considerable rivers. There are many marshes. The principal rivers, are: 1, the Dnieper, which rises in the marshes, but though swelled by the junction of several other rivers, is shallow and not navigable in this government; 2, the Obscha; 3, the Mischa; 4, the Kaspla, which run in a westerly direction to the Düna; 5, the Ugra, which flows eastward to the Oka; 6, the Gshat, and 7, the Wasuga, both which run into the Volga. There are, it is said, 150 lakes, but none of considerable extent, and many morasses. As the country lies so high, the climate is colder than that of other provinces in the same latitude. The frost in winter is very severe, and the ice does not break up till April; on the other hand, the heat of the summer months is very great, vegetation luxuriant, the weather not changeable, and the air healthy.

Natural Productions; Agriculture; Manufactures; Trade.—The government produces corn (especially rye), about four million chetwerts in a year, hemp, flax, tobacco and hops, culinary vegetables, and some fruit, but the wealth of the country consists chiefly in the immense forests, which supply timber for the use of the province itself, and also for the navy, particularly fine masts, which are sent to Riga. These forests abound in game of all kinds; elks, deer, wild boars, wolves, bears, and lynxes are found in them, and prodigious quantities of wild birds. Much attention is paid to the breed of horses, which are of a good Lithuanian race. Oxen are used in agriculture as well as horses; and great numbers are fattened for exportation. Swine are very numerous, but sheep do not appear to thrive. The fishery is of no importance; the quantity of sturgeon, shad-fish, &c. does not exceed four thousand poods in a year, and the profit is not above seven thousand rubles. The country-people have great numbers of bees. The minerals are copper, salt in abundance, and bog-iron. Though Smolensk is not among the manufacturing provinces of the empire, the inhabitants being chiefly engaged in agriculture and rural occupations in general, the country-people manufacture linen and woollen cloths. The Smolensk carpets are in great repute, and employ a large number of looms, which are mostly worked by the women. There are numerous saw-mills, brandy distilleries, tanneries, soap and candle manufactories, and some glasshouses.

The exports of this government are corn, flour, groats, peas, hemp, and flax of superior quality, some hemp-seed and linseed and oil, horse-hair, hides, hogs' bristles, wool, honey, wax, masts to Riga, timber and firewood to the Dnieper, boats made for the navigation of the Oka, the Volga, and the Düna; horses, oxen, swine, salt pork, tallow, and lard. Most of the articles are conveyed by land to Riga, Wilna, and Moscow; a great part of the cattle are driven to Poland, and thence to Germany, and the timber is floated down the rivers which fall into the Düna, the Oka, and the Volga. The imports are colonial produce, wines, fine manufactured goods, and various articles, which, if they cannot be called necessaries, nor yet designated as luxuries, are however nearly indispensable to the comfort and convenience of civilized life. The principal commercial towns are Wiäsma and Gshatsk. Smolensk, situated on the main road to Moscow, likewise takes an active share in the foreign commerce, but is chiefly engaged with inland and retail trade.

Religion and Education.—The great majority of the inhabitants are of the Russian-Greek church, under the bishop of Smolensk, whose diocese is co-extensive with the government, and has 608 parishes. The Poles, Jews, and Germans are few in number. For public instruction Smolensk is under the University of Moscow, but education is very backward. In 1832 there were only 18 civil schools, with 45 teachers and 1097 scholars; 8 ecclesiastical schools, with 27 teachers and 1534 scholars;—total, 26 schools, 72 teachers, 2631 scholars; so that there was only one scholar out of 450 inhabitants. Many schools have been since founded, but we have not the specific official accounts. The government is divided into twelve circles.

Smolensk, the chief town of the government, is in 54° 50′ N. lat. and 32° E. long., on the right bank of the Dnieper, which is there navigable, and over which there is a wooden bridge. It is the key to the interior of the Russian empire, on the road to Moscow, and is strongly fortified; it is surrounded with a wall 30 feet high and 15 feet thick, nearly two miles in circuit, and has a strong citadel. Smolensk is one of the most antient towns in Russia, and the date of its origin is not known. Its name occurs in the Russian Annals as far back as 879. It was subsequently an independent principality, and from the beginning of the thirteenth century suffered by the attacks of the Russians of Kieff, of the Tartars, and the Lithuanians. The Lithuanians obtained possession of it in 1413. In the next two hundred and fifty years it was repeatedly taken and retaken by the Poles and Russians, till it was finally taken by the latter in 1654, and formally ceded to them by Poland by the treaties of 1667 and 1686. It was then strongly fortified. In 1812 the first serious conflict between the army of Napoleon, and the Russians, under Barclay de Tolly, took place on the 16th and 17th of August, under the walls of Smolensk, when it was bombarded and set on fire. Two-thirds of the town were reduced to ruins. The Russians stated their loss at 4000 men; that of the French was 8000, and that of the Poles 5000. The Russians could not pardon Barclay de Tolly for giving up this holy city, as they call it, without a pitched battle. On the disastrous retreat of the French in November, they blew up part of the works. In 1813 there remained only 459 habitable houses, and 317 capable of being repaired. The number of the inhabitants was reduced to 4000. Smolensk, though not a handsome city, is now much superior to what it was before 1812, when it was almost entirely built of wood. The part rebuilt since that time is more regular; the houses generally of stone, and many of them handsome. The public buildings are numerous; there are sixteen Greek churches, three convents, one Roman Catholic and one Lutheran chapel, numerous charitable institutions, a gymnasium, a seminary for priests, a military school, &c. The manufactures are linen, leather, silks, hats, and soap; and the inhabitants carry on a brisk trade in their own manufactures and in the natural productions of the country. The population at the lowest estimate is now 12,000; some late writers state it at 20,000.

Wiasma, about 110 miles from Smolensk, on the road to Moscow, is a considerable town, with 12,000 inhabitants. It is situated on the river of the same name, and is built on a hill, and surrounded with a wall. There being large vacant spaces, it covers a great extent of ground, so that viewed at a distance it looks much more considerable than it really is, an illusion which is aided by the steeples and domes of nearly thirty churches.

Poretschje on the Kaspla, which is here navigable, is a town with 6000 inhabitants, 50 miles from Smolensk. It has a considerable transit trade, and is the staple place for the commerce between Smolensk and Riga.

Dorogobusch, on the Dnieper, is a pretty and well-built town, with 4000 inhabitants, who have some manufactures and considerable trade.

SMOLLETT, TOBIAS, was born in the parish of Cardross, in 1721, of good family; his grandfather, Sir James Smollett of Bonhill, upon whom he was left dependent, being a member of the Scottish parliament. The lovely scenes among which he was bred had no doubt considerable influence on his tastes and feelings; and he describes them in 'Humphrey Clinker' with great relish. He was sent to school at Dumbarton, where, under Mr. Love, he made great proficiency in the classics. His tendency to ridicule was manifested very early, and he wrote abundant satirical verses on his schoolfellows; and he also, with a boyish patriotism, wrote a poem on 'Wallace,' which has been lost. He left Dumbarton for Glasgow, where he chose the profession of medicine, and was apprenticed to Mr. Gordon, surgeon, whom Smollett is supposed to have ridiculed as Potion, in 'Roderick Random.'

His medical studies were but indifferently pursued: the more attractive pursuit of literature and history—the passion for miscellaneous reading which so often besets men of genius, unable to confine themselves to any one branch of study—and which so materially assisted him in his subsequent literary career—diverted his attention. Satirical verses; practical jokes, prompted by a wild reckless spirit of enjoyment; poetical and literary studies; fruitless endeavours to give the proper direction to his energies; these occupied, not quite unprofitably, his early years. Before completing his eighteenth year he finished a tragedy called 'The Regicide;' the preface to which, written ten years after, is perhaps the most amusing portion. It would be unjust to require in such a production any of the requisites of tragedy; it would be unjust to object to so prosaic a man as Smollett, that it is only stilted prose; and it would be still more unjust to criticise it otherwise than as the production of a boy; but when we find him in his preface railing at the managers, and looking on himself as a very ill-used man because it was not produced; and when we look at this tragedy, which he brought with him to London in the hopes of making his fortune, we cannot wonder at the tricks of managers, nor at his being reduced to 'print it, and shame the rogues.'

In 1741 Smollett was appointed surgeon's mate on board a ship of the line, and he sailed on the expedition to Carthagena. He describes this expedition in 'Roderick Random,' and also with historical accuracy in the 'Compendium of Voyages and Travels' which he published in 1756. He quitted the service in disgust whilst in the West Indies, and resided for some time in Jamaica, in what capacity is not known. It was here that he met and fell in love with Anne Lascelles, whom he subsequently married. On his return to London, 1746, his imagination was inflamed at the exaggerated descriptions of the severities practised in the suppression of the Scottish rebellion, and accordingly vented itself in some stanzas of prosaic fustian, entitled the 'Tears of Scotland.' 'His friends wished him to suppress this piece, as having a tendency to offend the Whigs, on whose patronage he had some reliance; and although his enthusiasm was at present too warm for advice, and he had from this time declared war against the Whig ministers under George II., yet it does not appear that it was published with his name for many years after.'

'Advice,' a satire, was his first appearance in public, in 1746. It has all the dirt and vehemence of Juvenal, with none of the power; it alarmed and disgusted his friends, increased his enemies, and enraged the persons attacked. He wrote also an opera for Covent-garden, called 'Alceste.' But his ungovernable temper was perpetually provoked at the delays and hindrances of a theatre, and a quarrel with the manager prevented its being acted. The next year he again disgraced himself by a satire, the 'Reproof,' a sequel to the 'Advice,' and of the same stamp, with some bitter lines on Rich, the manager of Covent-garden. It is curious to see how he quarrelled with all the managers, and thus for ever shut the theatres against him; and not content with quarrelling, he abused and ridiculed all who did not agree with him on the merit of his pieces. Garrick, Lacy, Rich, Quin, Akenside, Lord Lyttleton, were all introduced by him into his novels and satires, and made to pay the penalty of having offended an author's vanity. In this year, 1747, he married Miss Lascelles, who was to have had three thousand pounds, but owing to a suit he obtained only a small portion of this dowry. This disappointment, together with sundry extravagances he had been led into, placed him in a very unpleasant pecuniary position, to relieve which he published, 1748, 'Roderick Random,' the first and best of his novels. It is an admirable novel, and one which must ever be a favourite. The style is easy and unaffected: the incidents rapid, varied, but loosely connected and often purposeless. The humour is broad, palpable, and coarse—mostly of a physical nature, and deriving its force from external circumstances; for instance, Roderick's 'carrotty locks, which hung down over his shoulders like a pound of candles'—the adventure of Strap and Mrs. Weazle (which bears some resemblance to Chaucer's 'Reve's Tale')—Strap's ignorance of London, and the adventures and blunders which arise therefrom. Smollett's humour is essentially vulgar, but hearty. He exhibits, as Hazlitt said, the ridiculous accidents and reverses to which human life is liable, not the 'stuff' of which it is composed. Smollett does not probe to the quick, as Fielding does, nor penetrate beyond the surface. He has great knowledge of 'life,' especially in its worst shades, but little of 'character.' He knows the peculiarities of men better than their motives; their eccentricities better than their natures. In a word, he has a ready eye to seize the superficial distinctions of manner and appearance, but little insight into the passions and character. Here lies Fielding's superiority. On the other hand, he has a 'rude conception of generosity in some of his characters, of which Fielding seems incapable, his amiable persons being merely good-natured. It is owing to this that Strap is superior to Partridge; as there is a heartiness and warmth of feeling in some of the scenes between Lieutenant Bowling and his nephew, which is beyond Fielding's power of impassioned writing.' (Hazlitt's *Comic Writers*, p. 238.)

In 1750 Smollett went to Paris, but his prejudices against the French and his ignorance of their language rendered his stay there a short one. The year after he published 'Peregrine Pickle,' which was greatly read and applauded. He received 'a handsome reward' for inserting the prurient and profligate memoirs of Lady Vane, and they form such a mere episode, we wonder they have not been expunged. It might suit the morbid vanity of the 'lady' to pay a large sum for the insertion of her memoirs in a popular novel; but what are we to say to the author who received the money for such a purpose?—one too who described himself as—

'Too coy to flatter and too proud to serve,
Thine be the joyless dignity to starve.'

Having done it, we are not to be surprised at his 'flattering himself that he had expunged every adventure, phrase, and insinuation that could be construed by the most delicate readers into a trespass upon the rules of decorum:'—the one was a consequence of the other. After 'Peregrine Pickle' was published, he resumed his medical profession, and announced himself as Dr. Smollett; but from what university he obtained his degree was a secret, and remains one. With this character however he endeavoured to set up in Bath, and published a pamphlet on the 'External Use of Water.' Nobody however seemed inclined to trust their healths with the 'popular author'—reputation, unless exclusively professional, being a greater drawback to success than the most profound stupidity. Disappointed therefore in this design, he again took up the pen as a profession, and fixed himself in Chelsea, where he wrote the 'Adventures of Ferdinand Count Fathom.' This novel has not been relished so much as the others, and with reason; the subject and characters are disgusting, and the story is tedious and spun out. There is however some biting satire on the follies and vices of the world, and some powerful writing in it. The robber-scene in the forest is a masterpiece of effect.

In 1755 he published by subscription his translation of 'Don Quixote;' this translation, which has been so often praised, is worthless. Let any one compare it with the original, and he will be struck with its inefficiency. All the difficult passages are slurred over; Sancho's dry proverbial humour is lost, by having a sort of conscious slang mixed with it; the exquisite gravity of the Don is lost—his use of antique heroic words, such as 'insula' for 'isla,' 'las fazañas que han fecho' for 'las hasañas que han hecho,' &c., is not represented; the melancholy and poetical shades of his character are not seized, and the whole becomes vulgarized. Lord Woodhouslee was the first to detect, in his 'Essay on Translation,' that Smollett had founded his translation on the forgotten one of Jarvis. He is said to have excelled Jarvis, but we think without justice. Jarvis had a greater knowledge of Spanish; and if his translation be dull, it is at least free from the vulgarity and Smollettism (so to speak) of Smollett, which the latter has contrived to infuse into his translation.

Smollett then visited his relations in Scotland, and on his return to London undertook the management of the 'Critical Review,' which was to oppose the 'Monthly Review.' His taste was vitiated and capricious, and his temper irritable: his jealousy bitter and watchful, and his vanity enormous. These were not the qualities desirable in an editor, and in consequence his power to offend, coupled with his delight in offending, disgraced the 'Review' with unseemly personalities. Among the many he attacked was Admiral Knowles, who brought an action against the printer of the 'Review' for a libel. Smollett, by applying to persons acquainted with Knowles, endeavoured to stop the action, but without avail, and when judgment was about to be pronounced on the printer, he stepped forward and declared himself the author, and was sentenced to pay 100*l.* and be imprisoned for three months In 1757 he wrote the 'Reprisals, or the Tars of Old England,' a comedy, which Garrick, in spite of their old quarrel, produced on the stage, where however it had only small success. In 1758 he brought out his 'Complete History of England from the earliest times to the treaty of Aix-la-Chapelle in 1748. This was written in the space of fourteen months—a specimen, as it has been observed, of 'literary industry,' a specimen also of literary presumption. Neither his temper of mind nor his pursuits had qualified him to be an historical writer. But the work was written in a clear and easy style, and it was very popular, and was immediately reprinted in 8vo. weekly numbers, of which an edition of ten thousand was rapidly sold.

During his imprisonment he wrote the 'Adventures of Sir Launcelot Greaves,' a stupid and tedious imitation of 'Don Quixote.' But the characters of Crowe, Ferret, and Clarke are amusing. This novel was printed in detached parts in the 'British Magazine.' The success of his 'Complete History' induced him to continue it from 1748 to 1764. The volume for 1765 was written by Guthrie during Smollett's absence on the Continent. Smollett is also supposed to have written the accounts of France, Italy, and Germany for the 'Universal History.'

On Lord Bute's promotion to the administration, Smollett defended him against Wilkes in a paper called the 'Briton,' which Wilkes answered by his celebrated 'North Briton.' Smollett's paper was however soon discontinued and his services unpaid. About 1764 also, having mastered the French language, he was engaged in a translation of the works of Voltaire and a compilation entitled 'The Present State of all Nations.' In June, 1763, 'traduced,' as he sentimentally informs us, 'by malice, persecuted by faction, and overwhelmed by the sense of domestic calamity,' he went to France and Italy, and on his return published the result of his observations, 'Travels through France and Italy.' Splenetic and prejudiced, this work has long been forgotten. His increasing ill-health made travelling necessary, and accordingly he went to Scotland, and from Scotland to Bath, and in 1767 found himself considerably restored. His renewed vigour was shown in the 'Adventures of an Atom,' a violent political satire, wherein, under fictitious names, he abused ministers. But his health again requiring a milder climate, this 'independent writer,' this man too 'coy to flatter,' got his friends to solicit the very ministers whom he had satirized, for a consulship. It can occasion no surprise that this application did not succeed.

In 1770 however he left England again for Italy, writing on the way 'The Expedition of Humphrey Clinker,' a pleasant gossiping work, which has remained a favourite. 'It is quite as amusing as going the journey could have been; and we have just as good an idea of what happened on the road as if we had been of the party. Humphry Clinker himself is exquisite; and his sweetheart Winifrid Jenkins not much behind him. Matthew Bramble, though not altogether original, is excellently supported, and seems to have been the prototype of Sir Anthony Absolute in the "Rivals." But Lismahago is the flower of the flock. His tenaciousness in argument is not so delightful as the relaxation of his logical severity when he finds his fortune mellowing in the wintry smiles of Mrs. Tabitha Bramble. This is the best preserved and most severe of all Smollett's characters. The indecency and filth in this novel are what must be allowed to all Smollett's writings.' (Hazlitt's 'Comic Writers,' p. 239.)

In the neighbourhood of Leghorn he lingered through the summer of 1771, and died on the 21st of October, in the fifty-first year of his age. Stout, well-proportioned, and engaging in person; cold in his manners; impetuous, irritable, and unforgiving in temper; contemptuous and bitter towards all differences; hearty and loving in all sympathies; proud and yet mean; vain, yet generous; of quick, versatile intellect; considerable information; broad exuberant humour, and shrewd observation—such appears to have been Tobias Smollett. As a novelist he stands next to Fielding—as a poet he is not to be named—and in reference to his other works he must be looked upon as a mere bookseller's hack, writing for bread, with no other object than dispatch.

SMUGGLING is the clandestine introduction of prohibited goods; or the illicit introduction of goods by the evasion of the legal duties. Excessive duties present an overwhelming temptation to men to evade them; and the law loses a great part of its moral influence when it first tempts to violation of it and then punishes the offence. In parts of a country where a 'free trade' is extensively carried on, the smuggler is rather a popular person than otherwise; in some countries, as in Spain, still more than in England. His neighbours do not usually regard his mode of acquiring a livelihood disgraceful, but rather look upon him as a benefactor who supplies them with necessaries and luxuries at a cheap rate. 'To pretend,' says Adam Smith, 'to have any scruple about buying smuggled goods would in most countries be regarded as one of those pedantic pieces of hypocrisy, which, instead of gaining credit with anybody, serve only to expose the person who pretends to practise them to the suspicion of being a greater knave than the rest of his neighbours.' This is probably rather too strongly expressed; but many persons even attach a fictitious value to goods which have been smuggled, on account of their cheapness and supposed excellence; so much so, that articles which have duly passed through all the forms of the custom-house are frequently offered for sale as contraband. It is the crimes and the moral evils which are the offspring of smuggling that are to be dreaded rather than smuggling itself. The true remedy is a wise tariff. It annihilates at once a traffic which no ingenuity can ever put down; for all experience proves that so long as a profit can be made by smuggling sufficiently high to counterbalance the necessary risk, it will not fail to flourish. The decrees of Berlin and Milan, instead of annihilating commerce, only forced it into extraordinary channels. Silk from Italy, for example, instead of being received in England by the most direct means, often arrived by way of Archangel and Smyrna; in the former instance being two years, and in the latter twelve months on its passage. Sugar, coffee, tobacco, and cotton-twist were dispatched from England to Salonica, and thence conveyed by horses and mules through Servia and Hungary to Vienna, from which place they were distributed over the Continent, in defiance of the rigorous decrees of Napoleon: it might happen that coffee was consumed at Calais which, instead of being sent direct from London, arrived by the above circuitous route. The risks of this illicit traffic, and the enormous expense under which it was carried on, raised the price of sugar on the Continent to 5*s.* and 6*s.* per lb. The refined sugar was packed in small boxes made in England, and capable of containing about two cwts., so as to admit of one box being slung on each side of a horse or mule for the overland journey. (Tooke's *Hist. Prices*, i. 310.) The slave-trade may be mentioned as another instance of the impossibility of putting a stop to any traffic which is a source of great profit. The slave-traders of the Havanna gave from 35 to 40 per cent. as a premium of insurance on their African risks; but at this rate the assurance companies did not realise a profit, though they sustained no serious loss. This proves that nearly two out of every three adventures are successful; and as one out of three would at least have covered all loss, the difference makes a profit of at least cent. per cent. to the slave-dealer. Until this profit be reduced, the slave-trade cannot be effectually suppressed. (Turnbull's *Cuba*, 1840.) Whenever duties exceed 30 per cent. ad valorem, it is impossible to prevent a contraband trade.

We have only to examine the tariff of any country to know if smuggling is practised; and if a bad system of commercial policy has been long pursued, there the smuggler will be found. The *contrabandista* of Spain figures in novels and tales of adventure. In no country is the illicit trade so general and extensive. The exports to Gibraltar from England considerably exceed a million sterling per annum, and a very large proportion of British goods is introduced by smugglers into the interior. Mr. Porter states (*Progress of the Nation*, ii. 111) that nearly the whole of the tobacco imported into Gibraltar, amounting to from 6 to 8 million lbs. per annum, is subsequently smuggled into Spain, where the article is one of the royal monopolies. On the French frontier the illicit trade is equally active.

The vicinity of France and England, and the injudicious character of their respective tariffs, have encouraged smuggling to a large extent on both sides of the Channel. 1. Smuggling of French goods into England. Spirits, tea, tobacco and silk goods, and more particularly brandy, from the high duties imposed on it in this country, constitute the most important articles of the illicit trade. The total amount of duties evaded in 1831 by the smuggling of French goods into the United Kingdom was estimated to exceed 800,000*l.*, exclusive of tobacco, 'whole cargoes of which are sometimes introduced from the French bonding warehouses into Ireland.' (*Report on the Commercial Relations between France and England*, by Mr. Poulett Thomson (late Lord Sydenham) and Dr. Bowring.) The duty on tobacco in England is above 900 per cent.; and Lord Congleton states (*Financial Reform*) that three-fourths of the tobacco consumed in Ireland is believed to be supplied by smugglers. Mr. Porter, of the Board of Trade, proved before the Imports Duty Committee, in 1840, that 48 per cent. of French silks imported into England paid no duty whatever; and that the loss to the revenue in twelve years, from 1827 to 1838, amounted to 1,792,439*l.* In the Report just quoted, the loss to the revenue on smuggled French brandy was estimated, in 1831, as considerably exceeding 500,000*l.* a year. The duty is 22*s.* 6*d.* per gallon, and the smuggled brandy is usually 33 per cent. above proof, the proof being 22. Dunkirk, Calais, Boulogne, Fécamp, and Cherbourg are the head-quarters of the French smugglers, who in the northern parts of France are chiefly Flemings, and in the Channel ports Normans. The landing is usually effected during dark nights on the coasts of Kent and Sussex, or farther to the west, as may best suit their purpose. The premium on the illicit introduction of French goods into England was, in 1831, for gold trinkets, from 6 to 10 per cent.; silver, 10 to 12; silk goods and ribands, 22 to 25 per cent.; tea, 50 per cent.; and spirits 80 per cent. 2. Smuggling English goods into France. The extensive land frontier of France, and the offices for collecting the *octroi* duties in inland towns, give rise to some peculiarities in the smuggling-trade in France. It is not sufficient to land merchandise on the coast, as in England, but it has to pass the local custom-houses at the barriers of the large towns. This adds greatly to the difficulty and expenses of smuggling. It is stated that in 1831 the premium on landing English woollens on the French coast was 55 per cent.; at the barriers of Paris 63 per cent.; and within the walls 10 per cent. additional; making in all 73 per cent.; the premium on cotton goods being 65 per cent. English goods are chiefly introducted by the Belgian frontier, and the smugglers have their depôts at Cambray, St. Quentin, Ypres, Tournay, Mons, and other towns in the adjacent departments. In the Report of 1831, already quoted, it is stated that in that year the amount of British goods smuggled into France by this frontier exceeded 2,000,000*l.* in value; but if the ports on the Channel were included (of which no estimate is given), this amount would be greatly increased. Cotton-twist is the most important article in the illicit trade. Cotton-yarns, when once lodged in the manufacturer's warehouse, cannot be seized, and in consequence of the article being essential to the progress of manufacturing industry in France, the government, instead of reducing the duty, in some degree connives at its illicit introduction. Bobbin-net is extensively smuggled, also quiltings, cambric, and muslins; and tobacco is clandestinely introduced both by sea and land, the price of the inferior article produced under the royal monopoly being from 300 to 400 per cent. above the English and Dutch bonded prices. The smuggled tobacco finds its way to a great distance in the interior: at two or three leagues distance from the frontier it is 80 or 90 per cent. above the foreign prices, while at Amiens and in the inland towns it is 150 per cent. above the foreign price. A considerable quantity of fine cutlery is also smuggled. Smuggled sugar, coffee, and other bulky articles are consumed in the districts adjacent to the frontier. The agents of the smuggling companies regularly attend 'Change. They effect insurances to cover the risk of seizure, and make arrangements for the conveyance of smuggled goods into the interior. The houses importing these goods usually run from one-half to two-thirds of the risk; the rate of insurance varies considerably in the different custom-house districts; and the goods are valued at from one-half to two-thirds of the cost price. On the Belgian north-eastern and eastern frontier dogs are trained to convey smuggled goods into France. They are of a large size, and carry from 22 to 26 lbs. each of tobacco and colonial produce, and sometimes cotton-twist and manufactured goods. A single dog has been seized conveying goods worth from 20*l.* to nearly 50*l.* These dogs are conducted across the frontier in packs, are kept without food many hours, then beaten, and at night-fall their load is fixed upon them, when they start for their destination, which is usually two or three leagues on the other side of the frontier. On their arrival they are well fed. From

1820 to 1830 not fewer than 40,278 of the smuggling dogs were destroyed, a reward of three francs being offered for each.

The nature of the frontier by which a country is bounded necessarily exercises considerable influence on the character of its tariff. It would, for example, be nearly impossible to prevent the smuggling of British goods into the United States on the Canadian frontier, if the duties on importation were excessive. This consideration has induced the legislature of Texas to raise the public revenue by direct taxation, and the importation of merchandize is charged with very trifling duties.

In 1822 the cost of preventing smuggling in England was enormous. The Preventive Service and the Coast Blockade were organized for this purpose, and were aided by a fleet of fifty-two revenue cruisers. In 1822 and 1823 there were captured on the English coast 52 vessels and 385 boats engaged in smuggling. For the half-year ending April, 1823, the cost of this department of the public service amounted to 227,145*l.*, and the seizures were valued at 67,000*l.* The Coast Blockade consisted of 1500 officers and seamen of the royal navy, who were employed on shore under the orders of the Admiralty; and the Coast Guard was under the authority of the Board of Customs. In 1832 upwards of 181,000*l.* had been expended in building cottages for the officers and men of the Coast Guard in Kent and Sussex. Lord Congleton estimated the total annual cost of protecting the revenue in 1831 at from 700,000*l.* to 800,000*l.* For several years frequent conflicts took place between the officers of the revenue and smugglers, the latter being generally aided by the country-people. In 1830 there were 116 persons under confinement in England, and 64 serving in the navy as a penalty for smuggling offences. The counties on the Scottish border were at one period rapidly becoming demoralized by smuggling, the duties on spirits being much higher in England than in Scotland. In two years 163 informations were laid in the counties of Northumberland and Cumberland for smuggling spirits. The duties being reduced more nearly to an equality, these evils ceased on the border; and the quantity of spirits charged with duty in Scotland rose from 2¼ million gallons in 1822, to nearly six million gallons in 1825. The reduction of the duties on silks, tea, and British spirits has done more to repress smuggling than all the efforts of the revenue officers aided by a large armed force. In 1841 the number of persons under confinement in England for offences against the Customs laws was 65, all for periods under six months, with two exceptions; and in Ireland there were none under confinement.

The direct cost incurred for the protection of the customs revenue was as follows in 1840:—Harbour vessels, 7250*l.*; Cruisers, 118,543*l.*; Preventive Water-Guard, 349,474*l.*; Land Guard, 19,662*l.*: total, 494,930*l.* The Board of Excise employs cruisers for the protection of the revenue collected under its authority, the cost of which amounted to 5458*l.* in 1840; and also a force in Ireland called the Revenue Police, whose maintenance in the above year cost 42,095*l.* The total charge for collecting and protecting the customs and excise revenues of the United Kingdom was 2,309,611*l.*; namely, 1,286,353*l.*, or 5*l.* 8*s.* 8¾*d.* per cent., for the customs; and 1,023,258*l.*, or 6*l.* 10*s.* 11½*d.* per cent., for the excise. In 1835 the number of persons employed in the department of the customs was 11,600; and in the excise 6072. The present Acts relating to smuggling are 3 and 4 Wm. IV., c. 53, and 4 and 5 Wm. IV., c. 13.

SMUT. [UREDO.]

SMYRNA, one of the most antient Greek cities in Asia Minor. There was an Old Smyrna (*ἡ παλαιὰ Σμύρνα*) and New Smyrna. The old town lay on the north-east side of the Hermæan Gulf, which is sometimes called the Gulf of Smyrna. According to some traditions it was originally an Æolian colony, and was afterwards taken possession of by some Ionian exiles of Colophon. (Herod., i. 16, 149.) Another account describes it as an Ionian colony of Ephesus, where a part of the old town is said to have borne the name of Smyrna from an Amazon of the same name. Afterwards however the Ephesian colonists are said to have been expelled by the Æolians, and to have fled to Colophon, whence a short time after they returned, and recovered their original home. (Strab., xiv., p. 633, &c.) This latter account is not only in itself the more probable, but also contains the elements out of which the other may have arisen. (See Thirlwall's *Hist. of Greece*, ii., p. 93, in a note added to Schmitz's German transl.) After Melite, one of the Ionian towns, had been destroyed by the common consent of the others, Smyrna was admitted into the confederacy. This antient town of Smyrna was by some supposed to have been the birth-place of Homer; and in its vicinity, on the banks of the little river Meles, there was a grotto in which Homer was said to have composed his poems. The Smyrnæans were proud of this tradition, and endeavoured to propagate it. The Lydian king Sadyattes took and destroyed Smyrna, and distributed the inhabitants among a number of villages in the neighbourhood. (Strab., xiv., p. 646; Herod., i. 16.) In this state they remained, according to Strabo, for 400 years, after which the town was rebuilt with great splendour by Antigonus and Lysimachus, or, according to Pausanias (vii. 5, § 1), and Pliny (v. 31), by Alexander the Great. This new town however was 20 stadia distant from the site of Old Smyrna, and 320 stadia from Ephesus, and was situated on the north bank of the river Meles, covering the plain as far as the sea, and occupying also a part of a hill which Pliny calls Mastusia. It was adorned with several magnificent buildings, among which the Homereum was a square edifice surrounded by colonnades, and containing a temple and a statue of Homer. The streets were paved with stone, and built at right angles to one another; but as no sewers were constructed to carry off the water and filth, the streets were very dirty, especially in rainy weather. But notwithstanding this, the city was or soon became the finest and largest in Asia Minor. (Strab., xiv., p. 646; Marm. Oxon., n. 5.) When Asia Minor fell into the hands of the Romans, Smyrna became the seat of a conventus juridicus (Plin., v. 31), and flourished as a commercial town. It received various grants and privileges from the Romans as rewards for the part it took in the wars with Antiochus and Mithridates, as may be seen from several passages in Livy and Polybius. Trebonius, one of Cæsar's murderers, was besieged in Smyrna by Dolabella, who took the city, and destroyed a great part of it. (Strabo; Cic., *Philip.*, xi. 2.) But as in that most beautiful country even the heaviest calamities are soon got over, so Smyrna soon recovered and flourished as before. In the reign of Tiberius it received the honourable distinction of being allowed to erect a temple to the emperor. (Tacit., *Annal.*, iv. 56.) Christianity was early established here, chiefly owing to the zeal of Polycarp, who is said to have been the first bishop of Smyrna, and to have suffered martyrdom there. (Iren., iii. 3, 4, p. 176.) The whole neighbourhood of Smyrna appears in early times, as at present, to have been subject to frequent earthquakes; but that which occurred A.D. 178 visited the city most severely, and changed it into a heap of ruins, but it was restored by the emperor Marcus Aurelius. [ARISTIDES; ÆTIUS.] Before the introduction of Christianity the Smyrnæans worshipped chiefly the heroine Smyrna, Nemesis, Homer, and the mother of the gods, whose temple stood near the sea-coast, and whose head was represented upon several of their coins, as in that which is given below. (Eckhel, *Doctr. Num.*, ii. 537, &c.)

During the Eastern empire Smyrna again experienced several severe vicissitudes. Towards the close of the eleventh century it fell into the hands of Tzachas, a Turkish pirate, and was nearly destroyed by a Greek fleet under John Ducas. It was restored by the emperor Comnenus, but soon after fell into the hands of the Genoese, who continued in possession of it until the year 1364. In 1402 it was taken by Tamerlane, and suffered very severely. The conqueror erected within its walls a tower constructed of stones and of the heads of his enemies. Soon after it came under the dominion of the Turks, under whom it has always been the most flourishing city of the Levant, notwithstanding it has frequently been visited by earthquakes, fires, and the plague.

Smyrna, which the Turks call Izmir, is thus one of the very few antient cities which have survived to our times. At present it is the most important city of Asia Minor, and the centre of the Levant trade. Of her antient buildings however only very few traces remain. It rises in the form of an amphitheatre from the sea, and upon the hill there is an antient castle which forms the citadel; over one of the gates there is a head which either represents Apollo or an Amazon, and over another a Roman eagle.

The modern city of Smyrna is in 38° 25′ N. lat. and 27° 9′ E. long., about 210 miles south-south-west from Constantinople, direct distance. The situation is admirable, at the bottom of a capacious bay, with excellent anchorage, and so deep that large ships come close to the wharfs. The bay extends into the city, and its margin is lined with quays, on which there are handsome stone houses, so that the city, with its domes and minarets, has a fine appearance on approaching it from the bay; but a great part of the interior, and especially that part which is built on the side of the hill, consists of low wooden houses, and the streets are ill-paved, narrow, crooked, and dirty. The inhabitants are probably about 130,000, of whom about 70,000 are Turks, 30,000 Greeks, 12,000 Jews (the descendants of Jews who were expelled from Spain and Portugal), 7000 Armenians, and the remainder natives of various parts of the world, especially English, French, Dutch, and Italians, who reside there for purposes of commerce, and occupy, for the most part, the best quarter of the city near the bay. The port is frequented by ships from all nations, freighted with valuable cargoes both outward and inward. The greatest part of the trading transactions are managed by brokers, who are mostly Jews, the principals meeting afterwards to confirm the bargains. The chief imports are, coffee from America, England, France, &c.; sugar, chiefly from England and America; indigo, chiefly from England; tin, exclusively from England; iron, from England, Russia, Sweden, &c.; lead, from England and Germany; cotton-twist, from England; manufactured cotton-goods, from England, America, &c.; rum and brandy, spices, cochineal, and a variety of other articles. The principal exports are, silk, chiefly to England; opium, to England, America, and Holland; drugs and gums, mostly to England; galls, to England, Germany, and France; cotton-wool, valonia, and fruit; figs are brought to market early in September, and are only to be had at Smyrna, but raisins, which are ready early in October, are shipped also in large quantities from other neighbouring ports. Besides these exports there are various kinds of skins, goats' wool, olive oil, wax, and a variety of other articles. This large commerce has obviously arisen, not only from the advantageous situation of the port, but from the judicious and liberal policy of the Turkish government, which has imposed hardly any restrictive enactments, with few duties, and those extremely low.

Many of the European states have their consuls at Smyrna, such as England, Sweden, Prussia, France, Venice, &c. The city and its territory are governed by a pasha, and the revenues are raised by a muzelim.

About midnight, on the 28th of July, 1841, a fire broke out at Smyrna, which, from the crowded state of the wooden houses, the want of water, and the violence of the wind, was destructive to a dreadful extent. About 12,000 houses were destroyed, including two-thirds of the Turkish quarter, most of the French quarter, and the whole of the Jewish quarter, with many bazaars, and several mosques, synagogues, and other public buildings. It was calculated that 20,000 persons were deprived of shelter and food. The damage was estimated at two millions sterling. Subscriptions to a large amount were soon raised at Smyrna, Constantinople, and elsewhere; the sultan gave 4000*l.*, and sent ships with articles of food and clothing; and a large subscription has since been raised in London among the merchants connected with the Levant trade.

An excellent description of the antient as well as modern city of Smyrna was written by Prokesch, in the *Wiener Jahrbücher der Litteratur* for 1834, vol. 67.

Coin of Smyrna.

British Museum. Actual size.

The female figure on the one side of this coin is the great mother of the gods; on the other side, within a crown of oak-leaves, we read ΣΜΥΡΝΑΙΩΝ; and underneath a monogram, the meaning of which is not clear. Eckhel is inclined to take it for ΠΡΥΤ., that is, Πρυτάνεις.

SMY'RNIUM (*σμύρνιον*), a genus of plants belonging to the natural order Umbelliferæ. It is known by its obsolete calyx; lanceolate or elliptical, entire, acuminate petals, inflexed at the point; didymous fruit, contracted at the side. The half-fruits are almost globose and reniform, with three fine prominent ridges on the back, and two on the side, but almost obliterated; the channels with many vittæ; the seed is involute; the species are upright smooth biennials with fleshy roots, various leaves, terminal umbels, and variable involucres. The flowers are yellow or yellowish-green, and are frequently polygamous.

S. Olusatrum (Common Alexanders) has a taper stem; the leaves of the stem are ternate, with ovate serrated segments, and very short involucels. It is a native of the middle and south of Europe in humid places. It is found in Great Britain, and is observed most frequently near the coast, although not confined to such a locality. This plant was formerly much eaten in Europe both as a salad and potherb, on which account, and the black colour of its stalks and leaves, it derives its specific name *Olusatrum*, from *olus* and *ater*. Ray says that this is the *Herba Alexandrina* of Italy and Germany, whence our name Alexanders. It is supposed to have been originally brought from Alexandria. It flowers in May, and the whole plant dries up by the middle of July, but remains laden with large black seeds.

S. perfoliatum (Perfoliate Alexanders) has the stem angularly winged above, with ovato-cordate toothed leaves, which embrace the stem. This plant was obtained in Greece by Dr. Sibthorp, and is also an inhabitant of Spain, Italy, and Dalmatia. It is the *Smyrnium Dioscoridis* of Sprengel; and Sir J. E. Smith was of opinion that this species is the true *σμύρνα* of Dioscorides, with whose description it remarkably agrees. (*Flora Græca*, p. 289.)

SNAILS, the English name for the Slugs and shell snails. [Helicidæ.] N.B. The secretion of the so-called *saccus calcareus* of the snail and other molluscous animals has been found to contain uric acid. Consult the paper by Jacobson and De Blainville, *Sur l'Existence des Reins dans les Mollusques*, in the *Journal de Physique*, tom. xci., p. 318.

SNAITH. [Yorkshire.]

SNAKE, a term commonly applied to any serpent, but more particularly used to designate the common snake, *Natrix torquata*. [Natrix.]

SNAKEROOT. [Polygala Senega.]

SNAKEWOODS. [Strychnos.]

SNELL, WILLEBRORD, a Dutch mathematician and philosopher, was born in 1591, at Leyden, in the university of which city his father, Rudolph Snell, the author of several scientific works, was professor of mathematics. He at first applied himself to the study of the law, but he very soon abandoned that pursuit, and devoted himself to the mathematics. In these he early made great progress, and at seventeen years of age he published an essay, in which it was attempted to restore the lost treatise of Apollonius, 'De Sectione determinata.' The work is said to have possessed considerable merit, and to have procured for the author a reputation among the scientific men of that time, but it has lost its importance since the publication of the more complete restoration by Dr. Simson. [Simson, Robert.]

In order to acquire information relative to scientific subjects beyond that which his own country afforded, Snell travelled to Germany, where he obtained an introduction to Kepler. From the conversation of this mathematician, during the three years of his absence from home, he obtained a great accession to his knowledge of the sciences; he appears also to have acquired the esteem and friendship of the celebrated German, and he regularly corresponded with him during the rest of his life. On his return to Leyden, his father having resigned his post in the university, the young mathematician was immediately appointed to succeed him. From this time he applied himself to the fulfilment of the duties of his professorship, to the performance of philosophical experiments, and to the composition of the works which have procured for him a high reputation among the learned men on the Continent.

His first publication was an explanation of the monetary system of the antients, which appeared at Antwerp in 1613, in octavo, under the title, 'De Re Nummariâ Liber Singularis.' His second and most important published work was entitled 'Eratosthenes Batavus de Terræ Ambitûs verâ Quantitate à W. Snellio suscitatus' (Leyden, 1617): it contains a description of the method of determining the magnitude of the earth by trigonometrical operations, combined with the observed latitudes of the stations; and Snell has the honour of being the first who put in practice a method which has since been almost always adopted by those who have undertaken that great geodetical problem. He measured a base line on the ground, and observed with circular instruments the angles between the stations: he then by computation found the length of the terrestrial arc between Alkmaar and Bergen-op-Zoom, from which arc, with the difference between the observed latitudes of those places, he deduced the length of a meridional arc of one degree. The method possesses great advantages over the older process of actually measuring the whole length of the meridional arc with rods, or, as Fernel, in the beginning of the sixteenth century, is said to have ascertained it, by the number of revolutions made by a carriage-wheel. The imperfection of the instruments employed was the cause that some inaccuracies occurred in the performance of the operations; these were however discovered by Snell; and it is said that he intended to have given the necessary corrections in a second edition of his book, but he did not live to complete them.

He published, in 1619, a work, in quarto, entitled 'Descriptio Cometæ qui ann. 1618 primum effulsit;' and two years afterwards his 'Cyclometricus, seu de Circuli Dimensione,' in which is given an approximation to the value of the circumference of a circle by a method more short than that of Van Keulen. His next work (1624), called 'Tiphys Batavus,' constitutes a treatise on navigation; and in 1627, that is, after his death, Hortensius of Delft published his 'Doctrinæ Triangulorum Canonicæ Libri Quatuor,' which contains the theorems of plane and spherical trigonometry, together with rules for the calculation of sines, tangents, and secants.

According to both Vossius and Huygens, Snell was the first who made the discovery that if a ray of light be incident on a refracting surface, and be produced within the medium, the parts of the refracted ray and of the produced incident ray intercepted between the point where the refraction takes place and any line passing through them perpendicularly to the refracting surface, have to each other a constant ratio. This discovery, which is said to have been made in 1621, is no other than the now well-known law between the sines of the angles of incidence and refraction, which Descartes published in his 'Dioptrics,' in 1637, as the result of his own researches. The experiments by which Snell discovered the law were never published; but Huygens states that he had seen the manuscript containing an account of them; and Vossius relates that the heirs of Professor Hortensius communicated the contents of the manuscript to Descartes. It is therefore very probable that Descartes obtained the idea from the works of Snell, to whom Montucla, Bossut, and most of the English philosophers agree in attributing the honour of this important discovery.

After having suffered during several years from bad health, Snell died, October 31, 1626, when thirty-five years of age; his wife survived him only eleven days, and both of them were buried in the same grave.

SNEYDERS, or SNYDERS, FRANCIS, a painter, born at Antwerp in 1579, was a pupil of Henry van Balen, and for a time followed the style of his preceptor, confining himself to the representation of fruit, flowers, and other objects of still-life. He soon attempted the more difficult task of painting animals, in which, for freedom, truth, and energy, he became conspicuous, and for these qualities remains to this day, if not without a rival, at least inferior to no other artist. D'Argenville says that Sneyders went to Italy for professional improvement, and that at Rome he became an ardent admirer of the style of Benedetto Castiglione, from whose pictures he studied a considerable time. This statement is followed by M. Périès in the 'Biographie Universelle,' though the same work gives the date of Castiglione's birth as 1616. Mr. Bryan properly observes that the assertion of M. D'Argenville is not reconcileable with chronology, for the Flemish painter was thirty-seven years older than the Genoese; but how far he is justified in thence inferring that Sneyders did not leave the Netherlands is not so clear. During part of his career he lived at Brussels, having been invited there by the Archduke Albert, governor of the Low Countries, for whom he painted some of his finest works, particularly a stag-hunt, which was sent by the archduke to Philip III. of Spain, who was so charmed with the present, that he gave the artist commissions for several large pictures of huntings and other similar compositions, and which, down to a recent date, were in the old palace of Buen Retiro. Rubens although himself eminent as an animal painter, held the abilities of Sneyders in such admiration that he frequently entrusted that portion of his pictures, as well as the fruit and other similar accessories, to the masterly pencil of his brother-artist, and it would be difficult to point out any two masters who have worked in conjunction whose performances are in more perfect harmony than those of these eminent men. Jordaens too availed himself of the talents of Sneyders in a similar manner, and in a variety of instances both Rubens and Jordaens conjointly executed the human figures in compositions of Sneyders, and there are known to be several pictures in existence the joint production of these three great but friendly rivals. The works of Sneyders are in many of the best collections in England. One in the possession of the Marquis of Westminster, in Grosvenor House, London, representing a Bear Hunt, consists of a group of two bears and eleven dogs. This picture is stated, in Mr. Young's Catalogue of that collection, to have been painted for a noble family in Venice, and to have been sent to England about seventy years ago and purchased by the late Lord Grosvenor. M. Périès enumerates nine pictures by this master as being in 1825 in the museum of the Louvre, one of which contains the two lions afterwards introduced by Rubens into his picture of the Marriage of Henry IV. Although the works of Sneyders consist principally of boar and bear hunts, and other compositions of animals, views of interiors and subjects of still-life are by no means uncommon, though it is but reasonable to suppose that the chief number of these were executed soon after he had left the studio of Van Balen. Those however in which the human figures are painted by Rubens or Jordaens are of course of a later date. There is an admirable portrait of Sneyders by Vandyke, which was in the Orleans collection, and is engraved in the well-known series of heads after pictures by that master. There are, according to Mr. Bryan, a set of sixteen etchings of various animals by Sneyders, executed in a spirited and masterly manner. That there are a few etchings by him we know, but that they consist of so great a number as sixteen is very doubtful, for Bartsch in his catalogue does not mention even one as belonging to the extensive collection at Vienna, nor is there one by his hand among the prints formerly belonging to Mr. Sheepshanks, and now deposited in the British Museum, a collection confessedly rich in works, both with the graver and the point, by masters in the Flemish and Dutch schools. Although there are very few etchings by this eminent painter, there are many after his works. He died at Antwerp, in the year 1657.

(*Biographie Universelle;* Bryan's and Pilkington's *Dictionaries.*)

SNIPE, the English name for those grallatorial birds which belong to the second section of the SCOLOPACIDÆ [vol. xxi., p. 85], and form the genus *Gallinago*, Steph.

The Snipes most familiar to the English sportsman and ornithologist are the Common Snipe, the Jack Snipe, and the Solitary Snipe: Sabine's Snipe (*Scolopax Sabini*) is of very rare occurrence, and indeed the Solitary Snipe is far from common.

We proceed to illustrate this section by descriptions and figures of the Common Snipe and the Solitary or Great Snipe.

And first of the Common Snipe, *Scolopax Gallinago*, Linn., *Gallinago scolopacinus*, Bonap.

Description.—Normal number of tail-feathers fourteen, varying to sixteen (Brehm's Snipe), and twelve (Delamotte's Snipe). Upper parts variegated very nearly as in the Solitary Snipe; neck and breast striped longitudinally; sides striped transversely with white and blackish; middle of the belly and abdomen spotless, pure white; base of the bill ash-colour, the rest brown; feet pale-greenish; length about ten inches and a half, of which the bill measures about two inches and three-quarters.

The colours of the plumage, after the spring moult, are brighter and more brilliant with bronze reflections than after the autumnal moult: in winter the hue becomes more ashy.

Varieties.—Pure white; reddish-white; the feathers sprinkled or blotched with white, or some part of the plumage white.

This is the *Beccacino* and *Pizzarda* of the Italians; *Bécassine* or *Bécasseau* and *Chèvre volant* of the French; *Heer Schnepfe* and *Himels Ziege* of the Dutch; *Watersnep* of the Netherlanders; *Myr Snippe* of the Icelanders; *Horsgjok* of the Swedes; *Hossegioeg* of the Danes; and *Ysnittan y Fyniar* of the antient British.*

Geographical Distribution.—Mr. Gould (*Birds of Europe*) states, that, although the contrary has been long stated by naturalists, he conceives that the natural range of the Common Snipe is comparatively limited, and that the Snipes from India, Africa, and North America, which have been regarded as identical with our bird, will be found, on examination, to be specifically distinct; in the character of their plumage, he observes, they are indeed somewhat similar, but they nearly all present a different form in the feathers of the tail, and also a difference of number. The Prince of Musignano had, in his *Specchio Comparativo*, marked the North American bird with a ?, as identical with that found near Rome; and in his *Birds of Europe and North America*, the same identity is recorded, and the ? is withdrawn. Temminck says that an individual received by him from North America differs solely from those killed in Europe in the colours of the plumage, which are some shades brighter. He also states that the common snipe occurs 'jusqu'au Japon,' where, he remarks, the species is exactly the same, and has always fourteen feathers in the tail. Mr. Strickland notes it as abundant in Smyrna. It is said to be found in Lower Egypt.

The following localities have been given as the range of the common snipe in Europe and Asia:—Russia and Siberia, from Scona to Lapland, Norway, Sweden, Denmark, Faroe Islands, Iceland and Greenland, Germany, Holland, British Islands, France, Spain, Provence, Switzerland, Italy, Hungary, and Illyria.

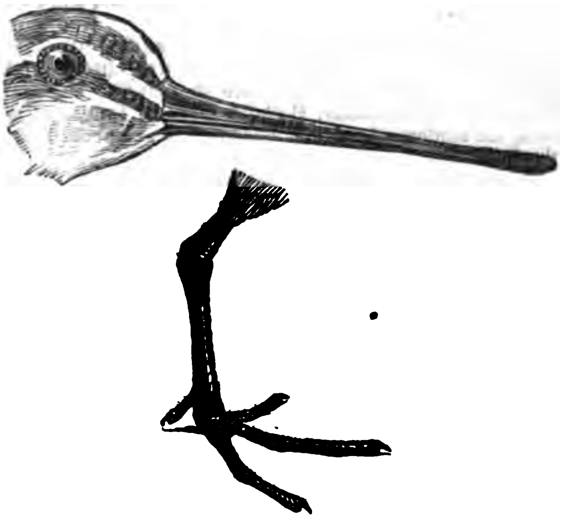
Food, Habits, Nest, &c.—Marshes, moist meadows, and, in frosty weather, the edges of rushy rills, are the haunts of the snipe. In such situations they have been seen pushing their bills, by means of repeated thrusts, quite up to the base in the mud, drawing them back with great quickness, and shifting their ground every now and then. Their food consists of such worms, insects, and small mollusks as haunt such miry places, and they have been shot in the act of feeding on leeches.

The bill of a fresh snipe presents above, at the end, and for some way up, a dimpled appearance, somewhat resembling the depressions on a woman's thimble: these little cells, which are continued into the bones of the upper mandible, are supplied by portions from two branches of the fifth pair of nerves. Thus this sensitive probe enables the bird to ascertain the presence of its prey, and to capture it securely, though hidden from its sight. The nest, which is rude and inartificial, being a mere depression in the ground under or upon a tuft of grass or rushes, scantily lined with dry grass or herbage, has been found among long grass by the side of small lochs, amid the long heather on the sides of hills, and in fens among rushes. The eggs, generally four in number, are pale-yellowish or greenish-white, with rather elongated spots of two or three shades of brown on the big end. They are large, being about one inch six lines in length, and one inch one line in breadth. Sir Humphry Davy, who came upon the nests of ten or twelve couple, in the heather surrounding a small lake in the island of Hoy in the Orkneys, where he was grouse-shooting in August, 1817, found usually two young ones in a nest, though he had seen three. He describes the parent birds as being exceedingly attached to their young, and says that if any one approach their nest, they make a loud and drumming noise above the head of the intruder, as if to divert his attention. In the British Islands they have been known to breed also in Dorsetshire, in the New Forest, in Cambridgeshire, in Norfolk, in Scotland, in Wales (on a marshy hill in the neighbourhood of Coytrahên, near Bridgend in Glamorganshire), and in Ireland. Mr. Selby observes, that, in addition to our native snipes, great flights come annually from Norway and other northern parts of Europe; and that in Northumberland they arrive in the greatest numbers in the beginning of November. He remarks what most snipe-shooters have noticed, that they seldom remain long in one situation, but move from place to place; so that the sportsman who has enjoyed excellent snipe-shooting one day, may find the same spots entirely deserted on the following. 'Towards the end of March or beginning of April,' says Mr. Selby in continuation, 'snipes, having perfected their summer or nuptial plumage, select appropriate places for nidification, and the male bird commences his calls of invitation for a mate. These are always uttered upon the wing, and consist of a piping or clicking note, often repeated, and accompanied at intervals by a humming or bleating noise, not unlike that of a goat,' whence probably its French names of *Chèvre volant* and *Chèvrette volante*, 'apparently produced by the action of the wings, as the bird, whenever this sound is emitted, is observed to descend with great velocity, and with a trembling motion of the pinions. At this season it soars to an immense height, remaining long upon the wing; and its notes may frequently be heard when the bird itself is far beyond the reach of sight. These flights are performed at intervals during the day, but more commonly towards the evening, and are continued during the whole time that the female is engaged in incubation.'

Utility to Man.—Few birds are better than a *fresh* snipe. The old quatrain says—

> 'Le becasseau est de fort bon manger,
> Duquel la chair resueille l'appetit.
> Il est oyseau passager et petit:
> Et par son goust fait des vins bien juger.'

'Snypes' were among the birds admitted to the earl of Northumberland's table (*Houshold*, 1512), and were then charged at 3*d*. a dozen.



Head and Foot of the Common Snipe.

The *Solitary, Double*, or *Great Snipe, Scolopax major* (*Gallinago major*, Bonap.), is a much larger bird.

Description.—Tail composed of sixteen feathers; midrib of the first quill whitish. The black of the top of the head divided by a band of yellowish white; eyebrows of that colour; upper parts variegated with black and bright rusty, the last-named colour disposed longitudinally; lower parts whitish rusty; belly and sides striped with black bands; bill inclining to reddish, brown at the point; feet greenish ash. (Temm.)

Mr. Yarrell gives a much more elaborate description, and as it is very correct, and the bird is not common, we here lay it before our readers:—

'The beak dark-brown at the end, pale yellow-brown at the base; irides dark-brown; from the base of the beak to the eye, a dark-brown streak; over that, over the eye and the ear-coverts, a streak of pale-brown; forehead and top of the head rich dark-brown, divided along the middle line from before backwards by a pale-brown stripe; neck all round pale-brown, the centre of each feather darker brown; interscapulars, scapulars, and back, rich brownish-black, with central lines and broad margins of rich buff or fawn colour; lesser wing-coverts nearly black, the upper series tipped with pale-brown, the lower series tipped with white; great coverts black, tipped with white; primary quill-feathers dull greyish-black, with white shafts; secondaries dull black, tipped with white; tertials black, barred and streaked with pale brown; rump very dark-brown, edged with pale brown; upper tail-coverts pale yellow-brown, varied with dark-brown; tail-feathers sixteen, the four on each outside nearly all white, the others rich brownish-black ove three-fourths of their length from the base, then a patch of chestnut, bounded by a circle of black, and tipped with white; chin pale yellow-brown; breast and sides of the body with half-circular bands of brownish-black on pale-brown; belly and vent pale brownish-white; legs and toes greenish-brown; the claws black. The legs and toes are subject to some variation in colour. I have seen them in fresh-killed birds of a livid-green, and even of a light-drab colour. The whole length about twelve inches. From the carpal joint to the end of the first quill-feather, which is the longest in the wing, five inches and a half. The weight from seven to nine ounces, depending on age and sex. The females larger than the males. The males are lighter in colour above and below the dark stripe behind the base of the beak, like the woodcock; and the breast is less covered with the dark half-circular markings: the white spots at the ends of the wing-coverts are rather larger, and more conspicuous from their purer white colour. Young birds in their first autumn have short beaks, and fewer, if any, white outside tail-feathers; these are probably obtained at their first moult, as this species is sometimes described as being without any white outer tail-feathers, and at others with as many as five on each outside.'

---

* *Giach* is the antient British name for the Jack Snipe.

This is the *Grande* or *Double Bécassine* of the French; *Beccacino maggiore*, *Pizzardone*, and *Croccolone* of the Italians; *Mittelschnepfe* and *Doppelschnepfe* of the Germans; *Poelsnep* of the Netherlanders; *Great Snipe*, *Double Snipe*, and *Solitary Snipe* of the modern British; and *Ysnid* of the antient British.

Geographical Distribution.—Head-quarters, the north of Europe. Norway, where specimens transmitted to the Zoological Society of London were shot by Sir Humphry Davy, Sweden, Germany, Holland, France, Italy, Switzerland, the borders of Asia, Trebizond, the neighbourhood of the Caucasus.

In the British Islands the bird has been killed in Lancashire (the specimen from which Pennant first described it, and which was preserved in the Leverian Museum), and has been noticed as not uncommon in Norfolk. Mr. Yarrell says, 'Their course, both in the spring and autumn (at which period they have been generally shot in this country), is considered by Mr. Selby to be generally to the east of the longitude of the British Islands; and I may mention, in corroboration of this view, that I am not aware of more than one record of the occurrence of this species in Ireland, and in England they are most frequent in the eastern counties.' From the Welsh name above noticed, it is plain that the bird has been not unfrequently observed in the principality, though published instances of its occurrence in that locality do not appear to be known. Whilst we write (late in September, 1841) a friend has sent us a fine specimen, killed on the marshy hill near Coytrahên, above alluded to. It was flushed from a dry hedge-row (the boundary to a wet field), into which it had been marked by the keeper, and was shot by our friend's companion. The bird uttered no cry in rising, and its flight was very heavy, more like that of a woodcock than a snipe. Several common snipes were found in the field, one not more than fifty yards from the place where the solitary snipe was put up. The keeper stated that the latter kept in a perfectly dry part of the hill, not near any other birds; and it was considered probable that it had been there all the summer, as it was in good condition, and no foreigners of the common kind had yet arrived in the low grounds, where they are very numerous late in the year. But it should be remembered that the bird was killed at a period when it most commonly occurs as a visiter to this country.

Food, Habits, Nidification, &c.—Sir Humphry Davy, who notices the fact of this snipe's breeding in the great royal decoy or marsh-preserve near Hanover, says that they require solitude and perfect quiet, and that, their food being peculiar, they require a great extent of marshy meadow. They feed on the larvæ of *Tipulæ* (commonly called Father Long-legs), or congenerous flies; and their stomach, the same author tells us, is the thinnest among the *Scolopax* tribe. Mr. Lloyd always found this bird singly, or at most in pairs, near Gothenburg, where they were by no means plentiful, and he states that they are so fat in the autumn, as apparently to be hardly able to fly; indeed, he remarks that, if flushed, they usually proceed but a short distance before they settle again. Their flight, he adds, is heavy and steady, and they present the easiest mark possible. The same sporting traveller quotes Mr, Greiff ('Förste Hof-Jagmästare'), who remarks that this species is a bird of passage, and amongst those which arrive the latest; and that at the end of July, when the meadows are mowed, shooting them commences and continues till towards the end of September. The pointer is the dog selected to accompany the sportsman, and Mr. Greiff speaks of the sport with rapture. 'The birds,' he says, 'are easy to shoot, and in some places fifty or sixty, aye, considerably more, may be killed in a day, particularly in autumn, when they are so fat that they almost burst their skins. They are most delicious eating.' Mr. Greiff adds, that he was already an old sportsman of thirty years' standing before it came to his knowledge that these double snipes had their *lek* or playing-ground. [CAPERCAILIE, vol. vi., pp. 262, 263.] He heard their cry a whole spring in a marsh where he had a good *Orr-lek*,* but never observed them, and therefore believed that the sound came from some frogs or reptiles; but at last he discovered that the cry was uttered by double snipes which ran like rats among the hillocks. This cry, according to Mr. Greiff, commences with a sound resembling the smack of the tongue, and thereupon four or five louder smacks follow.

The rude nest of the double snipe, which is very like that of the common snipe, is generally placed on a hummock or tuft of grass, or a bunch of rushes on the borders of a swamp, often near willow bushes. Eggs three or four in number, yellowish olive-brown, with great spots of reddish-brown; length, one inch nine lines; breadth, one inch two lines.

They breed in considerable numbers in the mountainous parts of Norway and Sweden, as high as the range of birch-woods extend. In the Dofre Fi-ell at Jerkin and Fogstuen, they are numerous on the edges of the grassy swamps, avoiding the wet. They also frequently resort to the borders of the small rills used for irrigating the grass-lands. During the pairing season they fly to a vast height. They make a drumming noise as they descend, which is produced by a slight and peculiar vibration of the wings. (Yarrell, ex relatione Dann.) Mr. Gould observes that there are two other snipes which exceed this in size, found in the hilly districts of India, and a third from Mexico, whose size is superior to that of a woodcock. (*Birds of Europe.*)

Solitary or Double Snipe.

SNORRI STURLUSON, also called *Sturleson* or *Sturlason*, and in Latin works *Snorro*, was the son of Sturla, and born in Iceland in the year 1178, on an estate belonging to his father, called Hoamms, whence the father is sometimes called Hoamms-Sturla. When Snorri had scarcely attained his fourth year, his father died, and he was thenceforth educated at Odi, in the house of Ion, the most learned man of the age. His education was conducted with great care, and his talents soon gave him distinction as a philosopher, a mathematician, a lawyer, a linguist, antiquary, and architect. At the same time he acquired great reputation for the enchanting manner in which he told the stories of former times, an art which is still highly valued in Iceland. Although his father had been the chieftain of an Icelandic tribe, the son appears to have been poor, until he improved his circumstances by a marriage with a wealthy lady, whom some years afterwards however he deserted. He managed his newly-acquired property so well, that he became no less distinguished for his wealth than for his talents and learning. He was several times invested with the office of Logsögumadr, that is, interpreter of the law, the highest official dignity in Iceland, and gradually rose to the rank of Landur-madur and of Yarl, which was the highest title next to that of duke. During this period of his greatest prosperity he composed some of the most beautiful songs, tales (sagas) that exist in the literature of Iceland, and also wrote some historical works. He also spent considerable sums upon the building of splendid edifices, especially at Reykiahollt. His character as a man however was by no means in accordance with his great mental powers, for he was avaricious, quarrelsome, inconstant, and full of cunning, though wanting in active energy. A party was formed against him, which was headed by his own brother Sighwat and his nephew Sturla; and his sons-in-law, enraged at Snorri having abandoned his wife, joined his enemies. Snorri and his adherents were defeated and banished from the island (1234). They went over to Norway, where Snorri's patron, Duke Skuli, was preparing to revolt against King Hacon, and was supported by the poetical powers of Snorri. In the meanwhile however his enemies in Iceland were defeated, and Snorri, dreading the vengeance of King Hacon, returned to his native island. But the king declared him an outlaw, and Snorri was murdered on the 22nd of September, 1241, at Reykiahollt, by his own sons-in-law.

---

* *Orre* is the Swedish name for the BLACK COCK.

Snorri is one of the greatest, and at the same time the last of the northern Scalds. His most important work is the 'Heimskringla,' a beautiful collection of sagas, consisting partly of Scaldic songs by Snorri himself, and partly of the poems of earlier Scalds, who were contemporary with the events which they describe, and whose poems are interwoven in the Sagas of Snorri himself. This collection was first published by Peringskiold (Stockholm, 1697, fol.), with a Swedish and Danish translation; another edition, with a Danish and Latin translation, appeared at Copenhagen from 1777 till 1826. Vols. 1 and 2 were edited by Schöning; vol. 3 by Sc. Th. Thorlacius; vols. 4, 5, 6, with the separate title of 'Noregs Konunga Sögor,' by Birg. Thorlacius and E. Chr. Werlauf. The last Danish translation is that by Grundtvig, Copenhagen, 1818-1822, 3 vols. 4to. It has also been translated into German by Wachter, who has added a very valuable historical and critical introduction.

Among the other works ascribed to Snorri are, 1, 'The Gylfa-Ginning,' which forms the first part of the 'Snorra-Edda;' 2, 'The Scaldic Songs called Kanningar or Skalldskoparmal;' 3, 'Hattalykill,' or the Key of the Wise, consisting of two eulogies on Duke Skuli, and three others which are partly written in praise of King Hacon. All these poems form part of the 'Skallda,' which has been edited by Rask (Stockholm, 1818), under the title of 'Snorra-Edda ásamt Skáldu.' Besides several other poems upon contemporary heroes, Snorri also wrote a number of Fraedibaekur, *i.e.* manuals of science, which have been very much used by his countrymen.

SNOW. It has been stated [RAIN, p. 269, col. 1] that rain, snow, and hail are formed by the precipitation of vapour when two volumes of air of different temperatures, and saturated with moisture, become mixed together; the nature of the precipitation depending on the temperature of the region of the atmosphere through which the aqueous particles descend towards the ground. Now when the particles are frozen in separate crystals of ice, and these afterwards unite together in such a manner as to reflect light to the eye in great abundance from all, thus producing a sensation of whiteness, the assemblages of crystals constitute snow.

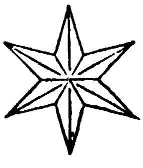
M. Monge observes (*Annales de Chimie*, vol. v., p. 1) that the crystallization of sal-ammoniac presents phenomena similar to those which are observed in the formation of snow. If a saturated solution of sal-ammoniac in a warm state be allowed to cool in a tranquil air, the surface of the liquid is that which first arrives at a state of supersaturation, and there the first crystals are formed; these sink immediately, and in descending they unite with similar crystals formed in the liquid itself, so that they arrive at the bottom of the vessel in white flakes. Thus also the elementary crystals, formed generally in the upper region of the atmosphere, gradually descend by their superior specific gravity, and by the laws of affinity cause the crystallization of the aqueous molecules which otherwise the air would have held in solution. These uniting, there would probably result, if the atmosphere were tranquil and the temperature very low, small flakes of some regular figure. From such as have been observed, it appears that these consist of brilliant spicular icicles, which diverge from a centre in six directions, and resemble stars having so many rays, upon each of which small crystals are sometimes formed; but if the atmosphere is agitated, the original flakes strike against each other, and uniting in groups, in consequence of small quantities of moisture adhering to them, they descend in irregular forms. In regions of the earth far to the north or south, the air, when allowed to enter through a small aperture into a heated apartment, has frequently caused the warm vapour to be converted into snow.

Snow has been observed to fall in a fine powder, not having any appearance of regular crystals; this is therefore supposed to have been formed near the surface of the earth, and is considered as being in an elementary state. (*Bibliothèque Universelle*, 1830.) The crystals are evidently those of ice combined together, and their primitive form is, from the experiments and observations of Sir David Brewster, considered as belonging to the pyramidal system; M. Haidinger infers this fact from the circumstance that tin-ore and rutile, which are of that class, produce crystallizations similar to the stellar figures of snow. The regularity of the formation of snow has been ascribed to electricity. Beccaria observed that his apparatus for ascertaining the electrical state of the atmosphere indicated the presence of the fluid in snow as well as in rain; and, according to the observations of Schübler, it is more commonly positive than negative. The lightness of the flakes, by which they float about in the air when agitated, is the result of their surface being great when compared with their volume. The specific gravity of snow is very variable; and according to Musschenbroek, that of some, of the stelliform kind, was only $\frac{1}{24}$ of the specific gravity of water; but M. Quetelet has since found that the greatest density is nearly $\frac{1}{2\cdot8}$ of that of water, the temperature being 34·5° (Fahr.). He ascertained also that the density of fine snow having no determinate form was about $\frac{1}{4}$, the temperature being 32°, and that the least density varied from $\frac{1}{18}$ to $\frac{1}{15}$ of that of water, at which time the snow had the form of small stars, and the temperature varied from 29·7° to 18·5°.

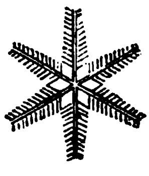
The flakes of snow have even in temperate regions many varieties of form, and are often very elegant; but the polar regions of the earth are those in which nature has displayed her power in creating this species of beauty in the highest degree and to the greatest extent. In the *Phil. Trans.*, 1775, may be seen numerous delineations of the figures assumed by flakes of snow as they were observed by Dr. Nettis of Middelburg in 1740; but Mr. Scoresby, in his 'Account of the Arctic Regions,' has given still greater varieties; the latter gentleman, besides dividing them into classes, has also expressed their magnitudes, and the state of the barometer and thermometer when the snow fell.

Of these classes the first is called 'lamellar,' and is divided into many different species: one of the latter is a thin transparent hexagonal plate, or a hexagonal plate with white lines parallel to the sides of the polygon, and sometimes there is a starlike figure in the centre; the magnitudes vary, and the greatest is about $\frac{1}{10}$ inch diameter. Another species, and this is the most ordinary appearance of snow, is the stelliform; the figures 1, 2, and 3 represent the most remarkable varieties of this kind; its magnitude varies, but the diameter of the greatest is about $\frac{1}{3}$ inch, and it occurs most abundantly when the temperature of the air is near the freezing-point of water. Sometimes the stars appear to have twelve points, but Mr. Scoresby thinks that these are formed merely of two stellar plates applied one on the other. The six following figures represent assemblages of hexagonal crystals; the diameters of the two first kinds are respectively $\frac{1}{10}$ and $\frac{1}{20}$ inch, and those of the rest are $\frac{1}{3}$ inch diameter; they are usually formed at temperatures between 32° and 20° (Fahr.)

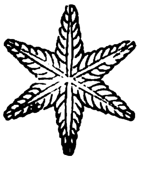
1

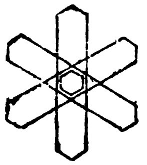


2

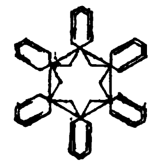


3

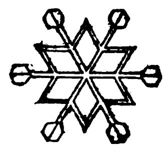




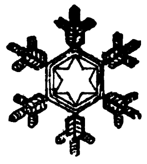
5



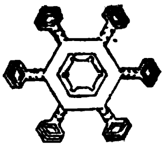
6



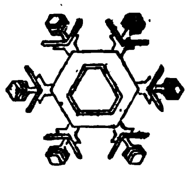
7



8



9



The second class is also lamellar, but it differs from the former in having a spherical nucleus, either transparent or white, about ¼ inch diameter; and sometimes spicular radii proceed from thence in different directions at angles of 60° with each other. The temperature at which this class is formed varies also from the freezing-point to 20° (Fahr.)

The third class consists of spiculæ, or six-sided prisms; of these, the finer sort, which are formed at the temperature of 28°, resemble white hairs very delicate and clear, and about ¼ inch long; the coarser kinds are formed in the lower region of the atmosphere, at about the freezing temperature.

The fourth class is of a pyramidal form and about $\frac{1}{30}$ inch high, but Mr. Scoresby could not determine whether the base was triangular or hexagonal. The fifth class consists of hexagonal crystals united together by a slender spicular crystal, so as to resemble two wheels with an axle. Both of these kinds are very rare. Mr. Scoresby saw the latter only twice and the former only once.

M. Huber Burnand, speaking of the character of the snow which fell at Yverdun in 1829 and 1830, states that it was crystallized in stellar plates with six rays, along each of which were disposed filaments arranged like feathers, and these again supported finer filaments similarly arranged; the plates, which were extremely thin, were perfectly plane and regular. (*Bibl. Univ.*, 1830.) It is also related in the same work, that in 1829 the frost at Yverdun assumed every day a different form, being sometimes disposed in parallel groups or fillets; sometimes it resembled leaves, and occasionally spines about an inch long, which were terminated by a flat rosette with six divisions.

Snow in the form of cylinders and spheres or spheroids has been occasionally observed in North America. The former were produced by the snow deposited in a second shower upon some which had previously fallen, and the surface of which had been covered by a thin coating of ice. A violent wind then caused the particles of snow to roll on the ice, and the masses thus produced assumed perfectly cylindrical forms of various sizes, the greatest being 2½ or 3 feet diameter; they were hollow at each end. The spherical balls were from 1 inch to 15 inches in diameter, and were also formed chiefly by rolling, though some were found in enclosures where they could not have rolled, and therefore they are supposed to have been formed in the atmosphere itself; they were very light, and were composed of crystals irregularly united. (Silliman's *Journal*, vols. ii. and vi.) Similar balls were observed in East Lothian, in 1830, by Mr. Sheriff; and this gentleman relates that they were composed only of snow, for one of them being cut through, was found to have no hard body for its nucleus. (*Edin. Phil. Journal*, ii. 58.)

That animalculæ exist in snow is evident from an observation stated in Silliman's *Journal* (vol. xviii.). We learn there that Dr. Mure having first examined some water in a glass by means of a microscope, and found it quite pure, put into the water a quantity of snow; he then found that, on solution, the water exhibited in full activity hundreds of animalcules, which, when viewed through the microscope, resembled very diminutive shrimps, and were quite unlike the eels discovered in acetous acid. It may be observed here, that snow-water, being drunk, is considered as unfavourable to the human constitution; the affections of the throat, to which the people in some parts of Switzerland are subject, are thought to be caused by its deleterious qualities.

The formation of hail is probably a result of the abstraction of caloric from the molecules of vapour in the atmosphere, by the agency of electricity or otherwise. Volta supposes that the hail, when once formed, may continue to acquire new accessions of frozen vapour, till the weight of the stones becomes sufficient to overcome the electrical attractions by which they are kept suspended; and thus the existence of very large hailstones may be accounted for. The violence with which they rush in a direction nearly parallel to the horizon when no wind is stirring, is ascribed by the same philosopher to a combination of the force of gravity with that which arises from the shock of two electrical clouds, by which the hail may be produced. The hypothesis of the formation of hail by the collision of electrical clouds has however been objected to by M. Arago; and the theory of Hutton respecting the formation of rain [RAIN] is considered capable of accounting also for the phenomena both of snow and hail. The loss of heat in the descending molecules being greater when hailstones are formed than when the vapour is brought to the state of rain or snow. This hypothesis appears to be confirmed by the fact that the same cloud has produced both rain and hail.

Hailstorms often extend to great distances in one direction, while they are of very limited breadth. That which created so much destruction in France, in July, 1788, passed in two parallel lines over that country from south-west to north-east, one line being in length about 175, and the other about 200 leagues, while the mean breadth of each was only about 3 leagues; and in the interval between them, which was about 5 leagues, the country was deluged with heavy rains. The hailstorm which, in the month of May, in the present year (1841), visited this country, spent all its fury between Bagshot and Reading, within which tract immense damage was sustained.

Hoar-frost is only dew frozen immediately upon being formed. [DEW.]

SNOW, RED. The occasional occurrence of snow coloured red has for a long time created great interest, especially as the labours of the most eminent naturalists have not yet been able to determine precisely to what causes this singular phenomenon owes its origin. The chemist, the botanist, and the zoologist have in turn examined this extraordinary substance, and each has not failed to trace its source to objects belonging to his particular department of study.

It appears that this phenomenon did not escape the observant eye of Aristotle, and he mentions that living beings found in old snow had frequently a reddish colour, which he supposed they derived from the snow. (*Hist. Anim.*, v., cap. 19.) This observation of Aristotle's however does not appear to have excited any attention, and no other writer mentioned the occurrence of red snow till 1760, when Saussure discovered it on the Brevent and other mountains, but more especially on the Saint Bernard, where it existed in great abundance. He made some chemical analyses of this snow, and came to the conclusion that it was of vegetable origin, and probably consisted of grains of pollen mixed with the snow, such a cause having been known to discolour rain, producing what was called a *sulphur shower*. (De Sauss., *Voy.*, ii., p. 646.)

It was not however till the year 1819, when our countryman Captain Ross returned from his arctic expedition, that this substance was accurately examined with a view to the discovery of the origin of its peculiar colour. Whilst in Baffin's Bay, 75° 54′ N. lat. and 67° 15′ W. long., Captain Ross discovered a range of cliffs covered with snow of a crimson colour. The cliffs were about 600 feet high, and were coloured for the extent of eight miles. According to Captain Ross, the party he sent on shore 'found that the snow was penetrated even down to the rock, in many places to a depth of twelve feet, by the colouring matter, and that it had the appearance of having been a long time in that state.'

The colouring matter of the snow, in the first instance, excited the attention of chemists, and was first analyzed by Peschier, an Italian chemist, and subsequently by Wollaston and Thénard. They all obtained nearly the same results. The following is Peschier's analysis:—

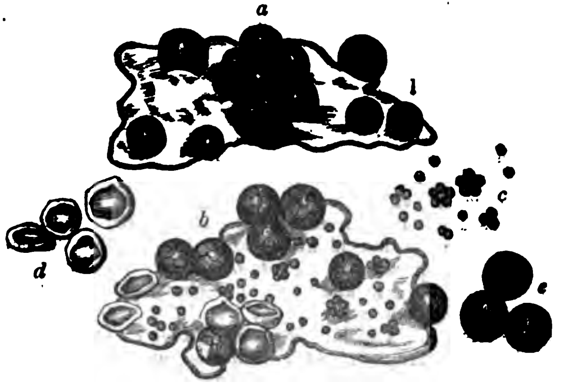
Siliceous matter . . .	65·5
Alumina	6·35
Peroxide of iron . .	21·35
Lime	1·17
Organic matter . . .	6·8
	100·0

But the labours of the chemist affording little that was satisfactory with regard to the nature of this substance, it was placed in the hands of the botanist, and in the Appendix to the account of Captain Ross's polar expedition, Mr. Robert Brown described the colouring-matter of the snow as a probable genus of the family of Algæ, and pointed out its resemblance to the *Tremella cruenta* of the English Botany. At the same time some of the red snow-water brought from Baffin's Bay was sent to Francis Bauer, who published the results of a very careful examination of it under the microscope, in the seventh volume of Brande's 'Journal of Science and Arts,' accompanied with several drawings. He found that the water contained a number of opaque or red spherical globules, which were heavier than the water, forming a sediment at the bottom of the bottle, and also of some transparent vesicular bodies which floated about in the fluid. On examining the red globules, he found them possessed of a pedicel resembling that of some species of *Uredo*, and regarded them as a species appertaining to this genus. He subsequently observed that many of the globules were attached to a gelatinous matrix presenting a cellular and articulated character. On exposing the water with the globules for some days to the air, he found that they lost their colour, and that on the sides of the vessel were developed new portions of the gelatinous matrix, which were covered with small globules, which he looked upon as young Uredos. He also found that on comparing the chemical analysis of the *Uredo fœtida* with that of the red snow, they in a great measure agreed, and hence he came to the conclusion that the colouring-matter of the red snow was a fungus belonging to the genus Uredo, and to which he gave the name *U. nivalis*.

But the question was not thus set at rest. In 1823 Baron Wrangel gave an account of a plant of a red colour, which he called *Lepraria Kermesina*, and supposed to be identical with the long-disputed *Byssus Iolithus* of Linnæus. This plant was obtained from the surface of white limestone rocks, forming over them a thin red crust, and was also found contained in the rain water remaining on the limestone. During the same year Professor Agardh of Lund, who had previously suggested the identity of this plant and that of red snow, received specimens of the Lepraria from Baron Wrangel, and also of the *Uredo nivalis* of Bauer from England, and he came to the conclusion, after a very minute examination, 'that the two plants were actually one and the same species.' 'We must conclude,' says Agardh (Greville's *Scottish Cryptog. Flora*, 'Protococcus,' p. 15), 'that the *Uredo nivalis* and the *Lepraria Kermesina* are alike called into existence by the gradual melting of the snow, and the intensity of light in their relative situations; and that they are neither washed down from the rocks, as some persons believe, nor are precipitated from the atmosphere, as might be inferred from the accounts transmitted by the Italians.'

The plants which Agardh had thus identified, he could not consider, with Bauer, a fungus, or, with Wrangel, a lichen, but, from its analogy to some of the Algæ, he placed it in his *Systema Algarum*, in that family under the name of *Protococcus nivalis*.

In 1825 the subject was taken up by Dr. Greville of Edinburgh. He had received specimens of the plant of red snow from the polar regions, and also from the island of Lismore in Scotland. From this latter situation it was sent to Dr. Greville by Captain Carmichael, who says:—'It occurs in abundance on the borders of the lakes of Lismore, spreading over the decayed reeds, leaves, &c. at the water's edge, but in greater perfection on the calcareous rocks within the reach of occasional inundation; and what is rather remarkable, it seems to thrive equally well whether immersed in water or exposed to the dry atmosphere. It is to be found more or less at all seasons of the year.' The specimens were immersed in water, and then examined by the microscope. In every instance Dr. Greville observed a gelatinous substratum varying in thickness, colourless, diffuse, without any border. Upon this gelatine rested a vast number of minute globules, the colour of fine garnets, exactly spherical, nearly opaque, yet very brilliant, and nearly equal in size. In the full-sized globules granules were detected in the interior, which gave to the surface a reticulated appearance. When mature, they burst, and the granules escaped, to the number of six, eight, or more, and the membrane only of the globule was left behind, buoyant and colourless. The globules or granules were never observed to move. Dr. Greville at first doubted the propriety of referring his plant to Agardh's genus Protococcus, as in his definition Agardh had not mentioned any gelatinous substratum, which was so evident in his own specimens. He however determined on keeping up the genus with an amended character. Agardh's definition of Protococcus is merely, 'plants with aggregated, not mucous globules.' To this Greville added, 'globules containing granules seated on a transparent gelatinous mass.'



Protococcus nivalis, Grev.: Glœococcus nivalis, Shut.: *a*, mature globules mixed with younger ones (1) lying on a mass of gelatine. *b*, mature globules: some burst, with granules lying on the gelatine. *c*, granules. *d*, globules after discharging their granules. *e*, full-sized globules.

In the same year Sir William Hooker, in the 'Appendix to Parry's Second Voyage to the Arctic Regions,' described, under the name of *Palmella nivalis*, the plant of the red snow collected in that expedition. Sir William Hooker referred the plant to this genus, as it only differed in its globules being seated on a gelatinous mass, instead of being immersed in it.

From this time to 1838 a variety of memoirs and observations upon the red snow were published, chiefly on the Continent, by Kunze, Unger, Martius, and other observers, but no new matter of any importance was elicited.

We now come to another and very important point in the history of red snow. Hitherto all the examinations had been made on old specimens of the red snow, most of them removed at a great distance from the spots on which they were originally found. In August, 1839, Mr. Shuttleworth, an English gentleman resident in Switzerland, being at Grimsel, understood that there was red snow in the neighbourhood, and having a microscope with him, made observations on the recently procured snow. Having melted the snow and placed some of the red matter on the field of the microscope, he was surprised at finding, instead of the immoveable globules of an Alga, an immense number of exceedingly active animalculæ, not of one form only, but of various sizes and forms. The results of this examination he has given in an interesting paper accompanied with drawings, in the 'Bibliothèque Universelle de Génève' for February, 1840. The following are the forms of Infusoria, which he was enabled to detect:—1. An animalcule belonging to Ehrenberg's genus *Astasia*, which he called *A. nivalis* 2. An animalcule, red inside, with a transparent carapace, belonging to the genus *Gyges*, *G. sanguineus*, Sh. 3. One much smaller than the other two, moving, but resembling the globules of Protococcus. 4. One belonging to the genus Volvox. Several other uncoloured species were found, but they were considered accidental. In addition to the animalcules, Mr. Shuttleworth found bodies which he took to be true plants, and referred to the *Protococcus nivalis* of Agardh and the *P. nebulosus* of Kützing.

In 1840 Professor Agassiz of Neufchâtel made a visit to the glacier of Aar, where, having taken with him a microscope, he had several opportunities of examining the red snow, and communicated a paper on this subject to the meeting of the British Association at Glasgow in the same year. He confirmed the researches of Shuttleworth, having found all the animalcules mentioned by him, and added four others to the list. Three of these are comparatively unimportant, but to the fourth great interest attaches, as he supposes that the ova of this animal are the globules which have been taken for a plant, and called Protococcus, &c. This animalcule is the *Philodina roseola* of Ehrenberg. It was found abundantly in the lower glacier of the Aar. It has a much higher organization than the other animalcules, and contains in its inside a number of red globules, which may be distinctly seen through its transparent body. These globules are its ova, which, on being deposited, precisely resemble the globules of Protococcus as figured by Shuttleworth and others.

In the various papers referred to above, no mention is made of snow of any other colour than red. Martius however, a naturalist who accompanied the French expedition to Spitzbergen, mentions having found in one instance a field of green snow. It was accompanied however with the Protococcus, giving a red colour. From many observations Martius arrived at the conclusion that the red globules of the green snow are identical with those of the red snow, and that the green snow (*Protococcus viridis*) and the red (*P. nivalis*) are one and the same plant, only in different stages of development, but that it is difficult to state which is the original. The late Professor Meyen (Taylor's *Ann. Nat. Hist.*, August, 1841) remarks on this statement, that these Protococci are not plants, but animals, the *Euglena sanguinea* and *E. viridis* of Ehrenberg. The reason of their being so often taken for plants is, that they naturally pass a great portion of their existence in a passive state, only occasionally under favourable circumstances starting into activity. When they do this, their spherical form is changed, and they become the elongated beings described and figured by Ehrenberg.

From this sketch of our present knowledge on this subject, it will be found that a wide field still remains open for observation, which will have for its object not so much the determining the nature of the colouring-matter of the red snow, as the ascertaining the laws that regulate organic life in its simpliest forms.

SNOWDON. [Caernarvonshire.]

SNUFF. [Tobacco.]

SNYDERS. [Sneyders.]

SOANE, SIR JOHN, was a remarkable instance of a career commenced in poverty and obscurity, and terminating in opulence and celebrity. Of his origin little is known, except that his father was a bricklayer or petty builder, and he himself born at Reading, September 10th, 1753. At an early age he was taken into the office of Dance, the architect (in whose family his sister was also a servant), first merely as errand-boy or attendant, but afterwards he was placed on the footing of a pupil. He subsequently entered that of Holland, another eminent architect, where he remained up to the time of his being sent to Italy for three years as travelling student of the Royal Academy, at the recommendation of Sir W. Chambers, in consequence of the talent displayed by him in a design for a triumphal bridge, which obtained the gold medal. It was perhaps a fortunate circumstance for him that an octavo volume of designs for temples, baths, &c., previously prepared by him, was not published till 1778, the year after he quitted England, since, so far from displaying any talent, it indicates the most wretched taste. No wonder, then, that at a later period the author should have bought up every copy he could meet with, more especially as his name is there printed *Soan*, which name itself, we have been assured upon excellent authority, was an improvement upon the original one of Swan. These designs exhibit the germs of many of his after peculiarities—of those whims and freaks, together with that littleness of manner, from which he could never totally divest himself even in his best works.

During his stay in Italy (1777-1780) he made good use of his time, studying antient buildings, particularly those arrangements of plan and picturesque combinations which occur in Roman Thermæ, or imperial baths. He also made original designs, among which were those for a British Senate House and Royal Palace. While in Italy he became acquainted with Mr. Thomas Pitt, afterwards Lord Camelford, to whose influence he is said to have been mainly indebted for his appointment as architect of the Bank of England, on the death of Sir Robert Taylor. Very soon after his return to England, he executed several private residences and country-seats in the counties of Norfolk, Suffolk, &c., the plans and elevations of which he published in a folio volume, 1788; but except that there are some good points in the former, and that they manifest great attention to convenience, they display very little invention or taste. On obtaining the lucrative appointment to the Bank, he married Miss Smith, the niece of Mr. George Wyatt, a wealthy builder in the city, whose death soon put him into possession of a very considerable fortune in right of his wife. Other advantageous appointments followed: that of clerk of the works to St. James's Palace, 1791; of architect to the Woods and Forests, 1795; and of surveyor to Chelsea Hospital, 1807; besides that of professor of architecture at the Royal Academy in 1806. Numerous commissions for both public and private buildings, in addition to his official engagements, kept him in constant occupation for many years; and some of them furnished him with more favourable opportunities than were afforded to almost any other architect of that day. Yet notwithstanding his undeniable attachment to his profession, and his industrious application to it, the majority of the buildings that he executed are little better than so many experimental attempts at originality, with considerable merits in parts, but more or less failures upon the whole. With all his apparent fertility of invention, they exhibit sameness of ideas, and those by no means of the happiest kind; while, with a good deal of study in some respects, they betray great neglect of it in others. Never was architect more unequal in his taste, not only at different times, but in the same building, for not a single building among all that he executed or designed is consistently finished up throughout. On the contrary, striking beauties and striking defects are so oddly mixed up in several of them, that it is hardly possible to say which predominate. Even in mere designs, where he was at liberty to exercise his fancy without restraint, there invariably occurs something most offensively mean or extravagantly uncouth and absurd. Proofs of this assertion are furnished by the folio of 'Public and Private Buildings,' published by him in 1828, and which was intended to be in some measure a record of his long professional career, although the plates are wretchedly executed; and nearly the same may be said of those in the 'Description' of his own house and museum, a quarto volume of some bulk, printed by him in 1832 for private distribution and presents. In both instances he was most niggardly towards himself, yet in the latter not altogether free at the same time from vanity. The same may be said with regard to his house itself, the exterior of which is by no means such a specimen of taste as an architect would be ambitious of bequeathing to posterity, though, taken altogether, the building and its contents form a monument sufficiently expressive of the character of the man—a strange jumble of insignificance and ostentation, of parsimony and extravagance, of ingenious contrivance in some parts, and of the most miserable conceits in others. Such as it is however, it was for years his favourite amusement, even from the time when he commenced it in 1812; and as he seems to have grudged no cost in making repeated alterations, it is singular, more especially considering the purpose to which he ultimately destined it, that he should not have rebuilt the front, and that of the house on each side of it (also his own property), so as to have produced a uniform façade of tolerably imposing aspect, even had he not added those houses to his own residence and museum.*

In 1833 he obtained an act of parliament vesting his museum, library, &c. in trustees, for the use of the public after his death. Availing himself of the power given by the act of parliament to make such regulations as he afterwards pleased, he thought proper to limit the time of the 'Soanean Museum' being opened to the public to two days in each week for three months in the year; when it can be visited only by tickets, and those are given in a very limited number for each day. On many occasions he indulged in ostentatious profusion, in donations to public bodies, &c., such as that of 1000*l.* to the fund for the Duke of York's monument, and similar sums to the British Institution, &c. Contrasted with his general economy—with the parsimony displayed in bringing out his own publications, it would indeed seem that such fits of expansive liberality were in some measure prompted by the desire of showing that it was not his love of money which prevented him from assisting his son, who had certainly some natural claims upon him. Whatever may have been the real cause, it is notorious that a most violent rupture had existed for years between Sir John and his only surviving son; nor could any reconciliation between them be effected—a circumstance which throws some light upon much that would otherwise be inexplicable in Sir John's character, including, among other points of it, his refusal of a baronetcy, and his determination to accept only simple knighthood (1831). His alienation from his son induced many to look forward to considerable legacies from him; but if he ever encouraged any such expectations, he certainly did not realise them. Advanced as he was in years, he had not fallen into dotage: both his faculties and health remained unimpaired to the last, when, with scarcely a day's previous indisposition, he died at his house in Lincoln's Inn Fields, January 20, 1837.

---

* An account of the building and its chief contents will be found in the 'Penny Magazine,' No. 363.

Eminently successful as he was throughout life, Sir J. Soane was quite as much to be pitied as to be envied, and he is a striking lesson to the world that prosperity may be bitter to the man, and opportunity sometimes worse than useless to the artist. As an architect, he did not, with the exception of the Bank—and there only in bits—accomplish anything of sterling merit. He had great ingenuity and contrivance, and was often singularly happy in those picturesque and perspective effects which depend upon arrangement and plan, and on the mode of admitting light [SKYLIGHT] in interiors, but he never fully wrought up his ideas, and often left them quite crude sketchings. His attempts at Gothic were almost beneath contempt. On the other hand, he is entitled to no small praise as being, if not the inventor of a new order, the first to apply and naturalise in this country the Tivoli Corinthian, employed by him at the Bank, the north-west corner of which structure so infinitely surpasses anything that he ever executed or designed, that his reputation would stand higher if that were all that he ever did.

SOAP. This term originally meant the compounds derived from the union between fatty bodies and the alkalis potash and soda; and although it is still usually thus limited in its meaning, it has nevertheless been extended to compounds of oleaginous bodies with some earthy and metallic bodies, having but few properties in common with soap properly so called.

It has been found by Chevreul that different varieties of fatty matter consist chiefly of two kinds: one hard, to which he gave the name of *stearin;* and the other soft, which he termed *olein*. He also discovered that stearin is composed of stearic acid and a peculiar principle which on account of its sweet taste he named *glycerin*, and it was further proved by his experiments that olein consists of oleic acid and glycerin; stearin is therefore a stearate of glycerin, and olein an oleate of the same substance.

When, in the manufacture of soap, an alkali (soda for example) is heated with tallow, the soda gradually dislodges the glycerin from combination with the stearic and oleic acids, and by combining with them forms soap, or in other words a compound of stearate and oleate of soda, and the glycerin remains in solution.

Glycerin was first noticed by Scheele, and is obtained in the greatest quantity and purity by saponifying olive-oil with oxide of lead mixed with a little water. This is the well-known process of preparing what is called diachylon or lead plaster, which is in fact a metallic soap, or a margarate and oleate of lead. The glycerin, which remains in combination with the water, is purified from oxide of lead by means of hydrosulphuric acid, and by cautious evaporation is obtained as a syrupy liquid of a decidedly sweet taste.

The principal kinds of soap manufactured in England are *white* or *curd soap*, made chiefly from tallow and soda, but for some particular purposes olive-oil and soda; *yellow soap*, composed of tallow, resin, and soda, to which some palm-oil is occasionally added; and *mottled soap*, made from tallow, kitchen stuff, and soda; the mottled appearance is given to this soap by dispersing the lees through it towards the end of the operation. There is also a *brown soap*, made from palm-oil and resin. This oil contains *palmitic acid*.

Soft Soap is generally prepared from fish-oil and potash, and it may be here remarked that while hard soaps are prepared with the alkali soda, the alkali potash always enters into the composition of soft soaps. Besides the fatty matters mentioned, linseed oil and cocoa-nut oil are occasionally used, and formerly *barilla*, an impure carbonate of soda prepared chiefly in Spain, was employed in England, while kelp (or incinerated sea-weed) was and still is to a certain extent used in Scotland. These changes have been effected by abolishing the duty on common salt, from which a very pure carbonate of soda is now made, and when treated with lime its carbonic acid is removed, and being thus rendered caustic, its solution is used in the manufacture; it is to this improvement in the nature of the alkali now used, and its freedom from sulphur, that the nuisance of soap-lees waggons passing through London is got rid of.

The harder or soda soaps are prepared by boiling the fatty matter with an aqueous solution of caustic soda, that is, of carbonate of soda deprived of its carbonic acid by means of lime; when combination has taken place, or in other words, when the soap is formed, a quantity of common salt is added, which, dissolving in the lees, increases their density, and the soap then floats on the surface of the liquid. The fire being then extinguished, the semifluid soap, after a proper interval, but while yet hot, is removed from the lees and put into frames of wood or iron, where it remains until it has become cold and hard, when it is cut into bars for sale. In making soft soap no lees are separated, the whole of the solution of potash, which is made strong on that account, being combined with the oily matter used.

In the opinion of Dr. Thomson, and according to his analysis, both white and yellow soda-soaps are subsalts consisting of one equivalent of fatty acids and two equivalents of soda, combined with variable quantities of water. The different analyses of soap which are on record can hardly be considered as satisfactory, for not only does the equivalent of the acid vary according to the fatty substance producing it, but the quantity of water is very variable. Thus a sample of yellow soap which had been left during nine days exposed to the air of a room with a stove, gave Dr. Thomson—

Oily acids . .	75·9
Soda . . .	10·6
Water . . .	13·5
	100·

Another specimen of the same kind of soap, made by a different manufacturer, exposed 34 days to the air in a room with a stove, yielded the same chemist—

Oily acids . .	80·6
Soda . . .	13·7
Water . . .	5·7
	100·

The excess of water in the former is evidently owing to its having been dried for a shorter time; but Dr. Thomson considers both these specimens as composed of one equivalent of acid and two equivalents of soda, and consequently the acids must be differently constituted, for their saturating powers are as 14 to 17 very nearly.

Braconnot, Thénard, and Pelletier, respectively, analysed Marseilles soap (1), marbled soap (2), and common French soap (3); the following are the results:—

	(1)	(2)	(3)
Oily acids .	68·40	64·	60·94
Soda . .	10·24	6·	8·56
Water . .	21·36	30·	30·50
	100·	100·	100·

In vegetable fat oils, olive-oil for example, the glycerin is combined with margaric and oleic acids, forming margarate and oleate of glycerin, and consequently soap made with this oil is a margarate and oleate of soda, instead of a stearate and oleate of this base.

The soaps which have the alkalis for their bases are soluble in water, though the solution is in general milky; they are also soluble in alcohol, and the solution is used frequently as a test of what is called the *hardness* of water; on the addition of the solution to a water containing earthy salts, as indeed spring and river water almost always do, a white curdy deposit is formed; this is an earthy soap, formed, in the case of sulphate of lime, by double decomposition, the sulphuric acid combining with the alkali and the fatty acids with the lime, thus forming an earthy soap, which, being insoluble in water, is precipitated. Bi-carbonate of lime produces a corresponding effect, and as the quantity of this in river water is generally much larger than that of sulphate of lime, the principal effect produced is owing to it.

Acids also decompose soaps, and though the effect is apparently similar, yet it is in reality different; thus when sulphuric acid is added to soap, a white precipitate is formed, but this is merely the fatty acid which the soap contained, and shows the change which the fat employed has undergone; it is either stearic, oleic, or margaric acid, &c., or a mixture of two or more of them; sulphate of soda remains in solution when a soda soap has been thus decomposed.

It is well known that there are certain preparations used in medicine under the name of emulsions and liniments, which are obtained by merely agitating either ammonia, potash, soda, or lime-water with oil: the first of these is an ammoniacal soap, the second and third are imperfect alkaline soaps, and the fourth is an earthy soap, and barytes and strontia-water form compounds analogous to it; these earthy soaps, as has been already remarked, are insoluble in water, or nearly so. Metallic soaps are formed by heating certain metallic oxides, as those of lead, mercury, and bismuth, with fatty matter; glycerin is separated, as has already been mentioned, and the metallic soaps formed are insoluble in water; the only soap of this kind extensively employed is that of oxide of lead, which is largely used under the name of diachylon, or lead plaster.

Soap Trade.—The Soap Manufacture is one of considerable importance, which contributes a million sterling to the revenue, and creates an annual demand for above 60,000 tons of tallow, 12,000 tons of palm oil, and 20,000 tons of rough turpentine as the raw material. From the Excise returns we ascertain that the total quantity of soap made in Great Britain in 1840 was 77,123 tons; that 4516 tons were exported to Ireland in the same year; 9379 tons to foreign parts; and 8072 tons were used in the various branches of our textile manufactures. The domestic consumption of the population of Great Britain was 58,593 tons. The principal seats of the soap manufacture in England are Liverpool and Runcorn, London, Brentford, Bristol, and Hull. In 1840 nearly three-fourths of the total quantities of soap were made at these places:—

	Hard.	Soft.
Liverpool . .	46,103,782 lbs.	5,643,542 lbs.
Runcorn . .	12,339,986	
London . .	37,548,574	758,468
Brentford . .	5,071,543	
Bristol . .	7,813,721	287,097
Hull . .	4,825,126	696,126

There are manufactories of considerable extent at Bromsgrove, Newcastle, Gateshead, Warrington, and Plymouth. In Scotland two-thirds of the total quantity of soap are made at Glasgow and Leith. In 1835 it was estimated that abou 1200 tons of soap were made at Belfast; 600 at Londonderry about 700 at Limerick and in the neighbourhood; and about 300 tons at Cork. The consumption of Ireland in 1835 was between 10,000 and 11,000 tons, one-half of which was imported from England, the remainder being of domestic manufacture.

In 1711 an Excise duty of 1*d.* per lb. was first imposed on all soap made in Great Britain, which was raised in 1713 to 1½*d.* per lb. In 1782 the duty was again increased, and a distinction was for the first time made between hard and soft soap, the duty on the former being 2½*d.*, and on the latter 1¾*d.* per lb. In 1816 another increase of duty took place, and hard soap was subjected to a duty of 3*d.* per lb. Since May 31, 1833, the duty has been 1½*d.* per lb. on hard soap, and 1*d.* per lb. on soft. The soap duty has not yet been extended to Ireland. In 1785, when the quantity of soap made in Great Britain was under 40,000,000 lbs., the number of manufacturers was above 900; but in 1815 the number had diminished to 447; in 1830 to 309; and in 1839 to 196, of whom 177 were in England, and 19 in Scotland. In 1832 one-twentieth part of the soap duty was paid by a single house. The number of manufacturers in Ireland has decreased from 214 in 1835, to 183 in 1839. Every manufacturer of soap, both in Great Britain and Ireland, is required to take out an annual licence, which costs 4*l.*

The interference of the Excise in the manufacture of soap was, until recently, exceedingly arbitrary and vexatious; but in the 'Seventeenth Report of the Commissioners of Excise Inquiry' (Soap), dated Dec., 1835, the discontinuance of the system of survey which then existed was recommended. The Act which at present regulates the manufacture is the 3 and 4 Vic., c. 49, passed in August, 1840. It repealed seventeen other Acts, so far as they concerned the making of soap. The article may now be made in any way or of any material which the manufacturer thinks most judicious, as the Excise does not interfere with the process of manufacture.

The quantity of soap made in Great Britain at the under-mentioned periods was as follows:—

Year.	Hard.	Soft.
1791	43,123,578 lbs.	3,842,136 lbs.
1601	52,427,791	3,199,609
1811	70,596,590	5,509,677
1821	89,168,834	7,758,938
1831	109,080,944	9,641,007

The quantity made from 1832 to 1840 inclusive, has been as follows:—

Year.	Hard.	Soft.	Duty.
1831	109,080,944 lbs.	9,641,907 lbs.	£1,433,817
1832	119,503,092	10,350,703	1,569,262
1833	138,170,787	11,731,156	1,174,421
1834	144,344,043	10,401,281	945,489
1835	148,806,207	12,103,109	980,468
1836	146,539,210	13,358,894	971,523
1837	140,822,611	11,794,834	929,286
1838	158,573,948	13,549,998	1,047.545
1839	155,585,756	14,874,963	1,034,390
1840	159,220,068	13,535,856	1,079,448

The quantity made in England and Scotland in 1840 separately, was,—

	Hard.	Soft.
England .	148,803,574 lbs.	8,917,668 lbs.
Scotland .	10,416,494	4,618,188

The quantity used by manufacturers, on which an allowance is made, has varied so little during the last few years, that it will be sufficient to give the quantities used in each class of manufactures for 1840:—

Allowance to Manufacturers of	Hard.	Soft.	Allowance.
Woollens .	6,021,114 lbs.	6,611,178 lbs.	£42,519
Linens . .	6,798	1,325	47
Silk . .	1,578,483	1,286,531	14,574
Flax or Cotton	1,965,414	611,859	14,514
Total .	9,571,809	8,510,893	£71,955

In consequence of the increase of duty in 1816, the price of soap advanced to 82*l.* per ton in the two following years; but in 1821-2-3, owing to the low price of the raw materials, the price fell to 68*l.*; and from this period it gradually declined to 52*l.* in 1830. In 1834, after the reduction of the duty in the previous year, the price was 47*l.*; and at present it is 50*l.* per ton. The old duty of 3*d.* per lb. discouraged cleanliness, and led to disease and its attendant evils. The reduction to 1½*d.* has not only been successful as a financial measure, but has conferred the greatest benefit on the poorer classes, who now consume a better and therefore more economical soap than before. In 1834 the consumption of Great Britain was estimated at 6¾ lbs. per head, and though it has not yet reached 7 lbs., the proportion of soap of better qualities now consumed has increased. As the Excise allowance of one-tenth in favour of the manufacturer ceased in May, 1833, it is necessary to add one-ninth to the quantity charged previous to that year, in order to institute a comparison between the quantities made before and after the reduction of duty. The illicit manufacture of soap is still carried on, but not to its former extent. The time has probably arrived when the duty might be reduced to 1*d.* per lb. on hard soap, and ½*d.* per lb. on soft, and at the same time these duties might be charged on soap consumed in Ireland. At present a drawback is allowed on all soap exported to Ireland, and fraudulent practices take place in both kingdoms in consequence of this arrangement, and of the article not being subject to duty in Ireland. The quantity of soap exported to Ireland from Great Britain in each of the years under-mentioned was,—

	Hard.	Soft.	Drawback.
1834	11,258,526 lbs.	33,604 lbs.	£76,595
1835	12,459,747	8,458	77,966
1836	11,086,072	86,326	69,647
1837	10,040,747	98,018	63,163
1838	10,240,399	195,328	64,816
1839	9,375,461	161,216	59,268
1840	9,930,108	187,244	64,457

In 1840 Ireland exported 708,126 lbs. of soap to England, on which duty was paid; but it is stated that a large quantity of Irish soap is annually smuggled into England.

A small quantity of foreign soap is imported: in 1840, the importation amounted to 729 cwts., of which 398 cwts. were re-exported.

The exportation of English soap to foreign parts has been increasing within the last few years. This may partly be attributed to the more liberal character of the present Excise regulations for the manufacture of soap, which do not render it necessary to conform to certain processes, but permit the manufacturer to make experiments and improvements, and thus enable him to unite cheapness and excellence. Formerly, though obtaining the raw material at a lower rate than the manufacturers of other countries, he was unable to compete with them in foreign markets. A few years ago an English manufacturer brought soap-makers to London from Marseille, where excellent soap is made; but it was found that these men could not pursue the processes to which they had been accustomed, in consequence of the Excise restrictions. The countries to which soap is exported are not distinguished in the public accounts separately from candles; but the gross quantities exported in each of the following years were as under:—

	Hard.	Soft.	Drawback.
1834	12,459,747 lbs.	8,458 lbs.	£77,966
1835	12,987,365	8,954	81,209
1836	13,548,895	8,239	84,716
1837	11,119,515	13,274	69,552
1838	16,175,681	7,713	101,130
1839	21,148,724	9,231	132,218
1840	22,004,075	7,008	140,745

SOAP, *Medical Uses of*. In pharmacy and medicine the term soap is applied to combinations not only of oily and fatty matters with the alkalis soda or potash, but also with the volatile alkali (ammonia), lime (an alkaline earth), and metallic oxides, especially oxide of lead; likewise to solutions of resins in liquid potash, such as guaiacin [GUAIACUM], called therefore *Sapo guaiacinus*. The combinations of oils with ammonia or lime, being very thin, are generally termed *liniments;* the common one of hartshorn with oil is an example of the former, while oil and lime-water constitute the common application to burns termed Carron oil, from its frequent employment in the great iron-works at that place. The combination of oil with oxide of lead is generally termed a *plaster*. Some combinations of a volatile or fixed oil with an acid are sometimes called soaps, such as that of oil of turpentine with hydrochloric acid (artificial camphor), or of almond oil with sulphuric acid (*Sapo acidus*): but these are scarcely entitled to be so regarded. Among continental pharmaceutists, many cerates and mixtures of metallic salts with common soap are termed *soaps*, but they are more correctly called plasters.

Of soaps properly so called there are two kinds, the *soluble* and the *insoluble*. To the first belong the soaps of soda, potash, and ammonia; to the latter, the combinations with lime and lead; but even the soaps of soda and potash are only perfectly soluble in *soft* water, for *hard* waters, especially those abounding in salts of lime, decompose the original union and form an insoluble soap.

Soaps are further divided into *hard*, when soda is employed in their formation, and into *soft*, when potash is used: each of these presents some varieties according to the nature of the ingredients associated with them in the manufacture. A soap is sometimes prepared in which both alkalis are used, but it belongs to the class of soft soaps.

Of hard soaps, the fine kinds are made with soda and the purer vegetable oils, and the inferior kinds with animal oils or the coarser vegetable oils or resins. White soda soap is prepared with caustic soda and olive oil (in Spain), or with almond oil (in France). In its purest state it is called *medicinal* soap; in a less pure state, it is called Alicant, Venice, or Spanish soap. The Castile or marbled soap has this appearance communicated to it by sulphate of iron and red oxide of iron being added and stirred through it when the soap is nearly made. These are impurities which render it less fit for medical use in many cases than the white soap. When properly prepared, white soap should neither make an oily mark on paper nor have a burning alkaline taste. It should be perfectly soluble in pure water and in alcohol. Its alcoholic solution is the ordinary chemical test of the purity or softness of water. When an alcoholic solution is evaporated, the residuum constitutes *transparent* soap.

White soda soap is the only one which should be used internally. It is chiefly employed to form pills, which are gently aperient and antacid; their power in this latter respect is greatly increased by the addition of exsiccated carbonate of soda: this combination is of great utility in the treatment of gouty and calculous disorders, when an alkali is indicated. In other cases it is used to prevent the pills becoming hard and insoluble. White soap furnishes a ready antidote to the strong mineral acids, in cases of poisoning by any of these.

Soft soap is directed by the London Pharmacopœia to be made with potash and olive oil, but this order is seldom complied with. The soft soap above mentioned, in which both soda and potash are used, is made with olive and other oils and tallow. It is employed only to form the compound sulphur ointment. Common soft soap is made with train or cod-fish oil and tallow; from its ordinary appearance, it is sometimes called *black* soap. If a slight excess of alkali exist, its detergent powers are thereby heightened. Soft soap is of great service in many cutaneous diseases, several of which, when in a mild form, may be cured by it alone. It may be rendered still more useful by the addition of sulphur or sulphuret of potash (liver of sulphur). In the treatment of scabies, porrigo (ring-worm), and such diseases, this application is far superior to the ointments and other greasy compounds commonly employed, which increase the filth or uncleanness by which the disease is aggravated. It is also much cheaper.

SOAP-BERRY. [SAPINDUS.]

SOAPSTONE. [STEATITE.]

SOAR, River. [LEICESTERSHIRE.]

SOBIESKI, JOHN, son of James Sobieski, a Polish noble, castellan of Cracow, and a distinguished warrior, was born in 1629, in the district of Olesko, in the present Gallicia, or Austrian Poland, near the sources of the Bug and the Bog, on the feudal estate of his ancestors. He was carefully brought up under the superintendence of his father; he completed his education at Paris, served for some time in the mousquetaires, or body-guards, of Louis XIV.; and travelled with his brother Mark in France, Italy, and Turkey. The young Sobieskis were staying at Constantinople when the news of a fearful insurrection of the Cossacks, who were joined by a multitude of Polish serfs, made them hasten home. They overran Polish Russia, and destroyed many people, especially priests and Jews. Out of hatred of Catholic intolerance, they obliged all the monks and nuns whom they could seize to marry each other under pain of death: the khan of the Tartars had also espoused their cause. The king of Poland, John Casimir, a weak prince, harassed by the proud independence of the magnates, opposed but a feeble resistance to the devastating torrent. At last the insurgents met with a check under the walls of Zamosc, and a peace was made with the Cossacks, but it was soon broken; and the Poles suffered many reverses, in one of which Mark Sobieski was killed by the hands of the Tartars. His brother John concontinued to serve in the army with distinction against the Cossacks and Tartars, as well as against the Swedes and Russians; for at that time Poland was assailed on every side, and nearly ceased to exist as a nation. In 1660 John Sobieski gained a victory over the Muscovite general Sheremetoff; and for several years after he continued to fight with success against both Muscovites and Tartars, in consequence of which he was raised to the dignities of grand marshal and grand hetman of Poland.

In 1667 Poland was invaded by 100,000 Cossacks and Tartars. Sobieski marched to meet them at the head of only 20,000 men. At first he kept on the defensive, in order to weary out the assailants; but seizing a favourable moment, he sallied out of his entrenchments, routed the enemy, and compelled them to sue for peace. Poland was thus again saved from destruction. In 1671 he routed the Turks, who were led by Sultan Mahomet IV.; and some time after he took from them the fortress of Kotzim, till then considered impregnable. On the death of king Michael Wisniowietski, in 1674, the diet assembled to name a successor. Several candidates appeared: Charles of Lorraine was countenanced by Austria, and Philip of Neuburg by Louis XIV. Sobieski himself proposed the Prince of Condé; but the palatine Stanislaus Jablonowski having stated in an eloquent speech his objections to those candidates, concluded by saying, 'Let a Pole reign over Poland,' and he proposed the conqueror of Kotzim, John Sobieski. The effect was electrical; all the Polish and Lithuanian nobles shouted 'Long live John III.,' and John was proclaimed king. The country was in a state of exhaustion: the regular army consisted of only a few thousand men, the treasury was empty, and the crown jewels were pledged to the Jews. Sobieski redeemed the jewels, raised several regiments at his own expense, and then marched to oppose the Turks, who were advancing with a large force. He was obliged to shut himself up within Lemberg, which was speedily invested; but taking advantage of a heavy fall of snow which a high wind blew in the face of the Turks, he issued from the town with a small but devoted band, and the cry of 'Christ for ever,' and completely routed the besiegers. A fresh Turkish army came, at the head of which was the brave pasha of Damascus, who had acquired in war the surname of 'Shaïtan,' or 'the Devil,' accompanied by a formidable artillery Sobieski entrenched himself, with about 10,000 men, between two villages on the banks of the Dniester, and there sustained for twenty days the attacks of the enemy and a continued cannonade. At last, on the 14th October, 1676, the Polish king issued out of his entrenchments with his few remaining followers, whom he drew up in order of battle. The Turks, who numbered between two and three hundred thousand, were astounded, and they began to cry out that it could not be a mere man who risked such odds, that Sobieski must be a wizard, and that it was useless to contend with the wizard king. The 'Shaïtan' pasha was superior to such superstition; but he knew that the 'pospolite,' or *levy en masse*, of the kingdom, was at hand; and he offered Sobieski an honourable peace, which was accepted.

A few years of peace followed, at least external peace, for Poland was seldom if ever at peace within herself. The king's authority was set at nought by the nobles, who would not listen to reform or redress of grievances, and by their veto dissolved every diet in which the attempt was made. In his own family, Sobieski was teazed and tormented by his wife, a French woman by birth, an ambitious domineering woman, whom he had not the heart to restrain. But a new storm was gathering to draw out Sobieski's energies. This time the attack of the Turks was directed against Austria. The Turks were countenanced by Louis XIV., the 'most Christian king' of France, who wished to humble the house of Austria to the dust. A most formidable army, commanded by the grand-vizier Kara Mustapha, after sweeping over Hungary, in the month of July, 1683, invested Vienna, from which the emperor Leopold and his family had fled. Germany, Italy, all Europe, were in consternation. All eyes were turned towards Sobieski. The Polish king had no reason to love Austria, but, as a Christian prince, he determined to defend the Eastern bulwark of Christian Europe against the dreaded Ottomans. Having assembled at Cracow an army of 16,000 men, he marched to the banks of the Danube, and was met on the way by the duke of Lorraine and other German princes with their contingents, and at length found himself at the head of 70,000 men. Having crossed the Danube, he ascended the ridge of the Kalemberg, which overlooks the Austrian capital. On the morning of the 11th of September, the allied army, reaching the summit of the ridge, saw before them the widespread tents of the Ottoman host in the plain below. On the following day Sobieski's army descended the mountain to attack the vizier, and, after a hard struggle, drove the Turks into their entrenchments, which were fortified with great care, and appeared even to Sobieski too strong to be forced. It was five in the afternoon, and he had given up all idea of attack for that day, when he spied the vizier sitting at the entrance of his splendid tent, tranquilly sipping coffee, with his two sons beside him. This composure provoked Sobieski, and he gave orders for an immediate attack. The Polish hussars cleared the ditch and rode into the camp, the infantry followed, and, after a rude shock, the Ottomans were driven in a confused mass towards the tent of the vizier. Kara Mustapha attempted to make a stand, but in vain: at last he fled with the rest; and Sobieski remained master of the whole camp, artillery, baggage, and all. On the news of the deliverance of Vienna, all Europe resounded with acclamations. Sobieski pursued the Turks into Hungary, and he experienced a defeat at Parany, where he was exposed to great personal danger; but he defeated them again at Strigonia, and at last cleared the whole country of them.

Returning to his own kingdom, he found himself again involved in domestic troubles. Every attempt that he had made for the regeneration of Poland was thwarted by some of the turbulent nobles by means of the veto which the constitution gave to each. Sobieski was even called a tyrant and traitor because he fretted at his own impotence to do good to his country. At the close of the stormy diet of 1688, he addressed the assembly in a sad and almost prophetic tone: 'What will be one day the surprise of posterity to see that after being elevated to such a height of glory, we have suffered our country to fall into the gulf of ruin; to fall, alas! for ever. For myself, I may from time to time have gained her battles; but I am powerless to save her. I can do no more than leave the future of my beloved land, not to destiny, for I am a Christian, but to God, the High and Mighty. You know that I am no believer in auguries; I do not seek after oracles; I place no reliance on dreams. It is not from auguries, but from faith, that I learn that the decrees of Providence cannot fail of accomplishment. The power and justice of Him by whom the universe is governed regulate the destiny of states. Wherever during the lifetime of the prince crime is attempted with impunity, where altar is raised against altar, and strange gods followed under the very eye of the true one, there the vengeance of the Most High has already begun his work.'

Sobieski was an accomplished scholar, and very fond of learning: he acquired the Spanish language at an advanced age, amidst the cares of his kingdom.

In 1696 Sobieski was suddenly taken ill, and died, on Corpus Christi day, and with him Polish greatness may be said to have expired. He was the last of its really patriot kings.

(*Lettres du Roi de Pologne Jean Sobieski*, publiées par De Salvandy, Paris, 1826; *Histoire de Pologne*, by the same author.)

SOCCAGE (more correctly *socage*) in its original signification, according to Bracton, Littleton, and others, is service rendered by a tenant to his lord by the soc (soke) or ploughshare. The term was afterwards extended to all services rendered which were of an ignoble or nonmilitary character, and were fixed in their nature and quality. The certainty of the services to be rendered distinguished socage tenure from tenure in chivalry, or by knight's service, on the one hand, and from tenure in pure villenage by arbitrary services, on the other; and therefore Littleton says, 'A man may hold of his lord by fealty [Fealty] only; and such tenure is a tenure in socage; for every tenure which is not a tenure in chivalry is a tenure in socage.' By some modern writers 'socage' is derived from 'soke,' a term importing a district having a particular jurisdiction. But there is no ground for supposing either that all lands within a 'soke' were held by one species of tenure, or that socage tenure was limited to such districts.

Socage is said by old writers to be of three kinds: socage in frank tenure; socage in antient tenure; and socage in base tenure. (*Old Tenures*, 125, 126; *Old Natura Brevium*, title *Garde*.) The second and third kinds are now called respectively tenure in antient demesne and copyhold tenure. The first kind is called free and common socage, to distinguish it from the two others, though as the term socage has long ceased to be applied to the latter, socage and free and common socage now mean one and the same thing.

Land denominated in Domesday 'reveland' is supposed by Lord Coke to be land holden by socage tenure. It was probably so called as being land from which the Reeve (the collector of the king's or lord's dues within the district) received rent in money, or in produce, in commutation for agricultural services.

Every tenure which had the same incidents as socage, properly so called, as derived from service of the plough, appears to have fallen under the same denomination. We however find the word soke used at a very early period for rent; and it is possible that the term socage may be derived, not immediately from the ploughshare, but from this secondary or derivative sense of the term soke.

Besides fealty, which the tenant in socage, like every other tenant, is bound to do when required, the tenant in socage, or, as he was formerly called, the socager or sockman, is bound to give his attendance at his lord's court-baron, if the lord holds a court-baron either for a manor [Manor] or for a seigniory in gross. This tenure is also still subject to a payment amounting to one year's additional rent upon the death of the tenant; which payment is sometimes called relief [Relief], from one of a similar nature due to the lord upon the death of a tenant by knight's service on the reverter of land to the lord.

Both forfeiture and escheat are incident to tenure in socage, as they were also to tenure by knight's service. [Escheat.] In that species of socage tenure which is called gavelkind [Gavelkind], and which exists in some parts of Kent, there is no forfeiture.

Wardship is also incident to this tenure. But this incident is not, as formerly in knight's service, a benefit given to the lord, but a burthen imposed on the infant's next friend of full age, who must however be a person not capable of inheriting the estate upon his young kinsman's death. So anxious was the law to avoid entrusting the person and the property of the infant to the custody of a party who might benefit by his death, that we find that in the thirteenth century even illegitimate relations might not be guardians in socage. (Bracton, 88, 'Wardship.'

By the mutual consent of lord and tenant, socage tenure might have been converted into tenure by knight's service, or tenure by knight's service into tenure in socage. It sometimes happened that the tenant held by knight's service of a lord who held in socage; and, more frequently, that a tenant held in socage of a lord who held by knight's service.

In particular districts some of the incidents of tenure by knight's service were by custom annexed to the tenure in socage. Thus in the diocese of Winchester the lord claimed the wardship and marriage of his socagers.

Before the abolition of feudal burthens by the Commonwealth, confirmed upon the Restoration by 12 Car. II., c. 24, tenants in socage were bound to pay 20*s.* upon every 20*l.* of annual value, as an aid for making the lord's son a knight, and the same for marrying the lord's eldest daughter.

This tenure was also subject to the payment of fines upon alienations.

By the above statute, the provisions of which were extended to Ireland by the Irish Act of 14 and 15 Car. II., c. 19, tenure by knight's service was abolished, and all lands, with the exception of ecclesiastical lands held in free alms [FRANKALMOIGNE], were directed to be held in free and common socage, which, with the limited exception in favour of lands held in frankalmoigne, is now the universal tenure of real property throughout England and Ireland, and those colonies which have been settled by the English.

It is true that a large portion of the soil of all those countries is held by leaseholders, and in England also by copyholders; but the freehold of the land held by leaseholders and copyholders is in their lords or lessors, who hold that freehold by socage tenure.

SOCIAL WAR, also called the Marsian or Italian War (Bellum Sociale, Marsicum or Italicum), lasted from 91 till 89 B.C., and was the most formidable war ever carried on in Italy during the dominion of the Romans. The object of Rome was to maintain her supremacy over Italy, and that of her enemies was to annihilate Rome, and to establish an Italian republic on new principles of representation. It arose from the desire of the Italians to be placed on a footing of equality with the Romans as to the Roman franchise. The Italians contributed largely to the maintenance of the republic, and a great portion of the Roman armies always consisted of them. The natural result of this consciousness of their own importance was a wish to have a share in the administration of the state which they upheld, and for which they were constantly shedding their blood. The relation of the Italians to the ruling Romans at this time had great similarity to the position in which the plebeians had formerly been with respect to the patricians. Attempts to bestow the franchise upon the Italians had been made by C. Gracchus and M. Fulvius, but their hopes had been disappointed by the Roman aristocracy, who strenuously opposed all measures of that kind. During the period preceding the outbreak of the Social War, several distinguished Italians had taken up their abode at Rome, and had exercised the Roman franchise, and the Romans had connived, and tacitly recognised their citizenship. But just at the time when the Italians began loudly to demand the franchise, the consuls L. Licinius Crassus and Q. Mucius Scaevola the pontifex (95 B.C.) carried the Lex Licinia Mucia, which enacted that all those who had illegally exercised the Roman franchise should quit Rome, and return to their former homes. (Ascon. Ped. *in Cornel.*, p. 67, ed. Orelli; Cic., *Pro Sext.*, 13; *De Off.*, iii. 11.) This act at such a time naturally created great exasperation among the Italians, though they still hoped that their claims might be granted in a peaceful way. Four years passed without anything being done, until in 91 B.C. the tribune Livius Drusus, in his Lex de Civitate Sociis donanda, renewed the attempt of Gracchus and Fulvius; but he was assassinated before he had attained his object. (Appian, *Civil.*, i. 36; Liv., *Epit.*, lib. 71.) Immediately after this act of violence another law (Lex Varia) was carried by the tribune Q. Varius, which enacted that all those should be prosecuted who had either publicly or secretly supported the claims of the Italian allies (Appian, *Civil.*, i. 37; comp. Ascon. Ped. *ad Cornel.*, p. 73; Orelli, *Onomast. Tull.*, iii., p. 291), and in consequence of this law the principal friends of the Italians were compelled to go into exile. It was now evident that the Italians could never hope to obtain their end without resorting to force. There arose a general commotion among the several nations of Italy: the Picentians, Vestinians, Marsians, Pelignians, Marrucinians, Samnites, and Lucanians entered into a sort of confederacy among themselves, secret embassies were sent from place to place, and at last a meeting of deputies was held at Asculum, in the country of the Picentians. The Latins, Etruscans, Umbrians, and Campanians did not join the insurgents. The Romans in the meanwhile also sent out their emissaries in various directions, with the intention of putting down the insurrection either by persuasion or by threats; but when the proconsul Servilius Caepio appeared at Asculum, and angrily exhorted the confederates to desist from their undertaking, he and his legate Fonteius were murdered by the enraged people in the theatre. All the Romans who were at the time at Asculum suffered the same fate, and their property was seized and destroyed. (Appian, *Civil.*, i. 38; Vell. Pat., ii. 15; Liv., *Epit.*, lib. 72.) After these occurrences an embassy was sent to Rome, to try whether the question might still be settled peaceably; and when this last attempt was fruitless, the Italians rose in arms. All their towns were protected by strong garrisons, independent of which their army, which was ready for fighting, amounted to nearly 100,000 men. The force which the Romans had to oppose to them was nearly equal, for they had drawn reinforcements from all quarters, and even enlisted their freedmen, which had never been done before. (Appian, *Civil.*, i. 49; Liv., *Epit.*, lib. 74.) The Italian allies were determined to raze Rome to the ground, and to form all Italy into one great confederate republic. Arrangements were made accordingly; Corfinium was made the capital of the new republic, and its name was changed into Italica. (Strabo, v. 4, p. 391, Tauchnitz; Vell. Pat., ii. 16.) The administration was entrusted to a senate, consisting of five hundred deputies, elected by the several towns of the confederacy, to two consuls, and twelve praetors. (Diodor., *Fragm.*, lib. 37, p. 245, ed. Tauchnitz.) The Marsians Silo Popaedius and C. Papius Mutilus were the first two consuls of the confederacy. Other distinguished generals among them were Herius Atinius, Insteius Cato, C. Pontidius, Marius Egnatius, Telisinus Pontius, and others. The war extended nearly over all Italy. The accounts which we have of it are so obscure, incoherent, and fragmentary, that it is impossible to trace all the operations in detail. The whole scene of the war may however be divided into three regions: the southern, comprehending the south of Italy as far as the river Liris; the middle, from the Liris to the frontiers of Picenum; and the northern, which was chiefly in Picenum. The Roman army in the south of Italy was under the command of L. Julius Cæsar and four legates; the forces of the confederates in this quarter were commanded by C. Papius Mutilus, who took many towns, and transferred the war into Campania, where the Samnites, commanded by Marius Egnatius, put L. Cæsar to flight, though some time afterwards he gained a victory near Acerrae. His colleague, the consul P. Rutilius Lupus, with five legates, commanded in central Italy, and was opposed to Silo Popaedius, a very distinguished general, whose uninterrupted success was only checked by the energy of the legates Marius and Sulla. Rutilius himself was slain in Apulia by Vittius Cato, and Q. Caepio, one of his legates, by Silo Popaedius. Marius was now entrusted with the command of the whole army of Rutilius. At the end of the first year the confederates had gained decided advantage over the Romans. The Etruscans and Umbrians also began to join the confederates, but they were soon reconciled to Rome. At this perilous juncture the Romans devised an admirable plan for strengthening themselves by the celebrated Lex Julia de Civitate, B.C. 90, which conferred the Roman franchise (Romana Civitas) upon all the Latins and Socii (Sociis et Latinis; Cic., *Pro Balb.*, 8), who had remained faithful to Rome. Upon these new citizens Rome could now place full dependence, and her armies were strengthened by them. Rome, with her central position, and surrounded by the faithful Latins, had thus great advantages over the Italians, who were obliged to leave strong garrisons in all their towns, and thus to split their forces into many fractions. The Latin colony Aesernia however was taken by the Samnites. The first signal victory which the Romans gained was in 89 B.C., under the consul Cn. Pompeius Strabo, who defeated 70,000 Italians at Asculum, which was destroyed. This victory was followed by several others, for L. Murena and Metellus Pius defeated the Marsians; Sulla, the Hirpinians and Samnites, who now transferred the seat of government from Corfinium to Aesernia, and henceforth, notwithstanding their defeat, became the soul of the war. Several of the confederates, disheartened by the success of the Roman arms, deserted the common cause, and concluded separate treaties with Rome, until at last the Samnites and Lucanians alone carried on the war. The undertakings of Mithridates in Asia, and the connections which the Italians began to form with him (Diodor., *Fragm.*, lib. 37, p. 247, Tauchnitz), as well as the hostility between Marius and Sulla, rendered the Roman senate now more than ever inclined to bring the destructive war to a close. In consequence of this the Roman franchise was promised to all who would lay down their arms. The offer was accepted by all, with the exception of the Samnites, who were resolved either to conquer or to perish, and who, in the civil war which soon ensued, joined the party of Marius. [SAMNITES, p. 380.]

Nearly all the nations of Italy now acquired, one after another, the franchise. Concerning the relation of these new citizens to the old ones, see ROME, p. 109. At the end of this war, then, Rome was, notwithstanding the reverses of the Italians, compelled to grant what at its commencement she had obstinately refused; but this refusal cost her and Italy the flower of their population, for nearly 300,000 lives were lost during these fatal two years (Vell. Pat., ii. 15), many towns were destroyed, and many districts laid waste, which were never restored to their former state of prosperity.

The history of the Social War is the subject of several separate works in modern times, among which there is one by Heyne, 'De Belli Romani Socialis Causis et Eventu, respectu ad Bellum cum Coloniis Americanis gestum habito,' in his 'Opuscula,' vol. iii., p. 144, &c.; C.G. Keferstein, 'De Bello Marsico,' Halae, 1812; C. A. F. Weiland, 'De Bello Marsico,' Berlin, 1834.

SOCIETIES, LITERARY AND SCIENTIFIC. A sketch of the origin and general history of associations for the cultivation of particular branches of science and literature will be found under the word ACADEMY, along with an enumeration of the most distinguished among such of these bodies or institutions as have adopted that name. As is there stated, what would be called academies on the Continent are more commonly called societies both in England and in the United States of America; and a few of them are also so designated in France and other Continental countries.

I. BRITISH SOCIETIES.

Of some of the principal of these, such as the Royal Societies of London and Edinburgh, detailed accounts are given under their names. Some of those established in provincial towns will also be found noticed in the articles on the towns. The following list however includes all the literary and scientific societies existing in the United Kingdom and its dependencies, that are of any eminence, whether elsewhere mentioned or not:—

Society for promoting the Discovery of the Interior parts of Africa, commonly called the African Association. [AFRICAN ASSOCIATION, vol. i., p. 188.]

Royal Agricultural Society of England; established 1838; incorporated 1840.

Agricultural Society of Ireland; established 1840.

Society of Improvers in the Knowledge of Agriculture in Scotland: (extinct) 'Select Transactions,' prepared for the press by Robert Maxwell, 8vo., Edinburgh, 1743.

Society of Antiquaries of London, commonly called the Antiquarian Society. [ANTIQUARIES, SOCIETY OF, vol. ii., p. 117.]

Society of Antiquaries of Scotland; established 1782, incorporated 1783; 'Transactions,' 4to., Edinburgh, 1792, &c.

Society of Antiquaries of Newcastle-upon-Tyne; 'Archaeologia Aeliana,' 4to., Newcastle, 1816, &c.

Society of Apothecaries of London. [APOTHECARIES, COMPANY OF, vol. ii., p. 175.]

Architectural Society of London; established 1806; 'Essays,' 8vo., London, 1808, &c.

London Society for the Encouragement of Arts, Manufactures, and Commerce; established 1753. 'Transactions,' vol. i., 8vo., London, 1783. [SOCIETY FOR THE ENCOURAGEMENT OF ARTS, &c.]

Bahama Agricultural Society; 'Communications,' 4to., Nassau, 1802, &c.

Bath Society for the Encouragement of Agriculture, Arts, Manufactures, and Commerce; founded 1777; 'Letters and Papers,' 8vo., Bath, 1792, &c.

Society of Arts for Scotland.

Association for the Promotion of the Fine Arts in Scotland; established 1834.

Society of Artists of Great Britain; incorporated 1765; re-incorporated 1768, under the name of the Royal Academy of Arts. [ROYAL ACADEMY, vol. xx., p. 202.]

Asiatic Society of Bengal; founded at Calcutta, 1784. [ASIATIC SOCIETIES, vol. ii., p. 484.]

Royal Asiatic Society of Great Britain and Ireland; founded at London, and incorporated, 1824. [ASIATIC SOCIETIES, vol. ii., pp. 484, 485.]

Bombay Asiatic Society, originally Literary Society of Bombay. [ASIATIC SOCIETIES, vol. ii., p. 485.]

Madras Royal Asiatic Society, originally Literary Society of Madras. [ASIATIC SOCIETIES, vol. ii., p. 485.]

Royal Astronomical Society of London; founded 1820: 'Memoirs,' 4to., London, 1822, &c.

Botanical Society of London.

British Association for the Promotion of Science; established 1831; 'Transactions' in 8vo. annually.

Cambridge Philosophical Society; established 1819; incorporated 1832; 'Transactions,' 4to., Cambridge, 1821, &c.

Camden Society for the Publication of Early Historical and Literary Remains; founded at London, 1838; first publication, 1839.

London Society for promoting Practical Design.

Society for the Diffusion of Useful Knowledge; established 1826; incorporated 1832; first publication, 1827.

Royal Dublin Society for Improving Husbandry and other Useful Arts; incorporated 1749 [DUBLIN, vol. ix., p. 172]; 'Weekly Observations,' 8vo., Dublin, 1739, &c.; 'Transactions,' 8vo., Dublin, 1799, &c.

Other Dublin Societies. [DUBLIN, vol. ix., p. 172.]

Central Society of Education; first publication, 12mo., London, 1837.

Smeatonian Society of Civil Engineers; incorporated 1818. [SMEATON, p. 145.]

Entomological Society of London; established 1806, 'Transactions,' 8vo., London, 1807, &c.

Royal Geographical Society of London; established 1831; 'Journal,' 8vo., Lon., 1832, &c.

Geological Society of London; established 1807; 'Transactions,' 4to., London, 1811, &c.; Second Series, 1824.

Royal Geological Society of Cornwall; established 1814; 'Transactions,' 8vo., London, 1818, &c.

Harveian Society of London.

Highland Society of London; founded 1778; incorporated 1816.

Highland and Agricultural Society of Scotland; founded 1784; 'Prize Essays and Transactions,' 8vo., Edinburgh, 1799, &c.; New Series, 8vo., Edinburgh, 1829, &c.

Horticultural Society of London; founded 1804; 'Transactions,' 4to, London, 1807, &c.; Second Series, 4to., 1835 &c.

Caledonian Horticultural Society; 'Memoirs,' 8vo., Edinburgh, 1814, &c.

Hunterian Society of London.

Royal Jennerian Society; founded 1803; 'Annual Reports,' 8vo., London, 1804, &c.

Linnean Society of London; founded 1788; incorporated 1802; 'Transactions,' 4to., London, 1791, &c.

Royal Society of Literature of the United Kingdom; incorporated 1823; 'Transactions,' 4to., London, 1827, &c.

Bath Royal Literary and Scientific Society.

Bristol Literary and Philosophical Society.

Hull Literary and Philosophical Society.

Leeds Literary and Philosophical Society.

Manchester Literary and Philosophical Society; founded 1781; 'Memoirs,' 8vo., 1789, &c.; Second Series, 8vo., 1805, &c. [See vol. xiv., p. 374.]

Edinburgh Society for Improving Medical Knowledge; founded 1731 (on the basis of the Edinburgh Philosophical Society, established in 1718); converted into Society for Improving Arts and Sciences, 1739 (now the Royal Society); 'Medical Essays and Observations,' 5 vols 8vo., Edinburgh, 1733-44.

Westminster Medical Society.

Medico-Botanical Society of London; 'Transactions,' 8vo., London, 1829, &c.

Royal Medical and Chirurgical Society of London; established 1805; 'Medico-Chirurgical Transactions,' 8vo., London, 1815, &c.

Medico-Chirurgical Society of Edinburgh; 'Transactions,' 8vo., Edinburgh, 1824, &c.

Mineralogical Society of London; established 1799 (incorporated with Geological Society in 1811).

Motett Society for revival of the Antient Choral Music of the Church; established 1841.

Royal Academy of Music.

Natural History Society of London.

Natural History Society of Manchester.

Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne; 'Transactions,' 4to., Newcastle, 1830, &c.

Natural History Society of Shropshire and North Wales.

Natural History Society of Warwickshire.

Literary and Philosophical Society of Newcastle-upon-Tyne; established 1793; 'Annual Reports,' 8vo., Newcastle, 1794, &c. [Newcastle, vol. xvi., p. 187.]

Ornithological Society of London.

British Institution, established 1805, exhibits annually in Pall-Mall.

Society of British Artists, exhibiting in Suffolk Street, Pall-Mall East; first exhibition, 1824.

Society of Painters in Water Colours, exhibiting in Pall-Mall East.

New Society of Painters in Water Colours, founded in or about 1832; exhibits annually.

Percy Society, for publishing old ballad poetry, &c.; established 1840; first publication, 1840.

Phrenological Society of Edinburgh; 'Transactions,' 8vo., Edinburgh, 1824, &c.

London Phrenological Society.

Society of Physicians in London (extinct); 'Medical Observations and Enquiries,' 6 vols. 8vo., London, 1757-84.

Royal Physical Society of Edinburgh; established 1786.

Royal Polytechnic Society of Cornwall; established 1833; 'Annual Reports,' 8vo., Falmouth, 1833, &c. [Falmouth, vol. x., p. 192.]

Geological and Polytechnic Society of the West Riding of Yorkshire; established 1838.

Royal Society of London. [Royal Society, vol. xx., p. 206.]

Royal Society of Edinburgh. [Royal Society, vol. xx., p. 211.]

Shakespeare Society, for publishing works relating to Shakespeare and the drama; established 1840; first publication 1840.

Statistical Society of London; established 1834; 'Journal,' 8vo., London, 1838, &c..

Statistical Societies of Birmingham, Bristol, Glasgow and Clydesdale, Leeds, Liverpool, Manchester, and Ulster; all established since 1838; have almost all published Transactions or Reports.

Surtees' Society; first publication, 1835.

Wernerian Natural History Society; established 1808; 'Memoirs,' 8vo., Edinburgh, 1811, &c.

Yorkshire Philosophical Society

Zoological Society of London; incorporated 1825; 'Transactions,' 4to., London, 1835, &c.

Cambridge Antiquarian Society; established 1839. Some 'Transactions' published.

Royal Institute of British Architects; established 1835; incorporated 1837; London.

Oxford Architectural Society; established 1839.

Ashmolean Society, Oxford.

Royal Botanic Society; incorporated by charter 1839.

Cambridge Camden Society; established 1839.

Institution of Civil Engineers; established 1817; incorporated 1828. 'Transactions,' 1st vol., 4to, 1836.

Historical Society of Science; established 1840; first work published 1841.

Microscopical Society; established 1839.

Musical Antiquarian Society, for publishing scarce English Music; established 1840; first publication 1841.

Parker Society, for printing works of the early fathers of the Church; established 1841.

Spalding Club, Aberdeen; established 1840; for antiquarian objects.

Numismatic Society; established 1837.

Art Union of London; established 1836.

Art Union of Ireland.

Granger Society, for publishing portraits and memoirs of illustrious persons; established 1840; first publication 1841.

II. American Societies.

American Philosophical Society, Philadelphia; founded 1769; 'Transactions,' 8vo., Philadelphia, 1804, &c.; New Series, 4to., Philadelphia, 1818, &c. [Philadelphia, vol. xviii., p. 71.)

American Historical Society, Philadelphia. [Philadelphia, vol. xviii., p. 71.]

Massachusetts Historical Society, Boston; founded 1791; 'Collections,' 8vo., 179 , &c.

Historical Society of New York; founded 1804; 'Collections,' 8vo., 18 , &c.

New York Literary and Philosophical Society; founded 1815; 'Transactions,' 4to., 1815, &c.

Medical Society of New York.

Historical Society of Concord, New Hampshire.

Essex Historical Society, at Salem, Massachusetts.

American Antiquarian Society; 'Transactions,' 8vo., Worcester, 1820, &c.

III. Continental Societies.

Société Royale de Médecine; established 1776, afterwards incorporated with the Institut National [see vol. xii., p. 497]; re-established 1820; 'Mémoires,' 4to., Paris, 1779, &c.

Société des Pharmaciens de Paris; (?) 'Journal, ou Recueil d'Observations de Chimie et de Pharmacie,' 4to., 1797, &c.

Société Royale d'Agriculture de Paris; (?) 'Mémoires d'Agriculture, d'Economie Rurale et Domestique,' 8vo., 1785, &c.

Société de Botanistes; 'Journal de Botanique,' 8vo., Paris, 1808, &c.

Société Philomathique de Paris; 'Bulletin des Sciences,' 4to., Paris, 1797; 8vo., 1799; 'Nouveau Bulletin,' 4to, Paris, 1807, &c.

Société d'Histoire Naturelle de Paris; (?) 'Actes,' folio, Paris, 1792, &c.

Société Royale des Antiquaires de France, formerly Académie Celtique; (?) 'Mémoires et Dissertations sur les Antiquités Nationales et Etrangères,' 8vo., Paris, 1817, &c.

Société de Géographie de Paris; 'Recueil de Voyages et de Mémoires,' 4to., Paris, 1824, &c.

Société d'Arcueil; 'Mémoires de Physique et de Chimie,' 8vo.

Société d'Encouragement pour l'Industrie Nationale; Paris; 'Bulletins,' 4to., 1802, &c.

Société des Sciences, d'Agriculture, et des Arts du Département du Bas Rhin; 'Journal,' 8vo., Strasburg, 1824, &c.; 'Nouveaux Mémoires,' 8vo., Strasburg, 1832, &c.

Société de Physique et d'Histoire Naturelle de Génève; 'Mémoires,' 4to., Gén.. 1821, &c.

Literary Society of Brussels.

Dutch Society of Sciences (Hollandsche Maatschappij der Weetenschappen), at Haarlem; (?) 'Transactions' (Verhandelingen), in Dutch, 8vo., Haarlem, 1754; in German, 8vo., Altenburg, 1758, &c.

Batavian Society (Bataafsch Genootschap der Proefenderfindelyke Wiisbegeerte); 'Transactions,' 4to., Rotterdam, 1774, &c.; new series, 4to., Amsterdam, 1800, &c.; 'Physical Transactions,' (Naturkundige Verhandelingen), 8vo., Amst. and Haar., 1799, &c.; 'Transactions,' (Wiisgeerige Verhandelingen), 8vo., Amst., 1811, &c.

Batavian Society of Language and Poetry (Bataafsche Maatschappij van Taal en Dichtkunde); 'Transactions' (Werken), 8vo., 1804, &c.

Societas Philologica Lipsiensis; 'Commentarii,' ed. curavit C. D. Beckius, 8vo., Lips., 1801, &c.; second series, 1811, &c.

Societas Artium et Doctrinarum Rheno-Trajectina; 'Nova Acta,' 8vo., Utrecht, 1821, &c.; and in Dutch, 'Nieuwe Verhandelingen,' 8vo., Utrecht, 1822, &c.

Literary Society of Flushing.

Hamburg Society (Hamburgische Gesellschaft); 'Transactions,' &c. ('Verhandlungen und Schriften, nebst der Geschichte'), 8vo., Hamb., 1792, &c.

Royal Botanical Society of Bavaria, at Ratisbon; 'Transactions' (Schriften), 8vo., Ratisbon, 1792, &c.; 'Memoirs' (Denkschriften), 4to., Ratis., 1815, &c.

Society of Natural History, and other Societies, at Berlin. [Vol. iv., p. 298.]

Societas Latina Jenensis; (?) 'Acta,' edita ab J E. Walshio, 8vo., Jen., 1752, &c.

Mineralogical Society of Jena.

Natural History Society (Naturforschende Gesellschaft) of Danzig; 'New Memoirs,' 4to., Danzig and Halle, 1820, &c.

Bohemian Society of Mathematics and National and Natural History (Privat-Gesellschaft in Böhmen zur Aufnahme der Mathematik, der Vaterländischen Geschichte, and der Natur-Geschichte); 'Transactions,' 8vo., Prague, 1775, &c.; New Series ('Neuere Abhandlungen der K. Böhmischen Gesellschaft der Wissenschaften'), 4to., Vienna and Prague, 1791, &c.

Royal Society of Sciences of Göttingen; founded in 1751; publishes the 'Göttingische Gelehrte Anzeigen,' which first appeared in 1739, before the foundation of the Royal Society, and under the title of 'Göttingische Zeitungen.'

Suabian National Society of Physical Philosophy and Natural History (Vaterländische Gesellschaft der Physiker und Naturforscher Swabens); 'Memoirs,' 8vo., Tübingen, 1805, &c.

Copenhagen Society of Literature and Science, Domestic and Foreign (Kiöbenhavnske Selskab af Laerdoms og Videnskabers, &c.); 'Memoirs,' 4to., Copen., 1747, &c.

Royal Danish Scientific Society; 'Memoirs,' 4to., 1781, &c.; New Series, 4to., 1801, &c.

Icelandic Royal Society of Copenhagen; and other Icelandic Societies. [See vol. xii., p. 126.]

Upsal Royal Society of Sciences; founded in 1720; 'Transactions,' 4to., 17.., &c.

Gothenburg Royal Society of Sciences and Belles Lettres.

Société des Naturalistes de l'Université Imperiale de Moscow; 'Mémoires,' 4to., Moscow, 1806, &c.

The few American societies must be considered as set down according to a loose notion of their respective eminence or importance; and the Continental societies are grouped as French, Belgic, Dutch, Hamburg, German, Danish, Icelandic, Swedish, Russian following what seemed the most natural connection of the several countries.

SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE. In the month of November, 1826, Mr. Brougham convened a meeting of gentlemen, who formed themselves into a committee for promoting the composition, publication, and distribution of elementary works upon all branches of useful knowledge. The two main objects in view were to give the people books which might convey knowledge to uneducated persons, or persons imperfectly educated, and to reduce the price of scientific and other useful works to the community generally. The committee then founded a society, under the name of The Society for the Diffusion of Useful Knowledge, composed of donors of 10*l.* and annual subscribers of 1*l.* The average income arising from annual and life subscription in each of the first five years was 300*l.*, from which one-half is to be deducted for works given to subscribers. From that time the subscriptions gradually diminished; indeed the pecuniary support of the Society was after the first year derived almost entirely from the sale of its works.

In the year 1832 the Society was incorporated by a charter, which vested in the London committee the whole of its property, and gave them the control over its proceedings. The London committee consists of a chairman, of a vice-chairman and a treasurer elected annually, and sixty members, who hold their seats until forfeited by neglect of the duties prescribed by the by-laws of the Society.

From its outset the Society excluded from its works all subjects that involved differences of religious opinion, partly because the different religious bodies had occupied that field far more efficiently than the Society could hope to do; partly because the Society was supported by men of various religious opinions, and intended to address itself to the whole people without distinction of sect. Excepting in so far as the history of the Church may trench upon matters that belong to controversial theology, this rule of the Society has been strictly observed. Upon two occasions the rule excluding theological matter has caused works which had been intended to be undertaken by the Society to be prepared and published by individuals connected with it in their separate and private capacity, namely, the 'Illustrated Edition of Paley,' by Lord Brougham and Sir C. Bell, and Mr. Charles Knight's 'Pictorial Bible.'

The usual method adopted by the Society for the preparation of its works has been to engage the assistance of authors; these in the first instance submit a plan for the approval of the committee, by whom the manuscript and proofs of the works are usually revised. The committee has also in several instances engaged the service of an editor, who conducts the works entrusted to him, under the superintendence and control of the committee. The proofs are often likewise referred by the committee for revision to gentlemen not members of their own body; and these referees are sometimes, according to circumstances, remunerated for their assistance. By means of the local committees, a list of which is printed periodically on the wrapper of the Society's publications, and with the assistance of friends to the diffusion of useful knowledge in many parts of Great Britain and Ireland, various works that have been published by the Society, and particularly articles in their periodical publications, have had the advantage of the revision of persons who, from possessing local knowledge, or from other circumstances, have been enabled to make valuable corrections and additions. The copyright of the works published under the Society's superintendence is usually assigned to the Society, unless when the work has been projected by one of its publishers, and produced and conducted with his capital. Such has been the case with many of those published by Mr. Charles Knight.

The revenue which the Society derives from its works is usually a rent paid by the publisher for the use of the copyright, proportionate to the cost and price of the work, and the number of the edition.

The Society has published or superintended the publication of the following works:—1, 'The Library of Useful Knowledge,' consisting of a series of treatises on various branches of knowledge, as pure mathematics, physics, history, biography, and geography. These treatises comprehend nearly the whole of the sciences taught, reaching to their most abstruse parts; but treatises on each branch of physics have been also published, adapted to the conveyance of instruction in the most elementary and popular form. There are for example treatises teaching as much of natural philosophy as can be conveyed without a knowledge of mathematical science. Three hundred and sixty numbers of this series have been published. 2, 'The Farmer's Series,' consisting of works on the horse, on various kinds of cattle, on planting, on farms, on farm implements, and other agricultural subjects. 3, 'The Library of Entertaining Knowledge,' which consists of volumes, largely illustrated, relating to history and biography, arts and antiquities, descriptive geography, and natural history, treated in a popular manner. 4, 'The Journal of Education,' 10 vols. 5, 'The Penny Magazine,' 9 vols. 6, 'The Penny Cyclopædia,' 21 vols. (not yet finished). 7, A series of Maps, almost complete, and consisting of nearly 200 maps and plans of great cities: these maps are founded on the best and most recent authorities, and are prepared under the superintendence of the Society. 8, Maps of the Heavens 9, 'The Gallery of Portraits,' containing engraved likenesses of eminent men, from original portraits or other good authority, with memoirs, in 7 vols. 10, Almanacs and Companions to them, from 1828 to 1842, both inclusive. 11, 'The Working Man's Companion.' 12, 'The Library for the Young.' 13, 'The Statistics of Great Britain.' 14, 'A Treatise on Friendly Societies;' 'A Treatise on Annuities;' 'A Manual for Mechanics' Institutions, and a Report of the Condition and Prospects of these Institutions 15, A Series of Treatises on Governments. 16, 'Tables of Logarithms,' and Barlow's 'Tables of Squares, Cubes, &c.' The total number of volumes of various sizes hitherto (Nov., 1841) issued by the Society is 168.

From the profit of some of these works the Society has derived a considerable income, which it has devoted to the preparation of others, tending either to the advancement of science or to the moral or physical improvement of the people Thus the work on the Statistics of the British Empire, and afterwards a set of large astronomical maps, were prepared with the Society's funds without hope of profit. Again, in the year 1829 the Society collected from all the Friendly Societies in England returns of the amount of sickness and mortality experienced by them during the preceding five years; and from these returns and other data a work was written by Mr. Ansell. More recently it has made similar inquiries concerning the state of Mechanics' Institutions, and has published the result of the inquiries, with suggestions for the improvement of those useful bodies, which it has united into associations in various parts of the kingdom, for mutual advice and assistance. The Society is prohibited by its charter from dividing any profit among its members, or in any way deriving gain from its publications: all that it does and can do is to make the profit on one work pay for the loss on another.

An impartial estimate of the direct and indirect effects of the Society's labours can scarcely be expected in this place, nor shall we attempt more than the statement of a few facts. Until the publication of 'The Library of Useful Knowledge,' persons of small means were unable to procure any scientific works, except at a high price and in a cumbrous form; nor were there any separate elementary treatises of particular branches of science that could be had for a few pence. Thus in all the memoirs of men who have raised themselves by their own exertions from humble circumstances to literary or scientific fame, we find that the greatest difficulty which they have had to encounter has been the obtaining of books. Of many of the scientific treatises in 'The Library of Useful Knowledge,' more than 25,000 copies have been sold, and the demand for them continues. Of 'The Penny Magazine,' the sale at one time reached nearly 200,000 copies; and if the sale has diminished, it is because other publications of the same kind afford to purchasers an opportunity of selection. The extent of the sale may be conceived when it is stated that for one woodcut as much as fifty guineas have been paid, to replace which (independently of the authorship and the cost of paper and printing, and other illustrations of that number) nearly 20,000 copies must have been sold. Until the publication of the Society's series, maps were luxuries confined to the rich; now nearly 25,000 copies of many of its maps have been sold; and other maps of the same form, and nearly as cheap as the Society's, have been published with success. But besides the direct benefit conferred on the public by placing in their hands works carefully prepared, vast advantage has been derived from the example of the Society's success. No sooner had 'The Penny Magazine' become successful, than the Christian Knowledge Society devoted a part of its large funds to the publication of 'The Saturday Magazine,' a meritorious work, similar in design to 'The Penny Magazine;' and soon afterwards the same body superintended the preparation of a series of popular works on subjects of general literature and science. The publication of the Society's 'British Almanac' was followed by an immediate improvement in those issued by the Stationers' Company, the suppression of two of the most absurd, and the publication of an excellent almanac by that corporation. 'The Library of Useful Knowledge' was followed (almost immediately) by Lardner's 'Cabinet Cyclopædia,' a work different in its form, but identical in its plan; and 'The Family Library,' published by Mr. Murray, was issued very soon after the first parts of 'The Library of Entertaining Knowledge' had appeared.

The sale of many of the Society's works has demonstrated that it is in most instances more profitable to count on a large number of purchasers for a good work, and accordingly to fix a low price, than to publish books in a costly form for the few.

Translations of many of the Society's works, especially of 'The Library of Useful Knowledge,' have been made into French, Spanish, and German. 'The Preliminary Discourse' has been also translated into Dutch, Swedish, and Portuguese. Societies after the model of that which we are describing, and with much the same name, have been founded at Paris, Madrid, Lisbon, Stockholm, Bombay, and at Canton, most of these being in correspondence with the London Society.

The effect of the Society's labours is demonstrated by the extensive adoption of the general principles on which they started, which is now apparent in the proceedings of the publishers generally. In one particular indeed it would be ruinous for the latter to imitate the former, namely, in expending their profits upon useful but unsaleable works; though it must be acknowledged that publishers frequently do, from want of foresight, that which the Society does from principle. In either case the benefit to the public is the same: works which produce useful effects by means of the few who require them, are attainable through the miscalculation of the publisher, as well as through the intentional expenditure of the Society. With regard to the latter however, it must be stated that their name, and the mode of their publication, has frequently extended the circulation of their works beyond that which the same species of books could have been expected to have had proving that many have been induced, by the efforts of the Society, to attempt the acquisition of information which they would otherwise never have hoped for. A mathematical work, of the sort which usually circulates its hundreds, has been increased to thousands by the Society. In fact, without claiming any peculiar merit for the material of the Society's publications, the following may be insisted on without any degree of partiality, and the work in which these observations appear may be cited as an instance: namely, that its efforts have had a remarkable success in bringing before a large number an amount of accurate knowledge which was formerly the property of a few only. The industrious student, if he required books of a high character of instruction, was obliged to content himself with those of a past age, which had gradually descended within his means as to price. If he can now commence his labours with the advantage of more modern assistance, he has to thank in a great measure those who discovered for him that books of the more learned character might be successfully published on the principles of cheapness which had been so often applied to other branches of trade. The number of editions of the best writers on all subjects which have appeared at almost artisans' prices within the last six years, and the amount of books now attainable by persons with very small means, may without arrogance be attributed to the example of the Society.

SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE. The object of this Society, as expressed in their address or advertisement to the public, is 'to promote the arts, manufactures, and commerce of this kingdom, by giving honorary or pecuniary rewards, as may be best adapted to the case, for the communication to the Society, and through the Society to the public, of all such useful inventions, discoveries, and improvements as tend to that purpose.' It was projected in the year 1753; but the first public meeting took place in March, 1754. The plan, which has been styled by Anderson (*Hist. of Commerce*, vol. iii., p. 298), 'one of the noblest designs for the improvement of the general commerce of Great Britain which could possibly have been devised,' was formed by Mr. William Shipley, a drawing-master, whose public spirit appears to have been very superior to his station in life, and who acted for some time as secretary to the Society; and it was carried into effect by a few noblemen and gentlemen, among whom appear the names of Lord Folkstone, Lord Romney, and Dr. Stephen Hales. The services of Mr. Shipley were acknowledged by the Society voting to him, in 1758, a gold medal, 'for his public spirit, which gave rise to the Society;' and subsequently by the publication of his portrait as a frontispiece to the fourth volume of their 'Transactions.' The Society began, immediately after its formation, to advertise premiums for the encouragement of young persons of both sexes in the various departments of the fine arts; for improvements in agriculture and manufactures; for mechanical inventions; and for promoting the cultivation of valuable plants in British colonies. The utility of the scheme soon attracted a large body of supporters; and for many years the Society received constant additions to its members, and continued to dispense its rewards with increasing zeal and success. It has latterly fallen off in prosperity; a circumstance which may be partially accounted for in various ways, and is probably in great part attributable to the fact that its proceedings have not been made public so fully as the altered state of society has rendered desirable. While numberless other societies, different indeed in their aim, yet all having for their object the cultivation and diffusion of useful knowledge, have been brought into active operation, and while a new and popular scientific literature has been extensively introduced, the operations of the Society of Arts in collecting and diffusing information have remained almost stationary; and the result has been that the Society and its proceedings have fallen into a state of comparative obscurity, which is neither in character with its various and important objects, nor justified by the manner in which those objects have been pursued. Measures have been recently taken, and are now in agitation, for so far modifying the constitution of the Society and extending its operations, as to place it once more in the prominent station which it deserves to occupy; but of the proposed changes it would be premature to attempt to give any details.

For several years after the formation of the Society of

Arts, there was no authorized or official publication of the papers communicated to its various committees, or for making known the results of its labours. The publication of such information in an annual volume of 'Transactions' was contemplated soon after the commencement of the Society's operations; but the first volume did not appear until the year 1783. Many of the papers however which would otherwise have appeared in such a work, were published, with the sanction of the Society, in Dossie's 'Memoirs of Agriculture and other Œconomical Arts,' of which the first volume appeared in 1768, and the third and last in 1782. Some further particulars respecting the early proceedings of the Society are supplied by a 'Register of the Premiums and Bounties[*] given by the Society instituted in London for the Encouragement of Arts, Manufactures, and Commerce, from the original institution in the year 1754, to the year 1776 inclusive.' This register, which was prepared by a committee of the Society, and is arranged in a tabular form, was printed in folio, in 1778. From it, and from a brief history of the transactions of the Society, published in the first volume of Dossie's 'Memoirs,' the following summary of their early proceedings is taken. It is much to be regretted that there are no published statements from which the account can be readily continued to the present time.

In the department of *Agriculture* the pecuniary rewards given from 1754 to 1776 amounted to 3201*l.* 19*s.*; while during the same time 56 gold and 26 silver medals were distributed. In this class of rewards several were given to encourage the planting, raising, and preserving of timber-trees; especially of oak for ship-building. Some were given for the cultivation of madder, the supply of which had been previously dependent upon Holland. In addition to the premiums bestowed, the Society aided this undertaking by procuring an act of parliament to substitute, for a term of years, a fixed payment of 5*s.* per acre, instead of the payment of tithe in kind, which would have impeded the cultivation of so valuable a crop in England. The cultivation of hemp, of foreign grasses, and of several kinds of roots for the food of cattle, was also encouraged by prizes. Another object attempted, but not so successfully, was the production of bees'-wax in England in sufficient quantity to render this country independent of others for the supply of so useful an article. Several important agricultural implements were also brought into use, and experiments on drill husbandry were promoted and brought into public notice.

In the class of *Chemistry* the Society expended, in the same time, the sum of 1315*l.* 5*s.* in pecuniary rewards, besides giving 2 gold medals and 1 of silver. One of the most important objects attained in this department was the manufacture of crucibles, similar to the Hessian, of melting-pots suitable for smelting tin-ores, and of earthern retorts. The production of such vessels was commenced at Chelsea under the auspices of the Society: the supply had been previously obtained from the Continent. The discovery of a mine of cobalt in England, and the home manufacture of zaffre and smalt, were also encouraged. The manufacture of verdigris was established in this country; and the industry of the nation was further promoted by the introduction or improvement of the processes of tinning copper and brass vessels; dyeing woollen cloth, linen, cotton, silk, and leather; making buff leather; tanning with oak sawdust; making transparent varnish, white enamel, sal ammoniac, &c.

Under the head *Colonies and Trade*, the register shows an expenditure of 2785*l.* 13*s.* 8*d.* in pecuniary rewards, in addition to which 12 gold medals had been presented. The chief object of this part of the Society's operations is the introduction into British colonies of plants or manufactures previously confined to foreign countries; and in the period embraced by the document referred to, this object had been attained as far as regarded the production of potash and pearlash in North America, while much had also been done towards the raising of silk, the cultivation of the vine, and the manufacture of wine, indigo, vegetable oils, &c. The American war of independence put an end to many promising experiments in this department.

In the promotion of home *Manufactures*, besides those already alluded to under the head of chemistry, much was done in the early part of the Society's career; the sum expended in pecuniary rewards in this department being 2026*l.* 1*s.*, together with 1 gold and 3 silver medals. The manufacture of Turkey carpets, tapestry weaving, weaving imitations of Marseilles and India quilting, various improvements in spinning, lace-making, &c., were among the objects promoted. The improvement of paper, the making of chip and straw hats, of artificial flowers, and of catgut strings for musical-instruments were also encouraged.

In the *Mechanical* department 6 gold and 10 silver medals were given, and 2284*l.* 14*s.* 6*d.* was distributed in pecuniary rewards. The introduction of saw-mills into this country was one of the most important objects effected by the Society, while they also encouraged the use of many new or improved machines. The gun-harpoon for the whale-fishery was rewarded by them.

In the *Polite Arts*, embracing sculpture, painting, drawing, mapping, engraving, &c., the expenditure in money amounted to 8325*l.* 5*s.*; and the honorary rewards bestowed were as follows;—10 gold medals, 6 silver medals, 17 gold pallets, 47 great silver pallets, and 37 small silver pallets. The rewards offered by the Society not only had a great effect in encouraging individuals, but also promoted the establishment of the Royal Academy. The first public exhibition of paintings in the metropolis, which soon gave rise to others, was held in the rooms of the Society of Arts, in 1767; the apartments being gratuitously opened for the purpose in that and the two following years.

In addition to the matters embraced in the above classes, 3613*l.* in money and 16 gold medals were devoted to miscellaneous objects embraced by the comprehensive plan of the Society. The principal part of this expenditure, the sum of 3500*l.*, was applied to the promotion of a plan for supplying the metropolis with fish by land-carriage: a scheme which was also assisted by parliament to the amount of 2000*l.*

The total amount of pecuniary rewards bestowed by the Society down to 1776 was, according to the 'Register' above referred to, 23,551*l.* 18*s.* 2*d.*; or, including the cost of medals and pallets, 24,616*l.* 4*s.* 8*d.* This register was continued by manuscript additions to the end of 1813; and from the unpublished part, with a sight of which the secretary has favoured the writer, it appears that the pecuniary rewards bestowed from 1777 to 1813 amounted to about 2757*l.* 10*s.*, and that the medals and pallets distributed were 188 in gold and 464 in silver. Later than this there does not appear to be any condensed statement of the operations of the Society; but it has been stated for some years past, in their advertisement to the public, that upwards of 100,000*l.*, derived from voluntary subscriptions and legacies, has been expended in pursuance of their plan. It is needless to recapitulate the more recent proceedings of the Society, which have been the same in character, although more limited in extent, than those above mentioned; but it may be briefly remarked, in the words of the secretary's address at the distribution of prizes in 1841, that 'at a time when it stood alone in offering encouragement to the fine arts, it effected much good in that department; and that it can now point with proud satisfaction to the names of Bacon, Nollekens, and Flaxman, Cosway and Lawrence, Sharp and Sherwin, Pingo, Marchant, and Wyon, with many other eminent artists, the early manifestations of whose genius were noticed by the Society in a manner which, there can be no doubt, assisted very materially in its development.' Still more important perhaps have been the effects of the Society's encouragement of poor operatives, in improving the processes with which they are practically acquainted. The history of those inventions connected with weaving, which have been the objects of their encouragement within the last forty years, was adverted to in the address just quoted, as an illustration of what the Society have effected; about twenty pecuniary rewards having been given, chiefly to Bethnal Green and Spitalfields weavers, for inventions of great utility.

As before stated, the first volume of the Society's 'Transactions' was published in 1783. For forty-seven years from that time a volume appeared annually; but since 1829 the volumes have been biennial. An index to the first twenty-five volumes was published in 1808, and two others, embracing respectively from the twenty-sixth to the fortieth, and from the forty-first to the fiftieth, have since appeared. In 1774 the Society removed from their original premises opposite Beaufort-buildings, Strand, to their present house in the Adelphi, which was erected purposely for them; and in the years 1777-83 Barry decorated their great room with a series of pictures. [BARRY, vol. iii., p. 511.]

---

[*] Premiums are the rewards bestowed for matters respecting which the Society has made a specific offer and *Bounties*, those which are given without any previous offer.

The Society of Arts consists at present of about eight hundred persons, of whom many are life members. Members are admitted by ballot, and subscribe two guineas or upwards annually, or twenty guineas or upwards in a single sum. The business is conducted by several committees, one being appointed for each department of its operations: and general meetings are held four times in each session, on the first Wednesdays of December, February, April, and June. Besides these, ordinary meetings are held every Wednesday evening, to receive reports from the several committees, &c. The Society issue gratuitously, every second year, a pamphlet containing a list of the premiums offered in the various classes of agriculture, fine arts, chemistry and mineralogy, colonies and trade, manufactures, and mechanics; and in which the privileges of the members are stated at length. The paintings in the great room, and the museum, which contains models of the machines rewarded by the Society, with specimens of the manufactures they have encouraged, may be seen gratuitously between the hours of ten and two on any week day, except Wednesday. According to the rules, admission must be obtained by an order from a member; but any respectable person can obtain admission even without this form. It is to be hoped that the utility of the collection may be soon extended by the suspension, in some cases, of a rule of the Society, which stipulates that all machines or processes rewarded by them shall be freely given up to the public, and not protected by patent,—a rule which now excludes many useful inventions from the benefits offered by its rewards and the publicity of its museum.

SOCIETY ISLANDS, the name given by Captain Cook, in honour of the Royal Society of London, to a cluster of islands in the South Pacific Ocean. They lie about 70 miles to the westward of another cluster, of which Tahiti (Otaheite), is the chief, named the Georgian Islands, in honour of George III. Mariners usually called the latter the Windward and the former the Leeward Islands. Recent geographers have been disposed to comprehend both the clusters under the name of Society Islands. As however the two clusters are politically as well as geographically distinct, it will be sometimes expedient to preserve the distinctive designations in speaking of them; although we are to be understood as noticing both groups under the general head. The following are the names and positions of these islands. The names are given according to the orthography introduced by the first missionaries, and used by the press now established among the people:

	S. lat.	W. long.
Meatia	17° 53′ 0″	148° 9′ 45″
Tahiti (Otaheite), north point	17° 29′ 17″	149° 33′ 15″
Eimeo	17° 30′ 0″	150° 0′ 0″
Maiaoiti, or Charles Sander's Island	17° 28′ 0″	150° 40′ 0″
Tetuaroa		
Huahine	16° 43′ 0″	151° 6′ 45″
Raiatea	16° 46′ 0″	151° 38′ 45″
Tahaa, three miles north of Raiatea.		
Borabora	16° 27′ 0″	151° 52′ 45″
Mauarua	16° 10′ 0″	152° 30′ 0″
Tuba		
Lord Howe's Island	16° 46′ 0″	154° 12′ 45″
Scilly Island	16° 28′ 0″	155° 24′ 45″

The five first are those called the Georgian Islands, and the rest the Society Islands, when the two groups are distinguished. The list is exclusive of several islets which surround or are interspersed among these.

Of all these islands, Tahiti is by much the largest and the most elevated. [OTAHEITE.] All the islands are mountainous in the interior, and have a border, from one to four miles wide, of rich level land, extending from the base of the high land to the sea; and although the outline of each has some peculiarity distinguishing it from the rest, in their general appearance they resemble each other. Tetuaroa, Tubai, Lord Howe's and the Scilly islands however form exceptions, as they are low coral islands, seldom rising many feet above the sea. Tahiti is 108 miles in circumference; Eimeo is supposed to be about 25 miles; Huahine probably more than 30; and Raiatea is somewhat larger. The others are of smaller extent. A corresponding resemblance prevails in the geological structure of the principal clusters and surrounding islands; the component substances being the same in all, although each has some distinguishing peculiarity of its own. A full account of these geological characteristics, analogous and distinctive, may be found in Ellis's 'Polynesian Researches.' There seems no reason to suppose that any of these islands are of altogether volcanic origin, like the Sandwich Islands. The entire mass of the latter has evidently been in a state of fusion, and offers no trace of any primitive or secondary rock. But in the Society Islands there are basalts, whinstone dykes, and homogeneous earthy-lava, retaining all the convolutions which cooling lava is known to assume; there are also kinds of hornstone, limestone, silex, breccia, and other substances, which under the action of fire do not appear to have altered their original form. Some are found in detached fragments, others in large masses. Although many unequal appearances of the action of fire occur in almost every island, yet Mr. Ellis states that he never met with any cavern, aperture, or other formation resembling a crater, nor had he ever heard of any, with the exeception of the large lake, called by the natives Vaihiria, situated among the mountains of Tahiti. 'The wild and broken manner however in which the rocks and mountains now appear, warrants the inference that since their formation, they have been thrown up by some volcanic explosion, the disruptions of an earthquake, or some other violent convulsion of the earth; and have from this circumstance assumed their bold, irregular, and romantic forms.' All the Society Islands, and many others in the Pacific, are surrounded by a belt of coral rock, from two or three to twenty yards in width, and situated at distances from a few yards to perhaps two miles from the shore. Against this barrier the long rolling waves of the wide Pacific are driven with terrific violence by the trade-winds, and, arrested by it, often rise ten, twelve, or fourteen feet above its surface. These reefs protect the low lands from the violence of the sea; for while, beyond them, the surface of the water is agitated by the slightest breeze, all within is smooth water. There is usually a break or opening in these marine barriers, which offers an easy passage for shipping. The soil is various. The sides of the mountains are frequently covered with a thin layer of light earth; but the summits of many of the inferior hills present a thick stratum of stiff red ochre or yellow marl. This is seldom found on the lofty mountains composed of basalt or cellular volcanic stone, but generally covers the lower hills that rise between the interior mountains and the shore. The natives use it as a pigment for staining or painting their doors, window-shutters, canoes, &c., and, when mixed with lime, the walls of their houses. The level tracts along the coast are the most valuable parts of the land. The soil of those tracts is a rich alluvial deposit, with a considerable mixture of vegetable mould, and is exceedingly prolific.

The climate, products, character, and condition of the inhabitants are the same as those of Tahiti, the principal island. [OTAHEITE.]

Rain is much more frequent in the Society than in the Sandwich Islands, during the whole year; but, except in the rainy season, it is seldom heavy or lasting. The rainy season, the only variation of the tropical year, occurs when the sun is vertical, and generally continues from December to March; during this time the climate is more insalubrious and the sickness of the inhabitants greater than at any other period. Thunder and lightning are frequent, especially in the rainy season.

Hogs and dogs, and sometimes rats, were the only animals whose flesh was formerly eaten by the natives. The missionaries have introduced all our domestic animals; and all have succeeded very well, except the sheep. Many of the natives now possess hundreds of cattle, which, with their other produce, they sell, with mutual advantage, to the ships which touch at the islands for refreshments. Rabbits could not be preserved; cats have become common in houses, and are great favourites. The birds of these and the neighbouring islands are not distinguished by brilliancy of plumage or melody of song. There are however several varieties, and some of them in immense numbers. The most numerous class are the aquatic fowl. The albatross (*diomeda exulans*), the tropic bird (*phaeton ætherius*), several kinds of petrel, with others, abound in all the islands, especially in Borabora and Mauarua. Among the lakes are several kinds of heron; and wild ducks resort to the lagoons and marshes. There are several kinds of birds of prov, and a number of the woodpecker tribe, with some small paroquets of rich and splendid plumage. The turtle-dove is found in the inland parts of some of the islands, and pigeons among the mountains. Among the few singing-birds the most conspicuous is that called by the natives *Omaomao*, which in appearance and note much resembles the thrush. Domestic fowl are abundant, and were found in the islands when originally discovered.

The Society Islanders are generally above the middle stature, but their limbs are much less muscular and firm than those of the Sandwich Islanders, whom in many respects they resemble; but they are more robust than the Marquesans, who are the most light and agile of the inhabitants of Eastern Polynesia. In size and physical power they are inferior to the New Zealanders, and more resemble the Friendly Islanders; but they as much lack the gravity of the latter as they do the vivacity of the Marquesans. The countenance of the Society Islanders is open and prepossessing, though the features are bold, and sometimes prominent. The facial angle is frequently as elevated as in the European, except where the frontal and the occipital bones have been pressed together in infancy. The prevailing complexion is an olive, a bronze, or a reddish-brown, equally removed from the jet-black of the African and Asiatic, the yellow of the Malay, and the red or copper colour of the aboriginal Americans: it is frequently a medium between the two latter colours. Considerable variety nevertheless prevails in the complexion of the population of the same island, and as great a diversity among the inhabitants of the different islands.

The mental capacity of the Society Islanders has hitherto been only partially developed. They are remarkably curious and inquisitive; and, compared with other Polynesian nations, may be said to possess considerable ingenuity, mechanical invention, and imitation. Totally unacquainted with the use of letters, their minds could not be improved by any regular continued culture; yet the distinguishing features of their civil polity—the imposing nature, numerous observances, and diversified ramifications of their superstition—the legends of their gods—the historical songs of their bards—the beautiful, figurative, and impassioned eloquence sometimes displayed in their national assemblies—and, above all, the copiousness, variety, precision, and purity of their language, with their extensive use of numbers, warrant the conclusion that they possess no mean mental capabilities.

By diseases, wars, infanticide, and the use of ardent spirits, the large population which these islands formerly contained was reduced to a mere remnant when the missionaries came among them, and was in rapid progress to extinction. The general adoption of Christianity put a stop to the evils in which this decline had originated; but for some years after, the number of deaths considerably exceeded the births. About the years 1819 and 1820, the births were nearly equal to the deaths, and since that period the population has been rapidly increasing. The latest information estimates the inhabitants of these islands at 18,000 or 20,000. Most of the natives can now read and write. Their moral conduct has become more regular, and their social condition much improved; they have acquired the knowledge of various useful arts, and profitable branches of commerce have been opened. Numerous vessels of from 30 to 80 tons burden are usefully employed in trade, and in maintaining an intercourse between the several islands. A press has for many years been actively engaged in supplying the natives with publications in their own language, suited to their wants and their condition.

(Ellis's *Polynesian Researches*; *Voyages* of Wallis, Cook, and Wilson; Tyerman and Bennet's *Voyage round the World*; Williams's *Missionary Enterprises*; the *Reports* and *Magazine* of the London Missionary Society, &c.)

SOCI'NUS FAUSTUS. The Socini were an antient family of Siena. Marianus Socinus, a lawyer, is highly extolled by Æneas Sylvius, Pope Pius II., with whom he was contemporary. This Marianus had a son Bartholomew, whom Politian calls the Papinian of his age; and also a son Alexander. Alexander had a son Marianus the younger, also a distinguished lawyer, who was the father of Alexander Socinus the younger and Laelius Socinus, by Camilla, who was related to the Salvetti of Florence. Alexander was a distinguished lawyer and a teacher of jurisprudence.

Laelius, the uncle of Faustus Socinus, was born at Siena in 1525. He was brought up to the law; but he turned his thoughts to the study of the Scripture, for which he was qualified by his knowledge of the Greek and Hebrew languages, and, it is said, the Arabic also. Having detected, as he supposed, various errors in the doctrines of the Roman church, he left Italy in 1547, either that he might ensure his safety, or have the advantage of prosecuting his theological studies more diligently. He was only about twenty-one years of age when he commenced his travels, which extended to England, France, Switzerland, Germany, and Poland. He first visited Poland about 1551, and a second time about 1556. He finally settled at Zürich, where he died in 1562, in the thirty-seventh year of his age. His nephew Faustus, who then happened to be at Lyon in France, succeeded in getting possession of his papers. Laelius was on intimate terms with all the great scholars of the time. By his prudent conduct he secured his personal safety amidst men who were the enemies of his opinions, which however he communicated freely to his friends, and principally to his countrymen who were in voluntary exile in Switzerland and Germany. He also corresponded with his family in Italy, and brought several of them over to his opinions. Laelius Socinus had put various questions to Calvin, among other great theologians. Calvin declined to answer his 'portentous questions,' and in a rough but well-meant letter, told him that 'if he did not timely correct this itch of inquiring, he would draw on himself great torments.' Calvin's letter was written in January, 1552; and in the month of October of the next year, Servetus was burnt at Geneva. This was a significant comment on the words of advice.

Faustus Socinus, the son of Alexander the younger, was born at Siena in December, 1539: his mother Agnes was the daughter of Burgesio Petrucci, a distinguished personage at Siena, and of Victoria Piccolomini, niece of Pope Pius the Second.

The parents of Faustus Socinus died young, and his education was somewhat neglected. He himself complains that he studied the liberal arts slightly, and without the direction of a teacher: he had learned nothing of philosophy or school divinity, and of logic he had only certain rudiments, and that very late. At the age of twenty he took refuge in France, on account of danger which threatened his family on a suspicion of heresy. On the death of his uncle Laelius he returned to Italy; and being taken into the service of the grand-duke of Tuscany, spent twelve years at the court of Florence. About the close of this period he began seriously to reflect on religious matters, and finally determined to abandon his country and his favourable prospects, that he might occupy himself about his own and other men's salvation. In the year 1574, at the age of thirty-five, he retired to Basle to study theology. About 1578 he was invited into Transylvania by George Blandrata, a person of great influence in that country, to oppose the opinions of Franciscus Davidis on the power of Christ and the honour due to him. The two theologians lodged together in the same house for four months, but Davidis could not be prevailed upon to change his opinions; and as he still continued to proclaim them publicly, he was put in prison by the prince of Transylvania, where he soon ended his life. Socinus was blamed in this matter, but without any reason; for whatever share any of those who followed his opinions had in the persecution of Davidis, there is no evidence that Socinus joined them.

In 1579 Socinus visited Poland, and wished to be received into the Unitarian churches of that country, which acknowledged none but the Father of the Lord Jesus Christ to be the most High God; but as he dissented from the Unitarian churches in some matters, his application was at first rejected.

Socinus however wrote in defence of the Polish Unitarian churches; and he also published his treatise, entitled 'Pro Racoviensibus Responsio,' in reply to the work of Jacobus Palæologus, which was entitled 'Defensio Veræ Sententiæ de Magistratu Politico.' Socinus maintains the doctrine of obedience to the sovereign power in its most unlimited extent, and he instances as an example of the mischievous teaching of those who inculcated the right of resistance to princes, the bloody wars of the Hollanders with Philip II. of Spain. It is singular that the Responsio was represented to Stephen Bathory, king of Poland, as a work against government, a charge which could not well be made against a treatise that was directed against all those who maintained the right of subjects to examine and pass judgment on the conduct of princes, however, Socinus thought it prudent to retire from Cracow, where he had lived four years, to the estate of a nobleman named Christopher Morsztyn, where he was safe. During this retreat he married Elizabeth, the daughter of his protector, by whom he had a child called Agnes, who afterwards married a Polish gentleman. By this marriage Socinus became connected with the principal families of Poland, a circumstance which greatly contributed to the influence which he subsequently obtained. His wife died in 1587, and his grief, which was excessive, was followed by a severe illness. He subsequently returned to Cracow, and in the year 1588 he assisted at the synod of Brest, which is a town on the borders of Lithuania, and disputed on the death and sacrifice of Christ, on justification, the corrupted nature of man, and with the followers of Davidis and Budny, on the invocation of Christ. Socinus was now beginning to gain over many persons of rank to his opinions, though some who were in authority, and most of the old ministers, still opposed him. It is said that Securinius was the first who maintained the doctrines of Socinus; but Petrus Stoinius, a young minister, became one of the most eloquent expounders of his tenets. It was during the second residence of Socinus at Cracow, and in 1598, after the publication of his book on the Saviour, 'De Jesu Christo Servatore,' that the rabble, being stirred up, as it is said, by the scholars, pulled him from his sick chamber, and dragged him half naked through the streets, and he was rescued with difficulty by one of the professors. His property was plundered, and his manuscripts were destroyed, one of which was against atheists. After this outrage he left Cracow for a neighbouring village, where he died in March, 1604.

Socinus was rather tall and slender: his forehead was lofty, and his eyes penetrating; he was a handsome man, and of dignified appearance. He was abstemious in all things; simple in his manners, though grave; and affable to all persons. He was naturally choleric, but he had so tamed his temper, that the mildness of his disposition seemed to be a natural gift. His services to the cause of the Unitarians in Poland, according to his Polish biographer, consisted in opening the genuine meaning of Scripture in innumerable places, and in confirming by solid arguments those opinions touching the person of God and Christ which he found in Poland. His biographer adds, 'As for the errors received from the reformed churches, which did, in a great number, as yet reign in that church, he did, with a marvellous felicity, root them out. Such were that of justification, that of appeasing the wrath of God, that of predestination, that of the servitude of the will, that of original sin, that of the Lord's Supper and baptism, together with other misconstrued doctrines.' With respect to Christ, Socinus declares, in opposition to the Theses of Davidis, 'that the man Jesus of Nazareth, who is called Christ, not only spoke by the spirit of prophecy, but more than prophecy, for he was the express image of God, in whom the whole fullness of the godhead dwelt corporeally, so that he never used a word in his teaching which ought not to be considered as uttered by the mouth of God himself;' and, further, for the reasons which Socinus alleges, 'Christ may now justly be called God, inasmuch as, by the appointment of God, he discharges the highest of all functions and is endued with divine power in heaven and earth;' and 'that we ought, in addition to keeping his commands, to obey and worship him as our Lord and God, appointed over us by the Supreme God, and now reigning over us with supreme power.' (Socini *Opera*, ii., pp. 801, 802.)

Antitrinitarian opinions had been promulgated in Poland in 1546, at the meetings of a secret society at Cracow. The works of Servetus were then read in Poland, and Laelius Socinus, in his visit to that country in 1551, is said to have propagated his doctrines. But it was Faustus Socinus who gave to the antitrinitarian opinions a definite form, and reduced them to a system. He did not form a catechism, though he designed one; but this was effected by Smalcius and Hieronymus Moskorzewski, who collected and digested the doctrines which were established or approved by Faustus Socinus. This catechism was published at Rakow in 1605, in the Polish language. It was translated into Latin in 1609, and an English translation appeared at Amsterdam in 1652. In 1819, the Rev. Thomas Rees published a new English translation, with an historical notice.

The works of Socinus are in Latin, and fill the first two folio volumes of the 'Bibliotheca Fratrum Polonorum ques Unitarios vocant, Irenepoli, 1656.' The first volume contains the exegetical and didactic works of Socinus, and the second his polemical writings. Socinus wrote in a pure perspicuous style, and the moderation with which he expresses himself contrasts favourably with the usual tone of polemical writings of that day.

('The Life of that incomparable Man, Faustus Socinus Senensis, described by a Polonian Knight,' *Harleian Miscellany*, vol. vi., p. 355 (this is a translation of the Life of Socinus, prefixed to his works, by Samuel Przypkowski); Bayle, *Socin* (*Fauste*); Krasinski's *Historical Sketch of the Reformation in Poland*, London, 1840; Socini *Opera*.)

SOCORRO. [GRANADA, NEW.]

SO'COTRA, is an island in the Indian Ocean, situated about 200 miles from Cape Guardafui, the most eastern point of Africa. It lies between 12° 16′ and 12° 45′ N. lat., and between 53° 25′ and 57° 34′ E. long., and extends about 70 miles from west to east, with an average width of 15 miles. It contains 1100 square miles, being equal in extent to the county of Gloucester.

Socotra consists of an elevated table-land, which occupies about four-fifths of the surface, and two plains, which lie south and north of the table-land. The general elevation of the table-land is between 700 and 800 feet above the level of the sea. Its surface is in many parts level for a considerable extent; many hills are dispersed over it, but they rarely constitute ridges, except a granitic range of mountains, which stands on the northern edge of the table-land, about four miles from the northern shores of the island, and extends about eight miles, between 54° 2′ and 54° 10′ E. long. This mountain-mass may have a general elevation of about 3000 feet, but the most elevated portion consists of numerous peaks, some of which rise to 5000 feet. This range may be called the Haggier Mountains, from the most elevated of its peaks. From the western extremity of this range a ridge of limestone runs off in a south-west direction, but without forming peaks. Near the mountains its height may exceed 2000 feet above the sea, but it decreases as it proceeds southward, and at its termination, about seven miles from the southern shores, it is not more than 1200 feet high. The hills which are dispersed over the surface of the table-land attain an elevation varying between 1000 and 2000 feet. On the more level parts of the table-land there are many wide depressions, which generally extend south and north, and form long valleys. As the water collects in these depressions, it forms temporary watercourses, which give nourishment to numerous bushes, and to a fine turf, so that they constitute the best pasture-grounds of the island. But these watercourses disappear when the rains have failed for some time. There are fields of dukkum (*Sorgum saccharinum*) only in a few places. Plantations of date-trees skirt the banks of the watercourses to a great extent in the eastern districts, but are rarely met with in the western districts. In the former the fields on which dukkum and cotton are cultivated are much more numerous. The table-land descends to the plains generally with a steep declivity, but in a few places it comes close to the sea, as at Ras (Cape) Shuab, the western extremity of the island, and at Ras Kattany: near Ras Feling, on the southern coast, the cliffs skirt the shores for eight miles.

The plain, which skirts the southern base of the table-land, is from two to three miles wide, and nearly level, but it is as arid and barren as the worst part of Arabia. The sand on the sea-shore is very fine, and is put into motion by every strong wind. The force of the south-west monsoon, to which the coast is exposed, has carried it inland, where it forms a continuous range of sand-hills parallel to the beach, and hence it has spread over the plain, so that in many places great quantities of sand are disposed at the very base of the table-land. The shores run in a continuous line without being broken by any inlet. The few inhabitants of this plain live by fishing; but they have no boats, and take only those fishes which remain in the depressions of the beach after the retreat of the high tides. The northern plain varies in width between two and four miles. It is not so low as the southern, nor so level, the surface being intersected by flat valleys in many places, and in others some masses of hills rise from 300 to 600 feet. Sometimes these hills, or rather small table-lands, occupy several square miles. The western districts of this plain, though less sterile than the southern plain, are more adapted for pasture than for cultivation, but the eastern districts have a superior soil, which is a reddish-coloured earth, covered at certain seasons with abundant grass, and well adapted for the cultivation of grain, fruit, and vegetables. In the valleys through which the streams flow there are extensive groves of date-trees, and numerous enclosures of dukkum, and some plantations of indigo and cotton, which are all in a thriving state. The vigorous vegetation with which the lower declivities of the Haggier Mountains are clothed indicates a superior fertility in that district. In general the soil of this northern plain is stony, but it is generally covered with a dwarfish bush about six feet high.

With the exception of a few rivulets which originate in the Haggier Mountains, few if any of the streams contain water all the year round. Hence the inhabitants are obliged to collect rain-water in reservoirs, but in most parts of the northern plain water is found at a distance of from eight to ten feet below the surface.

As no European in modern times has spent a whole year in Socotra, we are very imperfectly acquainted with the climate. In the first three months of the year, the mean temperature is about 70½°, and in June and July about 88°. Though within the range of the monsoons, it is differently affected by them from the neighbouring countries. The north-east monsoon brings dry weather to Hindustan and the eastern coast of Africa, but in Socotra during that monsoon it rains almost daily. During the south-west monsoon, on the contrary, the sky is generally clear and cloudless, and the stars shine with uncommon brilliancy. But before the setting in of the breeze a dense white canopy of clouds extends over the sky; the air however is perfectly dry. The north-east monsoon blows with a steady breeze, but that from the south-west commences with a force almost like a hurricane.

The principal commercial products are derived from the wild plants, and are the aloe and dragon's-blood. The aloe plant (*Aloe spicata* or *Socotrina*) in the western districts covers the hills for many miles, at an elevation of from 500 to 2000 feet above the plains. The dragon's-blood tree grows in the same part of the island, at an elevation of from 800 to 2000 feet. These two plants are so abundant, that ten times the quantity which at present is exported could be collected in the island. There are several forest-trees, but none fit for timber. Yams grow wild in the Haggier Mountains, where also wild orange-trees are found, which probably have been introduced by the Portuguese. Dates are the only fruit-trees which are cultivated, and though numerous in the eastern districts, their produce is not equal to the consumption, and dates are imported from Muskat. Agriculture is limited to the cultivation of dukkum, a species of millet, beans and tobacco, with a little cotton and indigo.

There are no horses. Asses are only found in a wild state on the Haggier Mountains. They are probably the descendants of domestic animals. The camel is the only animal of burden, and is nearly as sure-footed as the mule; but there are only about 200 in the island. The cows are small, resembling in size the black Welsh cattle. They are only kept for their milk. Ghee forms one of the principal articles of export. Sheep and goats are numerous, especially in the western districts, where they constitute the principal wealth of the inhabitants. The sheep are small, but have a good wool, of which thick cloaks are made, which are well known in Arabia and Persia. There are several kinds of goats, and one of them is found in a wild state on the mountains: the flesh of this species is much prized by the natives. There are civet-cats all over the island, rats, mice, and chameleons. There are several kinds of vultures, and also the flamingo. Turtles are found on the southern coast. Fish abound in several parts of the coast, and some families live on the produce of their fishing.

The population is estimated by Wellsted at 4000 individuals, which, considering the large tracts consisting nearly of bare rocks, seems to be a very fair estimate. It consists of two different nations, of which one is foreign and the other apparently aboriginal. The former are called Socotran Arabs, and the latter Bedouins. The Arabs are a mongrel race, chiefly the descendants of Arabs who were left there by boats passing between Zanzebar and the Arabian coast, and have settled on the island. With these are intermixed the descendants of the Somaulies, or natives of the southern coast of the Gulf of Aden, of Portuguese, and of Arabian and African slaves. They generally understand the Arabian language, but usually speak that of the Bedouins. They are the only cultivators of the ground, but they also make ghee. They are zealous Mohammedans. The aborigines are called Bedouins in consequence of their pastoral habits and their wandering mode of life, though they differ widely from the Bedouins of Arabia in some points. Their language also appears to differ considerably from that of the Arabs. The mountaineers from the Arabian coast indeed are sometimes able to make themselves understood by the Bedouins of Socotra, but the Arabs from Muskat, or from any of the neighbouring towns, are quite unable to do so. They have no characteristics in common with the Arabs or Somaulies. They are tall, with strong, muscular, and remarkably well-formed limbs; a facial angle like that of Europeans, the nose slightly aquiline, the eyes lively and expressive, and the mouth well-formed. Their hair curls naturally, but does not approach to a woolly or crisp texture. Their general complexion is fair, but a few of them are as dark as the Hindus. The regularity of their features, the fairness of their complexion, and the symmetry of their bodies, render them a people distinct from any of the varieties seen on the shores of the continent on either side. They live on the produce of their sheep and goats, and collect aloes and dragon's-blood, which, together with ghee, they bring to the ports, where they exchange them for dates, dhurra, and clothes. As they frequently change their abodes, and live in a country not abounding in building materials, they inhabit the numerous caverns which are found in the limestone hills of their country. They are Mohammedans, but they do not show much zeal in the performance of their religious duties, nor are they tainted with the intolerance of the Arabs. They are divided into families or tribes, each occupying a determinate part of the island, and having a representative or head, who exercises what may be termed a patriarchal authority over them.

There is no place which can be called a town. The capital is Tamarida, which is built not far from the northern shores, and consists of about 150 straggling houses, of which however only one-third are inhabited. Wellsted thinks that the number of inhabitants cannot exceed 150.

Socotra was known to Ptolemy, who notices it under the name of Dioscoridis Insula, and Arrian says that the inhabitants were subject to the kings of the incense country. It was visited by the Portuguese Fernandez Perara in 1504, and taken possession of by Albuquerque in 1507. It is not known at what time the Portuguese evacuated the island, but probably before the sixteenth century elapsed. It then returned under the sway of the sultan of Kisseen on the southern coasts of Arabia, and its peace was not interrupted until 1801, when the Wahabees made a descent on the northern shores, and laid waste a part of it, together with the town of Tamarida. The sultan of Kisseen is still the sovereign of the country, but all the advantages he derives from this possession are a few hundred dollars, which are annually collected by a person whom he sends to the island. On the other hand he maintains no regular administration, and the people live without any laws or courts of justice. It is stated that crimes are of rare occurrence.

(Wellsted's *Memoir on the Island of Socotra*, in 'Lond. Geogr. Journal,' vol. v.)

SO'CRATES, considered by some the founder of Greek philosophy, was born at Athens on the 6th of Thargelion, Ol. 77. 4 (B.C. 468). His father, Sophroniscus, was a sculptor; his mother, Phaenarete, a midwife. He was originally destined for his father's profession, and we are told that he made no slight proficiency in his art; statues of the Graces, clothed in flowing drapery, were exhibited in the Acropolis as his work. He did not however devote himself to this profession; he carried it on so far as to earn a decent subsistence from it, but as he inherited some little property on his father's death, he was content to devote the greater part of his time and talents to the study of philosophy, for which he had a strong natural inclination. While still engaged in statuary, and much more so after he had given it up, he spent a great part of his time in reading all the accessible works of former and contemporary philosophers. Crito supplied him with money to pay the masters who taught various accomplishments at Athens, and he became an auditor of most of the great physical philosophers and sophists who visited Athens during his time, especially of Anaxagoras, who was expelled from the city when Socrates was thirty-seven years old, his successor Archelaus, and the luxurious and accomplished Prodicus, of whom Xenophon makes him speak in terms of the warmest affection (*Mem.*, ii., 1, sects. 21, 24). In a word, he may be considered as having received the very best education which an Athenian could command in those days. With regard to his public life, we know that he served his country faithfully as a soldier, according to the duty of all Athenian citizens. During the Peloponnesian war he made three several campaigns. In the first of these he took a part in the long blockade of Potidaea, and Alcibiades, in Plato's *Symposium* (p. 219, E, &c.) gives a full account, though perhaps rather a partial one, of his extraordinary hardihood and valour during this long service. He endured, with the greatest indifference, hunger and thirst, heat and cold; in one of the skirmishes which took place, Alcibiades fell wounded in the midst of the enemy; Socrates rescued him, and carried him off, together with his arms, for which exploit the generals awarded him the civic crown as the prize of valour (τὰ ἀρίστεια); this however he transferred to Alcibiades. The scene of his second campaign was Bœotia, where he fought for his country in the disastrous battle of Delium. Here he saved the life of another of his pupils, Xenophon, whom he carried from the field on his shoulder, fighting his way as he went. On his third campaign he served at Amphipolis. On the merit of his civil services it is more difficult to form a decided opinion. As a member of the deliberative senate (βουλή), he showed great firmness in voting against the iniquitous sentence by which the victors of Arginusae were condemned to death. But there is too much reason to believe that he really belonged to the party of Theramenes, who was the chief mover in that and other unhappy proceedings. At any rate he did not leave Athens even when the tyranny of the Thirty had reached its height; he was employed by them as an agent in one of the most detestable murders which they perpetrated—that of Leon, and though he did not actually assist in seizing the fugitive, his reluctance to do so arose probably from a goodness of heart quite consistent with a general adherence to the party which had selected him as their instrument. That Socrates favoured the aristocratic or oligarchical faction at Athens—that, at least, he was not well disposed to the democratic constitution of his country, is proved, to a certain extent, by the fact that the indictment on which he was condemned and executed was brought forward by Anytus, one of the chief of those citizens who assisted Thrasybulus in restoring the old state of things. We are of opinion (and the subject is one on which many opinions have been entertained) that Socrates, though a thoroughly good and virtuous man, endued with great self-control, a strong sense of duty, wonderful amiability of disposition, and indeed with almost all those qualities which obtain for an individual the love and admiration of his fellows, was deficient in the higher kind of political virtue; that in fact he was not a good citizen, because, with every wish to obey the laws of the state, he could not refrain from broaching theories at variance with the first principles of a democratic constitution, because he could not prevail upon his intellectual convictions to bow before the supremacy of public opinion. That in the abstract he might have been in the right, while all Athens was in the wrong, is not the question. As laws, in a democratic state, are made by the majority, the voice of one man, or of a small class of men, though they may be all philosophers, will never justify the speakers in breaking through those rules, to which, as members of the body-politic, they are bound to submit. The Athenians were justified, by every principle of law which was acknowledged in those days, in the sentence which they passed upon Socrates, and it is only a matter of wonder that the votes of the judges were so nearly divided. An opinion generally unfavourable to him had for a long time been prevalent in Athens, and it is no slight evidence of this opinion being well-founded, that it was, in part at least, supported by Aristophanes, who introduced Socrates into his celebrated comedy, 'The Clouds,' as a mischievous speculator on matters of religion, and as a corruptor of the youth of Athens—as, in fact, one of the class of Sophists. Although there can be no doubt that the comedy just mentioned had no share in producing the condemnation of Socrates, it is at least remarkable that the two principal charges brought against him on his trial constitute the leading features in the satirical censure of Aristophanes. The accusers, Meletus, Anytus, and Lycon, state their charges as follows: 'Socrates is guilty of impiety in not acknowledging the gods acknowledged by the state, but on the contrary, introducing new deities; and he also does wrong in corrupting the youth.' It would be easy to confute the arguments by which Xenophon seeks to justify his master from these charges, and if we only put ourselves in the place of the Athenians, we cannot wonder that a small majority of judges were compelled by their duty to pronounce him guilty. It does not however follow that he would have been put to death in consequence of this conviction. But on being called up to receive his sentence, he treated the court with a contumelious disdain, which was not only at variance with Attic law, but also eminently calculated to provoke his judges, who were accustomed to the most humble and abject demeanour on the part of those who were brought before them, and who could ill brook the irony and ridicule of a condemned criminal. He was sentenced to death by a much larger number than those who had voted him guilty. The festival of the Theora gained him a reprieve of thirty days, during which his friend Crito provided for him the means of escaping from prison, but he would not avail himself of the opportunity. His sentence was carried into execution at the end of the month Thargelion, Ol. 95. 1 (B.C. 399). If we may believe the account given us by a friend and disciple of his, he met his fate with the most heroic calmness and resignation, discoursing with and consoling his weeping friends, even after he had drunk the cup of hemlock, and expressing with his last breath his debt of gratitude to Æsculapius for having at length supplied him with a cure for all earthly ills.

The philosophical merits of Socrates are less doubtful than his political character. The mere fact that he is made the chief interlocutor in those wonderful dialogues which contain the whole system of Plato, is sufficient to prove that he exerted no slight influence on that great philosopher, and though he never committed any of his own thoughts to writing, he has left indisputable traces of the important innovations in science, of which he must be considered as the real and first author. We have three authorities for the doctrines of Socrates: Xenophon's 'Memorabilia;' the 'Dialogues' of Plato; and the 'Strictures' of Aristotle. With regard to the first work, too much reliance has been placed upon it as a faithful delineation of the sayings of Socrates. It is too much of an apologetic nature to deserve the title of a just and accurate exposition of the doctrines which it defends; and even if Xenophon had wished to give a full account of the philosophy of Socrates, it is not possible, from all that we know of him, that he would have been able to do so. His talents, such as they were, were all of a practical nature; he does not seem to have had any toleration for philosophy; he clearly did not understand the definition of terms or ideas; and at any rate had not originality enough to enable him to appreciate such a thoroughly original character as Socrates.

As to Plato, there can be no doubt that he never meant to pass off as his own the doctrines and speculations which he puts into the mouth of Socrates; but we cannot help feeling that the Socrates, whom he represents with such dramatic truth, must have been a real person, and no creature of the imagination, and that Socrates must have been the philosophical as he is the formal basis of all that Plato has done for science. If then we seek to make up for the deficiencies of Plato and Xenophon, as exponents of the doctrines which their master actually promulgated, by turning to the criticisms of Aristotle, we shall find that Plato gives us a much truer conception of what he effected by his scientific labours, than we could have derived from Xenophon. Aristotle distinctly tells us that Socrates philosophised about virtue, and made some real discoveries with regard to the first principles of science. Now this is just the philosophical basis which we discern in the Socrates of Plato. We find him always endeavouring to reduce things to their first elements, stripping realities of their pompous garb of words, and striving to arrive at certainty as the standard of truth; and we also find that his philosophy is generally applied to ethics rather than to physics. He seems to have been convinced of the unity of virtue, and to have believed that it was teachable as a matter of science. In fact, with him the scientific and the moral run into one another, for knowledge is the final cause of the will, and good is the final cause of knowledge; hence he who knows what justice is, must needs be just, since no one wittingly departs from that which he knows to be good. Socrates considered it to be his particular vocation to arouse the idea of science in the minds of men. This is clear from the manner in which he is said to have insisted upon the consciousness of ignorance, and also from the use which he made of the Delphic response, γνῶθι σεαυτόν, 'Know thyself.' 'For,' says Schleiermacher (in his valuable paper on the 'Worth of Socrates as a Philosopher'), 'if he went about in the service of the god, to justify the celebrated oracle, it is impossible that the utmost point he reached could have been simply to know that he knew nothing; there was a step beyond this which he must have taken, that of knowing what knowledge is. For by what other means could he have been enabled to declare that which others believed themselves to know, to be no knowledge, than by a more correct conception of knowledge, and by a more correct method founded upon that conception? And everywhere, when he is explaining the nature of non-science (ἀνεπιστημοσύνη), one sees that he sets out from two tests: one, that science is the same in all true thoughts, and consequently must manifest its peculiar form in every such thought; the other, that all science forms one whole. For his proofs always hinge on this assumption—that it is impossible to start from one true thought and to be entangled in a contradiction with any other, and also that knowledge derived from any one point, and obtained by correct combination, cannot contradict that which has been deduced in like manner from any other point: and while he exposed such contradictions in the current conceptions of mankind, he strove to rouse those leading ideas in all who were capable of understanding or even of divining his meaning.' In all the isolated particulars which are recorded of Socrates, this one object is everywhere discernible. His antagonistic opposition to the Sophists is one very strong feature of this. They professed to know everything, without having the idea of science, or knowledge of what knowledge is, and as he had that idea without the mass of acquirements on which they prided themselves, he was naturally their opponent, and his strife with them is carried on entirely in this way, that he endeavours to nullify the effects of their acquired knowledge by shifting the ground from the objects to the idea of science, whereby he generally succeeds in proving their deficiency in the one thing needful to the philosopher. His irony, as it is called, is another remarkable proof of his devotion to his vocation as an awakener of the idea of science. The irony of Socrates has been well described as the co-existence of the idea of science in him, with the want of clear and complete views on any objects of science—in a word, as the knowledge of his ignorance. With this is intimately connected the indirect dialogical method which he invariably adopted, and which may be considered as his method of extracting scientific truth from the mass of semblances and contradictions by which it was surrounded. His *dæmonion*, or secret monitor, which was a great puzzle to his contemporaries, as it has been to many of the moderns, seems to have been little more than a name which he gave to those convictions on practical subjects which sprung up spontaneously in his mind, and for which he could not find any satisfactory means of accounting, though he felt himself constrained to follow in the course which they prescribed, as when he felt convinced of the issue of an undertaking, or was restrained by some secret misgiving from taking a certain route on his retreat from a disastrous battle.

Such are the leading outlines of the philosophy of Socrates, so far as they are capable of being established with any certainty. The importance of his doctrines is most clearly perceived when we consider them as they were developed and applied by the various schools which acknowledged him as their founder, and especially as they were carried out by Plato. [Cynics; Cyrenaics; Megarians; Plato.] In all these schools, we find, along with the purely Socratic element, some foreign admixture which constitutes the diagnosis of the different systems, and it is not a matter of wonder that no school of Socratic philosophy merely adopted the principles and method of its great founder. A thoroughly original man like Socrates would naturally gather around him all the original and thinking men who fell in his way, and his business was best done by making them all think for themselves and work by themselves on the idea of science which he had awakened in their minds. The Socratic impulse being once communicated, it would take a different direction according to the character and natural bias of the subject on which it operated, and though Socrates may be considered as the basis of the whole superstructure, he can have no more claim to the whole merit of the Platonic philosophy than he is entitled to be blamed for the reckless inconsistencies of Alcibiades or the selfish policy of Xenophon.

In person, Socrates was no less singular than he was in manners and dress He had large projecting eyes, a sunken nose turned up at the end, with wide dilated nostrils, and a great unwieldy belly; so that his appearance was not unlike that of the Silens and Satyrs, whom he also seemed to resemble in the severe mockery of his ironical language. His dress was coarse and inelegant, and he seldom wore shoes. If we add to this, that as he walked along the streets he strutted about in a most haughty supercilious manner, staring to the right and left at every one he met, sometimes stopping suddenly in an absent fit and remaining for a considerable time fixed to the spot, we shall not wonder at the selection which Aristophanes made of him as a fit and proper subject for the caricature of comedy.

SODA. [Sodium.]

SODA'DA has been named from *sodad*, the Arabic name of a shrub found in Egypt, as well as everywhere in the province of Yemen in Arabia. It was considered by Forskal, the discoverer, to be a distinct genus which belongs to the natural family of Capparideæ. It is now arranged only as a subgenus under Capparis [Capparidaceæ], distinguished by having concave leaflets of the calyx, stamens indefinitely numerous, berry ovate. It requires mention only as the unripe fruit is cooked and forms an article of diet among the Arabs. The same plant is known in Egypt by the name *Hombac:* it forms a shrub with thorny nearly leafless branches.

SODALITE occurs crystallized and massive. Primary form the cube, but usually met with in rhombic dodecahedrons, parallel to the planes of which it is cleavable. Fracture conchoidal, uneven, with a vitreous lustre. Hardness sufficient to scratch glass easily. Colour white, grey, greyish-green, and green. Streak white. Lustre vitreous. Transparent; translucent. Opaque. Specific gravity 2·295 to 2·37.

Massive Varieties, amorphous. Structure granular, compact.

When heated by the blowpipe, the edges are rounded with difficulty, and without any other alteration. With borax dissolves into a colourless transparent glass with great difficulty.

It is found in Greenland, in Mount Vesuvius, and in Siberia.

Analysis of the Vesuvian mineral by Arfwedson:—

Silica	35·99
Soda	26·55
Alumina	32·59
Muriatic Acid . . .	5·30
	100.43

SODDOMA, IL. [Razzi.]

SÖDERHAMN. [Swedbn.]

SÖDERKÖPING. [Sweden.]

SÖDERMANLAND. [Sweden.]

SÖDERTILGE. [Sweden.]

SO'DIUM, a metal, the base of the alkalis soda, natron, and the fossil alkali, in which substances it is combined with oxygen, forming the protoxide of the metal.

Sodium was discovered by Sir H. Davy in 1807, and the method by which he obtained it is perfectly similar to that by which he procured potassium [Potassium], which it strongly resembles in many properties. It will of course be understood that in the latter case the alkali soda in the state of hydrate was substituted for hydrate of potash. Gay-Lussac and Thénard soon afterwards procured it in greater quantity by decomposing soda by means of iron, as already pointed out. [Potassium.] It is stated by Schœdler, that it may be economically procured by mixing one part of acetate of soda, which has been decomposed by ignition, with half its weight of coarsely-powdered charcoal, and one-fourth of finely-powdered charcoal, and then heating the mixture in an iron retort with the usual recipients for the product.

The properties of sodium are such as to prevent its occurrence in nature, except in combination. Immense quantities occur combined with chlorine, forming common salt; and considerable quantity is met with in the state of oxide, or soda, combined with carbonic acid: these are its principal sources.

Sodium has a colour and lustre resembling those of silver. It remains a soft solid at 32°, so that small portions may be welded together by pressure; it becomes much softer at 122°, fuses at about 190°, and by a white heat it is volati lized. Like potassium, it speedily tarnishes by exposure to the air, owing to its great affinity for oxygen, and this occurs more rapidly when the air is moist, and it requires for preservation the same precautions as have been mentioned with regard to potassium. It does not, like this metal, inflame when thrown upon water, but decomposes it with a hissing noise, the results being hydrogen and oxide of sodium, or soda, which, remaining in solution, exhibits the well-known alkaline character of that substance. When however it is placed on a moistened bad conductor of heat, as charcoal, it decomposes water with vivid combustion. Its specific gravity is 0·972, so that although it is considerably more dense than potassium, it is yet less so than water. It is a good conductor of electricity and heat; but if too strongly heated in the air, it burns with a yellow flame.

Sodium combines with all the elementary gaseous bodies, two of which, namely, those with oxygen and chlorine, are of great importance and utility.

Oxygen and Sodium form two compounds, protoxide and peroxide of sodium; the former of these has been long known, and extensively used in various arts and manufactures for many centuries. It was formerly called the *fossil alkali*, to distinguish it from potash, which, as being procured by the incineration of wood, was called the *vegetable alkali;* the peroxide has been discovered only since the metal was known.

Under the head of carbonate of soda we shall briefly mention the processes by which soda is procured for manufacturing purposes, stating merely at present that protoxide of sodium, or anhydrous soda, is prepared by heating the metal in sufficient dry oxygen gas, taking care that there is no excess, for if there be, then some peroxide will be formed; thus obtained, it is a grey solid, resembling potash in appearance, but it is less fusible and volatile. It is extremely acrid to the taste, and is very caustic. It has great affinity for water, dissolving readily in it, and in large quantity, and the solution has strongly marked alkaline properties.

Sodium differs remarkably from potassium in some respects: thus, while both become first alkaline oxides, and afterwards carbonates, by exposure to the air, the carbonate of soda remains dry, while that of potash becomes fluid, owing to the absortion of water.

Sodium, as has already been noticed, is oxidized by decomposing water, and the solution of soda obtained, when evaporated to dryness, leaves hydrate of soda. This is a solid white substance, greatly resembling soda in appearance and properties. It retains the water with so great affinity, that it cannot be expelled by heat.

Soda, or protoxide of sodium, is composed of—

One equivalent of oxygen . . .	8
One equivalent of sodium . . .	24
	—
Equivalent . . .	32

The hydrate is composed of one equivalent soda and one equivalent of water (32 + 9).

Soda is met with in some mineral substances, but not so commonly as potash. It is found however in albite, or cleavlandite, a constituent of granite resembling felspar, except that it contains soda instead of potash.

Peroxide of Sodium.—This compound is formed by heating sodium in more oxygen gas than is required to convert it into a protoxide. It burns vividly, extricating much light and heat; the peroxide resulting is of a yellowish-green colour. When put into water, it is decomposed, oxygen gas being evolved, and soda, or protoxide of sodium, remaining in solution.

According to Davy it is a sesqui-oxide consisting of—

One and a half equivalent of oxygen .	12
One equivalent of sodium . . .	24
	—
Equivalent . . .	36

The later experiments of Millon make it a compound of—

Two equivalents of oxygen . .	16
One equivalent of sodium . . .	24
	—
Equivalent . . .	40

It is not applied to any use, and, being decomposed by water, it does not form salts with acids.

Chlorine and Sodium form only one compound, the important one, common salt, formerly called muriate of soda, and now chloride of sodium. Of all natural soluble salts this occurs in the greatest quantity. It is met with solid, constituting rock salt, in solution in salt springs and in the ocean, and in small quantity in almost all spring and river water. [SALT-TRADE.]

This salt may be obtained artificially, either by the direct action of chlorine gas on sodium, or by saturating hydrochloric acid with soda; by evaporating the solution, common salt is obtained, which, in whatever manner or from whatever source procured, has, when pure, the following properties:—it is colourless, inodorous, has a purely saline taste unmixed with bitterness; is transparent, brittle, and easily reduced to powder; its specific gravity is about 2·125; when exposed to moist air, it deliquesces; it crystallizes in cubes, which form under common circumstances is but little subject to modification. It is almost as soluble in cold water as in boiling. Water at 32° dissolves more than at 60°; the experiments of Gay-Lussac show that 100 parts of water at 58° dissolve 36 of salt, and in a boiling saturated solution, the temperature of which is 225°, 100 parts of water hold 40·38 of salt in solution. According to Berzelius, the quantities are very nearly 35·4 and 36·1. A saturated boiling solution does not deposit crystals on cooling, evaporation being necessary to produce this effect; in pure alcohol it is insoluble. At a red heat common salt fuses, and on cooling it becomes a transparent brittle mass; the crystals contain no water of crystallization, but decrepitate strongly when heated, owing to the expansion of mechanically interposed water. At a bright red heat it sublimes in the air, and tinges flame of a blue colour.

Chloride of sodium is composed of—

One equivalent of chlorine .	36
One equivalent of sodium .	24
	—
Equivalent .	60

The uses of this salt have been known from the earliest ages. It is employed not only in seasoning food, but in preserving meat from putrefaction. It is used occasionally as a manure. In chemical manufactures it is employed for preparing hydrochloric acid, sulphate and carbonate of soda, and several other salts, as hydrochlorate of ammonia and the chlorides of mercury, and in the preparation of soap.

Sodium combines with fluorine, bromine, iodine, sulphur, phosphorus, &c.; but the compounds which they form are not very important, not being extensively applied to any purposes whatever. We shall therefore proceed to consider the properties of some of the more useful

SALTS OF OXIDE OF SODIUM, OR OXISALTS OF SODA.

It is perhaps scarcely requisite to state that these salts are never prepared by directly acting upon the metal sodium, although for purposes of curiosity they might all of them be so procured. The first which we shall notice is—

Nitrate of Soda.—This salt may be prepared either by adding the metal, or soda, its oxide, to nitric acid; as a natural product it has however of late years been largely imported from Peru, where it forms a stratum of some miles in extent. This salt has a cooling saline taste, is inodorous and colourless; in a moist atmosphere it deliquesces; it readily crystallizes, and the form of the crystal is an obtuse rhomboid; so obtuse indeed, and so near a cube, that the salt was originally called *cubic nitre*, to distinguish it from potash nitre, the crystals of which are prismatic. According to Gay-Lussac, 100 parts of water at 32° dissolve 73 parts of this salt; and at 212°, 173 parts. Berzelius says that water at 60° dissolves half its weight. It is sometimes found with crude nitrate of potash.

Like nitrate of potash, it deflagrates with charcoal; but owing to its property of attracting moisture, it cannot be used in the manufacture of gunpowder. It is however used largely in making nitric acid, sulphuric acid, and as a manure.

Nitrate of soda is anhydrous, and is composed of—

One equivalent of nitric acid .	54
One equivalent of soda . .	32
	—
Equivalent .	86

There are three compounds of carbonic acid and soda, the carbonate, sesqui-carbonate, and bi-carbonate.

Carbonate of Soda.—This salt, formerly called *subcarbonate of soda*, was obtained from barilla [BARILLA] or kelp [KELP]: the former being the ashes of the *Salsola soda*, and prepared in Spain; the latter the ashes of burnt sea-weed, manufactured in Scotland. Since the duty has been taken off common salt, carbonate of soda is now prepared, for the numerous uses to which it is applied, by first converting common salt into sulphate of soda by means of sulphuric acid, and then treating the sulphate with small-coal and chalk in a reverberatory furnace: the result is a mixture of carbonate of soda and sulphuret or perhaps oxi-sulphuret of calcium; and when this is treated with cold water, the sulphuret remains undissolved, while the carbonate of soda is taken up by the water, and by evaporation to dryness what is called *soda ash* is obtained; while by due evaporation crystallized carbonate of soda is formed.

This salt, when obtained by evaporation, is a colourless inodorous powder; it is devoid of smell, but has a disagreeable taste, though less so than carbonate of potash; it is readily soluble in water; does not deliquesce when exposed to the air. The primary form of this substance, when crystallized by moderate evaporation of the solution, is an oblique rhombic prism. The crystals are frequently very large. They contain about 62 per cent. of water, the greater part of which they lose by exposure to the air, and efflorescing, fall to powder. At high temperatures the salt becomes fluid and boils. Water at 60° dissolves half its weight of carbonate of soda, and boiling water considerably more. The solution possesses the alkaline property of turning vegetable yellows brown. Like other carbonates, this salt is decomposed by the stronger acids, with effervescence of carbonic acid; and by lime, which separates its carbonic acid, it is rendered caustic.

Carbonate of soda is composed of—in the state of crystals—

One equivalent of carbonic acid .	22
One equivalent of soda . . .	32
One equivalent . .	54
Ten equivalents of water . . .	90
Equivalent of crystals .	144

The quantity of this salt prepared and used is enormous; it is required in making soap, and crown and plate glass, and for numerous other purposes.

Sesqui-carbonate of Soda.—This compound is found native in Hungary, and also near Fezzan in Africa. By the natives it is called *Trona.* It is found in hard striated crystalline masses, and it is not altered by exposure to the air, but is readily soluble in water.

This salt appears to be formed when a solution of the carbonate of soda is heated with carbonate of ammonia, and probably also when a solution of the bi-carbonate is heated. Its taste is less alkaline than that of the carbonate, into which it is converted, when strongly heated, by losing one-third of its carbonic acid.

It is compose of—

One equivalent and a half of carbonic acid	33
One equivalent of soda . . .	32
Two equivalents of water . . .	18
Equivalent . . .	83

It is used in medicine, and it is stated that in Africa it has been used for building walls.

Bi-carbonate of Soda.—This salt is formed by passing carbonic acid gas into and through a solution of the carbonate of soda; a crystalline granular compound is formed, which consists of—

Two equivalents of carbonic acid . .	44
One equivalent of soda . . .	32
One equivalent of water . . .	9
Equivalent . .	85

This salt has a very slightly alkaline taste, and it acts very feebly on turmeric-paper. It requires about twelve times its weight of water for solution. When the solution is boiled, it loses one-fourth of its carbonic acid, and is converted into sesqui-carbonate; at a red heat it loses all its water and half its carbonic acid, and is then carbonate of soda. It resembles the sesqui-carbonate in giving no precipitate with the salts of magnesia till heated; and they both differ from the carbonate in this respect. It is used in medicine. This salt dissolved in water is called *soda-water,* when an additional quantity of carbonic acid has been forcibly combined with it.

Sulphate of Soda, formerly called Glauber's salt, may be formed by the direct combination of the acid and alkali; it is however generally prepared by decomposing common salt, in the preparation of hydrochloric acid, or for making carbonate of soda. It has also been met with in nature, but not largely.

This salt is readily soluble in water, and the solution by evaporation yields colourless transparent prismatic crystals, the primary form of which is an oblique rhombic prism. It has a very bitter taste; effloresces when exposed to the air, by losing water of crystallization. Boiling water dissolves its own weight of this salt, and water at 60° one-third of its weight. It is insoluble in alcohol. When exposed to heat it first undergoes watery fusion, by melting in its water of crystallization; when the water has been expelled, it becomes opaque white, and at a red heat it melts.

It is composed of—

One equivalent of sulphuric acid . .	40
One equivalent of soda . . .	32
Equivalent . . .	72
Ten equivalents of water . . .	90
Equivalent of the crystals .	162

It is employed in medicine, but much more largely in the preparation of carbonate of soda.

Phosphoric Acid combines with soda to form several compounds; for an account of which we refer to Brand's 'Manual of Chemistry.' No one of them is extensively employed.

Borate of Soda is a compound of boracic acid and soda. [BORAX.]

Acetate of Soda is a salt prepared by saturating the acid with the alkali or by double decomposition with acetate (pyrolignite) of lime and sulphate of soda. This salt has a saline but not a disagreeable flavour; it is colourless, inodorous, and crystallizes in oblique rhombic prisms; the crystals are soluble in three times their weight of cold water, and much more so in hot; when heated, it first melts in its water of crystallization, and at a red heat it is decomposed and converted into carbonate of soda. It is employed in the preparation of acetic acid and of sodium.

It consists of, in its crystallized state—

One equivalent of acetic acid .	51
One equivalent of soda . .	32
Six equivalents of water . .	54
Equivalent . .	137

For an account of numerous other salts of soda we must refer to chemical authors; those whose properties we have detailed being merely the most useful.

General Properties of the Salts of Sodium.—Unlike the salts of potash, there is no acid nor any metallic oxide which forms an insoluble compound with the salts of soda, so that they cannot be precipitated in combination from solution. The best mode of distinguishing between these two alkalis is, to convert them into their respective sulphates or nitrates, and compare their distinctive characters.

SODIUM, *Medical Properties of the Preparations of* This, when in the state of an oxide, is termed the mineral alkali, in contradistinction to potash, or the vegetable alkali: both however are found in plants, though the former exists in large quantity only in plants growing in the sea, on the sea-coast, or inland salt-marshes. In the form of the chloride of sodium, common or table salt, it is one of the most abundant principles in the mineral kingdom. It also exists in many fluids in the animal kingdom, such as the blood and urine, particularly in man.

It possesses the ordinary qualities of a fixed alkali, but notwithstanding the resemblance it has to potash, the preparations, even with the same acid, present some differences which may be here pointed out.

In the oxidized state, or soda (pure or caustic), it is not employed in medicine to counteract acidity; nor in surgery to form an ulcer or to open abscesses, though for this latter purpose it possesses some advantages over hydrate of potash, inasmuch as it is not liable to spread or run.

It is only when in combination with carbonic acid that it is used to correct acidity. It exists in three states, viz. carbonate, sesqui-carbonate, and bi-carbonate: the causticity of these is less in proportion to the increase of the acid. These preparations, administered in various ways, but chiefly in solution, are much used to counteract real or presumed acidity of the stomach. The abuse of the analogous preparations of potash has been already pointed out. [POTAS-

SIUM.] The same caution is necessary as to soda-water, when that really contains any carbonate or bi-carbonate of soda, as it not unfrequently consists only of carbonic acid compressed into the water. The saline draughts so commonly employed in the medical practice of this country are liable to the same objection, and in all cases of debility, especially in the phosphatic diathesis, do infinite harm. For an opposite reason, they are extremely serviceable in all inflammatory complaints: the period when they should be discontinued can only be determined by an intelligent medical attendant.

The preparations of soda possessed of purgative properties are—the sulphate, or Glauber's salts, the phosphate, and the triple salt, called sodæ-potassio-tartras, or Rochelle salts, of which potash is also a constituent. Of these it is only necessary to observe that of the sulphate a much larger dose is required than of the corresponding salt of potash; and that the phosphate, being nearly tasteless, and extremely mild in its action, is a very proper aperient for delicate persons. A nearly similar character belongs to the Rochelle salt, but as this is decomposed in the stomach, it is as hurtful as the common saline draughts in cases of debility, though very beneficial in inflammatory disorders, particularly in both acute and chronic duodenitis. The same remark is applicable to the so-called Seidlitz powders formed with Rochelle salt and bi-carbonate of soda, to which, when dissolved, a solution of tartaric acid is added, and the mixture drank in the state of effervescence. The most quickly acting aperient is a Seidlitz powder dissolved in warm water; this is most proper at the commencement of common colds, influenza, and inflammatory diseases, but it should not be repeated without medical sanction, especially in influenza, where extreme debility speedily ensues.

The preparations of soda possessed of diuretic properties are the bi-borate and the acetate. The former of these has been already treated of [BORAX], and the second is rarely used, though, from not deliquescing, it has the advantage over acetate of potash, that it can be administered in the form of powder.

Chloride of sodium possesses purgative and emetic properties, which render it useful as a domestic remedy. Its other uses have been already pointed out. [BATHING; ANTHELMINTICS; FOOD.]

Chloride or hypochlorite of soda is a powerful disinfecting agent. [ANTISEPTICS.]

SODOM, an antient city of Palestine, which, with Gomorrah, Admah, Zeboim, and Bela or Zoar, formed the five 'cities of the plain,' four of which were destroyed by fire from heaven for the wickedness and vices of their inhabitants, in the time of Abraham. (*Gen.*, xix.)

It has usually been assumed that the Dead Sea has existed only since the destruction of Sodom and the other cities; and of late years the favourite hypothesis has been, that before that time the Jordan had flowed through the whole length of the Wady-el-Arabah to the Gulf of Akaba, and that the present bed of the Dead Sea was a fertile plain. But from the recent discoveries of Dr. Robinson, we learn that this could not have been the case, at least not within any historical period. This traveller found that the Arabah, through which the Jordan was supposed to have once passed southward to the eastern arm of the Red Sea, actually sends its own waters northward into the basin of the Dead Sea; and that the waters of the high western desert, far to the south of the Arabah, all flow in the same direction. 'Every circumstance goes to show that a lake must have existed in this place, into which the Jordan poured its waters long before the catastrophe of Sodom. The great depression of the whole broad Jordan valley and of the northern part of the Arabah, the direction of its lateral valleys, as well as the slope of the high western desert towards the north, all go to show that the configuration of this region in its main features is coeval with the present condition of the surface of the earth in general, and not the effect of any local catastrophe at a subsequent period.'

But although it appears that the Dead Sea existed before the destruction of Sodom, it is also concluded that the lake then covered a considerably less extent of surface than at present; and that Sodom and the other cities stood in what is now the southern portion of the lake, which portion is even now sufficiently distinguished from the main body of that water. That Sodom was at the southern extremity of the lake is shown by the fact that it was near to Zoar (to which Lot fled, and which was spared), and the name of Zoar is now recognised at a spot almost at the southern extremity of the present lake. The fertile plain therefore in which Sodom is described as having been situated, and which 'was well watered, like the land of Egypt,' lay to the south of the lake 'as thou comest unto Zoar.' Even to the present day more living streams flow into the Ghor, at the south end of the lake, from the wadys of the eastern mountains, than are to be found so near together in all Palestine; and the tract, although now mostly desert, is still better watered through these streams, and by the many springs, than any other district throughout the whole country.

(Robinson's *Biblical Researches in Palestine*, ii. 601, et seq.)

SOFA'LA is a country on the east coast of Africa, extending from Cape Corrientes on the south (25° S. lat.) to the vicinity of the river Luabo, the most southern arm of the Zambesi (19° S. lat.). As the country, except in two or three places on the coast, where small Portuguese settlements are found, is occupied by small independent tribes, it is impossible to assign to it a western boundary. This country, together with the province of Senna [SENNA], was formerly known by the name of Monomotapa, and was noted for the quantity of gold which was supposed to exist there. It has sometimes been considered to be the Ophir of Solomon, whence his fleets returned laden with 'gold and precious stones.' [OPHIR.] At present the name of Monomotapa is antiquated, and the few gold-mines which exist are included in the province of Senna. [SENNA, vol. xxi., 239.]

The coast is low, and so beset with shoals and sandbanks, that it is very difficult of access for large vessels. Along the coast are several islands, as the Bazaruta Islands, and Chuluwan, which is sixteen miles in length, and is nearly divided into two parts by a salt creek, which opens into the small channel that separates it from the mainland.

The mouths of several rivers have been visited. The most northern is the river Boozy, commonly called Jarra, which falls into a large shallow bay called Massangzany. Then follows the river of Sofala, forming at its mouth a tolerable harbour, which however is very difficult of access on account of the bar. Farther south is the river Savey or Sabia, and then the Sawooro, which falls into the great bay of Maroonone. These two rivers are hardly navigable for boats at their entrance, but are stated to be large rivers in the interior. The most southern river is Inhamban, which is easy of access, and makes a superb harbour, but is scarcely navigable for ships beyond the town, eight miles from the entrance; and five miles farther up it is not navigable even for boats.

Ivory and bees'-wax constitute the principal if not the only articles of export: they go to Mozambique. When the inhabitants have had a war with their neighbours, a few slaves are brought to the settlements.

The native tribes are very warlike. They are not acquainted with fire-arms, and use only spears and shields made of hide. They are divided into numerous tribes, and their chiefs come annually to the Portuguese settlements, where they receive some trifling presents.

The most northern of the Portuguese settlements is Sofala, which consists only of a paltry fort and a few miserable mud huts. At the mouth of the river Sabia a serjeant and six men are stationed. The most important settlement is Inhamban, which is a small trading town with tolerably good buildings. The Portuguese population, exclusive of the military, is only twenty-five, but the coloured inhabitants are numerous.

Sofala was visited by Pedrão Cavalhão, a Portuguese, before the way to India by sea was known. He went there by the way of the Red Sea and Calicut, in 1480, a year before Bartolomeo Diaz succeeded in reaching the Cape of Good Hope. Albuquerque took possession of it, and in 1508 the fort of Sofala was built. The Portuguese have always remained in possession of the country; but in proportion as their power in the East Indies decreased, the importance of these settlements was lessened, and in consequence they have been neglected.

(Capt. Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar.*)

SOHAM. [CAMBRIDGESHIRE.]

SOHO. [BIRMINGHAM.]

SOIL. Wherever the surface of the earth is not covered with water, or is not naked rock, there is a layer of earth more or less mixed with the remains of animal and vegetable substances, in a state of decomposition, which is commonly called the *soil*.

The nature and composition of the soil, and consequently its greater or less aptitude to the growth and maturity of vegetable productions, depend chiefly on the proportion and mechanical structure of the various substances of which it consists. When the soil is favourable to the chemical action by which the elements are combined to form vegetable substances, and admits that quantity of air and moisture without which this chemical action cannot take place in any given climate or temperature, vegetation goes on rapidly, and all the plants which are suited to the climate grow in the greatest perfection, and bear abundant fruits.

It is not however very frequently the case that a soil possesses all those qualities on which great fertility depends. So many circumstances must concur to make a soil highly fertile, that the great majority of soils can only be made to produce abundantly by being improved by art both in their texture and composition. Hence the practice and science of agriculture, which is founded on experience, but to which every progress in science also affords great assistance, by the additional light which every new discovery throws on the true theory of vegetation.

There are various modes of distinguishing soils, without entering into a minute analysis of their component parts. The simplest and most natural is to compare their texture, the size and form of the visible particles of which they are composed, and to trace the probable source of their original formation from the minerals which are found around or below them, or the rocks from which they may have been slowly separated by the action of the elements. The science of geology, which teaches the relative position and nature of the minerals of which the outer crust of the earth is formed, is consequently of the greatest utility in aiding us to compare different soils and ascertaining their composition.

The knowledge which geology imparts is however not sufficient for the minuter classification of soils; for it is found by experience that the soils which lie over or near the different strata, as they appear near the surface, vary greatly, although they retain some general character which distinguishes them from others. The streams which descend from the hills, and flow towards the valleys, and through them to the sea, carry to a great distance the minuter portions of the minerals which they flow over in their course, while the larger and heavier are deposited much sooner. Hence the heterogeneous mixture of various earths and stones, and their stratification in thin layers, as is often found when a soil is examined which has never been disturbed by cultivation. A sudden flood rising rapidly carries stones and fragments of rocks in its course, while a gentler stream deposits fine sand or clay over these, and forms every variety of sandy, gravelly, or clayey soil. If chalky hills are near, carbonate of lime abounds in almost every proportion, with its usual concomitant irregular flints. If the waters have accumulated in a basin, and formed a temporary lake, the soil will consist of all the finest portions of the minerals, which from their minute size have remained long suspended in the still waters, and slowly deposited in the form of mud. In proportion to the shallowness of the lake, vegetable matter will have been produced, and intimately mixed with the minerals; and where vegetation has gone on rapidly, peat and soft bogs are formed.

It is not sufficient to class soils according to the substance which predominates, as has been usually done, such as sandy, gravelly, chalky, or clay soils; for this gives very imperfect information respecting their nature or fertility; neither is it altogether sufficient to class them according to any particular geological formation. It is important to enter into a more minute examination of their component parts. But as the geological investigation of the different strata is a great help in the examination of soils, we will in the first place give a short description of those which have the most distinct characters, from their connection with different geological formations.

The soils which are immediately derived from those rocks in which no traces of organic remains are to be found, consist either of visible fragments of quartz and other hard minerals, which are not affected by exposure to air or water, and are only ground and comminuted by being rubbed against each other in floods and torrents, or of minuter particles of the same, of which the shape is not readily distinguished by the naked eye. When they are altogether composed of visible particles and stones, the water readily passes through them; and unless they are kept continually moist by a regular irrigation, without any stagnation of the water, they are absolutely incapable of sustaining vegetation, or of bringing fruits to maturity. It is seldom, however, that any gravel or sand does not contain some portion of earth or other matter, of which the particles become invisible when diffused through water, and to which, for the sake of perspicuity, and to prevent confusion, we will here give the general name of *impalpable substance*. A certain portion of this finer part of the soil, and its due admixture with the coarser, especially where there is some regular gradation in size, and no stones of too large dimensions to obstruct the instruments of tillage, may be considered as essential to fertility. The chemical composition of the impalpable substance no doubt greatly affects the degree of fertility; but the general texture must be considered as by far the most important circumstance. To improve this texture permanently is the great object of all the labours of the husbandman. For this purpose he carries various earths from one spot to another; clays one field, and limes or chalks another; brings peat upon sands and clays, and carries gravel and lime on his peat-bogs. Without an adequate knowledge of the composition and texture of a soil, it is impossible to make permanent improvements with any certainty, or without incurring the risk of failure or of useless outlay.

The soils which have been formed from the disintegration and decomposition of the primitive rocks, such as granite, basalt, schist, or limestone, and especially those which contain all these minerals minutely divided and intimately mixed, are always naturally fertile, and soon enriched by cultivation. The hard particles of quartz maintain a certain porosity in the soil, which allows air and moisture to circulate, while the alumina prevents its too rapid evaporation or filtration. The silicate of potash also seems highly favourable to the vegetation and growth of those plants which contain silica in their stems, such as the gramineæ, especially wheat, of all plants the most important to the husbandman in our northern climates. If organic matter be an essential ingredient in a fertile soil, it is soon produced by cultivation, or added by judicious manuring.

Where there is a deficiency of impalpable matter, and the fragments of the rocks of which the soil is composed are large, and lie loosely, it is in vain to expect vegetation, except along gently flowing streams, which supply the roots with moisture, and thus form a bed of vegetable matter; but in a climate suited to the vine, and in a good exposure, these loose soils often produce excellent wine, as may be seen along the steep banks of the Rhine and other rivers. The roots of the vine run deep into the fissures of the rocks below, and there find nourishment suited to their nature.

The primitive limestone, which is very hard, is yet gradually decomposed by the action of air and water, being, in a very small degree, soluble in the latter. The water which flows through these rocks is soon saturated; but when it springs out and comes to the light, the carbonate of lime is deposited by the evaporation of the water; and, if this meets with the clay which results from the decomposition of the slate, it forms a marl, which, naturally or artificially added to silicious sand, forms the basis of a very good soil, particularly well adapted to pasture.

The soils which have been evidently formed from the rocks which are supposed to be of secondary formation, are fertile according to the proportion of the earths of these rocks which they contain. It is of these chiefly that those loose sandy soils are formed of which the particles appear as distinct crystals, easily distinguishable with the aid of a lens, or even by the naked eye. Air and water have been the chief agents in the decomposition of those secondary rocks called *sandstones*, and agitation in water has washed from them the finer portions, which have remained suspended. The immense sandy plains which are either barren or have been fertilized with great trouble and expense, have probably once been the shores of the sea, from which the waves have washed all that portion which was impalpable and easily suspended in water, depositing this in the depths, which, by some convulsion of nature, may some time or other be raised above the level of the waters, and form hills or plains of clay, such as are often found in extensive basins of great depth.

Argillaceous earth exists in some proportion in almost every rock. Some of the hardest gems are chiefly composed of alumina. It has the property, when mixed with other substances, as silica or lime, of fusing into a stone of great hardness and insolubility. In this state its effect on the soil is not to be distinguished from that of silica; and by burning common clay, or clay mixed with carbonate of lime, a sandy substance is produced resembling burnt brick, which tends greatly to improve the texture of those clays which contain little or no sand in their composition. It must be remembered that the stiffest clays contain a large portion of silica in an impalpable state; but this, instead of correcting their impermeable and plastic nature, rather adds to it. It is only palpable sand which with clay forms what is commonly called loam, and which, when the sand is in due proportion with a mixture of organic matter, forms the richest and most easily cultivated soils. Some of the rocks of secondary formation contain a considerable portion of alumina and lime; and when these earths meet with crystallized sand, a compound, or rather a mixture is formed, which has all the requisite qualities, as to texture, to produce the most fertile loams. The only deficiency is that of organic matter; but this is so readily accumulated wherever vegetation is established, or can be so easily added artificially, that these loams may always be looked upon as the most favourable soils for the usual agricultural operations; and if a considerable depth of loam is found, which neither retains water too long nor allows it to percolate too rapidly, it may be looked upon as a soil eminently capable of the highest degree of cultivation, and on which no judicious outlay of labour will ever cause loss or disappointment to the farmer.

The greensand which lies under the chalk, and appears near the surface in several parts of Britain, consists of silicious, argillaceous, and calcareous earth, intimately combined and in a high state of subdivision, and yet not forming a compact paste with water so as to dry in hard lumps, but having rather the loose appearance and granulation of fine sand, whence its name. On this soil are found the finest wheats; but such is the variety of its form as it approaches towards the chalk or crystallized sand, or the plastic clay, that the soils which it forms have every degree of texture, from loose sands to stiff marls, whose chief use is to mix with other soils and improve them. In general however it may be said that the soils of which the greensand forms a considerable part are productive and easily cultivated, and that they repay the labour and manure expended on them better than most others. A narrow strip of this sand crosses Bedfordshire, and in the neighbourhood of Sandy and Biggleswade are raised some of the finest culinary vegetables which come to the London market. This sand, though light in appearance, and very easily worked, contains much of the impalpable substance mentioned before; and this, with careful cultivation and manuring, makes it peculiarly suited for gardens as well as for corn-fields. In its natural state it is easily distinguished from other sands by certain dark particles in it, which give it the greenish hue from whence it has been called greensand, and also by its effervescence with strong vinegar or any other acid.

Chalk is perhaps the mineral most widely spread throughout Britain. The chalk formation of itself forms a very poor and barren soil. In the course of ages the surface of the chalk has been covered with a thin coating of soil, consisting of chalk and organic matter chiefly. On this soil the finest and most aromatic plants are found, but of minute dimensions, affording a sweet short pasture, much relished by sheep. The constant treading in of the dung of the sheep, and the stimulating effect of their urine, gradually increase the quantity of vegetable and animal matter; and thus the turf becomes close and rich: but if this thin coat be disturbed by the plough and mixed with the chalk below, it will, after one or two tolerable crops of corn, be reduced to its original sterility; and it requires ages to restore the fine pasture which once covered it. Such is the case with those hills which are called the South Down Hills, in Sussex and Wiltshire, on which are bred the excellent sheep which bear that name.

But the chalk has in many places been carried down by the rains and transported in a comminuted state to the sandy or clayey valleys around them, and by the mixture has greatly improved both, forming various loams and marls in themselves highly fertile, or very useful in increasing the fertility and texture of other soils. Chalk has the peculiar property of neutralising acids of every description, and of preventing their formation in the soil by the fermentation of vegetable substances; while it assists in that slow decomposition which causes the evolution of carbonic acid, and thereby assists and invigorates vegetation. The presence of carbonate of lime, if it does not exceed a third part, and if it is intimately blended with alumina and silica, is always a sign of fertility, especially when loose sand is mixed with it, so as to form one-half of the whole soil. This is called a light calcareous loam, and is usually found on the slopes or around the base of chalky hills.

The Weald clay consists of very minute particles of alumina and silica, forming a tough unctuous earth, fit for the growth of oaks, with very few stones or visible particles. This soil is found in Sussex and Kent chiefly. The plough cuts it into continuous slices, when it can be ploughed, which is only in a certain state of moisture; for when it is dry, the surface is as hard as a rock, while the subsoil is continually moist, the water being unable to pass through its pores. It has the most unpromising aspect, drying into hard lumps like brick, and apparently incapable of being brought to such a state of mellowness as to admit the seed or cause it to vegetate; yet this stubborn soil may be rendered fertile by tillage, draining, and exposure to frost in winter: and its tenacity may be corrected by the application of lime, ashes, and other substances, especially fresh stable-dung, which interpose and prevent the clods from re-uniting into one tough impervious mass. Lime and chalk do this most effectually; and when the weald clay has been brought to a looser texture, it produces beans, wheat, oats, and clover in great perfection.

The system of complete under-draining by parallel drains, at the distance of from 10 to 20 feet, which carries the moisture into the surrounding ditches, has in many instances so greatly improved the weald clays, that those who had formerly attempted to cultivate them can scarcely believe their eyes when they see the abundant crops produced. Subsoil ploughing has also done wonders after complete draining, in some cases rendering the soil so mellow and loose as to allow of the cultivation of turnips, especially the Swedish. As clay soils predominate in England, and their improvement has been almost despaired of, it is of great importance that it should be generally known that no soils repay the cost of improvement better than clays, provided the surface be such as to admit of perfect draining.

Another clay is called the Oxford clay. This is of a bluish colour, which alters on exposure to the air, probably from a change in the oxidation of the iron which it contains. This clay is favourable to the growth of grass, and some of the richest pastures in Wiltshire and Oxfordshire have it for a subsoil, over which the decomposition of the roots and leaves of the grasses has formed a layer of vegetable mould of the highest degree of fertility. In the fens of Lincolnshire the Oxford clay is covered by a coat of peat, formed by the decomposition of aquatic plants, which have accumulated wherever the water had no natural exit. When these fens were laid dry by an extensive system of draining, the peat was converted into a rich soil by the admixture of the clay which was found under it.

The *Oolite* formation contains much carbonate of lime cemented by an unctuous earth into a species of stone. The soil which lies over this stone, and which is of nearly the same nature, but broken and disunited, is various in its qualities. Sometimes it is of great fertility, and sometimes nearly barren, according as the impalpable matter in it abounds and contains a due proportion of the different earths, or it resembles a loose chalky sand, in which moisture is retained with difficulty. In the first case it produces every kind of grain in abundance with moderate cultivation. In the latter it requires a great outlay of manure which readily disappears, and it is justly called a poor hungry soil.

On the red-sandstone is found a soil which is usually of the finest quality. The fine loose soils of Devonshire and Somersetshire are of this description. It unites most of the requisites of a good soil in its texture, neither too close nor too loose, and in the impalpable matter in its composition. It is peculiarly adapted to the growth of potatoes and all roots which form the basis of a judicious cultivation. When it contains a proper portion of calcareous earth, it may be reckoned amongst the most fertile soils, and where this is deficient, the addition of lime or chalk is the best means of improving it. The calcareous earth seems greatly to add to the effect of the usual manures, so that a much smaller portion is required to produce good crops.

The neighbourhood of coal, however valuable it may be to the proprietor of the land in a mercantile point of view, is generally accompanied by a great degree of poverty in the soil wherever this mineral crops out to the light. Coal seems not only barren in itself, but almost incapable of being fertilised. The slate which usually accompanies it crumbles into a very poor earth, which lets the water through, and is composed of visible fragments of irregular shapes. The same may be said of the slate which rises into high hills in Devonshire and Cornwall. The strata here are generally very upright and narrow, and the water finding an easy exit downwards between them, leaves the surface too dry to favour vegetation, even if the soil which covers it were more fertile; but every portion of organic matter is carried off, and none can accumulate to form vegetable mould. The lands which are in cultivation in the valleys whither the waters have carried a mixture of earths, and where the subsoil is of slate, require much manure to produce even moderate crops.

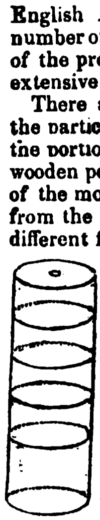
These are some of the principal natural soils found in Great Britain. It will be seen that each distinct formation gives rise to a great variety with respect to fertility, even where the basis remains the same: but it is of great importance to the farmer to ascertain the general nature of the rocks and strata on which his farm is incumbent, and no chemical analysis can determine the exact value of the land, unless the geological situation of it is distinctly known. But with this guide the analysis may distinguish the varieties, and point out the spots which can be cultivated at the least expense, or improved by the simplest means, while it may also show the deficiencies which render a soil on the most favourable formations difficult of cultivation or improvement, when these deficiencies are not easily remedied for want of those substances which are not found within reach of the farm. In all these soils no notice has been taken of organic matter, because this seems not in any great degree to be connected with their formation. The primary strata are distinguished by having no traces of organic remains in their composition. The secondary have not a sufficient proportion to call for an especial notice of it. It is in the tertiary strata, especially those which have been formed by the destruction of animal and vegetable substances, that organic matter becomes a peculiar object of attention, and from this reason alone the alluvial soils of later date are found highly fertile, whenever the circumstances which prevented their cultivation are removed; whether it be the waters which are to be shut out by dykes or carried off by draining, or a want of labourers which has left them to a state of nature, whenever the soil is turned up and the seed sown, the crops are always, for a greater or less period, certain and abundant.

The alluvial soils formed by the deposit of a variety of earths in a state of great division, and mixed with a considerable portion of organic matter, form by far the most productive lands. They will bear crop after crop with little or no addition of manure, and with a very slight cultivation. These soils are found along the course of rivers which traverse extensive plains, and which have such a current as to keep very fine earth suspended by a gentle but constant agitation, but not sufficiently rapid to carry along with it coarse gravel or sand. Wherever there is an obstruction to the current and an eddy is formed, there the soil is deposited in the form of mud, and gradually accumulating, forms those alluvial soils which are so remarkable for their fertility when carefully protected from the inroads of the waters. In these soils the impalpable matter greatly predominates; but the intimate mixture of the earths with organic matter, in that state in which it has been called *humus*, prevents their consolidating into a stiff clay; and the gasses which are continually evolved from the organic matter keep the pores open, and give scope to the growth as well as the nourishment of the roots. It is in the alluvial soils principally that an accurate analysis is useful; because the proportion of their constituent parts varies in innumerable degrees. It may be laid down as a general rule, that the most fertile of these soils are those in which the primitive earths are nearly in equal proportions, silica being the most abundant, with about 10 per cent. of organic matter: a greater proportion of this last would form too loose and spongy a soil to bear good crops of corn, especially of wheat. But 4 per cent. of humus, with a good mixture of earths, and some phosphate of lime from the decomposition of bones and marine shells, produces a very good wheat soil. The rich warp-lands along the Humber are artificial alluvial soils, and although they contain but a small proportion of humus, are highly fertile after their first deposition, but it is observed that they gradually become more tenacious and difficult of cultivation as this humus is carried off by the crops; and that it is soon necessary to add animal and vegetable manures to supply its deficiency.

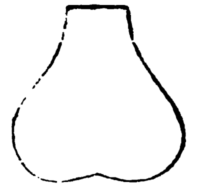
Organic matter is no doubt essential to great fertility in a soil, but some soils require more of it than others. *Humus*, which is the form which organic matter naturally comes to by slow decomposition in the earth, gives out certain elements which the roots can take up in their nascent state, and from which they obtain the carbon which is so abundant in all vegetable productions. But organic matter in every stage of its spontaneous decomposition keeps the pores of the soil open, and admits, if it does not even attract, air and moisture to the fibres of the roots. In all rich soils which have been long cultivated, especially in gardens, there are particles of a dark colour and fibrous texture, which in the microscope appear like minute logs of charred wood. These keep the soil open, and supply carbonic acid, when the air reaches them, or they are slowly transformed into humus, which remains inert as long as it cannot imbibe oxygen and form carbonic acid by a species of slow combustion. Humus is no doubt one of the chief causes of fertility, but its presence does not appear to be so indispensable as has been imagined. A proper texture seems a much more indispensable condition. Humus can undoubtedly be formed from the elements of water and of the atmosphere. Whether it be directly or by the slow process of vegetation and subsequent decomposition, does not so readily appear, but it is certain that there are soils which are highly fertile in which scarcely a trace of humus can be discovered, and which, from their igneous formation, cannot well contain organic matter; such are the soils which are produced by the decomposition of the lava which has run in a liquid state from the craters of volcanoes. This is composed of different minerals, which have been fused by the action of heat, but in which the mixture of the earths and salts has not been in such proportions as to form a perfect glass. When exposed for a time to the influence of the atmosphere, the lava crumbles into an earth, which is neither so loose as silicious sand nor so plastic as clay, and which has such a porosity as suits the growth of the roots of vegetables. By the effect of a warm climate and frequent rains, vegetation goes on rapidly; and by cultivation humus is soon formed and accumulated, so that it is only in the more recently cultivated lavas that it can be said that vegetation goes on without any supply of organic matter; and the addition of humus greatly increases the fertility of these soils. It is much easier to supply the deficiency of humus, which at best forms but a very small portion of the soil, than of silica or alumina, which should enter into its composition in the proportion of one-half or a third of the whole. It is practicable to carry lime or chalk upon soils which do not contain calcareous matter; clay may also be carried upon loose sandy soils, where it can be found below the surface, or at a moderate distance; but if a soil is very deficient in silica, it requires so large a proportion of this earth to give porosity to stiff clay, that it very seldom can repay the trouble and expense. Hence the difficulty of bringing poor wet clay soils into a fertile state, except where an abundance of chalk and vegetable manures can be easily procured. In this case the perfect draining of the land, and exposure of the ploughed surface to the frosts of winter, with the addition of chalk and manure, produces such an alteration in the texture of the clay, that by continuing the improving process it is entirely changed into a mellow and fertile loam. The burning of a portion of the retentive subsoil into a brick-like earth gives it a porosity which renders it mechanically similar to silicious sand, and converting the iron which all these clays contain into a peroxide, the soil is thereby greatly improved in fertility; for it seems that iron, in a state of slight oxidation, or combined with any acid, is hurtful to vegetation, whereas the red peroxide is not only innocuous, but seems to have fertilising properties.

The comparison of the different fertile soils leads therefore to the conclusion that the texture or porosity arising from the admixture of particles of various dimensions is the most important object of examination; and subordinate to this is the chemical constitution of the earths and other substances of which it is composed. In the examination and analysis of soils for the purpose of ascertaining their power of production, we must therefore first examine them mechanically, and afterwards chemically, and on this principle has been proposed the mode of *analysing soils*, in a paper which obtained one of the first prizes given by the Royal English Agricultural Society, and published in the first number of its journal. We will here insert a short account of the process, with such alterations and additions as more extensive practice has suggested.

There are two easy methods of ascertaining the size of the particles of a soil. The first and simplest is by drying the portion under examination, gently triturating it with a wooden pestle in a mortar, so as not to produce a grinding of the more solid portions, and then separating the coarser from the finer parts by means of several metallic sieves of different fineness. A simple instrument is recommended for this purpose, which is very portable, and consists of three or four sieves fitting into each other like the percolators in a coffee-biggin; the coarsest sieve being uppermost and covered with a lid; the finest fitting into a recipient, and the whole forming a cylinder three or four inches in diameter, and from six to eight in height. The coarsest sieve has threads at the distance of $\frac{1}{30}$ of an inch, the second has 80 in an inch, the third 120, and the fourth is the finest metallic tissue which can be made. What remains in the two first is easily examined by the eye, or with the help of a lens. The third and fourth require a microscope to see whether any crystallized particles remain in the impalpable dust which has gone through all the sieves. By carefully weighing these different earths their proportion is known, and by taking the specific gravity of each their nature can be guessed at with tolerable accuracy.



As this analysis is not intended for experienced chemists, the simplest methods are preferred to the more accurate. There is a mode of taking the specific gravities of substances, which are in the form of powder insoluble in water, so easy and so little liable to error, that any person, however unaccustomed to experiments, can soon become sufficiently expert to have full confidence in the result. It is as follows: a small pear-shaped phial is blown of thin glass, and the neck cut and ground smooth. The size is such as to contain 300 grains of water, more or less; the exact quantity is not essential. It is now filled with pure water at 60° of Fahrenheit's scale, and accurately poised in a delicate balance: 100 grains weight are then placed in the same scale with this phial, and, by means of a very fine tube, water is gradually sucked out of the phial, till the equilibrium is restored; that is, exactly 100 grains of water have been taken out. A counterpoise is now made of lead or brass, when the 100 grains weight has been removed, and this serves for all future experiments. When the specific gravity of any substance is required, the phial, partly filled with water, is placed in one scale, and the counterpoise, made as above described, is placed in the other; water is added or taken from the phial till an equilibrium is obtained. The substance to be tried is slowly and carefully poured into the phial, until the water rises to the ground surface of the neck and stands quite level, which is easily seen by observing the reflexion of the light from the surface. It is then carefully replaced in the scale, and grain weights are added to the other scale to restore the equilibrium. The number of these grains at once indicates the specific gravity of the substance; for the space above the water was that of 100 grains of water, and this space is now filled up by the earth examined. Its weight therefore denotes its specific gravity compared to water as 100; and as a delicate balance readily turns with a decimal of a grain, the decimals give the specific gravity to the third figure. Thus if the grains are 256 and the decimals 4, the specific gravity is accurately 2564, water being 1000.



By taking the specific gravity of the pure earths, it is found that silica is the heaviest, next carbonate of lime, and the lightest is alumina, while organic matter is much lighter than any earth. Thus a tolerable guess can be made of the composition of that impalpable portion of the soil which generally contains all the salts and organic matter. To separate these chemically requires more experience and a more extensive apparatus; but the quantity of carbonate of lime in any soil which effervesces with acids, when its presence is thus ascertained, can be calculated by a simple process, almost as easily as the specific gravity: for this purpose it is necessary to have a balance with a somewhat larger scale, in which can be conveniently placed a small glass cup and a phial. The cup is placed in the scale, with 100 grains weight in it; and the phial, also containing 200 or 300 grains, more or less, of very dilute muriatic acid. The whole is accurately poised. Fine dry sand is the most convenient counterpoise, when the exact weight is not required. The 100 grains are now taken out, and replaced by the dried soil to be examined; when the equilibrium is restored, the diluted muriatic acid is poured carefully and gently on the earth in the cup, as long as it continues to effervesce. It is then left for awhile, and a little more of the acid added. If no bubbles appear, then all the carbonic acid has been expelled, and the opposite scale preponderates. The grains and decimals of grains required to restore the equilibrium give the weight of the carbonic acid expelled, which will sometimes be considerable. Since 100 grains of carbonate of lime contain 44 grains of carbonic acid, we have only to take the proportion as follows: let a denote the grains of carbonic acid indicated in the experiment; then, $44 : 100 :: a : \frac{100a}{44} =$ the quantity of carbonate of lime in the soil. That is, multiply the grains added to the scale by 100, and divide by 44. This experiment repeated with a very accurate balance will surprise by its correctness; and no chemical analysis could give it with equal certainty, especially in the hands of an inexperienced person. When the weights are ascertained by substitution, the accuracy of the balance is of less consequence; all that is required is that it be sensitive, or turn readily by the addition of very minute weights. Thus, by two simple and easy experiments, some of the most important qualities of the impalpable portions of a soil may be accurately ascertained, viz. its specific gravity, and the quantity of carbonate of lime which it contains.*

It is more difficult to separate the fine silica from the alumina, and this is of less importance than might be supposed; for silica, when extremely divided, so as to remain long suspended in water, and mixed with alumina, becomes as impervious to water as alumina itself, and therefore its mechanical effect on the soil is the same. Phosphate of lime, where it is found, is no doubt of importance; but this requires a much greater knowledge of chemistry to separate it than is presumed in practical farmers, for whom this is chiefly written. Gypsum likewise has a considerable effect; but these substances are not generally diffused, and may always be suspected when the rocks and minerals in the neighbourhood indicate their presence; in which case it is prudent to submit the soil to a strict chemical analysis.

It is however very important to know how much organic matter exists in a soil, especially in alluvial soils. The specific gravity of the impalpable portions will often give some idea of this, when organic matter abounds, as in peaty soils. But the only sure test is its destruction by fire. This must be done very carefully. The soil must be dried and heated over a lamp to about 300° of Fahrenheit, stirring it often. This will expel the water, but not burn the organic matter or humus. It is then weighed in an open platinum capsule, and heated very gradually over the lamp, or in a clear fire, continually stirring it with a glass rod till it appears red; very minute portions of pure nitrate of ammonia may be added from time to time, taking care that there be no decrepitation, so as to throw any of the earth out of the capsule. After it is supposed that all the organic matter is destroyed, and expelled in the form of vapour or gas, the capsule is accurately weighed, and the loss indicates the quantity of organic matter in the soil. It will require some correction; for if alumina abounds, it will have retained some water, even after the first heating, which a red heat will have expelled. But this is not of very great importance in a mere comparison of different soils, for the same circumstances will be common to all.

The coarser portions of the soil, which have been separated in the sifting, are easily examined by the eye. If repeated washing carries off nothing from them, they may be considered as so many crystals, which have no other effect in the soil than to keep it open. If some of these are of a calcareous nature, they will dissolve with effervescence in muriatic acid, and their proportion can be ascertained by the process above described; if not, they may be all considered as mere silicious sand or gravel.

---

* A very neat instrument has been invented by Dr. Ure to facilitate this operation. It consists of a bent tube with two bulbs, which communicate by a very small aperture, one bulb being a little above the level of the other. The whole can be suspended from the arm of a balance. The diluted muriatic acid is poured into the lower bulb, and the earth into the other. By inclining the instrument the acid is gradually made to pass into the bulb containing the earth. Thus the carbonic acid is expelled without danger of loss by ebullition, and the loss of weight is accurately ascertained.

A good soil is composed of one-third coarse sand, one-third very fine sand, and one-third impalpable matter, in which there is silica in the greatest quantity, alumina and lime in a smaller, and from four to ten per cent. of organic matter, without any appearance of tannin, which is readily discovered by pouring into the water which has filtered through it a weak solution of sulphate of iron; if a blackness appears, the gallic acid is present, and in proportion to its quantity the soil is less fertile. In this case quicklime is the best corrective.

In ascertaining the value of a soil for the purposes of agriculture, two circumstances should be carefully noticed. The first is the permeability of the soil to water; and the second is its power of absorbing moisture from the atmosphere. To ascertain the first, it is only required to place an equal weight of different soils in glass tubes of equal diameter, pressing them so that they shall occupy equal spaces, but not filling the tubes. Then pour an equal quantity of water over each soil, and place them upright with cups under them. Examine which has the surface first dry, and how much water runs through each in a given time. That which presents a dry surface, while it holds most water in its pores, is probably the best. To ascertain the comparative absorption of moisture, the soils are dried in pairs on a plate of metal heated by steam, or at a heat of 212°, to expel the water. They are then placed in equal quantities in similar flat cups or dishes, and placed in opposite scales of a balance, and poised. The apparatus is exposed to a moist atmosphere out of doors, or in a cellar, and occasionally examined. That which is heaviest is, in general, the most fertile, and contains most humus. If there are more than two soils, they are compared with each other, and with a third as a standard.

By these simple means any person, however ignorant of chemistry, or unaccustomed to make accurate experiments, may soon satisfy himself as to the comparative value of different soils which have never yet been cultivated; how they may be improved, and what crops are best suited to them;—things of the greatest importance to those who go to distant colonies in the hopes of obtaining good land at a moderate price, and cultivating it to advantage.

But we have intimated that there were other means of ascertaining the mechanical texture of soils than by sifting them. This is by washing with pure water. For this purpose nothing is required but a few flat plates and large cups. Some of the soil is formed into a very thin mud by stirring it in a cup nearly full of water. The finer particles are successively poured off from the sand or grit, which at last remains pure, so that the water added to it is no longer discoloured. This being dried and weighed, gives the coarse sand. The water and earth poured off are allowed to settle. A common soup-plate is found a very convenient vessel for this purpose. On the surface of the deposited earth will be found all the undecomposed vegetable matter, which with a little care is easily taken off, dried, and weighed. The finer portions of the earth can be poured off successively, by shaking the whole moderately, till nothing but very fine sand remains. The alumina and impalpable silica will remain long suspended in the water, and allow any sand yet remaining to be deposited. They may be rapidly separated from the water by filtration through stout blotting-paper; but it is preferable to pour them into a glass tube about one inch in internal diameter, with a cork fitted into the lower end. In this tube the earths slowly fall to the bottom, and any variety in the size of the particles causes a line more or less distinct, which can be observed through the glass; and thus a very good idea may be obtained of the porportion of the different earths, as far as regards the size of their particles. For their chemical differences, the preceding process must be adopted.

It is often useful to ascertain nearly the composition of a soil, without having time or opportunity to make accurate experiments. A graduated glass tube, which can be carried in the pocket, and a small phial with a ground stopper, containing diluted muriatic acid, and secured in a wooden case for fear of accident, is all the apparatus required. A little of the soil is taken and moistened with water; a few drops of the acid are poured on; and by the greater or less disengagement of bubbles the proportion of calcareous matter is guessed at, and its presence proved. The soil mixed with water is poured into the glass tube and well shaken. In a few minutes the coarse sand is deposited: shortly after the finer sand, and, lastly, the clay and impalpable matter, of which the lightest remains longest suspended. Distinct rings can be observed in the deposits, and the graduated tube shows their proportion. A person accustomed to this method will guess with great precision the general qualities of the soil; and when the geological structure of the neighbourhood and the nature of the subsoil are taken into consideration, the value of the land for pasture or cultivation is guessed with little danger of making very glaring mistakes. To surveyors and valuers this method is of very great help, when other means are not at hand.

In practice, soils are usually divided into light, mellow, and stiff; but this gives very little information, there being every imaginable variety in each of these. In the article ARABLE LAND, we have given a more particular classification from Thaer, but this is found chiefly applicable to alluvial soils. There are still minute circumstances which produce great fertility or the reverse, and which it is difficult to investigate. An accurate chemical analysis, joined to a careful mechanical examination, and very correct accounts of the average produce under different systems of cultivation, can alone give us a scale according to which the natural fertility of different soils can be classed; and this must be the work of time and industry joined to science and practical knowledge. We shall therefore conclude this article by recommending to every lover of agriculture to observe and note the peculiarities of the soils with which he is best acquainted; to analyze them frequently and under various circumstances, and thus endeavour to find to what peculiar substance or condition is to be ascribed a greater or less degree of fertility; so as to lead to the simplest and easiest mode of rendering indifferent soils fertile, and increasing the productive power even of the best.

SOILING is the name given in agriculture to the mode of feeding horses and cattle in the stable or yards with food brought to them as it is cut in the meadows or fields. The great advantage of soiling cattle is the increase of manure of the best quality, which is thereby produced; and this circumstance alone can counterbalance the great trouble and expense incurred in cutting and carrying all the green food from a distance to the farmyard.

The system of soiling is not very generally adopted in British husbandry, it being so much easier to allow the cattle to crop their food in the pastures; but in those countries where property in land is greatly subdivided, and where farms are small and good pastures scarce, as in Flanders, France, and Switzerland, especially where the vineyards render manure scarce and dear by taking a considerable portion of it and returning none, there the soiling of cattle is almost a matter of necessity. A cow or ox requires from two to three acres of pasture or meadow to feed it all the year round, allowing a portion for hay. But by raising clover, lucern, sainfoin, tares, and other green crops, three cows or more can be fed with the produce of one acre, especially if a portion is in turnips or other succulent roots. Thus the straw of the white crops is converted into excellent manure, and the land kept in a state of fertility.

In proportion as a farm is larger in extent, so the expense of soiling increases, both from the distance of the fields where the green crops grow, and from the same distance to which the dung is to be carted. There is a limit therefore to the soiling system, unless there be many yards or stables in different parts of a farm, so as to subdivide it, and make each yard the centre of a distinct system of soiling, with fields near at hand for the green crops. In almost every experiment on a large scale it has been found that soiling was only a certain mode of purchasing dung, and that it often was more expensive to procure it in this way than to send to a considerable distance to purchase it in towns. Where it cannot be purchased at all, there are no other means, in many situations, of producing a sufficient quantity; and the trouble and expense of soiling must be submitted to. In almost every case where sheep can be folded to feed off the crops, the soiling of cattle is a loss, because the sheep pay something for their food; the cattle in the stall seldom do.

But there are animals which must be fed for the work of the farm, such as horses or oxen; and these are much more profitably and economically fed by soiling than by any other means. A horse or ox, if he works eight or ten hours, has no time for rest if he has to crop his food from a short pasture, however sweet; whereas an abundant supply of clover, lucern, or tares enables him to take a hearty meal and lie down to rest. He wants no corn with this food, and does his work without losing flesh or activity.

There is nothing easier in a mild climate, and especially a moist one, like Britain or Ireland, than to have a succession of green food from the beginning of spring to the end of autumn. Rye and winter barley, sown early in autumn, will be ready to cut as soon as the mild weather of spring commences: some sown later with winter tares, and the young clover, which has not been cropped in autumn, will succeed. After this come artificial grasses, as Italian rye-grass and the grass of water-meadows mown early; although this last is not so hearty food for working cattle; but when joined to a mixture of oats and cut straw, their watery nature is corrected. Clover and spring tares (when these last are sown at proper intervals), lucern and sainfoin (if the soil is suited to them), will afford a constant and abundant supply to the scythe which cuts the daily allowance. It is prudent to provide against failure, and have more land in these crops than is absolutely necessary, because the surplus can always be made into hay or reserved to ripen its seed; and these green crops, valuable as they are, far from deteriorating the soil, clear it of weeds, and render it more fit to bear corn afterwards. In this case soiling is profitable and economical.

It is generally thought in those countries where the soiling system is most universally adopted, that it is best to allow the green food to remain twelve or twenty-four hours after it is cut, before it is given to cattle. This may be prudent with cows and oxen, who are apt to eat voraciously, and are subject to be hoven from the fermentations of the green food in the paunch or rumen: but for horses there is little danger; and if the food is not wet with dew or rain, the fresher it is eaten, the better it will nourish the animal, and the more he will relish it.

If any one is desirous of calculating the expense of soiling any number of beasts, he has only to reckon what time of men and horses it will take to cut the food and carry it to the cattle, from the average distance of the fields in which it can be raised in succession. Much of their time is lost in the morning and evening in going backwards and forwards from the field to the yard; for there can scarcely be an establishment so large as to keep them employed a whole day; and if there was, the fields must be so large and so distant, as to greatly increase the expense of carriage. Not to enter into minute calculations, it is fully proved, that, to a certain extent, soiling is profitable and economical, when it can be done before and after the usual hours of labour; but that when undertaken on a large scale in any one locality, it is usually attended with loss, the manure produced being purchased at too great a price.

If a labourer who has an allotment of half an acre of good light land would devote it entirely to raise food for a cow, his wife and children cutting the food and tending the cow in a small yard with a shed, or in an airy cow-stall, he would find that he had a much greater clear profit, than if he had sown his land every year with wheat, and had always a good crop, which last supposition is impossible. There would be no better stimulus to industry than to let a piece of land for this purpose to every man who could purchase a cow and feed it by soiling.

SOISSONS, a town in France, capital of an arrondissement in the department of Aisne, 62 miles north-east of Paris, on the road to Namur, Liege, and Aix-la-Chapelle. This town existed in the time of the Romans, by whom it was called Augusta, with the distinctive epithet 'Suessionum,' from its being the capital of the Suessiones (Σουεσσιῶνες, or Σουεσιῶνες, Strabo), or, as Ptolemy writes the name, Οὐέσσονες. From this people, who were of the Belgic race, it afterwards took the name of Suessiones, or Suessonæ, from whence is derived the modern Soissons. D'Anville, Dulaure, and others are disposed to identify Augusta Suessionum with the Noviodunum of Cæsar (*De Bell. Gall.*, lib. ii., c. 12), but we think this position not consistent with Cæsar's narrative. In the 'Notitia Imperii,' it is recorded that there was at Augusta a government manufactory of shields, balistæ, and armour for the cavalry called Clibanarii, or Cataphracti (*fabrica scutaria, balistaria, et clibanaria*). The Roman roads popularly called *Les Chaussées de Brunhaut* are near this town, which in the later period of the Roman domination was one of the most important places in the north of Gaul; and one of the last which remained under the government of the emperors. It was the seat of government of Ægidius and his son Syagrius, and near it the latter was defeated by Clovis.

Under the early Frankish princes, Soissons continued to be of importance, and was the seat of a bishopric. Here Clovis espoused Clotilde; and upon the division of his dominions among his descendants, it gave name to one of the kingdoms formed out of them. Here, A.D. 752, Childéric III., the last Merovingian king was deposed, and Pepin le Bref, the first Carlovingian, proclaimed and consecrated. In A.D. 922 Charles le Simple was defeated at Soissons by the troops of Robert, his competitor, who fell in the battle. Under the kings of the third race (the Capetian) Soissons was the capital of a county, and received from Louis VI. (le Gros), with the consent of the count, a municipal charter; but the burgesses, weary of the contentions which they had with their counts and with the canons of the cathedral, surrendered their charter to the king Charles IV. (le Bel), A.D. 1325. Philippe VI. (de Valois) granted them some privileges, but would not re-establish the municipality. The county had in the meantime come by marriage to the Count of Hainault and Holland: it was subsequently divided, part soon falling to the crown, the other part, with the title, passing to a branch first of the house of Bourbon, and then of the house of Savoy; the last holder of this portion was the father of the well known Prince Eugene. [EUGENE FRANÇOIS DE SAVOIE.] In A.D. 1413 the town, then garrisoned by the Bourguignon party, was taken by the rival faction of the Armagnacs, who committed the most dreadful excesses. Having again fallen into the hands of the Bourguignons, it was a second time taken and pillaged by the Armagnacs. In A.D. 1544 the emperor Charles V. in his invasion of France was at Soissons. In the religious wars of the sixteenth century and in the troubles of the minority of Louis XIII. it suffered again. In the campaign of 1814 it was twice taken by the allies and retaken by the French; it was a third time besieged by the allies, bombarded, and much damaged.

The town stands on the south bank of the Aisne, over which river is a handsome stone bridge, uniting the town to the suburb of St. Vaast on the northern side. The town and the suburb of St. Vaast are fortified; the circuit of the walls includes many gardens and void spaces. The other suburbs are without the walls. The streets, though not wide, are for the most part well laid out and neatly kept; the houses, which are commonly of one story, are built of stone, and many of them covered with slate. The cathedral is a large and fine Gothic church, with a tower 160 feet high. Of the church of the ex-abbey of St. Jean des Vignes, the west front, with two noble towers, and spires remains, and is of rich Gothic architecture. The church of St. Pierre is of Lombard architecture; that of St. Leger belongs to the period of the revival of the arts. There are an antient castle and some remains of the antient abbey of St. Médard, in which Louis le Debonnaire was imprisoned by his rebellious children. The ex-office of the intendant (*i.e.* the director of the finances and judicial administration) of the Generality or province of Soissons, is one of the finest buildings in the town. There are public walks, a theatre, and public baths.

The population of the commune of Soissons, in 1826, was 7483; in 1831, 8149 (7946 of them in the town); and in 1836, 8124. The townsmen have few manufactures; some fine carpets, woollens, hosiery, linen, twine, seed, oil, leather, and percussion caps for guns are however made. Considerable trade is carried on in corn, flour, and pulse (especially French beans), for the supply of Paris, and timber and firewood, which are sent down the Aisne to the capital. There are a considerable weekly market and fourteen yearly fairs. Soissons has a college, two seminaries for the priesthood, a society of sciences, arts and belles-lettres, a public library, a drawing-school, an hospital, a foundling-hospital, a tribunal of commerce, a subordinate court of justice, and two prisons. The revolutionists Collot d'Herbois and Ronsin were natives of Soissons.

The arrondissement of Soissons had, in 1831, a population of 68,036; it comprehended six cantons or districts, each under a justice of the peace, and 169 communes. The diocese comprehends the department; the bishop is a suffragan of the archbishop of Reims.

SOJA HI'SPIDA (Mœnch), Soja Japonica (Savi), the Dolichos Soja (Linn.), a leguminous plant, native of Japan and the Moluccas, and abundant in the peninsula of India, though probably introduced there. The seeds resemble those of the haricot, French or kidney bean, and are used by the Chinese to 'form a favourite dish, called *ten-hu*, or *tau-hu*, which looks like curd, and which, though insipid in itself, yet with proper seasoning is agreeable and wholesome.' (Don's *Dictionary*.) The Japanese call the seeds *Miso*, and put them into soup, of which they sometimes partake three times a day. They likewise prepare with them the sauce termed *Sooja*, which has been corrupted into *Soy*. 'The beans are boiled until all the water is nearly evaporated, and they begin to burn, when they are taken from the fire, and placed in large wide-mouthed jars, exposed to the sun and air; water and a certain proportion of molasses or very brown sugar are added. These jars are stirred well every day, until the liquor and beans are completely mixed and fermented; the material is then strained, salted, and boiled, and skimmed until clarified, and will after this process become of a very deep brown colour, and keep any length of time. It has been stated that the gravy or juice of meat was used in preparing this condiment, but it appears to be entirely made from vegetable materials. There are two or three qualities of soy. To make the best requires much care and attention. Japanese soy is much esteemed in China on account of the superior manner in which it is made. Shopkeepers at Canton who sell soy have large platforms on the roofs of their houses, where the jars for preparing soy are arranged and exposed to the sun; for the consumption of soy is enormous. Neither rich nor poor can breakfast, dine, or sup without it; it is the sauce for all kinds of food; gives a zest to every dish, and may be said to be indispensable at a Chinese repast.' (Dobell's *Kamschatka*.) Soy is only sparingly used as a sauce in this country. It has the character of being a useful stomachic, but not more so than any of the other condiments when used with moderation.

SOKENS. [Essex.]

SOL, in music, the name given, in sol-fa-ing, by the English, Italians, and French to the fifth of the scale; and by the two last also to the sound called G by the Germans and English. [Solmisation.]

SOLA, frequently *Shola*, is the name of a plant common in moist places, and in the rainy season in many parts of the plains of India. It belongs to the genus Æschynomene, and has been called *Æ. aspera* by Linnæus, from the lower part of the stem being rough and scabrous, as well as the legumes. It has been called *Æ. lagenaria*, both by Loureiro and Roxburgh. The plants are remarkable for their light and spongy texture, and seem indeed to be composed almost entirely of pith. On this account the thicker stemmed plants are collected in the dry months and the light substance applied to a variety of uses, as for making some kinds of toys, and the floats of fishermen's nets; cut into thin slices and pasted together, they are much employed for making hats, which, being light and having broad brims, are well suited for protecting the head from the influence of the powerful Indian sun, especially if a handkerchief be put loosely into the crown of the hat. This substance has also been employed for lining drawers of natural history, and in its texture very much resembles the substance called rice-paper, which is the pith or stem of a Malvaceous plant cut into thin slices. A branch with leaves of this latter plant has been figured in Bennet's *Wanderings in New South Wales*.

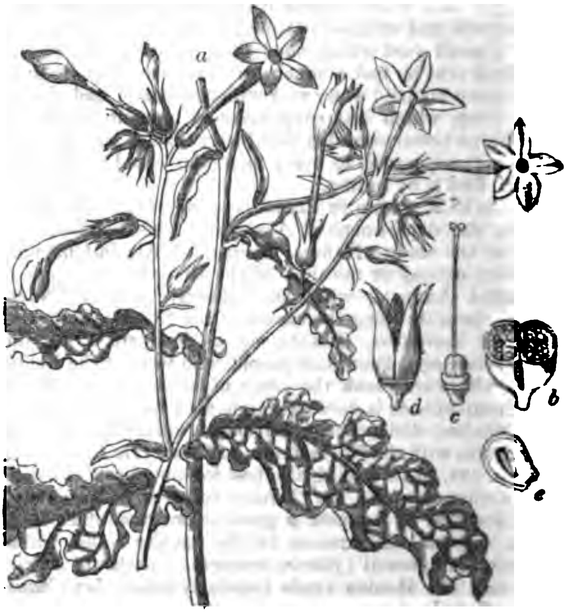
SOLAN GOOSE. [Booby, vol. v., p. 160.]

SOLANA'CEÆ, a natural order of plants belonging to the dicarpous group of monopetalous Exogens. This order is composed of herbs or shrubs, rarely of arborescent plants, with colourless juices, round or irregularly angled stems or branches, sometimes armed with thorns or prickles; their leaves alternate, simple, entire, or lobed. The inflorescence is variable, mostly axillary, sometimes terminal, pedicels without bracts, and the flowers regular and united. The calyx is 5-parted, persistent, inferior; corolla monopetalous, hypogynous, 5-cleft or 4-cleft, regular, deciduous, plaited or imbricated in æstivation; stamens inserted upon the corolla, as many as the segments of the limb, and alternate with them, anthers bursting, mostly longitudinally, sometimes by pores at the apex; ovarium 2- or 4-celled, style continuous, stigma simple; fruit either a capsule, with a double dissepiment parallel with the valves, or a berry with the placentæ adhering to the dissepiment; seeds numerous, sessile; embryo straight or curved, lying in fleshy albumen; radicle next the hilum.

This order is most closely allied to Scrophulariaceæ, but is distinguished by Brown from that order by the possession of a curved or spiral embryo, a plaited æstivation of the corolla, and the flowers being regular, with the same number of stamens as lobes. From the occurrence of many species in this order with a straight embryo, but with the other characters of Solanaceæ, Lindley, with Bartling and others, is inclined to look upon this as a secondary point, and a plaited corolla and symmetrical flowers to constitute the real character of this order. Solanaceæ and Scrophulariaceæ are however so nearly allied that scarcely any limits exist between them. They may be considered as the connecting groups of two larger masses of plants, of which one has a tendency towards regular flowers and symmetrical stamens, and the other a tendency towards irregular flowers and didynamous stamens.

The plants of this order are natives of most parts of the world, without the arctic and antarctic circles, and especially within the tropics.

This order is one of the most important and interesting in its class, from its bringing together plants of the greatest utility, yet possessing apparently opposite properties. It is a great advantage of a natural system that it brings together not only plants that are allied in structure, but in properties also; but this order seems to form an exception. The deadly nightshade, the esculent potato, the pungent capsicum, the mild tomato, the wholesome egg-plant, and the poisonous tobacco, are all found here. They will all however, on close examination, be found to possess the same properties in a greater or less degree. The potato, the tomato, and egg-plant possess, when uncooked, in a mild degree, the properties of the nightshade, the stramonium, and the henbane, confirming the remark of De Candolle, 'that all our aliments contain a small proportion of an exciting principle, which, should it occur in a much greater quantity, might become injurious, but which is necessary as a natural condiment.' In fact, when food does not contain some stimulating principle, we add it in the form of spices. Many of the plants of this order are used in medicine, amongst the most valuable of which are henbane [Hyoscyamus], deadly nightshade [Atropa], bitter-sweet [Solanum], stramonium [Datura], and tobacco [Nicotiana]. The species of *Physalis* were formerly used in medicine, but are not now in repute in this country. *P. Alkekengi*, the common winter cherry, is grown as an ornamental plant; and in Arabia, and even Germany and Spain, the berries are eaten as a dessert. *Lycium barbarum* is known in this country as *tea-plant*, and has been recommended as a substitute for the Chinese plant. The calabash-trees of the West Indies and the American continent are different species of *Crescentia*, which is often referred to this order. The fleshy pulp of the fruit of some is eaten, but in most species is deleterious. The most valuable part of the calabashes is their rind, which is tough, and it is applied by the negroes to a variety of purposes. Cups, mugs, bowls, basins, and saucepans are made from them, and, in fact, almost every other article of household use. Cayenne-pepper [Capsicum] is the produce of



Nicotiana crispa.

a, cutting, showing alternate leaves and monopetalous flowers; *b*, transverse section of capsule with many-seeded placenta; *c*, pistil; *d*, fruit; *e*, seed with straight embryo surrounded with albumen.

this order, as well as the potato, tomata, and egg-plant [SOLANUM], which are used extensively as articles of diet.

SOLANDER, DANIEL CHARLES, a celebrated naturalist, the pupil of Linnæus, and the friend of Sir Joseph Banks. He was born in Nordland, in Sweden, where his father was a minister, on the 28th of February, 1736. He studied at Upsal, under Linnæus, and took his degree of M.D. at that university. After this he made a tour in Russia, and on his return was recommended by Linnæus to go to England. For this purpose he embarked on board a vessel of war, which was suddenly ordered to the Canary Isles, taking Solander far away from his destination. He however made the most of it, for he not only shared the prizes taken by the vessel on this cruise, but made great accessions to his knowledge of natural history whilst at the Canary Isles. Shortly after his arrival in England, which was in October, 1760, he was employed at the British Museum for the purpose of drawing up a catalogue of the collections in that institution. Three years afterwards he was appointed one of the assistants in the natural history department. In 1764 he was elected a fellow of the Royal Society. In 1766 he published a catalogue of the fossils presented to the British Museum by Mr. Brander. In 1768 Sir Joseph Banks proposed to Dr. Solander that he should accompany him in a voyage round the world, in search of discoveries in natural history. To this he assented, and the trustees of the British Museum having promised a continuance of his salary in his absence, the two naturalists started with Captain Cook in his celebrated first voyage round the world. During this voyage Dr. Solander probably saved a large party from destruction, in ascending the mountains at Tierra del Fuego, by advising them on no account to give way to sleep when they arrived at the cold regions. He himself was the first affected amongst them, and was with difficulty kept awake during their perilous excursion, which was attended with the death of a negro and an English seaman, from the effects of the cold. They returned from this voyage in 1771, laden with treasures, which are still in the collection at the British Museum. It does not appear that Solander received any remuneration for his services in this expedition, unless it was from Sir Joseph Banks, whose munificence knew no bounds when forwarding in any manner the study of natural history.

Sir Joseph Banks and Solander wished to accompany Cook on his second voyage, but some misunderstanding having arisen with regard to their accommodation in the vessel, they abandoned the project. On his return from his voyage the University of Oxford conferred on Solander the degree of Doctor of Common Laws. In 1773 he was appointed under-librarian at the British Museum. He died in a fit of apoplexy, in the year 1782.

The following papers were published with his name during his lifetime:—1, An account of the *Furia infernalis*, and the disease which it produces. It was published in Latin at Upsal, and appears to have been his inaugural dissertation; 2, An account of Cardenia, a plant belonging to the natural order Cinchonaceæ, in the fifty-second volume of the 'Philosophical Transactions;' 3, A botanical description of the plant producing the Cortex Winteranus or Magellanicus, published in the fifth volume of 'The Observations and Inquiries of a Society of Physicians.'

Although Dr. Solander published little with his name attached, his labours were by no means few or of little importance. He has left behind him a large mass of manuscripts, which are still existing in the British Museum, and containing, as they do, a vast store of information on all that passed under his observant eye, they afford abundant materials for the further prosecution of the subjects to which he devoted his attention.

The arrival of Dr. Solander in England may be looked upon as an important æra in the history of botany in this country, as by his means the sexual system of arrangement of plants, which was only imperfectly understood in Great Britain, became more widely extended.. We will not stop here to inquire into the amount of benefit conferred on botany by this system, which is now nearly exploded, but from the perfect knowledge of it possessed by Dr. Solander, and the ease with which it was acquired by others, there can be no doubt that during his lifetime the cultivation of the Linnæan system had a very favourable influence in developing and extending a taste for botany in this country.

But botany was not the only department pursued by Dr. Solander. In 1786 the important work of Ellis, on the 'Natural History of Zoophytes,' was published, in the preface to which the editor thus expresses himself:—'For the arrangement and the descriptions, we are indebted to Dr. Solander, whose premature death prevented this and other valuable works from appearing in so complete a manner as they otherwise would have done, since it must be universally allowed that the world suffered in Dr. Solander the loss of one of the greatest naturalists ever known, while his more intimate friends that of an invaluable member of society.'

SOLANDRA, a genus of plants of the natural family of Solanaceæ, which has been thus named in compliment to Daniel C. Solander, LL.D. The name has been applied to other genera, but is now restricted to a small Solanaceous genus, which is remarkable for the beauty and great size of the flowers of its species, which are natives of Mexico, Jamaica, and Brazil, with a doubtful species in Ceylon, forming large scandent shrubs, with broad alternate leaves crowded at the extremities of the branches with the solitary extra-axillary or terminal flowers. The genus is characterized by having a sheath-like calyx splitting on one side, and 3-5 cleft at the apex. Corol funnel-shaped and ventricose, with a plicate quinquefid limb and undulated lobes. Stamens five; anthers versatile, opening longitudinally. Berry pulpy, covered by the split calyx, 4-celled, many seeded. These, being highly ornamental plants are cultivated in our hot-houses, but, requiring moisture and much room, are difficult to flower. Sweet says the best way is to plant them in a loamy soil, and allow them to grow fast at first, till they have made a great many shoots; then keep them very dry till their leaves drop off, and they will produce plenty of flowers. The best way to have plants flower young is to take the cuttings from the flowering shoots.

SOLANI'NA, a vegetable alkali obtained by Desfosses from the berries of the *solanum nigrum*, and the fruit of the common potato.

In appearance solanina resembles sulphate of quina, but the crystals are finer and shorter; it restores the blue colour of litmus when reddened by an acid; dissolves in acids, and is precipitated from them by the alkalis. The hydrochlorate and acetate of solanina have a gummy appearance when evaporated to dryness, but the sulphate and phosphate are crystallizable. It is extremely poisonous: a grain of it dissolved in dilute sulphuric acid killed a rabbit in six hours.

According to Blanchet this alkali consists of—

Hydrogen	8·96
Carbon	58·67
Oxygen	30·73
Azote	1·64
	100

SOLA'NUM, the name of one of the most extensive genera of plants, the type of the natural order Solanaceæ. This genus is distinguished by the following characters:—Calyx permanent, 5-10 parted. Corolla rotate. Anthers oblong, connivent, opening by 2 pores at the extremity. Fruit a berry, subglobose, 2-celled, sometimes 3 or 4-celled The species are herbs or shrubs, unarmed or prickly, rarely spiny. The leaves are entire, sinuated or lobed, mostly alternate.

Upwards of 400 species of plants belonging to this genus have been enumerated, including many with apparently very opposite properties. The esculent Tomato, the Egg-plant, and the invaluable potato, with the various species of poisonous nightshades, are found united so closely by botanical characters, that it is impossible generically to separate them. The properties of these plants however do not differ in kind, but in degree, and the berries and leaves, and even the tubers when uncooked, of the potato, possess in a mild degree the narcotic properties of the poisonous nightshades. Many of them have also very handsome flowers, and are much cultivated in our gardens and greenhouses. From the immense list of species belonging to this genus, we shall select for description a few of those that are used as medicines or food, or are much cultivated.

S. tuberosum, the common potato, is known in the genus by its tuberous subterranean stem, herbaceous stems without thorns, unequally pinnate leaves, with entire leaflets, and articulated pedicels. It is one of the plants for which we are entirely indebted to America. It is found native in the greatest abundance on the western coast of South America. Like most plants which are much cultivated, an abundance of varieties have been produced from the original plant, and in the leaves, colour of the flowers, shape, size, and colour of the tubers, it has a great tendency to depart from its normal character. For an account of the introduction of this plant into Europe, its varieties, the mode of its cultivation and uses, see POTATO. Two other species of *Solanum*, viz. *S. Valenzuela* and *montanum*, produce edible tubers, but they are little used.

S. nigrum, common or garden nightshade: stem herbaceous without thorns; leaves ovate, bluntly toothed, and waved; umbels lateral, drooping. Throughout Europe, it is a weed in cultivated ground, and is also found in Africa and Asia. It is common in gardens, fields, and waste places in Great Britain. It has white flowers, producing small berries of a black colour.

S. dulcamara, woody nightshade, or bitter-sweet: stem shrubby, thornless, climbing, flexuous; leaves cordate, upper ones jagged; corymbs almost opposite the leaves. It is a native of Europe, Asia, and North America, in hedges and among bushes. It is plentiful in Great Britain. It has purple flowers and crimson berries, which latter may be mistaken by children for red currants, a mistake that has sometimes been attended with fatal consequences.

S. Melongena, egg-plant, mad-apple, Jew's-apple: stem herbaceous, woody at the base, clothed with star-shaped hairs; ovate, serrated leaves; flowering peduncles reflexed; fertile peduncle solitary, sterile one racemose; calyx campanulate; corolla angular. It is a native of the East Indies, and also said to be of Arabia. This plant has purple flowers, and bears large smooth shining berries, which are the shape and size of a small hen's-egg. Two varieties of this plant are recorded: the *S. M. ovigerum*, in which the stem, calyx, and leaves are without thorns; and the *S. M. esculentum*, in which these parts are more or less covered with thorns. Several subvarieties of both these are recorded, varying in the shape and colour of the fruit. The berries are mostly of a white colour, but in some of the subvarieties they are yellow, red, purple, and black. The fruit of this plant is used by the French and Italians in stews and soups. For this purpose the varieties used are the oval-shaped white, the globular-shaped white, and the purple or violet-coloured of both forms. In cultivating them they may be reared in hot-beds in a rich light soil, or in fine summers they will even produce their fruit in this country against a wall, if planted out in June after having been struck in a hot-bed.

S. Sodomeum, Sodom egg-plant, or apple of Sodom: stem shrubby, diffuse; prickles straight, dilated at the base; leaves oblong, sinuate, shining above, and rather scabrous and prickly on both surfaces; lobes obtuse angular; peduncles bifid. It is a native of the North of Africa and the South of Europe. The fruit of this plant is white, and about the size of a walnut. It is very subject to the attacks of an insect which deposits its eggs within the germen, and as the fruit enlarges, the larvæ of the insect, as in the case of many other fruits, destroy and pulverise the whole of the interior, whilst the rind is left unchanged and entire. When the fruit is gathered under these circumstances, it is crushed to pieces by the hand; or if conveyed to the lips, the mouth becomes filled with an ash-like powder, exceedingly bitter to the taste. To these berries remarkable properties have been assigned by Josephus, Tacitus, and others. Mandeville, an old English writer, says, speaking of the Dead Sea, 'And there besyden growen trees that baren fulle faire apples and faire of colour to beholden, butte whosoe breakethe them or cuttethe them in two, he shall find within them coles and cyndres.' Milton finely alludes to this fruit in the lines—

> 'Greedily they pluck'd
> The fruitage fair to sight, like that which grew
> Near that bituminous lake where Sodom flamed
> This more delusive, not the touch but taste
> Deceived, they fondly thinking to allay
> Their appetite with gust, instead of fruit
> Chewed bitter ashes.'

S. Sanctum, Palestine egg-plant: stem shrubby, tomentose; leaves ovate, repand, oblique at the base, clothed with hoary tomentum on both surfaces; berries nearly globose. This plant is a native of Palestine; it is often found in collections of plants. There are several other species of Solanum, which, on account of the size, form, and colour of their fruits, are called egg-plants, as *S. Indicum*, the Indian egg-plant, &c.

S. Æthiopicum, Æthiopian nightshade: stem herbaceous; leaves ovate, repand, angular; peduncles usually 1-flowered, drooping; berries torulose. It is a native of Ethiopia, China, and Japan. There are two varieties recorded: the one the *S. Æ. violaceum*, is a native of China, and the fruit is frequently eaten in that country as a dessert. It has a large spheroid oval berry of a red colour. The other variety is the *S. Æ. aculeatum*, having a prickly stem, and small yellow berries of the size of peas.

S. pseudo-quina, false quina nightshade: stem shrubby unarmed; leaves oblongo-lanceolate, narrow, acute, entire, glabrous above, but with fascicles of villi in the axils of the nerves beneath; racemes extra-axillary, short; calyx glabrous. This plant is a native of Brazil in the district of Curitiba, in St Paul without the tropics. The Brazilians use this for the same purposes as the quina or Jesuits' bark. It is intensely bitter, and may with advantage be used as a substitute for that bark.

S. verbascifolium, mullein-leaved nightshade: stem shrubby; leaves ovato-oblong, acuminated, entire, tomentose, white beneath, without any leaves in the axils; corymbs nearly terminal, dichotomous; calyx semi-quinquefid. It is a native of Asia, America, and the tropical parts of New Holland. This plant is frequently cultivated. Every part is covered with a powdery white tomentum. The flowers are white, and the berries are of the size of small cherries.

S. Lycopersicum of Linnæus, common Love-apple or Tomato. This, with some other of the older species of Solanum, now form the genus *Lycopersicum*, which is distinguished by possessing a calyx 5-6 parted; corolla rotate, 5-6 cleft; stamens 5; anthers conical, connate at their extremities by an elongated membrane, and dehiscing lengthwise inside; berry 2-3-celled; seeds villous. The present species is called *L. esculentum;* it has herbaceous pilose stems; unequally pinnate leaves; leaflets cut, attenuated at the apex, glaucous beneath; flowers many, united; berries torulose. This plant is a native of South America, but it is much cultivated and well known in the United States of North America, and in France, Germany, and Italy. When ripe, the fruit has an acid flavour, and is added to soups, sauces, &c. It is also used in confectionary as a preserve, and sometimes as a pickle. It is not often used in this country, but in Italy, near Rome and Naples, whole fields are covered with it, and scarcely a dish is served up into which it does not enter as an ingredient. In the cultivation of these plants, the seed should be sown in March in a hot-bed, and when two inches high, they may be pricked out into another hot-bed. In May they should be transplanted into a warm south border, where they may have the full sun, and the fruit may ripen quickly. The stem runs up 6 or 8 feet high, and should be trained to stakes or nailed up a wall or pales. The fruit begins to ripen in August, and may be gathered in October, and, when kept dry, will keep good till November. There are several varieties cultivated; the best are called the large and small cherry and pear-shaped red, and the large and small or cherry-shaped yellow. The size of the fruit is seldom larger than a golden-pippin apple. (Don's Miller, vol. iv., p. 444.)

Several other species of Solanum are recorded as having medical properties. *S. Jacquini* is considered by the native practitioners of India as an expectorant; *S. bahamense* is used as a gargle for sore throat in the West Indies; *S. mammosum*, *paniculatum*, and *cernuum* have the reputation of being diuretic and astringent. (Lindley's *Flora Medica*, p. 512.)

SOLA'NUM DULCAMA'RA, an indigenous perennial climbing plant, common in wet and shady places, especially hedges. It has a remarkably zigzag stem, with alternate leaves, the lower ones lanceolate, entire, the upper hastate; the flowers resemble those of the potato, but are smaller, and are succeeded by a cluster of red berries. This plant is called *woody* nightshade, to distinguish it from the Atropa Belladonna, or *deadly* nightshade. The young twigs or tops are officinal, and they should be gathered in spring, before the flowering of the plant, or in autumn, while the leaves are yet *fresh*, as much activity seems to belong to the leaves, and the twigs are best from plants about three years old. When fresh, the plant has an unpleasant odour, which is in a great measure lost by drying, as is also a large portion of water. The taste is at first bitter and slightly acrid, then sweet; hence the name *bitter-sweet* given to it.

Ten pounds of the dried twigs yield two pounds of extract. According to Pfaff, 100 pounds of perfectly dried stems yield a bitter-sweet extractive (picroglycion), 21; vegeto-animal matter, 3; gummy extractive, 12; gluten with wax, 1; resin with benzoic acid, 2; gum, starch, salts (chiefly of lime), 6; and woody fibre, 62. Solanina has been found by Desfosses. Whether picroglycion is a distinct principle, or a combination of solanina with sugar, is doubtful.

Bitter-sweet, when taken fresh, has a slightly narcotic influence, causing also nausea, vertigo, and a dryness of throat, like other solanaceous poisons. If delirium display itself, it is always of a most frantic kind. Perspiration or an increased discharge of urine generally occurs, followed by gentle purging.

Bitter-sweet is chiefly employed in cutaneous diseases, especially of the scaly kind, such as lepra; it may be given internally, while a strong wash of it is applied externally. It is also useful in some vesicular diseases, such as herpes and eczema. In these its virtues as an external application may be increased by dissolving in it sulphuret of potass. This combination relieves most effectually the intolerable irritation of these complaints.

It is usually ordered in the form of decoction, but long boiling is destructive of its powers. Slow simmering is preferable. The extract, when prepared from the fresh plant with a low degree of heat, is a good form for internal administration, as it may be combined with antimonials.

In cases of poisoning by the berries, the stomach-pump should be used as speedily as possible, and moderate venesection is of service.

SOLAR CYCLE. [PERIODS OF REVOLUTION.]

SOLAR SYSTEM. We have given the elements of the planetary motions minutely in the several articles MERCURY, VENUS, &c., together with such physical peculiarities as belong to them severally, and independently of the System; the general phenomena of their motions have been deduced from the great principle of GRAVITATION; their history, as far as it is in the plan of this work to give it, has been treated in ASTRONOMY. It remains to bring together the dimensions of the various parts of the system, and to notice such points as could not properly find a place under any of the heads just mentioned.

By the Solar System is meant that collection of bodies which contains the sun, the planets which revolve round him, their satellites, and such periodic comets as have had their returns successfully predicted. The system of the antients includes the Earth as a fixed centre, with the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn. That of the moderns includes at this day the Sun as a governing body (but not as a fixed centre), Mercury, Venus, the Earth (with the Moon), Mars, Vesta, Juno, Ceres, Pallas, Jupiter and four satellites, Saturn (with the ring) and seven satellites, and Uranus with six satellites, besides the comets of Halley, Encke, and Biela. The following symbols are used to represent these bodies, to which we add the received explanation, without expressing any opinion about it:—

☉ Sun
☿ Mercury
♀ Venus
⊖ or ♁ Earth (modern)
☽ Moon
♂ Mars
⚶ Vesta (modern)
⚵ Juno (modern)
⚳ Ceres (modern)
⚴ Pallas (modern)
♃ Jupiter
♄ Saturn
♅ Uranus (modern)

The symbol for the Sun is all that modern abridgment has left of a face surrounded by rays: Mercury has the caduceus, or rod, entwined by two serpents: Venus a circular looking-glass with a handle: the Earth (a modern symbol) has a sphere with an equator, and also (with some) an inverted symbol of Venus. Those who first used it did not, we presume, know that they might be making a looking-glass turned upside down represent their planet. The symbol of the moon is obvious: Mars has what remains of a spear and shield: Vesta, an altar with fire on it: Juno, a sceptre: Ceres, a reaper's scythe: Pallas, the head of a lance: Jupiter, supposed to be a symbol of the thunder (arm and hand holding thunder?): Saturn, an altered form of a mower's scythe, the emblem of time: Uranus, the initial letter of Herschel, the discoverer's name, with a symbol of a planet attached. But others have thought that Mercury was designated by putting σ and τ together, the initials of στίλβων; Venus, from the first and last letters of Φωσφόρος; Jupiter, from the first and last letters of Ζεύς. These signs are found on very old manuscripts and gems, variously figured, but all with some general resemblance to the modern printed forms.

We are now to state the relative dimensions of the Solar System in a rough manner. This, we think, it may be useful to do in such a manner that any two planets may be compared with one another without computation.

And first, as to the relative distances from the sun, we have the following table:—

☿	100	54	39	25	15	74	41	20
♀	187	100	72	47	27	139	76	38
⊖	258	138	100	66	38	192	105	52
♂	394	211	152	100	58	293	160	79
⚶	612	327	237	155	90	455	248	123
⚵	690	369	267	175	101	513	280	139
⚳	715	382	277	182	105	532	290	144
⚴	716	383	277	182	105	533	291	145
♃	1344	719	520	341	197	1000	545	271
♄	2464	1319	954	626	361	1833	1000	497
♅	4955	2652	1918	1259	725	3686	2010	1000

This table is a succession of columns, each of which represents the comparative mean distances of the planets from the sun. In each column one of the distances is made 100 or 1000, and the rest are expressed accordingly; except only in the fifth column, in which the mean distance of the four small planets is made 100. Thus we see by inspection that Uranus is about 12½ times as far from the Sun as Mars; about 19 times as far as the Earth; about 26½ times as far as Venus; and about 7¼ times the mean distance of the four small planets. Also, taking the mean distance of the small planets, we see that the distances from the sun are as the numbers 15, 27, 38, 58, 100, 197, 361, 725; and if we take the first away from all the rest, we have 12, 23, 43, 85, 182, 346, 710; in which it will be observed that each is about double of the preceding. Kepler had observed a progression, without assigning a law; and had also noticed that one term appeared to be missing. Bode assigned the law which has just been noticed; noticing also the apparently missing term. The existence of a planet between Mars and Jupiter was accordingly suspected; and at last, to the astonishment of astronomers, four little bodies, looking more like fragments of a planet than planets, were discovered at a distance from the Sun so near to that which had been suspected, that their mean distance fills up its place in the series as well as that of any other planet. It was of course immediately suspected (when only two had been discovered) that these were remains of some planet which had been shattered by explosion or other cause; and the encouragement which this idea gave to look for further fragments, was perhaps one of the main causes of the discovery of the remaining two. This law of Bode, as it has been called from the astronomer who first noticed it, may be thus expressed: if a be the distance of Mercury, and $a + b$ of Venus, then $a + 2b$ is that of the Earth, $a + 4b$ of Mars, $a + 8b$ of the small planets, $a + 16b$ of Jupiter, $a + 32b$ of Saturn, and $a + 64b$ of Uranus; all nearly.

To convert the above relative distances into actual ones, consider the distance from the sun to the earth as 23984 mean semidiameters of the earth, the mean semidiameter being 3956 miles; so that the distance in question is 95 millions of miles. The semidiameter of the sun is 111·454 times that of the earth; so that the distance of the earth from the sun may be called 215 semidiameters of the sun. One of our objects in this article is to correct the absurd notions derived from the playthings called orreries, and the diagrams exhibited in books and lectures. Let the capital letter O of the type which stands at the beginning of the article in this work represent the sun; then the earth is a speck which would need a good microscope to show it; and its distance from the sun is represented by 11 inches, or nearly two inches more than the length of one of our columns. Sir John Herschel describes the Solar System thus:—

Planet.	Object which represents it.	Representative of its distance from the Sun.
Sun.	Globe of 4 feet diameter.	
Mercury.	Grain of mustard seed.	164 feet.
Venus.	A pea.	284 feet.
Earth.	A pea.	430 feet.
Mars.	A rather large pin's head.	654 feet.
Juno, &c.	Grains of sand.	1000 to 1200 feet.
Jupiter	A moderate sized orange.	Half a mile.
Saturn.	A small orange.	⅘ of a mile.
Uranus.	A full sized cherry, or small plum.	A mile and a half.

The *excentricity* of a planet means the fractional part of a planet's mean distance by which its greatest or least distance exceeds or falls short of the mean distance. Arranging the planets in the order of their excentricities, we have

For Venus	·007	For Saturn	·056	For Mercury	·206
„ Earth	·017	„ Ceres	·078	„ Pallas	·242
„ Uranus	·047	„ Vesta	·089	„ Juno	·258
„ Jupiter	·048	„ Mars	·093		

That is, if the mean distance of Venus were called 1000, its greatest distance would be only 1007 and its least 993. But if the mean distance of Juno were called 1000, its greatest distance would be 1258 and its least distance 742.

We now give a table for the times of revolution, similar to that given for the distances :—

☿	100	39	24	13	6	20	8	3
♀	255	100	62	33	14	52	21	7
⊕	415	163	100	53	23	84	35	12
♂	781	306	188	100	44	159	65	22
⚶	1507	590	363	193	84	306	126	43
⚵	1810	709	436	232	101	368	151	52
⚳	1911	748	460	245	107	388	160	55
⚴	1917	751	462	246	107	389	160	55
♃	4925	1929	1156	631	276	1000	412	141
♄	11950	4680	2878	1531	669	2428	1000	343
♅	34880	13660	8401	4467	1952	7082	2918	1000

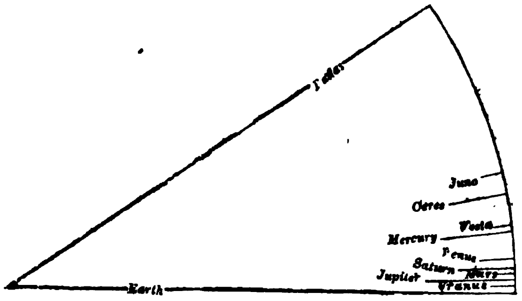
The explanation of this table resembles that of the preceding one, times, instead of distances, being the objects of comparison. Thus, if a revolution of Jupiter contain 1000 parts of time, that of Saturn has 2428 such parts: and the revolution of Uranus is 84·01 as long as that of the earth.

In the following table will be seen the absolute time of revolution in days, and also numbers expressive of the comparative angles moved over in a day by each planet, and the intervals (in days) between two conjunctions with the sun :—

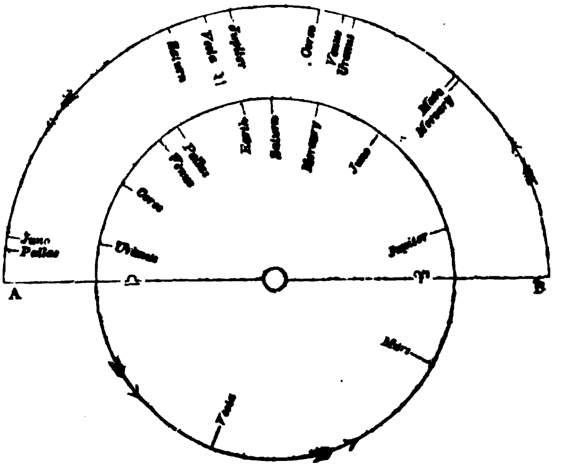
	Rev.	Int. of Conj.	Comp. Ang.		Rev.	Int. of Conj.	Comp. Ang.		Rev.	Int. of Conj.	Comp. Ang.
☿	88	116	1137	⚶	1326	503	75·4	♃	4333	399	23·1
♀	225	584	445	⚵	1593	474	62·8	♄	10759	378	9·29
⊕	365	—	274	⚳	1681	467	59·5	♅	30687	370	3·26
♂	687	780	146	⚴	1687	466	59·3				

Thus, Venus revolves in 225 days (all the numbers in this article are more roughly given than in the articles specially devoted to the planets); is in conjunction with the sun at intervals of 584 days; and, with its mean motion, would describe 274° in the heavens while Jupiter describes 23°·1. Saturn moves 2·01 minutes daily; the earth, 59′ 8″·3.

The minor elements (in a general consideration) may be best described by diagrams: the inclinations of the orbits may be represented by the following lines, which show the slope or inclination of each orbit to the orbit of the earth or plane of the ecliptic. None of the old planets have an inclination of more than 7°, while in the new planets the same element varies from 7° to 35°.



In the next figure the plane of the ecliptic is represented: OB is the line which points to the astronomical first point of Aries, or the vernal equinox, and the arrows represent the directions of the planetary motions. On the outer circle are represented the longitudes of the ascending nodes of the different planets, or the lines in which they are found when they rise through the ecliptic from the southern to the northern side of it. On the inner circle are represented the longitudes of their perihelia, or points of nearest approach to the sun. The slow changes which take place in these elements are noted in the articles devoted to the different planets.



Jupiter and his satellites might be enclosed in a sphere having a radius of about 2½ times as great as that of the sun; Saturn and his satellites in a sphere of 7¾ the radius of the sun; and Uranus and his satellites in a sphere of 4½ the radius of the sun. The earth and moon [MOON] might be contained in a sphere of one-half the radius of the sun.

In apparent diameter Mercury varies from 5″ to 12″; Venus from 10″ to 61″; Mars from 4″ to 18″; the small planets have diameters hardly measurable; Jupiter from 30″ to 46″; Saturn from 14″ to 18″; Uranus from a little less to a little greater than 4″.

If the radius of the sun were divided into 1000 parts, there would be as follows in the radii of the several planets:—Mercury, 3½; Venus, 8¾; the Earth, 9; Mars, 4¾; Jupiter, 97½; Saturn, 85; and Uranus, 39. If the bulk of the sun were divided into a *million* of parts, Mercury would be a little less than one-twentieth of one of the parts; Venus, two-thirds of a part; the Earth, three-quarters of a part; Mars, one-tenth of a part; Jupiter, 925 parts; Saturn, 720 parts; Uranus, 58 parts. The Moon is about the third part of Mercury in bulk.

The mass of the planets varies very much from what it would be if they were nearly of the same substance. From the effects of the planets in attracting their satellites, compared with the effects of the sun upon themselves, it is found that if, according to Cavendish's experiment, we take the earth to be, at a mean, 5½ times the density of water, or about half that of lead, the sun may be considered, as to density, to be made of asphaltum, or rather heavy coal; Jupiter of the same; Uranus of a material very little heavier; Saturn of maple-wood; the Moon of diamond or topaz. By other modes, of course, than that of their satellites, Mercury is found to be three times as dense as the Earth; Venus of about the same density; and Mars about three-quarters as dense as the Earth.

The sun revolves about its axis in about 25½ sidereal days; Mercury, Venus, the Earth, and Mars, all revolve in about the same time, from 23½ h. to 24½ h.; Jupiter and Saturn severally revolve in about 10 h. and 10½ h. About Uranus nothing is known in this respect.

From what precedes, a sufficient general notion may be collected of the dimensions of the Solar System, and we now proceed to some other points connected with it. As to its place among the fixed stars, it is only within the last two years that the distance of any star from our system may be said to have been positively measured. [PARALLAX.] The star 61 Cygni is shown to be more than 340,000 times as far from our system as its most distant discovered planet is from the sun. As to the question of the motion of the Solar System in space, no such phenomenon has been made apparent. Were any such motion to exist, of a degree sufficient to have a sensible effect, it is obvious that the stars which the system is leaving would appear to draw nearer together, while those to which it is approaching would appear to become wider apart. W. Herschel thought at one time that some such phenomenon was slightly perceptible, and that the system was in motion towards the constellation Hercules; but the fact has received no confirmation. That the whole System is in motion more or less, mechanical considerations make almost certain. Whatever motion the centre of gravity had at any one time, it is demonstrable that it must keep unaltered, except by the attraction of the fixed stars; and it is millions to one against there having been no motion whatever of this centre at the time when the system received its organization. And if there be *any* attraction from the fixed stars, however little, some motion must be produced. Centuries of close observation on double stars may, and probably will, detect the motion of our system. All that can be said up to the present time is, that, be it what it may, it is exceedingly small, compared with the distance of our System from these stars.

The next question may be, is there any evidence in our System of any secondary law of formation, indicating a connection between the mode of creation of one planet and another. The will and power of the Creator are the final causes both of the initiation and maintenance of this vast machine; but in the latter there are visible secondary laws, that of attraction, for instance: were there any in the former? Attempts at investigation on this point have been frequently considered atheistical; a foolish notion arising out of those views to which we have alluded in MOTION, p. 452. Those who can only think of the *Creator* and forget the *Maintainer*, and who virtually separate the office of the latter, and give it to the 'laws of nature,' may reasonably fear that they would have to give up also the former office to the 'laws of creation,' if such were found; which would be (but owing only to their own interpretation of the manner in which the world *continues* to exist) a renunciation of the idea of Deity in the contemplation of the manner in which it *began* to exist. But to those who keep constantly in view the fact which no modern theist disputes, that the same power which created continues to create in preserving, and that the 'laws of nature' are only expressions of the manner in which this preservation is seen to act, will look upon the 'laws of creation' to be as simple and natural an object of philosophical inquiry as those of the ascent of sap in a plant, or of the revolution of a planet. The proper reply to a charge of atheism brought against those who investigate any mode of action of the Creator of the universe, at any *past* time, is the retort of semi-atheism against those who make it.

Many speculations have been made upon the formation of the several planets, but none which has any appearance of connecting the phenomena of one planet with those of another, except by Laplace (*Système du Monde*, vol. ii., note 7), in what has been called the nebular hypothesis. This conjectural theory, which is well worthy of attention, never received any particular notice, to our knowledge, from any writer in this country, until Mr. Whewell's 'Astronomy and General Physics,' the third of the Bridgewater Treatises, appeared, in which it is announced that the nebular theory was ushered in with expressions which showed Laplace to be a professor of atheism. What Laplace really thought on these subjects, as we have said before [LAPLACE], we do not know, nor would it really matter if he were what he was represented to have been; for a conjecture may be ingenious, and a theory sound in its details, even though its author made it stand in the place of a Creator. But considering the collateral associations connected with such a charge, it will be well to examine into the fact whether there was any such announcement; and to do this fairly, we must quote both Mr. Whewell and Laplace. The former says,—'We have referred to Laplace as a profound mathematician, who has strongly expressed the opinion that the arrangement by which the stability of the Solar System is secured is not the work of chance; that "a *primitive cause* has directed the planetary motions." This author however, having arrived, as we have done, at this conviction, does not draw from it the conclusion which has appeared to us so irresistible, that "the admirable arrangement of the Solar System cannot but be the work of an intelligent and most powerful Being." He quotes these expressions, which are those of Newton, and points at them as instances where that great philosopher had deviated from the method of true philosophy. He himself proposes an hypothesis concerning the nature of the *primitive cause*, of which he conceives the existence to be thus probable.'

Here are two assertions:—1, That it is the doctrine of an intelligent Creator which Laplace 'points at' as a deviation from true philosophy; 2, That Laplace proposes his nebular hypothesis as a primitive cause. We pay a writer of Mr. Whewell's character the compliment of inserting here matter which would more appropriately appear in a review of his work: and we deny that Laplace has been well described in either assertion. Our object is to clear the nebular hypothesis from the unphilosophical character with which its first appearance is thus presented, and by no means to uphold the moral dignity of Laplace. Until the biting facts connected with his treatment of his benefactor [Vol. xiii., p. 325] are answered or explained, that great mathematician must be called a time-server; and we suspect that his 'Système du Monde' only treats the intelligent Creator whom his mind acknowledged, in the same manner as he afterwards treated Napoleon. It was published in 1796, a period which would well explain the mere suppression of all allusion to the Supreme Being: and one of these things must be true; either Laplace was what Mr. Whewell styles him, or he had not the courage to declare himself otherwise in his age and country. But what we have here to do with is the assertion that he did more—that he *attacked* the doctrine of a Supreme Being. His words are as follows, the passages to which we wish to draw attention being in italics:—'I cannot here help observing how much Newton has departed on this point from the method which he elsewhere so happily applied. After the publication of his discoveries, this great geometer, abandoning himself to speculations of another nature, *inquired into the motives which made the Author of nature give to the Solar System* the constitution which we have described.' Laplace then quotes Newton's Scholium (PRINCIPIA, pp. 10, 11, where we have translated the whole) thus: '*And all these regular motions have no origin in mechanical causes*,'[*] &c. &c. down to 'all parts of the heavens.' He then further quotes, 'This most elegant group, &c. can only arise from the design and government of a powerful and intelligent Being.' He (Laplace) continues thus, speaking, so far as the mere notion of a Supreme Being is concerned, rather in approbation: 'He repeats the same thought at the end of his Optics, in which he would have been still more confirmed if he had known what I have demonstrated, namely, that the arrangement of the planets and satellites is precisely that which makes a certain provision for their stability. "Blind destiny," says Newton, "can never make the planets move thus with such small irregularities, which appear to come from the mutual action of the planets and comets, *and which will probably become greater and greater in the course of time, until at last the System will again require its author to put it in order*." But,' proceeds Laplace, 'may not this arrangement of the planets be itself a consequence of the laws of motion, and may not the Supreme Intelligence, which Newton makes *to interfere*, have already made it depend upon a more general law? *Are we to affirm that the* [unlimited] *preservation of the Solar System is a part of the intentions of the Author of nature?*' This we should sum up as follows: Laplace charges Newton with a departure from philosophical principles in—1, Speculating on the motives of the Creator;[†] 2, Assuming the probability that his works would not last his time without his own supernatural interference; 3, Assuming that he intended to preserve the Solar System for ever. But Mr. Whewell singles out only one part of Laplace's quotation, and without paying any attention to the remarks which explain his meaning, declares that Laplace 'pointed at' Newton's declaration of belief in God as a piece of bad philosophy; whereas this part of his quotation is only followed by the remark how much stronger he himself (Laplace) had been able to make the sort of evidence on which Newton rested; and the sentence selected by Mr. Whewell as 'pointed at,' coupled with the remark specially made on that sentence, has rather the appearance of being pointed at with approbation. With regard to the assertion that Laplace propounded the nebular theory as a *primitive cause*, it is true that he did so in his own sense of the words. Mr. Whewell means by primitive cause a first cause, as those words are usually understood: and he asks (and the question would have been much to the purpose if Laplace had really meant the same thing as himself by the words *primitive cause*), 'Was man, with his thought and feeling, his powers and hopes, his will and conscience, also produced as an ultimate result of the condensation of the solar atmosphere?' But Laplace speaks as follows: 'Quelle est cette *cause primitive?* J'exposerai sur celà, dans la note qui termine cette ouvrage, une hypothèse,' &c. And in the very first words of this note we find, 'On a, pour remonter à la *cause* des mouvemens *primitifs* du système planetaire,' &c. This then is what Laplace understood by *primitive cause*, a *cause* of the *primitive* motions;—an improper use of language, if the reader pleases; but when a man puts his own meaning on his own words, no one has a right to fix the consequences of another meaning upon him.

---

[*] Laplace evidently thought that by mechanical causes Newton meant what we now call second causes. See the reference just made.

[†] Newton's Scholium does not seem to us to do any such thing; but that is not the question. Laplace's approval or disapproval is of course to be applied to his own interpretation of Newton's meaning, not to ours.

We now proceed to the nebular theory, which is a conjecture proposed with much doubt by Laplace, as a possible explanation of the manner in which the *motions* of the several planets obtained those remarkable resemblances which are found to subsist, without making the inquiry extend to anything except their motions. All the planets move in one direction round the sun, and their satellites move in the same direction round themselves; those that are known to revolve round their axes (and the contrary has been proved of no one of them) also revolve in the same direction, and their equators are not much inclined to their orbits. The excentricities of the planets and satellites are in no case very large, and generally very small; and the inclinations of their orbits to one another are generally small. Many nebulæ in the heavens appear, when examined, to consist of a bright nucleus surrounded by nebulous matter; in others it is found that the apparently nebulous matter consists of stars. This gave Laplace the idea that our System might originally, that is, previously to the establishment of its present order, have been a large nebula of which the sun was at the centre. Imagine a large nebulous mass in a state of revolution, with a solid or at least less nebulous centre, round which it revolves: call this central nucleus the sun. Assume the ordinary laws of matter to be true of this nebulous mass; and also that it extends as far as such an atmosphere can do; namely, until the attraction of the whole upon particles at the equator is equal to the centrifugal force of those particles. If condensation should begin to take place, arising from loss of heat, the mass would revolve more and more rapidly as it was condensed into less and less space; but it does not follow that the equatorial particles would fall in towards the centre: they are balanced by the equality of the centripetal and centrifugal forces; and might form a ring round the rest of the mass. If the process were conducted with great regularity, this ring and the mass of vapour might undergo continual condensation together, until the increasing velocity of rotation prevented the formation of the ring from continuing. The departures from complete regularity which might exist in the mass might cause disturbances in the formation of the rings, which might end in there being one or more (not many) permanently revolving round the rest of the mass condensed into a solid body, in the manner of Saturn and its rings. Such regular formation however might be rarely continued long enough; and if the rings got broken, each ring would become several masses, which would revolve nearly at the same distance, and nearly with the same velocity: such a result is seen in the four small planets. But as, generally speaking, these masses would, by irregularities in their velocities, be combined into one[*] at last, each broken ring would form a new nebulous mass, revolving round the diminished central nucleus: and if a number of such masses were formed, those nearer to the central mass would move with the greater velocity, and would be both smaller and denser than the external ones: the first circumstance certainly, the second and third most probably. Again, each mass would have a motion of revolution in the same direction [MOTION, DIRECTION OF] as the motion round the primary; for when the ring becomes broken, its internal parts have a somewhat more rapid motion than the external ones, which would give the motion of rotation noticed. And the rotations thus created in the internal masses would probably be greater than those in the external masses. The orbits of the masses would necessarily be nearly circular, and not much inclined to each other: but for irregularities, quite circular, and in the same plane. In each of the nebulous masses, thus detached and revolving, condensation might again give rings or satellites or both; but in all probability the external masses would get more satellites than the internal ones: the orbits of the satellites must be also nearly circular, and not much inclined. All the preceding circumstances, both those which are certain and those which are probable (Laplace confined himself to the former), are actually existing in the Solar System; consequently this hypothesis, though subject to serious difficulties, deserves attentive consideration, as often as any new knowledge of the constituent parts of our system shall render a reference to it likely to produce evidence on one side or the other. As a substitute for intelligent creative power, if such a thing were intended, it would do no better than any other; for, as Mr. Whewell observes, a man with will, power, and conscience, cannot be admitted to be a necessary consequence of the cooling of a nebulous atmosphere. Nevertheless, as exhibiting a possible mode in which the Creator of mind and matter made the laws of formation resemble those of continuation, as far as the motions of the system are concerned, this hypothesis is strikingly explicative of what we really see. But even if we were to take it to be a true explanation, it would only be one step of the ascent, and the next question would be, what higher process distributed the parts of this nebulous mass in such a manner as to place those outermost which were fit to form a planet so distant from the source of light and heat as Uranus, and to support the appropriate forms of animal and vegetable life which analogy would induce us to suppose must exist there.

The history of astronomy teaches us that the system in which we live has not undergone any apparent change for more than 2000 years; and, on inquiring into the connection which exists between one planet and another, or the laws of gravitation, it is found that so far as their mutual actions are concerned, there is no reason why any change ever should take place. If the central body were the only one which attracted the rest, and as long as the laws of matter remained unaltered, it is certain that nothing could alter the revolutions of a system of planets, unless two orbits intersected, and the planets of those orbits happened to come to the intersecting part at the same time, and to strike each other. But the planets are subject to the action of each other as well as to that of the sun, and no instant elapses without every orbit undergoing a slight change from every one of the planets of the other orbits. Jupiter alone produces on the earth's orbit in one year more change than we have any right to say all the comets put together would do in a hundred. And yet the system not only continues without any sensible change, but, one circumstance alone excepted, to which we shall presently allude, is demonstrably formed to continue for a most enormous length of time, unless some new action should arise, or some external cause begin to operate. As it is sometimes stated that a complete mathematical demonstration has been given of the *eternal* stability of the Solar System, so far as the mutual actions of its parts are concerned—an assertion which is altogether incorrect—it may be worth while to enter a little on the details of this subject.

The disturbing forces of the planets on each other cannot have their effects calculated all at once; but each force must be divided into an infinite series of terms, the first of which contains all the terms of the first dimension, the second all those of the second, and so on. Of all these terms each is much less in its effect than the preceding; so that in fact the first two dimensions are all that produce any sensible effect in any time which it is worth while to consider. Occasionally it happens that terms of the third and fourth dimensions have been required to be used, but almost all the sensible perturbations of the system depend on terms of the first two orders. As far as any effects arising from such terms are concerned, Lagrange and Poisson are admitted on all hands to have demonstrated the stability of the Solar System: and considering the nature of the process employed, and there being no appearance of any circumstance which looks likely to lead to a different result in any of the remaining terms of the disturbing forces, it may be highly probable that a further investigation would show the same thing, if all the dimensions of the disturbing forces were employed. Sir J. Lubbock (*Phil. Mag.*, February, 1831) has pointed out the forms which further investigation would apparently produce, and which would (unless a detailed investigation should lead to something not discoverable *à priori*) bear out as certain what we have just stated to be probable. But though all the presumptions lie on the side of those who would assert the proposition absolutely of all dimensions of the disturbing force, it is not yet time to say that it is a certain mathematical consequence of the theory of gravitation.

---

[*] If any number of masses, capable of cohering, revolve in orbits so near to one another that they must cohere when they come to their minimum distance, nothing but an absolute and mathematical equality in their mean velocities can keep them permanently asunder; the smallest inequality must at last bring them all together.

When the effects of preturbation are examined, as far as the second dimension of the disturbing force, it appears that the immense mass of the sun compared with that of any planet, the great distance of the planets from each other as compared with their amounts of departure from spherical form, the small excentricities and inclinations of their orbits, and their motions being all in one direction, give the following mathematical consequences of the law of attraction:—First, the longest or major axes of the planets' orbits are not subject to any slow variations of very long period; all their variations being excessively small, and soon destroyed by the production of contrary variations. It is very often stated that the major axes are subject to no variation; this is to be understood only of *secular* variation (or of very long period). One year is not precisely the same as another to any fraction of a second; but the average year of one long period *is* precisely the same as that of another; or at least the mean years of the two periods become more nearly equal the longer the periods are made. But the excentricities and inclinations are subject to long periodic alterations, the times of their recurrences not being exactly settled, from the difficulty of their determination. How then is it known that they are periodic? For instance, the excentricity of the Earth's orbit is subject to a yearly diminution of ·00004, its value in 1801 being ·017. Had this diminution been an increase, as it is in Mercury and Jupiter, it might *à priori* appear possible that this increase should continue until the orbit (preserving the same major axis) should be so elongated that the ultimate approach to and recession from the sun should give our planet the alternate climates of Mercury and Mars, and thus no doubt destroy it as the abode of beings constituted like ourselves. It is found however that the following relation must exist:—If at any one moment the square of the excentricity of each planet be multiplied by its mass and the square root of its mean distance from the sun (represented in numbers), the sum of all these products must be the same as it was at any moment past, or will be at any moment future. And if in each product the tangent of the inclination to a fixed plane be substituted for the excentricity, the resulting equation is true. From such relations as these, and others connected with them, it is shown that so far as the mutual actions of the planets are concerned, no one excentricity nor inclination can increase indefinitely, but all their changes must be periodic, and confined within rather small limits. The approach of the ecliptic to the equator, for instance, which amounts to about half a second in a year (and which leads speculators sometimes to talk about a past time when the ecliptic passed through the pole, and a future time when it will coincide with the equator), must stop long before the ecliptic reaches the equator, and attain a minimum inclination, after which the two will begin to separate; the whole oscillation being less than three degrees. The whole result is summed up thus: As far as terms of the second order (inclusive) in the disturbing forces, and as long as only the mutual attractions of the planets act, there is a mathematical certainty that the Solar System will remain in its present state, the elements of the different orbits oscillating about certain mean values, from which they are never very distant: except only the longitudes of the nodes and perihelia, which change with velocities which are always very near to a certain mean velocities. The probability is very small that the higher dimensions of the disturbing forces would affect this result, and certainly only in a length of time to which the longest periods known are trifling in comparison.

This last point however is of the less importance, since it has become highly probable, within the last few years, that an external cause does exist, which must, unless there be a counteracting force of which we know nothing, in time cause the destruction of the System. If the planets move in any medium which resists their motions, however little, the consequence must be a gradual diminution of their mean distances from the sun, and a gradual increase of their velocities, ending in their absolutely falling into the sun. For the presumption in favour of the actual existence of such a resisting medium, see [Comet], p. 394. This retarding agent seems to show a rapid effect upon so attenuated a mass as Encke's comet, though thousands of years have elapsed without its producing any sensible effect upon the planets. Little as it may concern us directly, these speculations have an interest, both as to the glimpse they give of the possible destiny of our System, and from their association with the history of past and the hope of future discovery. It is to be remembered that no science has drawn out so much of mathematical talent, or indirectly excited such an influence upon other branches of physical research, as the application of the theory of gravitation to the development of the planetary motions.

For more detail upon the subject, in a popular manner, the English reader may consult Sir John Herschel's 'Treatise on Astronomy,' in the *Cabinet Cyclopædia*, or Mrs. Somerville's 'Treatise on the Physical Sciences.

SOLA'RIO, ANTONIO DE, called 'Il Zingaro,' or the Gipsy, was born in 1382, at Chivita, in the Abruzzi, according to Dominici (*Vite de' Pittori Napolitani*), but others have contended that he was a Venetian. He was a gipsy by birth, and in his youth was a sort of itinerant blacksmith. He was not a mere tinker, a mender of kettles and saucepans, for he is said to have been admitted into the house of the painter Colantonio del Fiore at Naples, on account of his skill in making implements of iron. Nearly the same story is related of Solario as of Matsys, the blacksmith of Antwerp. [Matsys.] Solario fell in love with the daughter of Colantonio, and she fell in love with him. Solario made proposals, but Colantonio said that he would never consent that his daughter should marry any one but a painter of reputation at least equal to his own. The gipsey was not to be thus got rid of; he asked to be allowed ten years to study the art, and Colantonio, to satisfy his daughter, assented. Solario became a pupil of Lippo Dalmasi at Bologna, with whom he remained six or seven years, and afterwards travelled through the chief towns of Italy in order to study the works of other masters. In rather more than nine years he returned in disguise to Naples, and having presented to the queen of Naples a picture of the Virgin, with the infant Jesus crowned by angels, and also been permitted to paint a portrait of the queen, Colantonio was then invited to view the productions of the unknown artist, of which he expressed the highest admiration. Solario then discovered himself, and soon afterwards became the son-in-law of Colantonio. His reputation was immediately established, and he was much employed, especially at Naples, in painting altar-pieces, and in decorating the walls of convents and other religious houses with frescoes. In the fine expression of his heads, and in the richness and harmony of his colouring, he has been compared to Titian. He is also praised for the graceful action of his figures, but is said to be defective in the drawing of the hands and feet. Solario was also distinguished as an illuminator of manuscripts, especially Bibles. He died in 1455. Vasari has not included Solario in his 'Lives.'

(Dominici, *Vite de' Pittori Napolitani*; Moschini, *Memorie della Vita di Antonio de Solario, detto Il Zingaro, Pittore Viniziano*, Venezia, 1828.)

SOLA'RIUM. [Trochidæ.]

SOLDA'NIA. [Foraminifera, vol. x., p. 348.]

SOLDERING, according to Dr. Ure (*Dict. of Arts*, &c.), is 'the process of uniting the surfaces of metals, by the intervention of a more fusible metal, which, being melted upon each surface, serves, partly by chemical attraction, and partly by cohesive force, to bind them together.' In accordance with this, which is the ordinary acceptation of the word soldering, a solder may be defined as a metallic cement employed to unite, by being fused between them, two pieces of metal. Such an explanation however, though correct in most cases, does not apply to every kind of soldering; a process having been recently introduced by which pieces of metal may be perfectly united without the interposition of solder.

In the ordinary mode of soldering, the alloy used as a solder must be more fusible than the metal or metals which are to be united, and must have a strong affinity for them. The solder usually contains a large proportion of the metal to which it is to be applied, in combination with some more easily fusible metals. To insure perfect metallic union between the solder and the surfaces to which it is applied, it is essential that they be made perfectly clean and free from oxide and that the atmosphere be excluded during the operation, in order to prevent the formation of any oxide while the process is going on. This is effected in various ways, but most commonly by the use of borax, sal ammoniac, or rosin, either mixed with the solder or applied to the surfaces to be joined. Mr. Thomas Spencer, of Liverpool, has recently made some interesting experiments, the results of which are given in a paper 'On the Theory and Practice of Soldering Metals,' which was read before the Liverpool Polytechnic Society in May, 1840, and published in the 'Mechanic's Magazine,' vol. xxxii., p. 729, &c. An almost infinite variety of alloys are used in different kinds of soldering, the principal of which, as recommended by the best authorities, will be described below, classified according to the metals which they are commonly used to unite.

Platinum is soldered, according to Dr Ure, with fine gold.

For *gold* it is usual to employ an alloy of fine gold with silver or copper, or with both of those metals. These are sometimes used in the following proportions:—pure gold twelve parts, pure silver two parts, and copper four parts. The metals are fused together, beat into thin leaves, and then softened by annealing. Borax mixed to a thick consistence with water is applied to the joint, and the solder is melted by the blowpipe. It is stated in Brewster's 'Edin. Ency.,' that the borax may be removed by boiling water, or diluted sulphuric or muriatic acid; and that the paleness of the solder may be remedied by melting upon its surface a mixture of two parts of nitre and one of burnt alum, and then washing it off with hot water. The same authority states that gold articles may be cleaned after soldering by boiling them in urine and sal ammoniac, and those of silver by boiling in alum-water.

Silver solders usually consist of silver mixed with brass, and sometimes with zinc. Dr. Ure states that pure tin is occasionally used as a solder for silver, but that the solder commonly used is an alloy of five parts silver, six brass, and two zinc. Some authorities give nineteen silver, one copper, and ten brass, as the proportions in jewellers' silver solder; and two parts of pure silver to one of brass as the composition of solder for plating. Another solder for coarser silver has four parts silver to three of brass, with a little borax; and a hard silver solder is made of equal parts of silver and fine brass. The addition of zinc softens this alloy. Mr. Gill, in an article on soldering in jewellery, in the 'Technical Repository,' vol. ii., p. 63, states that the thin laminated solder is cut up into very small bits, and applied with borax and water. The article to be soldered is laid on charcoal ashes, and submitted to the jet of a blowpipe. To prevent the solder from spreading over the surrounding parts, they may, he observes, be coated with Indian ink laid on with a camel's-hair pencil. The fluid borax is also applied with a hair-pencil, and the solder with the end of the ivory handle on which the pencil is fixed. Filagree-work is soldered in a somewhat different manner; the minute parts being laid together in their proper position on a flattened piece of charcoal, which is smeared with a thick solution of gum tragacanth to hold them steady. The fluid borax is then brushed over, and the solder, reduced to a fine powder, is sprinkled upon it. In this as in all other kinds of soldering, whenever several parts must be successively put together, it is necessary to use solders of different degrees of fusibility; the least fusible being used first, so that the joints made with it may not be disturbed by the heat of the subsequent operations.

Spelter solder is used for brass, copper, and iron, and consists of zinc (spelter) mixed with copper or brass, and sometimes also with tin. The proportions vary greatly. Gill gives eighteen parts brass, three zinc, and two tin; or sixteen parts copper, sixteen zinc, and one tin. (*Technic. Rep.*, i., 432.) Dr. Ure says it consists of zinc and copper in nearly equal parts. Brewster's 'Edin. Ency.' describes it as consisting of two parts zinc and one brass, and observes that the addition of one dwt. of silver to each ounce is a great improvement. In the 'Dict. Technologique,' as quoted in vol. vi. of Gill's 'Technical Repository,' p. 181, the following solders for copper are mentioned:—eight copper and one zinc, which form a very hard yet fusible and malleable solder; three copper and one zinc; and ten copper and one zinc. The latter forms the hardest but least fusible solder. Generally the addition of copper increases the hardness and diminishes the fusibility of the alloy. For hard brass solders the same proportions are recommended, but brass is substituted for copper. The proportions may vary, it is stated, from two to sixteen parts of brass to one part of zinc. Six brass, one zinc, and one tin, form a soft solder for brass. An alloy of two parts copper and one part tin is sometimes used as a hard solder. All the above-mentioned hard solders are granulated, and applied to the joint in the form of a coarse powder.

Articles of *wrought-iron*, and some qualities of *steel* also, may be soldered with cast-iron; the cast-iron being repeatedly heated and quenched in water, by which it becomes sufficiently friable to be beaten to a coarse powder with an iron pestle and mortar. Several papers respecting this method of soldering were published in the 'Technical Repository,' vols. i., iii., and iv.; from which it appears that the process was, about sixteen or eighteen years ago, practised in such a way as to lead to the supposition that it was rather a welding than a soldering operation; the solder being applied in the form of a black shining composition resembling pitch, which Mr. Gill conceived to be cast-iron powdered and mixed with glass of borax; and the joints being subjected to a slight hammering. The parts united by this means are stated to be scarcely distinguishable. In making fine steel instruments, gold, either alone or with a slight alloy of copper, is often used as solder. Silver solder, being less expensive, and nearer the colour of the steel, is preferred by some for this purpose. An alloy of nineteen parts fine silver, one copper, and two brass, has been recommended for steel joints. In larger articles of iron and steel, a solder consisting of equal parts of tin and iron is sometimes used.

Common *plumbers'* solder is made of two parts lead and one part block tin; or of the same metals mixed in nearly equal quantities; bismuth is added when it is desired to make the alloy more fusible. Soft solder has two parts tin to one lead; and other alloys of tin, lead, and bismuth, are used for uniting various articles of lead, tin, pewter, and other soft compounds. Such highly fusible solders are usually cast in ingots or strips, and melted as they are used by means of an instrument called a soldering-iron, which is tipped with copper—that metal being preferred for its greater affinity for tin. In soldering tin plates together, their edges are made to overlap; but in almost every other case the edges to be joined are made only to meet, the solder being run between their abutting edges.

The 'Technical Repository' (vol. iv., p. 57) gives an account of a curious mode of soldering resorted to in order to fix upon the back of the dial-plate of a watch the small copper studs by which it is attached to the plate which encloses the wheel-work. The heat required for melting spelter solder would be injurious to the enamel, and therefore the studs are made of wire plated with silver, and fixed by melting the silver on their sides, and causing it to run down to their base, where borax and water is previously laid. Thus the studs are fixed without applying the jet of the blowpipe immediately to the back of the enamelled plate.

A kind of soldering, called *burning-to*, has been long practised in some cases with sheet-lead, where it has been desirable to make a vessel entirely of that material; the junction being effected by pouring melted lead on to the edges to be united, until they fuse together. Somewhat similar to this is the process recently introduced under the name of *autogenous soldering*. This process, which is the invention of a French gentleman, M. de Richemont, consists in the union of two pieces of metal without the interposition of any solder, by fusing them at the point of junction by jets of flame from a gas blowpipe. The apparatus used for the purpose contains a hydrogen gas generator bellows for atmospheric air, and valves for regulating the proportion in which the gas and air are to be mixed. A complete description, with cuts, of this machine, is given in the 'Mechanic's Magazine' (vol. xxxii., p. 546). The invention has been rewarded in Paris by a gold medal, at the National Exhibition of Arts, and is patented in this country. It has hitherto been applied chiefly to lead, but appears suitable for metals more difficult of fusion. By its adoption lead may be applied very extensively in chemical vessels, in which the use of solder has been inconvenient or impossible, owing to its degree of expansibility differing from that of lead, and its greater liability to be acted upon by acids. The joints formed in this way are also much neater and less liable to flaws than those made by the common process. It appears by the paper referred to at the commencement of this article, that Mr. Spencer discovered this process about the same time as M. de Richemont; and his experiments lead him to suppose that, by varying the admixture of gases, a jet of flame may be produced of intensity suitable for any metal to which it may be desired to apply the new mode of soldering.

SOLDIER is a term applied now to every man employed in the military service of a prince or state, but it was at first given to such persons only as were expressly engaged for pay, to follow some chief in his warlike expeditions.

Cæsar mentions a band of 600 men called 'soldurii,' who bound themselves to attend their leader in action and to live or die with him (*De Bello Gallico*, iii. 22), but it does not appear that they served for pay. By some the word has been thought to come from 'solidus,' the name of a coin under the Roman empire, which may have been received as the payment for the service. .

The troops which formed the armies of the Crusaders were engaged to serve for pay, for though the nobles voluntarily entered into the war, their vassals were not obliged by the tenure of their fiefs to accompany them. Père Daniel (*Hist. de la Milice Fr.*, tom. i., p. 103) expresses his belief that Philip Augustus, near the end of the twelfth century, was the first of the French kings who had hired troops, at least in any considerable body, in his service; and the practice of retaining such troops appears to have been afterwards very general. It is probable that men hired for the wars were, from the time of that prince, called soudoyers or souldyours, that is, stipendiaries; but the name appears for the first time in the 'Chronicles' of Froissart, where it is applied to the hired troops both of France and Germany. It is stated that Jaques Dartvell (von Artaveld) of Ghent (1339) kept a guard of 60 or 80 souldyers, each of whom was paid four Flemish groats daily (liv. i., c. 29). About the same time Philip de Valois, in revenge for an inroad which had been made into his country, gave leave to the soudyers of France to plunder the lands of Sir John of Hainault (liv. i., c. 44); and the name occurs in many other parts of the work. This class of troops at that time engaged themselves to fight for any party which would employ and pay them; and when not occupied in the wars, they used to wander about the country in large bodies, plundering the people and committing every enormity. The terms 'routiers' and 'brigands,' as words of reproach, were applied to them, and they appear to have been as formidable to those who hired them as to the enemy. In the reign of Charles V. of France, Bertrand du Guesclin led them into Spain to serve against Peter the Cruel, and in that country great numbers of them remained, yet the disorders which they caused in France did not terminate till Charles VII., in 1445, and Louis XI., in 1480, established a regular militia, which was paid by the state.

In the wardrobe account of Edward I. (1300) the term soldier occurs frequently, and Grose considers that the persons so designated were of a different class from the other troops. Some of them are called 'soldiers scutifers,' or esquires; some, 'soldiers constables;' and others, simply 'soldiers;' but the pay of all was the same, viz. one shilling per day. (*Mil. Antiq.*, vol. i., p. 326.) From the time of Edward I. to the end of the reign of Edward III. the daily pay of a banneret was 4*s.*, and of a knight, 2*s.*; that of a hobiler, a sort of light horseman, was 6*d.*; of a crossbowman, 4*d.*; and of an archer, 2*d.* In that age the stipendiary troops, or soldiers, were raised in England by commissions granted by the king to persons who undertook to enlist men for a certain pay (which was made to depend on the nature of the service), and for a certain portion of the ransom-money which might be obtained in the war.

Little change seems to have taken place in the pay of the English soldiers between the times of Edward III. and Mary. We find that during the reign of this queen the daily pay of a captain of heavy cavalry was 10*s.*, and of a cavalry soldier 1*s.* 6*d.* The pay of a captain of light cavalry was 6*s.*, and of a soldier 1*s.* The pay of a captain of foot was 4*s.*, of a lieutenant 2*s.*, of an ensign 1*s.*, and of a foot soldier 8*d.*; a halbardier and a hackbutter, on horseback, had each, 1*s.* daily. In the times of Elizabeth, James I., and Charles I., the pay of the officers was a little raised, but that of a private foot-soldier was still 8*d.* per day: during the civil wars the pay of the latter was 9*d.*, but in the reign of William III. it was again reduced to 8*d.* At that time the pay of a private trooper was 2*s.* 6*d.*, and that of a private dragoon was 1*s.* 6*d.*, including in both cases the allowance for the horse. It is evident that the pay of the private soldier in later times is far from having been raised in the inverse ratio of the value of money.

While armour was in general use, the common soldiers of England were distinguished only by scarfs or by badges, on the latter of which were impressed the arms of their several leaders; but in the reign of Henry VIII. something like a uniform was worn, and it appears that the colour of the men's upper garments was then generally white; the soldiers in the king's particular service only, had on their coats a representation of the cross of St. George. However, on an army being raised in 1544, the soldiers were ordered to wear coats of blue cloth bordered with red. White cloaks marked with red crosses continued to be the uniform of the troops during the reign of Queen Mary; but in the time of Elizabeth the infantry soldiers wore a cassock and long trowsers, both of which were of Kentish grey: the cavalry were furnished with red cloaks reaching down to the knee and without sleeves. Grey coats, with breeches of the same colour, continued to be the uniform as late as the end of the reign of William III., but soon after that time red became the general colour for the coats of the British infantry soldiers.

The low condition of the first soldiers in France has been mentioned in the article INFANTRY: with respect to those of England in the times of Henry VIII. and Edward VI., we have a more favourable account; for Sir John Smithe, in the preface to his tract on 'Military Instruction' (1591), observes that the order and discipline in the armies during the reigns of those kings were so good, that the men, on being discharged, were never seen to become rogues or to go begging under pretence that they had been soldiers, as, he observes, they now most commonly do. In the preface to his 'Discourses on the Forms and Effects of Weapons' (1590), he complains that, in his time, the commanders of troops serving abroad, instead of publishing regulations for the conduct of the men, gave a few laws artfully tending to deter the soldiers from demanding their pay, but in no way prohibiting them from plundering the people of the country: he adds that they esteemed those soldiers to be the best who, by robbery, could live longest without pay. He complains also that while the commanders were gallant in appearance, and had their purses full of gold, the soldiers were without armour, ragged, and barefooted; and that when money was to be received, they used to send the men on desperate enterprises, in order that they might obtain the pay of those who were killed. He adds that, in the summer before the earl of Leicester went over (to Holland) the commanders devised a manner of paying the soldiers which had never before been heard of; instead of money, the men were paid in *provand*, under pretence that they knew not how to make purchases; by which means, the food supplied being of an inferior kind, great part of the soldiers' pay was put in their own pockets. It appears that Queen Elizabeth, on being informed of these abuses, caused the practice of paying in provand to be abolished. We find that subsequently, even so late as the time of George I., the pay both of officers and private soldiers was frequently postponed for years, and was sometimes entirely withheld. Happily such injustice no longer exists in the British army; the pay of the soldier is assured to him by the nation; and a well-appointed commissariat provides, as far as possible, for his wants while in the field.

It must be admitted that, till lately, the condition of a private soldier, both in this country and on the Continent, was unfavourable for inspiring a love of the service in his mind. Obliged to be furnished with good clothing and to preserve a becoming appearance, that which remained of his scanty pay scarcely sufficed for procuring the food necessary for his support. In his barracks he was subject to numerous petty details of duty, which produced weariness and even disgust; and, at all times, to the restraints of discipline, which deprived him of the recreations enjoyed by other classes of men. It may be added, moreover, that the soldier had too often the mortification to find himself despised for his poverty by persons with whom men of his condition are accustomed to associate. These disadvantages are now however in a great measure removed; and the pay of the soldier suffices to afford him the means of obtaining the comforts of life in a degree, at least, equal to those which are enjoyed by an ordinary peasant or mechanic. With the improvement of his condition, a corresponding improvement in the character of the soldiers has taken place: men of steady habits are induced to enlist, and officers are enabled to select the best among those persons who present themselves as recruits for the army.

The duties of the soldier are now rendered as little burthensome as is consistent with the good of the service; and the regulations, promulgated by the highest authorities, prescribe that he shall at all times be treated with mildness and humanity: even the non-commissioned officers are required to use patience and forbearance in instructing the recruits in their military exercises. When breaches of discipline on the part of the soldier oblige a commander to order the infliction of punishment, attention is paid as much as possible to render it a means of promoting a reformation of character: the lash is now very sparingly used. Wherever a regiment be now quartered, there is established for the soldiers a school, which the men are obliged, as part of their duty, to attend, and which is generally furnished with a library for their use. The library and school are formed and supported by the subscriptions of the officers, and both have been found to contribute greatly to the preservation of sobriety and good conduct among the men, by weaning them from the haunts of idleness and dissipation, and giving them a taste for useful knowledge.

In time of peace the soldier, being surrounded by the members of civil society, must, like them, conform to its laws; and, being under the influence of public opinion, he is, unconsciously to himself, held in obedience by them; so that no extraordinary coertion is necessary to keep him within the bounds of civil or military law. But in the colonies the soldier, even though he be serving in a time of peace, has many temptations to fall into a neglect or breach of discipline: he is far removed from the friends of his early life, who may have exercised upon his mind a moral influence for good: he sees around him only the conduct, too frequently licentious, of the lower orders of people in the country where he is stationed; and it may be that he is not fortified with the principles which should have been implanted in his mind by a sound education. The probability of a return to his native land before many years have passed is small, and the diseases to which he is exposed from the unhealthiness of the climate frequently terminate fatally: hence he becomes reckless from despair, and the facilities with which wine or spirituous liquors may often be obtained lead him into excesses which, while they accelerate the ruin of his health and render him unfit for duty, cause him to commit offences both against discipline and morals. Thus in the colonies there arises a necessity for greater restraints on the freedom of the soldier, and for the infliction of heavier punishments than are required at home. (Maj.-Gen. Sir Chas. Napier, *Remarks on Military Law.*) Lastly, in time of war and on foreign service a vigorous discipline is essentially necessary: the privations to which soldiers are then exposed strongly induce those who are not thoroughly imbued with moral and religious principles to plunder the country-people, in order to supply their immediate wants, or to drown the sense of their sufferings in liquor. It ought also to be observed that, in war-time, many turbulent spirits are induced to enter the army in the hope of enjoying the licence which the military life abroad appears to hold out. These men are the ring-leaders in all excesses, and they too commonly cause many of those who are weak in principle to join them; in such cases therefore the most severe coercive measures must be immediately applied, if discipline is to be preserved in the army. The efforts made by the British commanders, during the war against the French in Spain, to maintain order, and prevent the people of the country from being injured, were great and praiseworthy; and perhaps fewer crimes were committed by the British troops than by those of their allies or their enemies; but it is to be lamented that there were still too many occasions in which the national character was disgraced by the misconduct of its soldiery.

SOLE. [PLEURONECTIDÆ.]

SOLECISM (*soloecismus*, *σολοικισμός*), a grammatical term which is used by the later Greek and Roman writers, and by modern grammarians also, though in a somewhat different sense. It is defined by Sinnius Capito (Gell., v. 20) as an unequal and improper arrangement of the parts of speech, that is, as a violation of the rules of syntax. Quinctilian (i., s. 28, &c.) specifies four kinds of solecisms: the first consists in the addition of a superfluous word; the second, in leaving out one that is necessary; the third, in perverting the order of the words of a sentence; and the fourth, in using an improper form of a word. The antients also used the word in a wider sense, understanding by it any kind of fault, error, or mistake, whether made in speaking, writing, or acting. Modern grammarians designate by solecism any word or expression which does not agree with the established usage of writing or speaking. But as customs change, that which at one time is considered a solecism, may at another be regarded as correct language. A solecism therefore differs from a barbarism, inasmuch as the latter consists in the use of a word or expression which is altogether contrary to the spirit of the language, and can, properly speaking, never become established as correct language.

The term solecism was supposed by antient grammarians to be derived from Soli, a town of Cilicia, where the language of the original Greek settlers, who were few in numbers, became corrupt through the influence of the people by whom they were surrounded.

SOLEN. [PYLORIDIANS, vol. xix., p. 145, *et seq.*]

SOLENA'CEA, Lamarck's name for a family of bivalve testaceous mollusks, including the genera *Solen*, *Panopæa*, and *Glycymeris*. [PYLORIDIANS, vol. xix., pp. 145, *et seq.*]

SOLENE'LLA, Sowerby's name for a genus of testaceous bivalve mollusks apparently belonging to the family *Arcacea* of Lamarck, and partaking of the characters of the genus *Nucula* [POLYODONTA, vol. xviii., p. 363], and of the family SOLENACEA.

Generic Character.—*Shell* oval, equivalve, sub-equilateral, compressed, covered with a thin shining olive-green epidermis. *Hinge* with many teeth, three or four of which are anterior, and the numerous rest sharp, posterior, lateral, and arranged in a straight line. Two lateral *muscular impressions*. The *pallial impression* with a large sinus. *Ligament* external, prominent, and elongated.

Example, *Solenella Norrisii*. A few specimens of this, the only known species, were dredged up by Mr. Cuming at Valparaiso.

SOLENIMY'A, or SOLEMY'A. [PYLORIDIANS, vol. xix., p. 146.]

SOLENOCURTUS, or SOLECURTUS. [PYLORIDIANS, vol. xix., p. 144.]

SOLE'NODON, a genus of insectivorous mammals established by Brandt on a specimen sent from the island of Hispaniola by Jaeger.

Generic Character.—Habit generally between that of *Sorex* and *Didelphys*. Muzzle elongated, the snout smooth, produced, and with nostrils at the sides of its apex. Eyes minute. Ears large, rounded, nearly naked. Body hairy. Stern and upper part of the rump beset with a few very short silky hairs. Feet ambulatory, plantigrade, pentadactylous; claws falcular, those of the fore feet the longest. Teats inguinal? Tail long, smooth, and for the most part scaly.

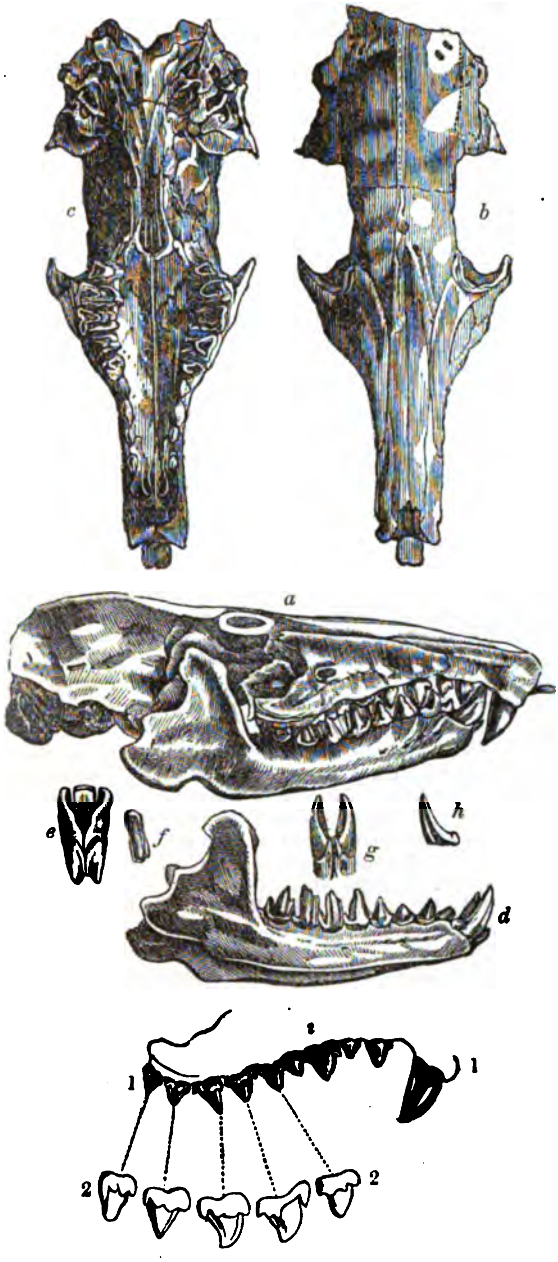
Dental Formula —Incisors, $\frac{6}{6}$; molars (spurious $\frac{6}{6}$, true $\frac{8}{8}$) $= 40$.

The skull of *Solenodon* is considerably elongated: the occipital, parietal, and temporal bones are moderately convex; and the condyles of the occipital are prominent. There is an obtuse crest on the sagittal suture, but none on the coalesced frontal bones. The internal pterygoïd processes alone are conspicuous, thin, and joined by a suture with the perpendicular parts of the palatal bone. There is no bony *bulla*, and, consequently, the interior wall of the tympanic cavity is only closed by skin. There is no zygomatic arch. The coronoïd process of the mandible is dilated and directed outwards. The angle of the mandible is dilated, subtetragonally rounded, and prominent above the condyloïd part.

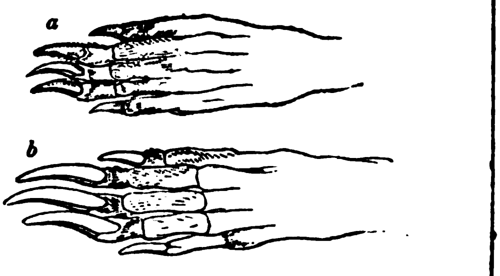
The two anterior upper incisor teeth are the largest, disjoined from the others, perpendicular, and unicuspid: the two anterior lower incisors are very short and very narrow; the two middle are the longest, and conical, and excavated on the internal surface with a rather deep triangular canal. Brandt remarks that the structure of the teeth manifests a greater similitude to that of *Myogale* (Mygale) than any other genus.

Example, *Solenodon paradoxus*.

Description.—Sides of the head and neck dilute yellow-brown, mixed with ferruginous, and, occasionally, with grey. Abdomen and feet dilute yellow-brown, with hardly a mixture of grey. Space upon the breast between the anterior limbs dilute ferruginous, extended to the internal side of the feet, and, anteriorly, to the cubit. A similarly coloured space occupies the inguinal region, and also extends upon the anterior part of the legs. Upper part (dorsum) of the muzzle, forehead, vertex, middle of the nape, and anterior part of the back, tinged with black-brown: the rest of the back black-brown, the colour (more diluted) extending towards the posterior part of the sides and towards the external surface of the thighs. The basal and middle part of the scaly tail grey; the apical part white.



a, skull of Solenodon (profile): *b*, seen from above; *c*, seen from below: *d*, mandible or lower jaw; *e*, anterior part of the intermaxillary bone, with the two anterior incisor teeth; *f*, anterior surface of an anterior upper incisor tooth; *g*, anterior parts of the mandible, with the four anterior incisor teeth; *h*, the crown of a second or middle incisor tooth of the mandible, seen on its internal surface, and exhibiting its triangular canal. The foregoing figures are nearly of the natural size. *i*, teeth of the upper jaw seen laterally; 1, 1, nat. size; 2, 2, magnified. (Brandt.)

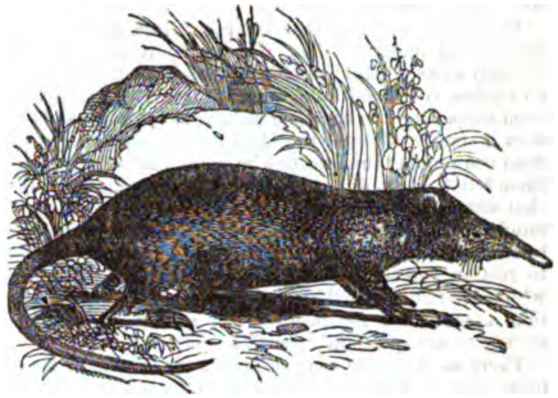


Feet of Solenodon. (Brandt.)

a, anterior part of the anterior foot, seen on the dorsal or upper side; *b*, a similar view of the anterior part of the posterior foot.

Habits, &c.—Brandt remarks that nothing is known of the mode of life of this animal; but from the structure of the proboscis and claws, he concludes that it must burrow. The form of the nose and of the cribriform plate seems, he observes, to indicate a well-developed organ of smell.

The true place of this animal is, most probably, among the Soricidæ.



Solenodon paradoxus. (Brandt, 'Memoirs of the Imperial Academy of Sciences of St. Petersburg, 1832-3.)

SOLETELLI'NA. [Pyloridians, vol. xix., p. 144.]

SOLEURE. [Solothurn.]

SOL-FA-ING. [Solmisation.]

SOLFATA'RA. [Phlegræi Campi.]

SOLICITOR. [Attorney; Six Clerks.]

SOLID, SOLIDITY. (Mechanics.) A solid body is one which is composed of matter so connected together that the relative positions of its parts cannot be altered without the application of sensible force. The force which resists the alteration of the relative positions is called force of Cohesion: the perfect absence of this force constitute fluidity. [Fluid.]

SOLID ANGLE, a name given to the idea of opening conveyed by three planes which meet at a point. The properties of a solid angle are considered under the head Spherical Triangle.

SOLID, SURFACE, LINE, POINT. (Geometry.) We have thought it best to bring together the remarks which it is necessary to make upon these fundamental terms of geometry. According to Euclid, a point has no dimensions; a line, length only; a surface, length and breadth; a solid, length, breadth, and thickness. No one has the least doubt about each of these terms conveying a clear and distinct notion; in spite of this however, the propriety of the definitions has been made matter of much discussion.

Space being distinctly conceived, parts of space become perfectly intelligible. Hence arises the notion of a boundary separating one part of space from the rest. That a material object, a desk or an inkstand, occupies a certion portion of space, separated by a boundary from all that is external, needs no explanation: this boundary is called surface, and possesses none of the solidity either of the desk or inkstand, or of the external space. Surface itself, when distinctly understood, is capable of division into parts, and the boundary which separates two parts of a surface has none of the surface, either on one side or the other: it therefore presents length only to the imagination. Again, length itself is capable of division into parts: the boundaries do not possess any portion of length, either on one side or the other: they are only partition marks or points. Euclid reverses the order of our explanation, requiring first the conception of a point, then of a line, then of a surface, then of a solid.

That when we think of a point, we deny length, breadth, and thickness; that when we think of a line, it is length without breadth that we figure to ourselves; that in the same manner the surface of our thoughts possesses no thickness whatever—are, to us at least, real truths. We cannot, for instance, imagine what Dr. Beddoes meant when he said (*Obs. on Demonstrative Evidence*, p. 33), 'Draw your lines as narrow as you conveniently can, your diagrams will be the clearer; but you cannot, and you need not, conceive length without breadth.' *Why* are diagrams the clearer, the narrower the lines of which they consist? Diagrams have no clearness in themselves, the comprehension of them is in the mind of the observer. If diagrams having (so called) lines of one-hundredth of an inch in breadth be clearer than others of five-hundredths of an inch, it is because the former approach nearer than the latter to a true representation of that which is in the mind, or of that which the mind desires to see portrayed. If the smaller the breadth the better the diagram in the clearness which it gives to the mind, it must be because the mind would have no breadth at all.

It matters nothing that the point, line, and surface are mechanical impossibilities, that no point or line, if they actually existed, could reflect light to show them, and that no surface could continue to exist for any perceptible time, even supposing it to have one moment of existence. Neither does it signify whether the ideas are necessary, or acquired from the senses; the question in geometry is, Have you got them? not, How did they come? There may be danger that some students should need at first to be frequently reminded of the abstract limits of which the conceptions must be made permanent, lest they should accustom themselves to rest in the imperfect approaches to these conceptions which are realised in their diagrams; but it is always found that a moment's recollection will produce a satisfactory answer to any question upon this point.

There is, it is true, one circumstance in which the pupil may acquire a permanently false notion of the object of geometry. If an instructor should require what is called a very well drawn figure in every case, with very thin *lines* and very small *points*, he may perhaps succeed in giving the learner some idea that geometry consists in that approach to accuracy which constitutes practical excellence in the applications of the science. No idea can be more false: let the good line be examined under a microscope, and it is seen to be a solid mound of black lead or ink, as the case may be. Hence it is perhaps desirable that the demonstrations should be frequently conducted with what are called ill-drawn figures, in order that no reliance may be placed on the diagram, further than as serving to remind the student of the ideal conception which is the real object of his demonstration. This of course is recommended without prejudice to his learning the accurate use of the ruler and compasses for another distinct purpose, namely, the intention of producing *avowedly* approximate practical results.

It is to be noted that these definitions, so called, are in Euclid more than definitions. They appeal to conceptions supposed to exist, in words which are considered sufficient not to give, but to recal, the necessary ideas. This they actually do, to the satisfaction of the learner, who would never dream of their containing anything dubious, if it were not for the ill-advised interference of the metaphysician. Whatever of pleasure or profit there may be in the subsequent union of the sciences, there is, we think, no doubt that the young geometer should not be required to take lessons of the ontologist.

SOLID, SUPERFICIAL, AND LINEAR DIMENSIONS. A solid, a surface, and a line, when they come to be the objects of arithmetic, are things as distinct as a weight and a time. That a surface is included by lines, or a solid by surfaces, makes no more of necessary connection between them than exists between weight and time, because the former can never be made sensible without the latter. Length only can measure length, a surface only a surface, a solid only a solid. Reasons of arithmetical convenience, not of necessity, make it adviseable that whatever length may be chosen to measure length, the Square on that length should be the surface by which surface is measured, and the Cube on that length the solid by which solidity is measured. Unfortunately, if a foot be the measure of length, the square on a foot and the cube on a foot have no other names than *square foot* and *cubic foot.* The farmer with his acres, and the distiller with his gallons, have an advantage which is denied to the young mathematician. Ask the first how many acres make a gallon, and the second how many gallons make an acre, and both would laugh at the question; the third is allowed an indistinct conception of measuring surfaces and solids in feet or inches, as if they were lines, from the occurrence of the same word in all his measures.

Length is said to be a quantity of one dimension, surface of two, and solidity of three. The right line, the right surface or Rectangle, and the right solid or rectangular Parallelopiped (the figure of a box, a die, a plank, a beam, &c.), are the implements of mensuration. Every surface must be reduced to the second form, and every solid to the third, before it can be measured. The rules (which tacitly contain these reductions) for measuring different superficial or solid figures will be found under the several heads: the two fundamental theorems by which measurement becomes practicable, are as follows:—

1. The numbers of linear units in the two sides of a rectangle, being multiplied together, give the number of superficial units, square units, or squares on the linear unit which the rectangle contains. Thus a rectangle of $2\frac{1}{2}$ by $4\frac{1}{3}$ feet contains $\frac{5}{2} \times \frac{13}{3}$, or $\frac{65}{6}$, or $10\frac{5}{6}$ *square* feet.

2. The numbers of linear units in the length, breadth, and thickness of a right solid, being multiplied together, give the number of solid units, cubic units, or cubes on the linear unit, which the right solid contains. Thus a plank of $2\frac{1}{4}$ inches broad, $1\frac{1}{2}$ inch thick, and $10\frac{1}{3}$ inches long, contains $\frac{9}{4} \times \frac{3}{2} \times \frac{31}{3}$, or $\frac{279}{8}$, or $34\frac{7}{8}$ *cubic* inches.

SOLIDS, REGULAR. [Regular Figures, &c.]

SOLIMAN, EBN ABD-AL-MALEK, the seventh caliph of the race of the Ommiyades, succeeded his elder brother Walid I., A.D. 715 (A.H. 96). He acquired high popularity at the commencement of his reign by dismissing the various governors whom the inertness of Walid had suffered to oppress the people at their pleasure; and Katibah, the first Moslem conqueror of Transoxiana, who alone refused to acknowledge his authority, was seized and put to death by his own soldiers. Another of his lieutenants, Yezid Ebn Mohalleb, reduced the rugged and impenetrable provinces of Tabrestan and Jorjan, on the south coast of the Caspian, which had never before been completely subdued. But the principal military undertaking of his reign was the siege of Constantinople, commenced the year after his accession, by a vast fleet and army under his brother Moslemah. (Gibbon, c. 52.) But the Saracen fleet was destroyed by the Greek fire; the strength of the fortifications reduced the siege to a blockade; and the caliph was preparing to lead a second army to reinforce his brother when he died of a surfeit at Chalcis in Syria, A.D. 717 (A.H. 99), nominating in his last moments his cousin Omar Ebn Abd-al-Azez as his successor, to the exclusion of his own sons and brothers. The reign of Soliman is said to have been the epoch of the first rise of the Barmecides, who afterwards became famous as the ministers of the Abbasides.

SOLIMAN, EBN AL-HAKEM, a Moorish chief, who, in the civil wars preceding the extinction of the caliphate of the Ommiyades at Cordova, possessed himself of the capital by the aid of the African troops whom he commanded, and proclaimed himself king, A.D. 1009 (A.H. 400), under the title of Al-Mostain Billah. Though soon expelled by Mohammed, one of the Ommiyan competitors, he recovered Cordova in 1112, dethroning Hesham II., who had been replaced on the throne on the death of Mohammed: but his valour and abilities were not able to maintain him in his usurped authority: the *walis*, or governors of the African and Spanish provinces, refused obedience; and after various changes of fortune, he was overthrown and slain, A.D. 1016 (A.H. 407), by Ali Ebn Hamid, *wali* of Tangier, who was proclaimed king in his room, but speedily perished by another revolution. The first discovery of the Azores has been attributed to the reign of this prince, on the authority of a passage in the 'Geography' of Sherif-Al-Edrisi; but it is not very clear that the Azores are the islands there alluded to as discovered by some Moslem adventurers from Lisbon. D'Herbelot erroneously mentions Soliman as the nephew of Hesham II., whereas he was a stranger to the blood of the Ommiyades.

SOLIMAN EBN CUTULMISH, a Seljookian prince who founded the first Turkish dynasty in Room, or Asia Minor. His father had perished in a revolt against Alp-Arslan, the great Seljookian sultan of Persia; and Malek-Shah, the son of Alp-Arslan, was glad to rid himself of the turbulent ambition of Soliman by furnishing him with an army for the conquest of the West, A.D. 1074 (A.H. 467). The internal dissensions of the Greeks facilitated his progress. In a few years he had subdued nearly all Asia Minor except the districts on the western coast and the isolated city of Trebizond; his capital was fixed at Nicæa, within 100 miles of Constantinople, and his Turkoman followers spread themselves all over the country, which was thenceforward permanently lost to Christendom. Antioch (which had been held by the Greeks since its capture by John Zimisces in 968) was betrayed to him (1084) by the son of the governor; but this acquisition brought on a rupture between Soliman and Moslem-Ebn-Koreish, prince of Aleppo, to whom the Greeks had paid a tribute for Antioch, which Soliman refused to continue. Moslem was defeated and killed; but in attempting to pursue his advantage and occupy Aleppo, Soliman was opposed and overthrown by Sultan Tutush, viceroy of Syria for his brother Malek Shah (whose vassal Moslem had been), and either fell in the battle, or, as some say, perished by his own hand, A.D. 1086 (A.H. 479). His sons were however restored by Malek-Shah to the kingdom of Room, where one of them, Kilidj-Arslan, was reigning at the appearance of the first Crusaders, who erroneously call him Soliman.

SOLIMAN (often mentioned with the surname of Tchelibi, 'gentle or noble,' which is however the general title of the sons of the Ottoman sultans) was the eldest surviving son of Bayezid I. After the fatal battle of Angora, in which his father was defeated and made prisoner by Timour, A.D. 1402 (A.H. 804), he effected his escape to Europe with the vizir Ali Pasha, and reigned several years in tranquillity at Adrianople, while the fragments of Asia Minor were disputed by his three brothers. He was frustrated however in an attempt to possess himself of the Asiatic provinces (1406) by an insurrection excited against him at home by his brother Mousa, which recalled him to Europe. Mousa was defeated, and fled into Wallachia, but he returned in 1410 with a fresh army, and Soliman, surprised in Adrianople, was slain in his flight. Mousa was himself dethroned three years later by Mohammed I., under whom the Ottoman dominions were reunited.

Soliman is not generally included in the list of the Turkish sultans, the interval between the death of Bayezid and the final establishment of Mohammed being regarded as an interregnum. He was a brave and generous prince, and the first of the line of Othman who patronised literature; but his good qualities were obscured by his excessive indolence and indulgence in wine.

SOLIMAN (surnamed by the Turks *Kanooni*, or 'the Legislator,' and by European writers 'the Magnificent'), the tenth and greatest of the Ottoman sultans, succeeded his father Selim I., A.D. 1520 (A.H. 926), in the twenty-seventh year of his age; and as he was an only son, his succession was not disturbed, like those of his father and grandfather, by civil wars. His first exploit was an invasion of Hungary (1521), in which he captured Belgrade, the key of that kingdom, a conquest often attempted in vain by his predecessors; and in the following year Rhodes, which had defied all the efforts of Mohammed II., was surrendered to him after an arduous siege, by the knights of St. John. The suppression of a rebellion in Egypt, and of a revolt of the Janissaries (as a counterpoise to whom the corps of Bostandjis was instituted), occupied the next three years; but in 1526 Hungary was again invaded; the king, Lewis II., and nearly all his army, slain in the fatal battle of Mohacz, and the whole kingdom overrun by the Turks. The Hungarian crown was conferred by Soliman on John Zapolya, who received it as a vassal of the Porte; but the rival pretensions of Ferdinand of Austria kindled the first of the long wars between the sultans and the German emperors; and in 1529 Vienna was besieged without success by Soliman in person. A war with Persia followed, in which Armenia and Irak, with the cities of Tabreez and Bagdad (1534), were subdued by the Ottomans; while Yemen and the Arabian coast were subjugated by the pasha of Egypt, and armaments sent even into Guzerat to aid the Indian Moslems against the Portuguese: the fleets of the vassal states of Barbary, under the famous corsair Khaireddin, or Barbarossa, at the same time swept the Mediterranean, and laid waste the Italian coasts; and Croatia was conquered (1537) after a great victory over the Imperialists at Essek. The Turkish arms were everywhere triumphant, and the powerful friendship of Soliman was courted by Francis I. of France, the alliance with whom (1536) was the first between the Porte and any Christian power. The death of John Zapolya (1541) wrought a fresh change in the affairs of Hungary, great part of which was seized by the Turks; Buda became the seat of a pasha; and the war continued, generally to the advantage of the Sultan, till a truce was concluded in 1547, by which Austria agreed to pay a tribute of 30,000 ducats for her remaining possessions in Hungary. In the same year a fresh invasion of Persia led to the capture of Ispahan; but this conquest was not long retained. The war with the house of Austria for Hungary again broke out in 1552; and Transylvania was subdued and made a principality under the suzerainte of the Porte. Persia was again attacked, and Erivan taken in 1554; but a peace was concluded with the Shah in the following year, which became the basis of all subsequent treaties between the two powers.

A great naval victory was gained in 1560, over the combined fleets of the Christian powers at Djerbeh, on the African coast, by Piali, who had succeeded, on the death of Barbarossa, to the command of the Turkish navies; and a fresh truce with the empire (1562) left the Turks in possession of their Hungarian conquests. But the martial glories of Soliman were clouded by domestic dissensions. His eldest son, Mustapha, had been put to death in 1553, at the instigation of his stepmother Roxalana, who was solicitous to secure the succession for one of her own children; and jealousies of the two surviving princes, Selim and Bayezid, having ended in the rebellion of the latter, he was defeated and driven into Persia; but the Shah surrendered the fugitive on the demand of Soliman, and he was put to death with his children (1561).

The united fleets of the Porte and of Barbary had ruled the Mediterranean since the battle of Djerbeh; but they were repulsed with great loss in the siege of Malta (1565) by the heroism of the grand-master John de la Valette. The war in Hungary meantime continued, notwithstanding frequent partial pacifications; and in 1566 Soliman headed his armies for the last time for its invasion; but he died in his tent before the walls of Szigeth, September 5, 1566 (Safar 20th, A.H. 974), the day before the capture of the town, at the age of 72 solar (or 74 lunar) years. His only surviving son, Selim II., succeeded him.

Though the Ottoman empire did not fully attain its greatest territorial extent during the reign of Soliman, its military power was undoubtedly during this period at its greatest height and most complete organization, and declined irrecoverably in both these respects under his indolent and voluptuous successors. The personal energy of the Sultan himself, and of the ministers and generals selected by him and trained under his eye, maintained the efficiency of every branch of the administration; and the Kanoon-Nameh, or code of regulations, which was drawn up under his own superintendence, completed the reform which his exertions had commenced. The finances, the military fiefs, the functions of the pashas and other employés, the police and administration of justice, are all treated at length in this elaborate compilation, which long formed the basis of both the jurisprudence and political science of the Ottomans. But Soliman was not less distinguished as a patron of literature and the arts than as a warrior and a legislator; the erection of the noble mosque of the Solimaneyeh, and of numerous public buildings both in the capital and the provinces, attest his architectural magnificence; and he is the only one of the Ottoman sovereigns who facilitated the internal communications of his dominions by the construction of roads and bridges. He was himself a poet of no mean rank; and the encouragement which he afforded to the employment of the Turkish language in place of the Persian, which the Ottomans had generally chosen as the vehicle of their sentiments, forms an æra in the literature of the country. In an age remarkable for the eminent greatness of the monarchs filling the thrones of Europe, few of them equalled Soliman the Magnificent either in the union of princely qualities or in the glory and good fortune of their reigns.

SOLIMAN II., a younger son of Sultan Ibrahim, was placed on the Ottoman throne A.D. 1687 (A.H. 1098), on the deposition of his elder brother, Mohammed IV. He was nearly forty-six years of age at his accession, and had passed his whole life secluded in the seraglio and occupied by the study of the Korán. A prince thus unacquainted with active life was little fitted to stay the progress of the Imperialists, who in the last years of the preceding reign had almost expelled the Turks from Hungary. In the campaign of 1688 Belgrade and Agria were lost; and in 1689 the vizir Ragib was twice signally defeated by the Austrians, who penetrated into the heart of Servia and took Nissa. An abortive negotiation for peace followed; but the appointment of Mustapha-Pasha Kuprilu to the visirat changed the face of affairs, and in the two succeeding campaigns the Ottomans recovered Belgrade and most of the frontier fortresses. Soliman however died at Constantinople in June, 1691 (A.H. 1102), after a reign of three years and nine months; and leaving no children, was succeeded by his next brother, Ahmed II.

SOLI'NUS, CAIUS JU'LIUS, a Roman writer of whose life and period nothing is known. It is however certain that he did not write in the Augustan age, as some have supposed, for his work, entitled 'Polyhistor,' is merely a compilation from Pliny's 'Natural History.' Indeed Salmasius says (*Prolegomena*) that the work contains nothing which is not found in Pliny, and that he got together all that he could out of Pliny's work, and put it in his compendium, keeping the same arrangement and nearly the same words. Solinus however never mentions Pliny, though he cites near one hundred authors. Salmasius endeavours to show that he lived about two hundred years after Pliny. The first writers who mention him are Hieronymus and Priscian. It has often been said, and even in very recent works, that the researches of Salmasius prove that there were two editions of the 'Polyhistor.' But we certainly do not need the testimony of Salmasius to this point, as it is correctly observed in the article 'Solinus' (*Biog. Univ.*); for Solinus, in his address to his friend Adventus (according to some readings) says that the first edition was a hasty performance, and that it appeared under the title of 'Collectanea Rerum Memorabilium;' and that he gave the name of 'Polyhistor' to his second and improved edition. The work of Solinus contains a great variety of miscellaneous matter, of which a large part is geographical. His style deserves no great commendation, but it is sufficiently perspicuous. Some fragments of a poem entitled 'Pontica' have been attributed to him, but it has recently been attempted to be shown that this poem is the work of Varro Atacinus.

The first edition of Solinus is probably that of Rome about 1473; but one also appeared about the same date at Milan, edited by Bonini Mombriti. The pains that have been taken with a work of little value are shown by the number of editions. The principal edition is that of Salmasius, 2 vols. fol., Paris, 1629; and 2 vols. fol., Utrecht, 1689; a work, says Morhofius (*Polyhistor*, ii., c. 2), accompanied with a most enormous commentary, in which the editor has collected all that he could find in the antient writers on the topics which Solinus discusses, and has given also his own opinions; but the editor, as usual, did his work in a hurry, and made various blunders, which a little more attention might have prevented.

There is an English translation of Solinus, by Arthur Golding, London, 1587 and 1590. The title of the former edition is, 'The Excellent and Pleasant Worke of Julius Ca. Solinus, Polyhistor, containing the Noble Actions of Human Creatures, &c.'

SOLIPE'DES, Cuvier's name for his third family of Pachydermata, which have only one apparent toe and a single hoof on each foot, although under the skin these quadrupeds have on each side of their metacarpus and metatarsus *stylets* which represent two lateral toes. The genus *Equus* of Linnæus is the only recent form belonging to this family known. [Horse.] The extinct Hippotherium may find a place under it.

SOLI'S, JUAN DIAZ DE, a Spanish navigator, was born at Lebrixa, the antient Nebrissa, in the province of Seville. In 1506 he sailed, in company with the celebrated pilot Vicente Yañez Pinzon, on an expedition, the object of which was to endeavour to find the strait or passage supposed by Columbus to lead from the Atlantic to a southern ocean. As no such passage exists, this of course proved unsuccessful, as did also another voyage which was undertaken by them for the same purpose in 1508. They however explored the northern coast of South America, and are supposed to have discovered Yucatan. On their return to Spain, Solis and Pinzon were appointed royal pilots, and again entrusted with the command of an expedition for the discovery of new lands. This time they doubled Cape St. Augustine, and sailing southwards along the coast, reached the 40° of S. lat. However, on their return to Seville in 1509, the court was so much displeased with the unprofitable result of the expedition, that they were both deprived of their offices and emoluments, and Solis was put in prison. In 1512 Solis applied for and obtained permission to sail on a voyage of discovery; but as the government would not grant him any assistance, he was obliged to raise among his friends the funds required for the expedition. After touching at Teneriffe, he surveyed Cape St. Roque, then Cape St. Augustine; continuing his route to the South, he discovered Cape Frio, and entered the Bay of Rio Janeiro. Thinking this to be the strait in search of which he had sailed, Solis took possession of the northern coast in the name of the king of Castile, and gave the name of Mar Fresca (Fresh sea) to that portion of the Atlantic which lay before him. Proceeding farther along the coast, he saw several Indians, who told him of a river called Paraguaya, *i.e.* great water, on the banks of which gold was said to be found in large quantities. Satisfied with this information, Solis returned to Spain, and having obtained the requisite leave to undertake the conquest of the lands watered by that river, he sailed on the 8th of October, 1515, with three caravels, having seventy soldiers on board. On his arrival at Rio Janeiro, Solis left two of his ships behind, and sailed with the third in a south-western direction in search of the Indians with whom he had conversed on his first voyage. He found them; but scarcely had he landed with the greater part of his crew, when they were surrounded and put to death by the Indians. This catastrophe happened near a small river between Maldonado and Montevideo, which to this day is called 'El Rio de Solis.'

SOLI'S, ANTONIO DE, was born at Placenzia, July 18, 1610, of an antient and illustrious family. His parents sent him to Salamanca to study the law; but having a natural turn for poetry, he gave it the preference, and cultivated the muses with great ardour and success. At the age of seventeen, and when still a student, he wrote a comedy called 'Amor y Obligacion' (Love and Duty), which was received with the highest applause. This introduced him to the notice of Calderon, with whom he was afterwards very intimate, occasionally writing the preludes to his dramas. At six-and-twenty Solis applied himself to ethics and politics, as well as to the history and antiquities of his native country. His great merit procured him a patron in the count of Oropesa, then viceroy of Navarre, and who appointed him his secretary. Solis seems to have taken particular delight in recording the virtues of his Mæcenas, whom he highly praises in several of his poems. On the birth of one of his sons he composed an heroic drama called 'Orpheo y Eurydice,' which was acted at Pampeluna during the festivities celebrated by the municipality on that occasion. In 1642 Solis was appointed to a lucrative office in the secretary of state's department, and subsequently raised to the honourable post of secretary to Philip IV. It was then, and in order to celebrate the birth of a son of this king, that Solis composed one of his best comedies, 'Triumfos de Amor y Fortuna' (Triumphs of Love and Fortune), which met with the most brilliant success. After the death of Philip, Solis was named to the office of *cronista de las Indias*, or first historiographer of the transactions of the Spaniards in both Indies. In this capacity he wrote his 'Historia de la Conquista de Mexico,' a work which has ranked him among the best prose writers of Spain, and which was greatly esteemed at home and abroad. It contains an account of the conquest of Mexico by Hernando Cortés, written with great spirit and in very elegant style, though it is deficient in the criticism which belongs to a true historical writer. The work is considered by the Spaniards as the last relic of their classic literature. It appeared for the first time at Madrid in 1682, folio, and went subsequently through several editions, of which the principal are: Barcelona, 1691, fol.; Madrid, 1777 and 1783, 4to.; Venice, 1704, 4to.; London, 1808, 2 vols. 8vo. We have an English version of it by Townsend (Lond., 1724), and there are besides French and Italian translations.

Solis is better known out of Spain as an historian than as a dramatic writer, yet he occupies a prominent place among the poets of that nation. His plays do not display so much invention as those of Calderon, but his dramas are more regular than those of that poet, because he was less liable to be led away by the force of his imagination. Among his comedies, 'El Alcazar del Secreto' (the Castle of Mystery), and 'La Gitanilla de Madrid' (the Gipsy-girl of Madrid), which is partly founded on Cervantes's novel of the same title, are justly much valued. His comedy 'Un Bobo haze Ciento' (One Fool will make a Hundred) has, with many others, been imitated by the French dramatic writers. A volume of Solis's plays and dramas, in all fourteen, appeared at Madrid in 1732, 4to. There is also a volume of Lyric Poems written by him on various subjects, 'Varias Poesias de Don Antonio de Solis,' Madrid, 1682, 4to.; and some letters published by Mayans in 1732. At the age of fifty-six Solis entered into holy orders, and devoted himself almost exclusively to exercises of devotion. He now renounced all profane compositions, and wrote nothing but some dramatic pieces upon sacred subjects. He died April 19, 1686. His friend Juan de Goyeneche wrote an account of his life and writings, which appeared for the first time at Brussels in 1704, with the 'History of the Conquest of Mexico,' and has been prefixed to almost every subsequent edition of the same work.

SOLITA'RIUS (the Hermit), an obscure constellation of Lemonnier, which, having been admitted into the Astronomical Society's lists, appears here. It is situated a little above Centaurus, near the tail of Hydra. Its principal stars are as follows:—

Character.	No. in Catalogue of		Magnitude.
	Piazzi.	Astron. Society.	
	(68)	1633	6
α	(116)	1647	7
	(190)	1566	7
	(206)	1576	7
ι	(282)	1716	6

SO'LLYA, a genus of plants of the natural family of Pittosporeæ, named by Dr. Lindley in compliment to R. H. Solly, Esq., a gentleman versed in the anatomy and physiology of plants, and well known as a patron of science and art. The genus is closely allied to Pronaya and Billardiera, and the species are highly ornamental plants, which are indigenous in New Holland and Van Diemen's Land, with voluble stems, oblong alternate, shining, dark-green leaves, with the flower-stalks terminal, or opposite to the leaves, and bearing bunches of bright-blue nodding flowers. *S. heterophylla* and *S. angustifolia* are two common species cultivated in our greenhouses, and were very common everywhere until the severe winter of 1837-38.

SOLMISATION, or *Sol-fa-ing*, in singing, is the art of applying to the seven notes of the scale certain syllables, having no meaning in themselves, but containing the five first vowels, according to the French method, and the four first according to the system adopted by the Italians and English.

This art was practised by the Greeks; but the six syllables now in use are generally attributed to Guido d'Arezzo. [GUIDO D'AREZZO.] These he selected, on account of their furnishing all the vowel sounds, from the following stanza of a monkish hymn to St. John the Baptist:—

'*Ut* queant laxis,
*Re*sonare fibris
*Mi*ra gestorum
*Fa*muli tuorum
*Sol*ve polluti
*La*bii reatum
SANCTE JOANNES.'

In what is called the hexachord system [HEXACHORD], these syllables were found sufficient. When, however, that perplexing and absurd method began to be disused, the addition of a name for the seventh of the scale became necessary, and Le Maire, a French musician of the seventeenth century, has the credit of having introduced for this purpose the syllable *si*. The Italians rejected the French *ut*, and substituted the more euphonous syllable *do*, which is also adopted in England. The syllables therefore now used by the Italians and English—at least by such masters as understand and know how to value the art of Solmisation—are as follows:—

Do, Re, Mi, Fa, Sol, La, Si, Do.
C, D, E, F, G, A, B, C.

To these syllables the English give the Italian pronunciation.

SOLOMON (שְׁלֹמֹה, Σαλωμών, Σολομῶν), the son of David and Bathsheba, was born B.C. 1033, and was named by God, through the prophet Nathan, 'Jedidiah,' that is, 'beloved of the Lord.' (2 *Sam.*, xii. 24, 25.) In the old age of David, his son Adonijah attempted to seize the kingdom, upon which David had Solomon proclaimed and anointed king, B.C. 1015. (1 *Kings*, i.; 1 *Chron.*, xxiii.) In the same year David died, after giving certain charges to Solomon. (1 *Kings*, ii.) The first acts of Solomon were to punish the enemies of David, and especially Adonijah and his adherents. He then contracted a close alliance with Pharaoh, king of Egypt, whose daughter he married. Being thus strengthened in his kingdom, he assembled all the congregation of Israel at Gibeon, where the Tabernacle stood, and offered burnt offerings to God. In the same night God appeared to him, and commanded him to ask what he would. Solomon asked for wisdom and knowledge, that he might judge the people. God was pleased with the request, and promised him not only the wisdom which he asked for, but also riches and long life, and power over his enemies. Solomon's wisdom was soon displayed in his decision of a singular case which came before him for trial. (1 *Kings*, iii.; 2 *Chron.*, i.)

The kingdom of Israel was now at its highest pitch of prosperity and extent. It reached from Egypt and the borders of the Philistines to the Euphrates, and southward as far as the head of the Red Sea. With the neighbouring kings of Egypt and Tyre, which city then held the supremacy of Phœnicia, Solomon was in close alliance. The people of Israel were very numerous and prosperous, and enjoyed profound peace; and the court of Solomon was maintained on a scale of the greatest splendour, which was supported by the encouragement that he gave to commerce, by which 'he made silver and gold as stones, and cedar-trees made he as the sycamore-trees that are in the vale for abundance.' The fame of his wisdom spread abroad, and people and kings came from all countries to hear it, for 'he spake three thousand proverbs, and his songs were a thousand and five. And he spake of trees, from the cedar-tree that is in Lebanon even unto the hyssop that springeth out of the wall: he spake also of beasts and of fowl, and of creeping things, and of fishes.' (1 *Kings*, iv., x.; 2 *Chron.*, ii., 13-17; ix.)

In the fourth year of Solomon's reign, having secured the co-operation of Hiram, king of Tyre, he began to build the Temple of God at Jerusalem, for which David had already formed a plan and collected treasures, but which he had not been allowed to build because he was a man of blood. (1 *Chron.*, xxii., xxviii.) In seven years (B.C. 1005) the building was finished and dedicated to God. (1 *Kings*, v., viii.; 2 *Chron.*, ii.-vii. [TEMPLE.] On this occasion God appeared to Solomon in a vision the second time, and promised that if he continued in piety and uprightness, his family should be established on the throne; but that if he or his children should fall into idolatry, Israel should be cut off out of their land, and both they and the Temple itself should be made a proverb and by-word among all people. (1 *Kings*, ix. 1-9; 2 *Chron.*, vii. 12-22.)

Josephus (*Antiq.*, viii. 2, 8) states that copies of the letters which passed between Solomon and Hiram concerning the building of the Temple were preserved in his day among the archives of Tyre.

Solomon adorned Jerusalem with other magnificent buildings. He built a palace for himself, which took thirteen years to complete; and another palace, which was called the House of the Forest of Lebanon, probably on account of the quantity of cedar used in it, with porticoes where he sat in judgment; and also a palace for his wife, the daughter of Pharaoh. (1 *Kings*, vii. 1-12; 2 *Chron.*, viii. 1.) He also built several cities, and among them Tadmor in the wilderness, which was afterwards called Palmyra; but the splendid ruins which still exist belong to the age of the Roman empire. (1 *Kings*, ix. 15-19; 2 *Chron.*, viii. 1-6.) In all these buildings he used as workmen the descendants of the Canaanites who remained in the land, whom also he made to pay a tribute: the Israelites he employed in his armies, and in superintending the works. (1 *Kings*, ix. 20-23; 2 *Chron.*, viii. 7-10.) He built a navy at Ezion-geber, which brought him the produce of Arabia and India. (1 *Kings*, ix. 26-28; x. 11, 12; 2 *Chron.*, viii. 17-18. [OPHIR.] He had also another navy in the Mediterranean, in company with a navy of Hiram, which made a voyage to Tarshish every three years, bringing gold, silver, ivory, apes, and peacocks. (1 *Kings*, x. 22, 23; 2 *Chron.*, ix. 21.) From Egypt he imported horses and linen-yarn. (1 *Kings*, x. 28, 29.)

While Solomon was thus at the height of his prosperity, he received a visit from the queen of Sheba, or Saba, in Ethiopia, who had heard of his wisdom and came to prove it with hard questions, to which Solomon gave such answers that she confessed that the half of his wisdom had not been told her, and departed after an exchange of presents. (1 *Kings*, x.; *Matt.*, xii. 42.)

Solomon's prosperity was at length too much for him. Among his magnificent establishments was a large harem, composed, in direct opposition to the divine command, of women from the remnant idolatrous nations of Canaan. These women seduced him into idolatry, as a punishment for which God threatened to divide his kingdom after his death; and even during his life signs were given of the coming calamity in the rebellion of Hadad the Edomite, Rezon, king of Syria, and Jeroboam, the son of Nebat, who afterwards became king of the ten revolted tribes of Israel. (1 *Kings*, xi.; *Nehem.*, xiii. 26.)

It is generally supposed that this threat had the effect of recovering Solomon from his idolatry, and that he then recorded in the book of *Ecclesiastes* his confessions of the vanity of worldly wisdom, riches, and honour. This supposition is rather favoured by the internal evidence of the narrative in the book of *Kings*, and by that of the book of *Ecclesiastes* itself. Among the other works ascribed to him are the 'Book of Proverbs,' of which he must be regarded as the compiler rather than the author [PROVERBS], the SONG OF SOLOMON, the *Wisdom of Solomon* [SOLOMON, WISDOM OF], the *Psalms* lxxii. and cxxvii., and also a collection of eighteen psalms, entitled 'The Psalter of Solomon,' which was found in Greek, in the library at Augsburg, by Schott, and translated into Latin by De la Cerda, and which are generally supposed to be the composition of some Hellenistic Jew, in imitation of the Psalms of David. Other writings ascribed to Solomon are mentioned by Suidas (s. v. 'Εζεκίας), by Euseb. (*Praepar. Evang.*, ix. 31). See also Fabric., *Cod. Pseudepigraph.*, I. 914, &c.; 1014, &c.; Bartolocc., *Bibl. Rabb.*, i. 490, &c. Solomon died in the year 975 B.C., after a reign of forty years. (1 *Kings*, xi. 42, 43; 2 *Chron.*, ix. 30, 31.)

The reign of Solomon was the period of the highest prosperity of Israel and the commencement of its decline, both in its religious and civil state. At its commencement the kingdom had reached its utmost boundaries, and was in the enjoyment of profound peace and plenty, and the temple of God was built and dedicated; but before its close the king had turned idolater, rebellion had broken out, and the kingdom was on the eve of a partition. The causes of this decline are obvious. They were in part judicial, for in the magnificent establishments of Solomon, especially in his treasures, his horses and chariots, and his concubines, he had transgressed the fundamental law which defined the duties of the king. [MOSES, p. 441.] But natural causes also may easily be found. The government of Solomon was calculated rather to promote the splendour of the court than the prosperity of the people. The wealth derived from commerce went into the king's treasury, and the people were even taxed in addition. (1 *Kings*, xii. 4, 10, 11.) The court set the example of luxury, which weakened and depraved the whole nation, besides training up that race of insolent young nobles whose bad advice to Rehoboam was the immediate cause of the partition of the kingdom. (1 *Kings*, xii. 6-11.) The subject nations were of course ready, especially after forty years of peace, to throw off the yoke, and it has even been doubted whether the splendid scale on which Solomon established the Temple worship was likely to support the national religion. On the whole, therefore, this period of the history of Israel must be regarded as far less solid than splendid.

Solomon has always had an extensive fabulous reputation in the East. As early as the time of Josephus magical powers were ascribed to him (*Antiq.*, viii. 2, 5; comp. Origen, *Ad Matth.*, xxvi. 63; Nicet. Chon., *Annal.*, iv. 7). The similar traditions of the Arabians concerning him have been collected by Mr. Lane (*Thousand and One Nights*, Index, under *Suleymân Ibn Dâood*).

(Winer's *Biblisches Realwörterbuch*; Calmet's *Dictionary*.)

SOLOMON, THE WISDOM OF (Σοφία Σαλώμων), an apocryphal book of the Old Testament, ascribed to Solomon, but manifestly written long after his time. It is not known to have ever existed in Hebrew, and it contains Greek ideas and expressions which prove it to belong, if to a Jew at all, to one of the Alexandrian school. There are in it historical references utterly at variance with the state of things in Solomon's reign, and quotations from Isaiah and Jeremiah. Internal evidence would point to the end of the second or beginning of the first century B.C. as the time of its composition. It is commonly ascribed to Philo the Jew, but the style is quite different from his genuine writings. It was badly translated into Latin before the time of Jerome, who did not revise the version. The fathers of the church considered it apocryphal; but it was pronounced canonical by the third council of Carthage (A.D. 397) and again by the council of Trent.

It consists of two parts. The first part (chap. i.-ix.) contains the praise of wisdom, an exhortation to all, and especially to kings, to seek it, and the manner in which it is to be obtained. The second part (chap. x.-xix.) brings forward examples from history of the happiness that springs from wisdom and the misery entailed by folly. Throughout the book Solomon is represented as speaking; and the work is evidently an imitation of his proverbs. It is remarkable as being the earliest Jewish work extant which contains a clear statement of the doctrine of rewards and punishments in a future state.

Bishop Lowth says (*Praelec.*, xxiv.): 'The style is very unequal; it is often pompous and turgid, as well as tedious and diffuse, and abounds in epithets, directly contrary to the practice of the Hebrews; it is however sometimes temperate, poetical, and sublime. The construction is occasionally sententious, and tolerably accurate in that respect, so as to discover very plainly that the author had the old Hebrew poetry for his model, though he fell far short of its beauty and sublimity.' (The *Introductions* of Jahn and Horne.)

SOLOMON, THE SONG OF, or THE BOOK OF CANTICLES (שִׁיר הַשִּׁירִים; Ἆσμα ᾀσμάτων, 'Canticum Canticorum,' which titles mean 'The Song of Songs,' that is, 'the most beautiful song'), a canonical book of the Old Testament.

The canonical authority of this book has been much disputed. It is now admitted on all hands that it formed part of the Jewish canon. It is found in the oldest Christian catalogues of the sacred books, and in all the antient versions. The argument that it is not quoted in the New Testament is of little weight against this mass of external evidence. The same objection would apply to other parts of the Old Testament. And although the book is not actually quoted, yet the canonical writers of both Testaments employ the same imagery which is used in it to describe the connection between Christ and the church. Some critics have indeed found passages in the New Testament which they conceive to contain designed allusions to passages in the *Canticles*, but it must be confessed that in most of these examples the allusion is not very obvious. The objections to its canonical authority are now therefore derived solely from its internal character, and may be summed up in the following argument: that the book cannot form a part of Holy Scripture, since it contains no religious truth, unless we interpret it after a fashion for which there is no authority.

The book is a poem, or collection of poems, describing in imagery, which is certainly warm, but to an Oriental taste perfectly delicate, the chaste loves of a bridegroom and his bride. It bears the name of Solomon in its title, 'The Song of Songs, which is Solomon's;' and is supposed to be the only remaining one of the thousand and five songs which we are told that that monarch composed. According to the common opinion it was composed as an epithalamium at the marriage of Pharaoh's daughter with Solomon, who are respectively the bride and bridegroom of the poem; but under the guidance of divine inspiration it was so constructed as to form a mystical allegory representing the relation between Christ and his church.

First then with respect to its date and author. An attempt has been made, supported by the authority of Kennicott, to prove the poem later than the Babylonish captivity, simply from the insertion of the letter *Yod* in spelling the name of David, which was the spelling adopted after the Captivity, but not before. But as the name in question occurs only once, and as all our MSS. of the Hebrew Bible are comparatively modern, what is more probable than that the *Yod* was inserted by mistake in an early copy, and afterwards retained by transcribers? Whether this be the true explanation or not, Kennicott's argument is of no weight against the clear allusions to Solomon in the poem, and to circumstances connected with his history, which prove that it must have been written in his time (i. 5, 9; vi. 12; iii. 9, 10, &c.).

The style and language are not more different from that of the 'Book of Proverbs' than might be expected from the difference of the subjects. But the structure and contents of the poem are alleged as presenting insuperable ob stacles to the supposition that Solomon was the author. It is contended that the scene is laid among the beauties of the open country, and not amongst courts and palaces; and that so far from the bridegroom's portions of the poem being an expression of Solomon's feelings, they are the language of an humbler and happier man, who only refers to Solomon to contrast his numerous concubines and unbounded wealth with the treasure he himself possesses in his sole and undefiled spouse. (vi. 8-10; viii. 11, 12.) But besides those passages which appear to place the scene in the country, others might be quoted which refer to the splendours and luxuries of a royal palace; and some which seem to have a direct allusion to Solomon's establishment, as it is represented to us in history; and the passages which are thought to cast reflections upon Solomon are quite capable of a different interpretation. Again, with reference to the bride, it is contended that the poem itself proves her to have been not an Egyptian princess, but an Israelite. This point is very strongly if not conclusively brought out by Dr. Mason Good. On all these points the difficulty is much increased by the highly coloured imagery of the poem. But the first difficulty may perhaps be explained by supposing one or more changes of scene: there seem in fact to be several. The question respecting the person designed to be represented by the bride, it has been attempted to solve in various ways. A writer in the 'Foreign Quarterly Review' (vol. xvi., p. 321) has adduced certain Egyptian hieroglyphics in support of the common opinion that Pharaoh's daughter is referred to. Dr. Mason Good imagines that the poem describes a *love-match* which Solomon made with some Israelitish woman after his *political* marriage with Pharaoh's daughter. A third mode of explanation, which if adopted would cut the knot, is that of Dr. James Bennett, who supposes that the poem never had any literal reference at all to an actual marriage, but is purely an allegory descriptive of the mutual love of Christ and his church. The reasons which Dr. Bennett adduces to prove that the poem would be most unsuitable to the circumstances of an actual marriage, are, to say the least, extremely fanciful but the great principle for which he contends is one which the generality of critics admit in a case very nearly parallel to the present, namely, the 45th Psalm. But the minute allusions, especially those to Solomon, which are contained in this poem, are a most formidable objection to such an explanation; and even those critics who contend most strongly for the purely allegorical character of the 45th Psalm, maintain as strongly that the 'Song of Solomon' has a literal as well as a spiritual meaning. (See especially Bishop Horsley's 5th *Sermon.*) The distinction however between the two questions of who was the author and who the parties described, ought not to be lost sight of, as it too often has been. Finding the book in the Jewish canon, the presumption is that it is a genuine part of Holy Scripture, and is intended to teach religious truth. This presumption is strengthened, if it can be proved that Solomon was the author, since we have at least one other book of his in the sacred canon; but it is not disproved even if the poem should be found to have nothing to do with Solomon either as its author or its subject.

But this argument is met in another way, namely, by denying that the book is intended to convey any religious truth. This objection seems to proceed in a wrong direction; for inasmuch as Christ and the Apostles referred to the Jewish Scriptures, as they existed in their day, as containing the great body of religious truth, and we know that this book did form a part of the Jewish canon at that time, we ought to conclude that the diligent inquirer will find a religious meaning in it, rather than first deny the existence of any such meaning, and then argue from this assumption against its canonical authority. But the objection can be met upon its own merits. The composition, it is said, is a mere love-song: it bears nothing on its face to mark it as allegorical, nor have we any inspired authority for so regarding it.

Now it is admitted that from a very early period the Oriental nations have been accustomed to express religious entiments allegorically under the guise of amatory poems, of which the Gitagovinda is an example. To this day the Egyptian Arabs, at their religious festivals, sing songs re- embling this, in which the prophet is the beloved object, nd which are only intended to have a spiritual sense. Lane's *Modern Egyptians*, vol. ii., p. 195.) Mr. Lane in act gives passages from these songs strikingly parallel to assages in Solomon's Song. Neither is it denied that similar imagery is used with a similar meaning in other parts of the Bible (*Psalms*, xlv.; *Isaiah*, liv.; lxii. 4, 5; *Rom.*, vii. 4; 2 *Cor.*, xi. 2; *Ephes.*, v. 23-32; *Rev.*, xix. 7; xxi. 2-9), and also the opposite figure of representing idolatry and apostasy under the image of adultery or whoredom. But it is said that in all such passages the allusions are more distant, and enter less into detail than is the case in Solomon's Song, and that in them the religious sense is made so prominent that one can scarcely fail to perceive it. The first part of this assertion does not appear to be sustained by fact. Any one who examines the passages carefully, especially those which relate to spiritual adultery, will find allusions inferior in delicacy to the grossest which can be produced from Solomon's Song. The latter condition does not appear to be necessary (as has been argued above) to establish the allegorical meaning of such imagery, when occurring in a canonical book; neither is the spiritual sense always so obvious. For example, there is nothing in the 45th Psalm, except one or two expressions which could not by the greatest hyperbole refer to a human being, to lead us to suspect its spiritual meaning. Passages of the same kind might perhaps be adduced from Solomon's Song; but even if not, does not the admission that one love-poem which we find in the sacred canon is to be interpreted spiritually, furnish a presumption for putting a similar interpretation upon another? The fact that the 45th Psalm is quoted in the New Testament, and that the Song of Solomon is not so quoted, is no objection, for the quotation of the one sanctions the general principle of interpretation, while the silence respecting the other proves nothing, knowing as we do that the New Testament writers adopted the Old Testament canon as it existed in their day, and that this Song was in that canon. Nearly all expositors, both Jewish and Christian, have adopted the allegorical interpretation, though they have explained the allegory in different ways. The Chaldee Targum considers it as a figurative description of the love of God to Israel, as shown in delivering them from the Egyptian slavery, supporting and comforting them in the wilderness, and bringing them into the promised land. Christian expositors, from Origen downwards, have generally understood it as descriptive of the union between Christ and the church; but some few have explained it in a different way. Those who acknowledge its canonicity, but reject the idea of a reference either literally to Solomon or figuratively to Christ, take its admission into the canon to be a divine recommendation and praise of a single virtuous marriage as opposed to polygamy and concubinage. This appears to be now the opinion of the most distinguished modern opponent of its canonicity in England, Dr. J. Pye Smith. Various opinions are held as to the structure of the Song, the best of which appears to be that which takes it to be a series of Idyls.

(The *Introductions* of Eichhorn, Augusti, Jahn, and Horne; Dr. Smith's *Scripture Testimony*, vol. i., c. 1, note A; *Papers* by Dr. Smith, Dr. Bennett, and others, in the 'Congregational Magazine' for 1837 and 1838; Calmet's *Dictionary*, art. 'Canticles,' with fragments in Taylor's edition; *The Song of Songs*, by Thomas Williams, Lond., 1801; *The Song of Songs*, by Mason Good, Lond., 1803; other *Commentaries* in Horne, vol. ii., part ii.; Lowth's *Prælections*.)

SOLOMON'S ISLANDS. [NEW GEORGIA.]

SOLON, son of Execestides, and a descendant of the royal house of Codrus, was born about B.C. 638, in the island of Salamis. His father is said to have considerably diminished his property by his liberality, and that Solon in his youth engaged in mercantile undertakings in order to better his circumstances. For this purpose, or, according to others, in order to satisfy his thirst for knowledge, he visited various countries. The time when he returned and settled at Athens is not quite clear, but it seems very probable that it was soon after the Cylonian conspiracy (612 B.C.), when he must have been about twenty-six years old. Athens at this time was in a deplorable condition: it was distracted by internal feuds, and unable to maintain itself against its hostile neighbours. It had shortly before been deprived of the island of Salamis by the Megarians, and in the ensuing war Athens had suffered such losses, that at last a decree was made that any one who ventured to propose the continuance or renewal of the war should be punished with death. (Plut., *Sol.*, 8; Diog. Laert., i. 45.) Solon, indignant at the humiliation of Athens and the pusillanimity of her citizens, devised a plan by which he hoped to rouse the Athenians to renewed activity without incurring the penalty of the law. Being endowed by nature with considerable poetical talents, as appears from the fragments of his works, he composed an elegy upon the loss of Salamis (Müller, *Hist. of the Lit. of Antient Greece*, i., p. 117), and assuming the appearance of a madman, he rushed into the Agora, where a crowd soon gathered around him. Here he recited his poem to the multitude, and its inspiriting influence, together with the probably preconcerted assistance of some of his friends, had such an effect upon the people, that they not only repealed the law respecting Salamis, but resolved to try once more to recover that island. Solon was placed at the head of the Athenian forces, and led them to victory by a stratagem which is differently described by antient writers. (Plut., *Sol.*, 8, 9.) All the Megarians in Salamis were either slain or dismissed to their homes, and Salamis again came into the hands of the Athenians. This successful undertaking, in which the Athenians also appear to have gained possession of Nisaea, raised Solon to a very high degree of popularity. In the war between Delphi and Cirrha (about 600 B.C.), Solon advised the Athenians to support the former city against the sacrilegious Cirrhaeans. His advice was followed and crowned with success, for Cirrha was destroyed, and Solon's fame now spread through all Greece.

In consequence of the massacre of the friends of Cylon, notwithstanding their having taken refuge in the temples and at the altars of the gods, the republic was at this time divided between two parties, which were as much the result of religious fears and scruples as of the political state of the country. A part of the Athenians were enraged against Megacles and his associates for their violation of all religious feelings, and the surviving friends of Cylon did their utmost to foster this hostility against their enemies. The Megaclids were looked upon as a cursed race, and the Cylonids were gaining fresh strength every day. It was evident that peace could not be restored until the Megaclids had atoned for their crime, and delivered the city from the curse they appeared to have brought upon it. Solon, who appears to have belonged to neither party, enjoyed the full confidence of his fellow-citizens, and when the dissensions had reached their highest pitch, he persuaded the Megaclids to submit their case to the decision of a commission of 300 persons to be chosen from among the nobles. The sentence of this court was that the surviving Megaclids should be sent into exile, and that the bodies of those who had died should be taken from their graves and be carried beyond the frontiers of Attica. During these troubles at Athens the Megarians renewed their attempts upon Salamis with success. Both the Megarians however and the Athenians were unwilling to engage again in a long and tedious warfare, and both agreed to request the Lacedaemonians to appoint a commission of five men to investigate the claims of the two states. Solon, who was the spokesman on the part of the Athenians, established by various means the legitimacy of the claims of his country, which thus again came into the possession of Salamis. (Plut., *Sol.*, 10, 12; Diog. Laert., i. 48.)

Notwithstanding the removal of the Megaclids from Athens, the party feuds continued to rage as before. For besides the religious scruples arising from the crime of the Megaclids, which still seemed to call down the divine wrath upon the city, there were other causes, which could only be removed by a reform of the constitution. This however could not be effected with any degree of success, unless all religious fears and apprehensions were allayed by a complete purification of the city. This was done by Epimenides of Crete, whom the Athenians invited for this purpose. The way was thus prepared for the legislation of Solon.

The three antient local divisions of the country, the lowlanders (Πεδιεῖς or Πεδιαῖοι), highlanders (διάκριοι), and the inhabitants of the coast (Πάραλοι), formed three distinct political parties; the highlanders being the most democratical, the lowlanders the most oligarchical, and the men of the coast, who took a middle course, wishing to reconcile the two other parties. Besides these political parties, a struggle was going on between the wealthy and the poor. Many of the latter had not only lost their property, but, not being able to pay their creditors, had become the bondsmen of their wealthy oppressors, and some had even been sold as slaves into foreign countries. (Plut., *Sol.*, 13.) The most moderate and wisest among the Athenians saw that this state of things could not last, and that if no remedy was applied, the time would soon come when the people would take the power into their own hands. Solon appeared to be the only man who was impartial and skilful enough to mediate between the hostile parties. In the year B.C. 594 he was invested with the office of archon, and requested to act as mediator and to frame a new code of laws. In considering the legislation which he undertook, it should constantly be borne in mind that he received from both parties full power to arbitrate between them; and he acted in the name and on behalf of his country. The sincerity with which he acted is manifest from the fact that he resisted all temptations and exhortations of his friends to make himself tyrant of Athens, which he might undoubtedly have done without much difficulty, and that he himself lost a considerable part of his property by his own legislation.

The legislation of Solon consisted of two main parts: the one embraced those measures by which he intended to remove the evils under which the republic was actually labouring; the object of the second was to establish the constitution upon such a basis as would prevent the recurrence of these evils. The first step he took was to relieve those who were oppressed by debts. This was done in a manner which did not cause too great loss to the rich, and was yet a great relief to the poor, by a measure called σεισάχθεια, or a disburdening ordinance, by which he not only established a reduction of the rate of interest (which was probably made retrospective), but also lowered the standard of the silver coinage in such a manner that 73 old drachmae became worth 100 new ones. (Plut., *Sol.*, 15.) He also released the pledged lands, and restored them to their owners, but it is not clear whether this was effected by a particular measure, or whether it was included in his disburdening ordinance. Those citizens who had been enslaved by their creditors were restored to freedom, and those who had been sold into foreign countries seem to have recovered their liberty at the expense of those who had sold them. Finally, the law which gave to the creditor a right to the person of his insolvent debtor was abolished. Some of the antient writers state that he cancelled all debts, but the best authorities do not mention any such measure, which is the more improbable, as we read that the most violent democrats, who would certainly have been pleased with it, were not satisfied with his disburdening ordinance. If we except the extreme of both parties, the relieving measures of Solon were received with universal approbation, and sacrifices were offered to the gods for the happy change. Thus encouraged, Solon proceeded to the second and more difficult part of his task. The first thing he did was to abolish the bloody laws of Draco, with the exception of those relating to murder. The characteristic feature of his new constitution was, that he substituted property for birth as a title to the honours and offices of the state. The change brought about by this new standard could not at first be great, as the eupatrids were undoubtedly the wealthiest citizens. According to their property, he divided the whole population of Attica into four classes, and regulated their political rights and duties according to the amount of their income from their landed property. The first class comprised all those citizens whose estates yielded a yearly income of 500 medimni (a medimnus is a bushel, six pints and a fraction) of dry or liquid produce, whence they are called πεντακοσιομέδιμνοι; the second, those who had 300 medimni, and could keep a war-horse, whence they were called ἱππεῖς, and formed the Athenian cavalry; the third contained those whose estates yielded 200 medimni. They were called ζευγῖται, from the yoke of cattle for the cultivation of their fields, and formed the heavy-armed infantry in the Athenian armies. All the remaining population whose income did not amount to 200 medimni constituted the fourth class, with the name of θῆτες, that is, hired labourers, who were excluded from all the offices of the state, and formed the light-armed infantry in the armies, as subsequently they also manned the fleets. They had however the right of voting in the popular assembly, as well as the exercise of the judicial power, which Solon placed in the hands of the people. The archonship and the other great civil and military offices, which had before been held by the nobles alone, became now accessible to all the citizens contained in the first class, while the second and third classes had access to all the minor offices. The public burdens were distributed according to the classes; but as the lower classes had fewer political rights than the higher, the contributions to the necessities of the state were for the lower classes proportionately light, for the second and third classes were not taxed according to the real value of their property, but that of the second class was reduced by one-sixth, and that of the third class by one-third below its real value. (Böckh, *Staatshaush*, ii., p. 29, &c.) The fourth class was altogether exempted from direct taxes. This distribution of power and duties was, as Solon himself expressed it, intended to give to the people as much power as would enable them to protect themselves, and to the wealthy as much as was necessary to maintain their dignity. (Plut., *Sol.*, 18.)

The four old tribes into which Attica was divided were left unaltered by the new constitution. The magistrates also appear to have retained the same power which they had had before, with the exception that they were now made responsible for the exercise of it to the people, and not, as before, merely to the order of the nobles. From the judicial sentence of a magistrate an appeal also was left to the popular courts of justice, which were numerously composed of citizens of all classes indiscriminately. (Thirlwall, *Hist. of Greece*, ii., p. 39, &c.) Two other institutions, which were intended as bulwarks against democratical extravagance, the senate of four hundred and the council of the Areopagus, are almost unanimously ascribed to Solon. But as regards the senate, there can be no doubt that it existed previous to the legislation of Solon, and was composed of the nobles, but its number cannot be ascertained with any accuracy. Solon raised it to the number of four hundred, and threw it open to all citizens belonging to the first three classes, in such a manner that each of the four tribes was represented in it by one hundred members. Whether these members were elected, as Plutarch states, or whether they were appointed by lot, as in subsequent times, is uncertain. Each member however had to give evidence of his qualification by an examination called *δοκιμασία*, and no person was eligible who had not attained the age of thirty. All members of the senate were changed every year, at the end of which they were liable to give an account of their conduct during the time of their administration. The senate was divided into sections, called prytanies, which succeeded each other in the management of the affairs throughout the year, and held their assemblies in the Prytaneum. The most important part of their business consisted in preparing those measures which were to be laid before the popular assembly, which had the power to accept, reject, or modify them. The senate however had other powers connected with the finances and other branches of the administration. Concerning the council of the Areopagus, see AREOPAGUS.

As regards the rights which Solon gave to the popular assembly, no measures could originate in it, but its discussions were confined to such measures as had been prepared by the senate. Every citizen, to whatever property-class he belonged, had a right to take part and to speak in it, so that the vote of the wealthiest nobleman had no more weight than that of the poorest labourer. No one however was allowed to speak who had not attained the age of twenty, and the oldest persons were called upon by the crier to vote first. Though the political power of the assembly was limited, the judicial power with which Solon invested it was considerable. Out of the popular assembly 6000 men above the age of thirty were chosen every year by lot, to form a supreme court of justice called the *ἡλιαία*, to which appeals were made from the sentence of magistrates, and which had in certain cases to take cognizance, independently of any other court, and in subsequent times assumed all judicial power in the state. The importance and influence of the Heliaea appears from the oath which the heliasts had to take at the time of their appointment, and which is preserved in Demosthenes (*c. Timocrat.*, p. 746).

It would be impossible to give any detailed account of the civil and criminal legislation of Solon, although there are many materials for such a purpose. It may suffice here to state, that although he did not in the same degree as Lycurgus interfere with and regulate the private affairs and the mode of living of his fellow-citizens, yet, like most antient legislators, he did not think any part of the life of the citizens unworthy of his attention. The education of the young, and the conduct of women as well as of men, were to him as important as any of those subjects which in modern times alone engross the attention of legislators. Plutarch (*Sol.*, 18) states that Solon clothed his laws intentionally in obscure language, for the purpose of increasing the influence of the courts of justice. But surely nothing is more contrary to the whole spirit of his legislation than such a scheme and the alleged obscurity, if it existed at all, was probably nothing more than the natural consequence of the state of the language in the days of Solon, in comparison with what it was two centuries later.

The Attic tribes had from early times been divided into forty-eight naucraries, and Solon is said to have established the law according to which each of these naucraries was charged with the equipment of a trireme and the mounting of two horsemen. If this is true, he must be regarded as the founder of the Attic navy. (Phot., s. v. *ναυκραρία*.) Solon also encouraged the arts and manufactures, and for this purpose he invited foreigners to settle at Athens. (Plut., *Sol.*, 24.) The calendar likewise received some improvements from Solon.

He had made such arrangements in regard to the observations of his laws, and their constant revision, that it is impossible to place any confidence in the statement of Plutarch, that he enacted them to remain in force unaltered only for a century. The laws were inscribed upon wooden tablets, put together in pyramidal blocks, which turned upon an axis. They were at first kept in the Acropolis, and afterwards in the Prytaneum. These axes were called *ἄξονες* and *κύρβεις*, and according to some authors the former contained the civil, and the latter the religious laws. (Plut., *Sol.*, 25.)

When his legislation was completed, Solon is said to have been so much annoyed at Athens by the remarks of the discontented, and the importunate inquiries of the curious, that he asked permission to leave Athens for ten years, hoping that during this period the people would become familiar with their new institutions. The permission was granted, and Solon is said to have visited Egypt, Cyprus, and Asia Minor. The beautiful story of his interview with Croesus, king of Lydia, which is told by Herodotus, Plutarch, and others, is inconsistent with chronology, as even some of the antients have observed, for Croesus did not come to the throne till about 560 B.C., some twenty or thirty years later than the time at which Solon must have visited Asia Minor. (Voemel, *Exercitat. Chronolog. de Aetate Solonis et Croesi*, Frankf., 1832.) On his return he found Athens again distracted by factions. The three parties, of the highlanders, the men of the plain, and of the coast, were again engaged in hard struggles. The first of these parties was headed by Pisistratus, the friend of Solon, the second by Lycurgus, and the third by Megacles. Solon exerted all his powers to avert the threatening danger, and to reconcile the heads of the parties. But he laboured in vain, and although Pisistratus listened to him respectfully, he secretly continued to work out his plan. [PISISTRATUS.] When Pisistratus had established himself as tyrant of Athens, Solon, who was probably convinced that the mild rule of one man was, after all, greatly preferable to the continuance of party struggles, is said to have supported the tyrant with his advice. At the same time, he withdrew from public life. How long he survived the ascendency of Pisistratus is not certain, but according to the most probable account he died soon after, in the year B.C. 559. (Clinton, *Fast. Hell.*, ii., p. 301.) Respecting the constitution of Solon, see Thirlwall, *Hist. of Greece*, ii., pp. 23-58.

From the numerous works ascribed to Solon, it appears that he must have devoted all his leisure hours to the muses; and he is said to have done so to the last moment of his life, for at the time when he died, he is said to have been engaged in writing a poem upon the state of Attica previous to the Ogygian flood, and its wars with the inhabitants of the island Atlantis, which was afterwards swallowed up by the Atlantic Ocean. (Plut., *Sol.*, 31, &c.) We are enabled to judge of his poetical powers from the few fragments which are still extant. They are distinguished by a graceful simplicity and great vigour. They have been collected by Fortlage, in a work entitled 'Solonis Carminum Fragmenta, Græce, cum variis lectionibus notisque,' Lipsiæ, 1776; and by N. Bach, in 'Solonis Carmina quæ supersunt, emend. atque annot. instr.,' Bonn., 1825, 8vo.

SOLOR. [SUNDA ISLANDS, LESSER.]

SOLOTHURN (*Soleure*, in French), a canton of Switzerland, is bounded on the north by Basle, on the east by Aargau, on the south by Bern, and on the west partly by Bern and partly by France. Its shape is extremely irregular, the boundaries being conventional, and not marked by natural limits: the area is about 270 square miles. It is crossed in the direction from south-west to north-east by the Jura, which forms several parallel ridges, and covers the greater part of the canton. The principal valley is that of the Aar, which runs in the same direction, flowing eastward of the Jura. The highest summits of the Jura in the canton of Soleure are the Weissenstein and the Hasenmatt, which latter is about 4400 feet above the sea. The canton of Soleure is one of the most productive in Switzerland, especially in corn, fruit, and vegetables. The vine thrives only in certain localities. The mulberry-tree is cultivated, and some silk is made. There were in 1835 about 28,000 head of horned cattle, 19,000 sheep and goats, 19,000 pigs, and 4700 horses, the average value of which is from twelve to eighteen pounds sterling each. The horse-fair of Soleure is one of the principal in Switzerland. A considerable quantity of cheese is made, both of cow's milk and goat's milk, and part of it is exported. Part of the mountains are covered with timber-trees, especially fir and beech. The canton abounds in iron-mines, and the ore is smelted in the furnaces of St. Joseph, and worked at the iron-works of Klus. The other manufactures consist of leather, paper, woollens, and kirschwasser. There are also quarries of marble and gypsum.

The population of the canton, according to the census of 1835, amounted to 62,400, distributed among 134 communes. A dialect of the Swiss-German is the language of the country. The inhabitants are Roman Catholics, with the exception of those of the district of Bucheggberg, and a small congregation in the town of Soleure, which profess the Helvetic reformed communion. Most families are possessed of landed property. Every commune has now an elementary school, and a normal school, or school for teachers, has been established at Soleure. Most of the communes have a bourse, or fund for the relief of their own poor.

The constitution of Soleure was for a long time aristocratical, as in most of the Swiss cantons, but in January, 1831, a new constitution was framed, on a more popular system. The mode of election of the members of the legislature is by means of electoral colleges, as in France.

The canton is divided into ten electoral circles, each having its electoral college, which names a certain proportion of members to the great council or legislature. The town of Soleure returns 34 out of the 109 members who compose the great council. A little council, chosen from among the members of the great council, constitutes the executive. The members of the great council are renewed every six years.

Solothurn, or **Soleure**, a bishop's see, and the head town of the canton, is built on both banks of the Aar, 1320 feet above the sea, and is surrounded by walls. The population is 4200. The cathedral is reckoned the finest church in Switzerland; the tower is 190 feet high. The canons of Soleure receive about 2600 francs a year, and the emoluments of the bishop are 10,000 francs. The other remarkable buildings of Soleure are the town-house, which is very old, the arsenal, the theatre, the hospital, the fountain in the market-place, the former church of the Jesuits, and several convents. Soleure has a gymnasium with six professors, a lyceum with three professors, and a faculty of theology divided into three classes. The town library has 15,000 volumes. There are also the library belonging to the cathedral, which is said to contain some valuable manuscripts, and several libraries belonging to convents and to the gymnasium. Soleure has a botanical garden, a cabinet of natural history, a society for the natural sciences, founded in 1823, a medical society, a literary society, a dramatic society, and a military society. Soleure is nineteen miles north of Bern, and twenty-six miles south of Basle.

Olten, on the left bank of the Aar, about twenty miles north-east of Soleure, is the second town in the canton, and is a bustling, thriving place. It has several manufactories, some good buildings, and above 1500 inhabitants. (Leresche, *Dictionnaire Géographique de la Suisse.*)

SOLSTICES, the points of the ecliptic which are highest above the equator, at which, the sun's motion in declination being imperceptible, the days remain sensibly unaltered in length for several days together, as they would do if the sun absolutely stood still: whence the name. [Sun.]

SOLUTION. (Mathematics.) By the solution of a problem should be meant the method of finding that which the problem requires to be found; but the word is frequently understood to apply to the answer itself.

A solution is given when the problem is reduced to any other which was supposed to be known before the first was presented: the difficulty peculiar to the given problem is removed as soon as it is shown to be capable of reference to another and a lower class. Thus, though properly speaking a problem is not solved until the answer is presented in numbers, yet it is not thought necessary to require that such a result should be attained, provided the steps which are left are such as are well known and generally admitted. Thus an equation would be said to be solved were it found that the roots required are those of a given quadratic; for no one is supposed ignorant of the mode of then finding them.

A *geometrical* solution, in the strict sense of the word, is one in which only the means of construction admitted by Euclid, or others deducible from them, are employed in its attainment. This is the least finished of all solutions; for a mode of laying down the various points which terminate lines is not, generally speaking, a mode of ascertaining their ratio. Nor must it be forgotten by the admirers of geometry that the most important part of a result, the expression of the ratios which the answer bears to the several data, is only indirectly obtained in their favourite method.

When more means than those allowed by Euclid are employed, the solution used to be called *mechanical*. It is rarely that such a solution is now employed.

An algebraical solution is one which employs algebra and arithmetic, to the exclusion of geometrical construction; that is, one in which the answer can always be directly calculated from a formula. Geometrical construction may be necessary for the demonstration of the solution: it is enough that the answer contain no directions to find lines or surfaces by construction.

An approximate solution is one which has an amount of inaccuracy necessarily. Thus if $3 + \sqrt{2}$ were the root of an equation, this solution would not be called approximate: for though $\sqrt{2}$ cannot be perfectly represented in a finite form, the symbol itself contains the mode of attaining the result with any degree of exactness short of perfection. But if $\sqrt{2}$ were found to five decimal places, the answer 1·41421 would be called an approximate answer. Most solutions must terminate in an approximate representation. [Transcendental.]

SOLVENT is that which has the power of rendering other bodies liquid; and chemically, a menstruum. Of all solvents, water is the most universal and useful; it dissolves a great number of neutral vegetable products, as gum, sugar; and of saline bodies, as common salt, sulphate of soda, &c. The resins are not soluble in water, and oils do not combine with it, nor has it the power of dissolving any metal whatever while it retains its metallic properties; it is only the oxides even of the lately discovered metals of the alkalis and alkaline earths which are taken up by it, except indeed such metallic oxides as were previously known to possess acid properties. The solvent of resinous bodies is alcohol, and of some similarly constituted substances; while caoutchouc is insoluble in it, but is dissolved by naphtha, oil of turpentine, and æther.

The metals are insoluble in any solvent until they have suffered some change by its action, or by a similar change differently produced; thus, when zinc is put into nitric acid, that acid acts as a solvent, because the metal, by decomposing a portion of the acid, is converted into an oxide; and after this, whether it be effected by the acid or by the action of heat and air, the metal, or rather metallic oxide, becomes soluble not only in nitric acid, but in an aqueous solution of the alkali ammonia and of potash.

Heat has great power in altering the solvent power of bodies; in most cases it increases it, and hence, when it is required to crystallize certain salts, they are dissolved in hot water, and the solvent power of the water diminishing as the solution cools, the salt is deposited in crystals.

There are exceptions however to this increased solvent power by heat: thus lime is more soluble in water at 32° than at 60°, and at this latter temperature than at its boiling point. Sulphate of soda is more soluble in water at 32° than at 92°. There is a remarkable difference between the solvent power of hot and cold water with respect to all gaseous bodies; owing to their disposition to resume the elastic state, gases are readily expelled from solution by heat, and, as might be expected, in many cases, the solvent power is increased by cold.

It has been already mentioned that gum is soluble in water, while resin is taken up by spirit, and each is insoluble in the other, so that when we mix an aqueous solution of gum with a spirituous solution of resin, both are rendered insoluble and precipitated together, owing to the combination which takes place between the spirit and the water. When any solvent has taken up as much of any particular substance as it is capable of, the solution obtained is termed a saturated one; and what shows that the change of form from solid to fluid is the result of chemical affinity, is the fact that water which is saturated with one substance will take up another; thus a saturated solution of common salt will still dissolve sulphate of soda, and *vice versâ*.

We shall conclude this subject with adducing an example of the chemical nature of solution, and the extent to which it is applied in chemical researches connected with the insolubility of some substances.

Thus yellow copper is a compound of sulphur, copper, and iron. Put it into water, no action takes place, the component parts being quite insoluble in it; put it into dilute nitric acid and apply heat, and it is totally dissolved. The sulphur, acquiring oxygen, becomes sulphuric acid; the copper, combining also with oxygen, becomes oxide of copper; and the iron from the same cause becomes peroxide of iron; and both these oxides combine with the sulphuric acid formed, and remain in solution as sulphates of copper and iron. The next operations are to determine the quantity of the acid formed, and of the oxides with which it is combined, and this is effected by a solution of nitrate of barytes, the base of which combines with the sulphuric acid, and the sulphate of barytes, being an insoluble salt, is precipitated. The oxides of copper and iron are now held in solution by the nitric acid of the decomposed nitrate of barytes; and these oxides are separated by finding a substance which acts as a solvent upon one and not upon the other; ammonia dissolved in water is such a body; when added to the mixed solution in excess, it dissolves the oxide of copper and leaves the peroxide of iron unacted upon.

Thousands of analogous and of more complicated cases might be adduced, but the above, without carrying out the analysis, or showing how the quantity of sulphur is estimated from that of the sulphate of barytes, or the quantities of copper and iron from their oxides, is sufficient to prove the important action of solvents, and of the varied application of solubility and insolubility in chemical investigations.

SOLWAY FRITH, an æstuary or inlet of the sea, on the western side of the island of Great Britain, separating, in one part, England from Scotland. This æstuary extends inland, from a line drawn between Rayberry-Head in Kirkcudbrightshire to St. Bees' Head in Cumberland, 41 miles north-east to Solway Moss at the mouth of the Esk. The line between the two above-mentioned headlands, which may be regarded as measuring the mouth or entrance of the Frith, is more than twenty miles long. About seventeen miles up, between Southerness Point, Kirkcudbrightshire, and the Cumberland shore near Allonby, the width is diminished to seven miles: it afterwards expands, then again contracts; and fifteen miles farther up, between the mouth of the Annan, Dumfriesshire, and Bowness, Cumberland, is reduced to two miles: this continues to be the width of the æstuary for the remaining nine miles to its termination.

On the north-west or Scottish shore, the Solway Frith is bounded near its entrance by the stewartry or shire of Kirkcudbright, from which it receives the river Urr, and in its upper part by Dumfriesshire, from which it receives the Nith and the Annan. On the south-east or English shore, and at its head, the frith is bounded by the county of Cumberland, from which it receives the Esk, with its tributaries the Liddle and the Line; the Eden, with numerous tributaries; the Wampool, the Waver, the Ellen, and the Derwent. It receives in fact the drainage of the district, bounded on the north-west by the higher grounds of East Galloway, on the north by the Lowthers and the connected hills; on the north-east by the heights which unite these to the Cheviot and other border hills; on the east by that part of the Penine chain which extends from the border hills southward to the heads of the Eden and the Yore or Ure, including Geltsdale, Milbourn, Lune, and Stainmoor forests; and on the south by the mountains of the Cumbrian group.

The shores of Solway Frith are for the most part low. At St. Bees' Head are lofty cliffs; and there are cliffs again for a short distance between Whitehaven and Workington, and between Maryport and Allonby; but all the Cumbrian shore from Allonby to the head of the frith is low and sandy. The shore of Dumfriesshire is also low and sandy, and lined in several parts with marshes, locally termed 'mosses' or 'flows.' The shore of Kirkcudbrightshire is loftier; and in this part, not far inland from the shore of the frith, Criffel mountain rises to the height of 1830 feet. A considerable part of the frith within Southerness Point and Allonby is occupied by broad sands, dry at low water, and intersected by the channels formed by the streams which flow into the frith. The frith is navigable through the greater part of its extent for vessels of 300 tons, and for those of 100 tons up to the head. It affords a supply of different kinds of fish, especially salmon, of which there is a valuable though declining fishery. The tide sets into it with great force, the flood sometimes advancing with a head three or four feet high. The water has a whitish colour from the great extent of sand over which it flows.

At the head of Solway Frith is Solway Moss, a tract of bog in the parish of Kirk-Andrews-upon-Esk, in Cumberland. In 1771 this bog burst, and overflowed several hundred acres of fertile land, sweeping away the tenants' houses with its black stream. The damage was at first thought to be irreparable; but by great exertion and expense the land was again brought into cultivation, and all trace of the catastrophe obliterated.

Solway Moss is memorable for the defeat of the Scots, A.D. 1542. A body of 10,000 men, under Lord Maxwell and the Earls of Cassilis and Glencairn, entered England; but the leaders were corrupt, and the men mutinous; and on being attacked by a force of 1400 English, the whole army took to flight, leaving nearly 1000 prisoners, of whom 200 were lords, esquires, or gentlemen. Lord Maxwell, the commander-in-chief, was among them. James V. of Scotland died of vexation at this defeat, about a month after it took place.

SOLWAY MOSS. [Solway Frith.]

SOMATE'RIA. [Fuligulinæ, vol. xi., p. 5.]

SOMBRERE'TE. [Mexican States.]

SOMERS, JOHN, LORD SOMERS, was born at Worcester, where his father, of the same name, was an attorney in good practice. His mother was Catherine Ceaverne, of a good family in Shropshire. The year of Somers's birth is supposed to have been 1650; but some accounts make it to have been 1652. We are not aware upon what authority it has been sometimes stated, or assumed, that the day on which he was born was the 4th of March.

Somers's father, who was a zealous Commonwealth man, and had commanded a troop under Cromwell in the civil war, intended to breed his son to his own profession. He managed the estates of the earl (afterwards duke) of Shrewsbury, who often visited him, and in that way had his attention early attracted to the promising qualities of young Somers. He was also connected by electioneering services with the member for the city, Sir Francis Winnington, afterwards solicitor-general, in whom his son found another useful patron when he entered the profession of the law. He died in 1681, when the subject of the present article inherited a small estate in Gloucestershire, which had been for some generations in possession of the family.

Young Somers however is said to have been educated at the expense of his father's sister, who had married Mr. Blurton, an opulent Worcester clothier, and who, having no children of her own, had adopted him from his birth. At her house, and not at that of his father, he resided throughout his boyhood. He appears to have been placed first at the cathedral school of Worcester, and afterwards at a private school at Walsall in Staffordshire; and it has also been supposed that after leaving school he may have spent a year or two in his father's office. While at school he is said to have been remarkable for his gravity of demeanour, as well as his studious habits. It is stated, on the authority of his friend Winnington, that at this time, 'by the exactness of his knowledge and behaviour, he discouraged his father and all the young men that knew him; they were afraid to be in his company.' This beginning would not lead us to expect the robust heartiness of character by which Somers was distinguished in after-life, nor the somewhat free or lax system of private morality as to certain points, of which indeed we have not a hint in the common formal biographies of the distinguished lawyer and statesman, but which nevertheless he is very well known to have adopted and practised.

Winnington has the credit of having advised that he should be sent to the bar. With this view he entered himself of the Middle Temple, and in 1674 was admitted a commoner of Trinity College, Oxford. In 1676 he was called to the bar, but although he never took any further degree than that of B.A., he continued to reside at the University for five or six years longer. To the latter part of this interval, between the completion of his studies and his removal to London and entrance upon the practice of his profession, belong the principal literary performances which he sent to the press:—1, 'The Memorable Case of Denzil Onslow, Esq., tried at the Assizes in Surrey, July 20, 1681, touching his election at Haslemere in Surrey;' 2, 'A Brief History of the Succession of the Crown of England, collected out of Records and the most authentic Historians,' 1681; reprinted 1714; 3, 'A just and modest Vindication of the Proceedings of the two last Parliaments,' [in which the question of the exclusion of the Duke of York had been agitated,] 1681, (a reply to the king's declaration,) at first penned, according to Burnet, by Algernon Sidney, but afterwards drawn out anew by Somers, and finally corrected by Sir William Jones, who had been attorney-general a few years before; but, adds Burnet, 'the spirit of that side was now spent; so that this, though the best writ paper in all that time, yet had no great effect;' 4, 'The Security of Englishmen's Lives; or the Trust, Power, and Duty of the Grand Juries of England, explained according to the fundamentals of the English government,' 1681, written on the failure of the charge against the earl of Shaftesbury; 'it passed,' says Burnet, 'as writ by Lord Essex, though I understood afterwards it was writ by Somers, who was much esteemed and often visited by Lord Essex, and who trusted himself to him, and writ the best papers that came out in that time.' He had before this time contributed poetical versions of Ovid's 'Epistles of Dido to Aeneas, and of Ariadne to Theseus,' to Tonson's edition of Ovid's 'Epistles' in English; and a translation of Plutarch's 'Life of Alcibiades' to the English Plutarch, 'by various hands,' produced by the same publisher. And there is also attributed to him an original English poem, of some three hundred lines, entitled 'Dryden's Satire to his Muse,' a libellous attack on that poet, which, from several allusions in it, must have been written early in 1682. It has a considerable portion of the strength, as well as the coarseness, of Dryden's most prosaic manner. Walpole, in his 'Royal and Noble Authors,' expresses his opinion that 'the gross ribaldry' of this poem 'cannot be believed to have flowed from so humane and polished a nature as Lord Somers's;' but this, we apprehend, is to carry out too strictly, or too far, the figure with which Walpole introduces his notice of Somers—that he was 'one of those divine men, who, like a chapel in a palace, remain unprofaned, while all the rest is tyranny, corruption, and folly.' The poem is printed in part ii. of the 'Supplement to the Works of the Minor Poets,' pp. 3-11.

Somers, whose ability and professional learning were already well known to a circle of influential friends, at last came up to London in 1682, and commenced practice at the bar. The first cause of public importance in which he was engaged was the prosecution of Pilkington and Shute, sheriffs of London, and other members of the Whig party, who were tried and convicted, in May, 1683, for a riot at the last election of sheriffs, in which he appeared as junior council to his friend Winnington for the defendants. From this time, it is stated by the writer of the Memoirs of his Life, 8vo., London, 1716, that his practice increased daily, so that in the reign of James II. his professional income already amounted to 700*l.* a year, which was in those days a large sum for a barrister of his standing; and, according to this authority, 'he was looked upon as one of the most rising counsel in England, before he appeared at the trial of the Bishops.'

But no doubt his being selected to be one of the counsel for the defence in that celebrated case, tried in the Court of King's Bench, in June, 1688, was what first brought him prominently before the public eye. He was selected, it is stated, on the strong recommendation of Mr. Pollexfen, one of the leading counsel for the bishops, and a lawyer of the highest eminence. 'I have heard one of the bishops declare,' says Bishop Kennett, in a note to his 'Complete History,' 'that objection was made among themselves against Mr. Somers as too young and obscure a man; but old Pollexfen insisted upon him, and would not be himself retained without the other; representing him as the man who would take most pains, and go deepest into all that depended on precedents and records.' Somers's speech occupies only about a column in the 'State Trials' (vol. xii., p. 396); but it is probable that his seniors were indebted for much of their matter to his learning and research.

From this time Somers is to be regarded as one of the leading political persons of his time. He is understood to have been associated with his friend Shrewsbury and the other chiefs of the Whig party in the negociations and arrangements which resulted in the coming over of the Prince of Orange; and he was taken into the confidence of William from the first. He was returned as one of the representatives for Worcester to the Convention, which met in January, 1689; and he took a distinguished part in the debates in the Commons and the conferences with the Lords, which terminated in the adoption, by both houses, of the decisive resolution that the late king had 'abdicated' the government. Somers indeed was a member of the first and chairman of the second of the two committees which prepared the Declaration of Right; and it was perhaps mainly drawn up by him, as is hinted by Burke, who, in his 'Reflections on the Revolution in France,' says, 'I never desire to be thought a better Whig than Lord Somers, or to understand the principles of the Revolution better than those by whom it was brought about; or to read in the Declaration of Right any mysteries unknown to those whose penetrating style has engraved in our ordinances, and in our hearts, the words and spirit of that immortal law.'

Under the new government preferment flowed fast upon Somers. In the beginning of May, 1689, he was made solicitor-general and knighted; on the 2nd of May, 1692, he was made attorney-general; and on the 23rd of March, in the same year, he was promoted to the office of lord-keeper of the great seal. This last appointment, of course, though he was not yet raised to the peerage, removed him both from Westminster Hall and from the House of Commons. 'All the people,' says Burnet, 'were now grown weary of the great seal being in commission; it made the proceedings in Chancery to be both more dilatory and more expensive; and there were such exceptions made to the decrees of the commissioners, that appeals were brought against most of them, and generally they were reversed. Sir John Somers had now got great reputation, both in his post of attorney-general and in the House of Commons; so the king gave him the great seal. He was very learned in his own profession, with a great deal more learning in other professions—in divinity, philosophy, and history. He had a great capacity for business, with an extraordinary temper: for he was fair and gentle, perhaps to a fault, considering his post; so that he had all the patience and softness, as well as the justness and equity, becoming a great magistrate. He had always agreed in his notions with the Whigs, and had studied to bring them to better thoughts of the king, and to a greater confidence in him.' The most remarkable occasion on which Somers distinguished himself while holding the office of lord keeper, was what is called the case of the Bankers in the Court of Exchequer, in 1696. He delivered a judgment against the bankers, and reversing the decision of the barons of the Exchequer, which has been characterised by Mr. Hargrave as 'one of the most elaborate arguments ever delivered in Westminster Hall,' and in collecting books and pamphlets for which he is said to have expended several hundred pounds. It is contained in the report of the case in Howel's 'State Trials,' vol. xiv., pp. 39-105. This judgment however, in which he was supported by Treby, chief justice of the court of Common Pleas, but opposed by Holt, chief justice of the King's Bench, was afterwards reversed by the Lords; and Lord Dartmouth, in a note to Burnet's 'History,' asserts that when the decree which he had made was, after a very warm debate, set aside, Somers fell ill, and never appeared upon the woolsack more. This was in 1700.

Meanwhile, in 1697, Somers had been appointed lord-chancellor, and raised to the peerage by the title of Baron Somers of Evesham in the county of Gloucester. He appears to have had a seat in the cabinet from the time of his promotion to the place of lord keeper; and he was now generally regarded as one of the chiefs of the ministry, as well as one of the most attached and influential of the king's friends. This made him a principal object of attack on the part of the Tory opposition in the second, or last, session of King William's fourth parliament, which commenced in November, 1699. After two successive charges brought against him had been negatived—the one for his having improperly, as was alleged, dismissed many persons from the commission of the peace; the other, founded on the affair of Captain Kid, who, after having been sent out in the command of an armament to destroy certain pirates in the West Indies, the expense of which had been very patriotically contributed by Somers, Shrewsbury, and some other noblemen, had taken to piracy himself,—a motion was made on the 10th of April, 1700, the day before the king came down to prorogue the parliament, that his majesty should be addressed to remove Somers from his presence and councils for ever. But this attempt also failed: the numbers, according to Lord Hardwicke, in a note to Burnet, were 106 for the motion, and 167 against it. Immediately before this, the bill for resuming the king's Irish grants had been carried through both Houses, in spite of the most strenuous opposition by the court, and the determination which William was at one time understood to have come to rather to risk everything than give his consent to the measure. 'While the bill was in suspense,' writes Lord Dartmouth, in a note upon Burnet, 'the whole city of London was in an uproar; Westminster was so thronged, that it was with great difficulty anybody got into either House. . . All seemed under the greatest distraction. I heard the king was come to the Cockpit, and had sent for the crown, with a resolution to dissolve us immediately, which I communicated to the earl of Shaftesbury, who ran full speed with it to the House of Commons; upon which they adjourned in great haste.' It was this apprehension, according to Burnet, of the king's resorting to the violent measure of a dissolution in order to quash the bill, that provoked the second of the above-mentioned attacks of the Commons upon Somers. But the chancellor did not please either party in this unfortunate business. 'During the debates about the bill,' says Burnet, 'he was ill, and the worst construction possible was put on that: it was said he advised all the opposition that was made to it in the House of Lords; but that, to keep himself out of it, he feigned that he was ill; though his great attendance in the Court of Chancery, the House of Lords, and at the council-table, had so impaired his health, that every year about that time he used to be brought very low, and disabled from business.' Lord Hardwicke tells us, in a note on this passage, that for this conduct of Somers, in absenting himself from the house, and taking little or no share in the debates about the bill, 'it is said the king was angry with him, and made easy to part with so wise a servant soon after.' It is certain at any rate, that, shortly after this, William resolved to endeavour to rid himself of the incessant annoyance and obstruction he received from the aversion the Commons had taken up against the chancellor by the dismissal of Somers. Tindal, who says that the account was given to Mr. Oldmixon by a gentleman who had it from Somers's own mouth, tells us that the first time Somers came to court after his illness, the king stated that it seemed necessary for his service that he should part with the great seal, and expressed his wish that he would make the delivering of it up his own act. Somers replied, that he knew this was what his enemies were striving after; that the seal was his greatest crime, and that if he quitted that, he should be freed from their abuse and persecution; but that he was resolved, with his majesty's permission, to keep it in defiance of their malice; adding, that 'he did not doubt but, if his majesty would be as firm to his friends as they would be to him, they should be able to carry whatever points he had in view for the public welfare in a new parliament.' His majesty however shook his head, and said 'It must be so.' But Somers persisted in declining to offer the surrender of the seal; so that a few days after, on the 17th of April, the king sent Lord Jersey for it, with a warrant under his hand, on which, of course, it was immediately given up. About a month after it was given to Sir Nathan Wright, with the title of lord keeper.

After all, his ejection from office neither saved Somers from the enmity of the Commons, nor lost him the favour and confidence of the king. In the new parliament, which met in February, 1701, the Tories found themselves in a majority in the Lower House; and they had not sat long before they proceeded to direct their power against the chief of the king's friends and ministers, the Duke of Portland, Lord Somers, the Earl of Oxford, and Lord Halifax, all of whom it was resolved to impeach. The resolution to impeach Somers was carried at a late hour on the night of the 14th of April, by a majority of 198 to 188, after he had come down to the House, and been heard in his own defence. The principal, and indeed at this stage of the proceeding, the only crime laid to his charge, was the concern he had had in the two treaties for the partition of the Spanish monarchy [PARTITION TREATIES] which had been negociated in 1698 and 1699 by King William, without consulting with his ministers, and for which Somers had forwarded, at the king's desire, the necessary powers in blank under the great seal. We suppose there can be no question, but that, according to the modern practice of the constitution, no minister would be held to be justified in acting as Lord Somers admitted he had done in this case; but ministerial responsibility was not so well understood or so completely established in those early days of the system introduced by the Revolution as it now is. The precise charge against Lord Somers too, as stated in the resolution for impeaching him, was, that he had advised his majesty to the treaties; and that certainly was not and could not be made out, being in truth contrary to the fact. Afterwards fourteen distinct articles of impeachment were drawn out and sent up to the Lords, which charged his lordship distinctly with having presumed to affix the great seal to the blank commissions, contrary to the duty of his office, and in violation of the great trusts reposed in him, 'without communicating the same to the rest of the then lords justices of England, or advising in council with his majesty's privy council thereupon.' His conduct in the affair of Captain Kid, which surely was the very reverse of blameable, was also made the subject of one of the articles; but the most remarkable of the charges brought against him related to various personal grants of land and money which he was asserted to have begged and obtained from the crown—'many great, unreasonable, and exorbitant grants,' as they were styled, 'of several manors, lands, tenements, rents, hereditaments, and revenues,' besides the annual salary, or pension (as it is called), of 4000*l.*, which, 'through his majesty's most abundant grace and bounty,' he had received during all the time he was lord keeper and lord chancellor, over and above 'the fees, profits, and perquisites of or belonging to the great seal, established by law as a sufficient and ample recompense and reward for the faithful discharge of that high station.' The grants were alleged to consist of the manors of Ryegate and Howleigh, granted in 1697, to Joseph Jekyl, Esq., in trust for Lord Somers and his heirs—of certain fee-farm rents to the value in all of 33,000*l.*, granted at various times by pretended contracts, under which 'there was not any sum of money whatsoever really and *bonâ fide* paid as the consideration of the conveyances of the said rents' from the trustees to whom they were granted for Somers's benefit—and of certain other rents to the yearly value of nearly 400*l.* obtained in a similar manner. Somers in his answer stated that the 4000*l.* a year was the same allowance that had been made to several of his predecessors; and as to the other grants, he pointed out certain deductions from their value to which the Commons had not adverted, and denied that there had been anything unlawful in the transactions, or that the grants had been obtained either in deceit of his majesty or in elusion of any acts of parliament. The affair ended, after many messages and conferences between the two Houses, by the Commons declining to appear to prosecute their impeachment on the day appointed by the Lords, under the pretence that the Lords had refused them justice in the matter; on which their Lordships pronounced him acquitted, and dismissed the impeachment. (See Howel's *State Trials*, xiv. 311.)

In October of this same year a negociation was opened by the king with Somers, through Lord Sunderland, for bringing him again into power; but his majesty's death, in March, 1702, put an end to the project after everything had been arranged. The speech with which William opened his last parliament, on the 31st of December, 1701, called by Burnet 'the best speech that he, or perhaps any other prince, ever made to his people, was written by Somers; Lord Hardwicke mentions that he had seen the original in Somers's handwriting.

In 1702 Somers, unoccupied by the cares and toils of office, was elected president of the Royal Society. In 1706 he introduced and carried through parliament a bill 'for the amendment of the law, and the better advancement of justice,' which, although deprived of some useful clauses by the Commons, corrected various abuses in the courts both of Chancery and of Common Law. He also took a leading part in the discussion and arrangement of the great measure of the Union with Scotland, which was now at last brought to a conclusion, after having been again and again unsuccessfully attempted during more than a century. [Scotland, Union with.] It may also be mentioned, that the learned and able statement of the famous Aylesbury Election Case, ordered to be printed by the House of Lords in 1703, was, according to Mr. Speaker Onslow, drawn up by Lord Somers. He too, it is stated by Lord Hardwicke, was the author of the act passed in 1705, for the security of the Protestant Succession. [George I., vol. xi., p. 157.]

On the return of his party to power in 1708, Somers was made president of the council; and he held that office till the recovery of the cabinet by Harley and the Tories in 1710. He succeeded in making himself very acceptable to Queen Anne, notwithstanding her original prejudice against him. It is affirmed by Lord Dartmouth that he impressed her with a deep and grateful sense of his fidelity and integrity, by his acquainting her with and putting her on her guard against a scheme entertained by the Duke of Marlborough to get himself made captain-general, or commander of the forces, for life, which, without having so much as mentioned it to her majesty, his grace tried in 1709 to get proposed in the House of Commons, and expected the Whigs should all come into, in return for the great services he had lately done them. The following year, on occasion of the proposals for peace made by the French at Gertruydenberg, Somers strongly recommended the continuance of the war. He had of course gone along, apparently, with his colleagues in the prosecution of Sacheverell, in 1709; but Swift, in his 'History of the Four Last Years of Queen Anne,' tells us that he had heard from Lord Somers himself that he was against engaging in that foolish business, as foreseeing that it was likely to end in the ruin of the Whig party.

There is a curious note to Burnet's 'History of his own Time,' by Mr. Speaker Onslow, in which he relates some negociations that were carried on with Harley by Somers, Halifax, and Cowper, a short time before the change of ministers in 1710, on the basis of an overture made by Harley for keeping them in place, if they would consent to the substitution of himself and some of his friends for the lord treasurer (Godolphin) and his dependants. Onslow says that he had his information from Sir Joseph Jekyl, 'who,' he adds, 'had it very likely, and I think he said so too, from the Lord Somers, to whom he was brother-in-law.' The negociation was broken off in consequence of the opposition of Lord Wharton, who expressed his detestation of having anything to do with Harley.

Somers continued to take part occasionally in the debates of the House of Lords after his second dismissal from office; but the infirm state of his health is said by this time to have somewhat affected his intellect. In 1713 we find him joining in support of the factious motion brought forward by a section of the opposition, for leave to bring in a bill to dissolve the Union. 'I had it,' writes Onslow, 'from good authority (the late Sir Robert Monroe, then of the House of Commons), that at a meeting upon it at my lord Somers's house, where Monroe was, nobody pressed this motion more than that lord!" He resumed his place at the council-board after the accession of George I.; but his faculties were now almost gone. It is related, however, that he took an interest in the progress of the Septennial Bill, which he declared 'he thought would be the greatest support possible to the liberty of the country.' At last a stroke of apoplexy occasioned his death, on the 26th of April, 1716.

Lord Somers was never married, though it is stated by the author of the Memoirs of his Life, that when he was solicitor-general he paid his addresses to a daughter of Sir John Bawdon, a London alderman, and that he went so far in the matter as to deliver in a rental of his estate, after several meetings with the lady's friends; 'but,' concludes the story, 'the treaty broke off on account of a difference about the marriage-portion and settlement, to the great regret of the lady, when she found him made lord keeper of the great seal in two years' time.' His estates descended to the family of his sister, who was married to Charles Cocks, Esq., M.P., whose grandson, the father of the present Earl Somers, was created Baron Somers in 1784.

The character of Lord Somers has been elaborately drawn by Addison in one of the numbers of the 'Freeholder' (published 14th May, 1714), but with considerable wordiness, and something perhaps of the air of insincerity which commonly attaches to a formal panegyric. He had been an early and zealous patron of Addison, who had obtained his notice by inscribing to him his early poem on the campaigns of King William, and who afterwards dedicated to him his 'Travels in Italy,' and the first volume of the 'Spectator.' There is much more force in the more shaded picture of him which Swift has given in his 'History of the Four Last Years of Queen Anne;' nor perhaps, taken with the proper allowance, does it convey a less correct notion of the man.

The collection commonly called the 'Somers Tracts,' which has been twice printed, first in 1748, in 16 volumes, 4to., secondly, in 1809-15, in 13 volumes, 4to., under the superintendence of the late Sir Walter Scott, consists of scarce pamphlets selected, as the title intimates, principally from the library of Lord Somers. A valuable collection of original letters and other papers left by his lordship was unfortunately consumed in a fire which happened in the chambers of the Honourable Charles Yorke, then solicitor-general, in Lincoln's Inn Square, on the morning of Saturday, the 29th of January, 1752. Mr. Yorke's father, the Lord Chancellor Hardwicke, married Lord Somers's niece, Miss Margaret Cocks.

SOMERSET, EARL OF. [James I.]

SOMERSET, EDWARD SEYMOUR. [Edward VI.]

SOMERSETSHIRE, an English county, situated on the shore of the Bristol Channel, by which it is bounded on the north and north-west sides. On the north-east it is bounded by Gloucestershire, from which it is in part separated by the river Avon; on the east by Wiltshire; on the south-east and south by Dorsetshire, and a small detached part of Devonshire; and on the south-west and west by Devonshire. Its form is irregular; the greatest length is from east by north to west by south, from the neighbourhood of Bath to Exmoor on the Devonshire border, 70 or 71 miles; the greatest breadth at right-angles to the length is from the coast at the mouth of the Avon to the Dorsetshire border between Milborne Port and Stalbridge, 40 miles. A small detached portion of the county is entirely surrounded by Dorsetshire: it lies between Sherborne and Blandford. The total area of Somersetshire is 1645 square miles: it is the seventh English county in respect of size, ranking next below Lancashire, and next above Hants.

The population by the different enumerations of the present century was as follows:—

Year of census.	Population.	Increase per cent.
1801	273,750	—
1811	303,180	12
1821	355,314	17
1831	404,200	13

The last enumeration gives 246 inhabitants to a square mile. In amount of population it is the eighth English county, being below Staffordshire, but above Norfolk; and in density of population the eleventh, its place being being between Nottinghamshire and Leicestershire. Taunton, which has the best claim to be regarded as the county town, is 133 or 134 miles in a direct line west by south of the General Post-office, London; or 141 miles by the road through Basingstoke, Andover, Amesbury, Bruton, Castle Cary, Somerton, and Langport.

Surface, Coast-line, and Geology.—Somersetshire is a hilly county; but the ranges of hills are separated by low marshy flats; so that, hilly as it is, it yet exceeds most counties in the extent of its fens. The north-eastern part is occupied by the eminences round Bristol and Bath, through which the Avon makes its way. These eminences are irregularly grouped, and extend along the north-eastern border, from Pill on the Avon below Bristol into Wiltshire: many of the valleys or 'combes' which separate the hills are drained by small streams which flow into the Avon. The principal heights in this part of the county are, Falkland Knoll near Norton St. Philip, between Bath and Frome; Lansdown (813 feet high), and Claverton, Combe, and Odd downs, near Bath; Dundry hill (790 feet high); Mays knoll, Cadbury, Sims, and North hills, which are summits of Broadfield down, south of Bristol; and Leigh down, west of that city.

The summits of the hills in the immediate neighbourhood of Bath are of the oolitic formations. The great oolite, the most important of these, which furnishes the fine-grained freestone commonly known as Bath stone, has a thickness probably of 130 to 150 feet. Masses of this rock are found scattered on the slopes of the hills which it crowns, covering the subjacent clays and fullers'-earth, which, with the inferior oolite and calcareous sand, constitute the lowest members of the oolitic group, and form a terrace projecting into the subjacent valleys, beyond the great oolite and connected rocks which crown the summits of the hills. Sometimes these lower oolitic beds form outlying eminences, such as Stantonbury hill, Dundry hill, and Mays knoll. The inferior oolite is extensively quarried in Dundry hill, where it yields a good freestone. The general inclination of the strata of all these formations is to the south-east, but with a very small angle. Some remarkable derangements and dislocations are observable.

The oolites rest on a platform of the lias formations, which appear on the lowest part of the slope of the oolite hills, or form detached hills to the south-west of them.

The valley of the Avon, and the other valleys which separate these hills, and are drained by streams flowing into the Avon, are occupied by the formations of the red marl or new red sandstone group. In some places the newer magnesian or conglomerate limestone, which underlies the new red sandstone, rises to the surface: it occasionally crowns the summit of the hills, but more usually is found in horizontal strata resting against the elevated beds of the coal-measures or of the mountain limestone, which latter, with the old red sandstone, forms the constituent mass of Leigh down and Broadfield down near Bristol. These two masses of mountain limestone are surrounded by the magnesian limestone conglomerate. The mountain limestone of Leigh down is prolonged across the Avon, and forms the well-known precipices of St. Vincent's rocks, Clifton, between which that river flows. Broadfield down has two precipitous combes or valleys, Cleve and Brookley, less magnificent than the defile of Cheddar, but possessing, from the abundance of wood, more beauty.

The coal-measures, mountain limestone, and old red sandstone belong to the carboniferous group of the Somersetshire and South Gloucestershire coal-field, and occupy the northern part of the county extending to the Mendip hills, though covered in most places by more recent formations. In this field are numerous coal-pits: the chief of them are in those parts (Bedminster, Nailsea, and the valley of the Chew above Keynsham) where the coal-measures have been denuded; but several are in the valley of the Midford brook, which extends from Combe Monkton near Bath to High Littleton, and in the adjacent valley, which extends from Combe Monkton to Radstock, where they are sunk through the superincumbent strata of the red marl, the lias, and even the lower oolite: this last is the case in a pit near Paulton, which is probably unequalled in the number of formations through which it passes before it reaches the coal: it penetrates through strata which in other parts would probably have an aggregate thickness of 2000 feet, but are here reduced, in consequence of the thinning out of many of the beds, to less than 500 feet.

The eastern side of the county, extending from Bath by Frome, Bruton, and Castle Cary to Yeovil, and the southern side, from Yeovil by Ilminster to Wellington, are occupied by hills of similar geological character to those around Bath, and uniting with them in the neighbourhood of that city. The lower slopes, with some outlying eminences or ranges projecting to the west or north-west, consist of lias, upon which rest the lower oolitic formations, and upon these again the great oolite, with its connected beds. Rocks of the middle system of the oolitic formations and of the green-sand formation, and even chalk, are found in several places along the border of the county. This range is divided into detached parts by the transverse valleys of the Brue, the Yeo or Ivel, the Parret, and the Isle; and that portion which lies west of Ilminster overlooks to the north the vale of Taunton, which is occupied by the new red sandstone, and is watered by the Tone. Among the eminences of this range are Barrow hill, north-west of Frome; Roddenbury hill, near Longleat park; Long Knoll (chalk); and the site of Alfred's tower, south of Frome in Selwood; May's down, near Shepton Mallet; Lamyat beacon, near Bruton; Ash beacon, near Milborne port; Hamden hill and St. Michael's hill, between Ilchester and Crewkerne; Shave Lane hill, near Crewkerne; and Buckland down, Staple hill, and the Black Down hills (green sand and chalk marl), south of Taunton. Good freestone is quarried in the inferior oolite, near Shepton Mallet, and at Norton-under-Hamden, between Ilchester and Crewkerne; and the lias is much used for building cottages in the neighbourhood of Ilchester.

The Mendip hills are a distinct range stretching from west by north to east by south, and separated from the hills about Bath and Bristol by the narrow valley of the Yeo or Yow, a small stream which flows into the Bristol Channel near Weston. They extend at their western end to the coast, and unite at their eastern extremity with the hills near Frome. The length of the Mendips may be estimated at 25 miles, their breadth between Stoke Rodney and West Harptree at 6 or 7. 'This chain consists of a central axis of old red sandstone, flanked on its opposite declivities by parallel bands of mountain limestone, dipping from it in opposite directions in angles varying from 30° to 70°. This central axis is not however visible throughout its whole course, being occasionally overarched and concealed by the calcareous strata; but it appears in four ridges, forming the most elevated points of the chain, and disposed at nearly equal distances through its length. The cavern of Wokey hole, and the defile of Cheddar cliffs, with its long line of stupendous mural precipices, certainly among the most magnificent objects of this kind in Britain, are the well-known features of this chain.' (Conybeare and Phillips.) The cavern at Wokey, or Wookey, is not in the mountain limestone, but in the calcareo-magnesian formation which abuts against it, near the foot of the chain, on every side; of English caverns it yields in extent only to those of the Peak in Derbyshire. It is described in Dr. Maton's 'Observations on the Western Counties,' vol ii., p. 136, &c. The mineral treasures of the Mendips are important; zinc and calamine are obtained abundantly in the central and western part of the range. Lead was formerly procured; but the works, from the exhaustion of the ore, or the difficulty of procuring it, have been given up. There are numerous coal-pits in the villages which lie north-west of Frome. The argillaceous beds of this coal-formation have been remarkably contorted, apparently by the force which elevated the adjacent harder rocks (mountain limestone and old red sandstone) in mass. The coal-seams are all thin, hardly any exceed three feet; nor could they be profitably worked, but for the highly improved state of the machinery. The Mendips rise in some parts to more than 1000 feet. Their principal summits are —Worle hill, near Weston-super-Mare; Banwell hill, Sandford hill, Dolberry warren, and Burrington Ham, between Worle and Blagdon, overhanging the valley of the Yeo, north of the chain; Bleadon hill, Wavering down, and Shutshelve hill, overhanging the valley of the Ax, below Cheddar; Black down (old red sandstone), in the axis of the range, north of Cheddar; West hill, North hill, and Egar hill (all in the old red sandstone), between Cheddar and Chewton Mendip; Pen hill (old red sandstone) and Milton hill, north of Wells; and Masberry castle and Beacon hill (both old red sandstone), north of Shepton Mallet.

The long low ridge of Pawlet or Polden hill and the connected hills is an offset from the eastern hills between Castle Cary and Ilchester. It extends about 20 miles in a direction parallel to the Mendips, from which it is separated by a wide intervening fenny flat, drained by the Brue, and comprehending East Sedgemoor and the adjacent moors. Among the higher points of this range, which consists of lias resting on the new red marl or red sandstone, are Kingweston down, Butleigh hill, Dundon beacon (360 feet), Moorlynch (330 feet), Cock hill, and Ball hill. Some detached knolls of lias, and a tract of new red marl crowned with some lias, or oolitic eminences, rise out of the fens between the Polden and the Mendip hills; such as Brent knoll, near the sea, and Glastonbury Tor, or Chalice hill near Glastonbury. Gypsum occurs abundantly in the red marl on the south side of Polden hill near Somerton.

In the western part of the county, running north-west from the neighbourhood of Taunton to Bridgewater bay in the Bristol Channel, bounding the valley of the Parret after the junction of the Tone, are the Quantock or Quantox hills. They consist of an elevated mass of a coarse gritstone (with some portions of killas), and belong to the slate formation which overspreads the north of Devonshire, separated however from the principal slate district by an intervening tract of new red sandstone, which formation nearly surrounds the foot of the range. At the northern foot of the hills lias occurs, covering both the red sandstone and the slates. The principal summits of the Quantock range are—Thorncombe barrow, Hurley beacon, Doucebury or Danesborough (1022 feet), Fire beacon, Bagborough station or Will's-neck (1270 feet), Cothelston lodge (1060 feet), and Buncombe hill. The length of the Quantock hills is about 14 miles. Their greatest breadth is about 5 or 6 miles, or, including the hills which are thrown off from the principal range toward the bank of the Parret, about 9 or 10 miles. Limestone is procured in the hills, and gypsum in the new red marl formation of the adjacent coast, near Watchet. Some veins of copper have been found and worked, but with little advantage.

The greater part of the county west from the narrow tract of new red sandstone which separates the Quantock hills from the principal district of the slate rocks, is occupied by an irregular hilly district, forming part of the wild moorlands of Exmoor forest, extending into the two counties of Devon and Somerset. This hilly district is bounded on the south by the valley of the Tone, and on the north by the Bristol Channel. It is occupied by the slate rocks of the Devonian range; but in some of the valleys near the coast these are covered by the rocks of the new red sandstone group. The principal eminences are—Oare hill, Porlock hill, North hill (824 feet), Grabbist hill (906 feet), Croydon hill, and Old Cleeve hill, near the coast; and Ox-Head hill, Dure down, Ashcombe hill, Span head, Shear down, Black Barrow down, Lucott hill, Dunkerry beacon (1668 feet), Winsford hill, Exton hill, Lype hill, and Brendon hill (1210 feet) more inland. Slate is quarried in these hills near Wiveliscombe.

The measurements of heights given above are from the Ordnance Survey, except Doucebury, North hill, and Grabbist hill, which are given by Mr. Leonard Horner, and Brendon hill, which is given by Mr. S. Woods. The latter gentleman has estimated North Hill at 1000 feet, and Dunkerry Beacon at 1784 feet.

There are mineral springs at Bath, Glastonbury, Alford, near Castle Cary, and Queen Camel, near Ilchester. Most, if not all of these, are found in a stratum of marl between the lower oolite and the lias formations. Others are enumerated by Collinson, in his *History of Somersetshire*.

The coast from the mouth of the Avon (which separates Gloucestershire from Somersetshire) runs about 15 or 16 miles south-west to Sand Point. For about 2 miles from the mouth of the Avon, it is low and marshy, but at Portishead point, near the village of Portsihead, the coast rises, and low cliffs skirt the shore, with one or two slight intervals, for 7 miles to the quiet watering-place of Clevedon. Between Portishead and Clevedon is a continuous range of hills, formed by an outlying mass of mountain limestone and old red-sandstone, separated from Leigh down by a low marshy valley; the cliffs are formed on the side of these hills. For nearly 5 miles beyond Clevedon the shore is lined with the marshes through which the Yow or Yeo and some other small streams flow into the sea; but between St. Thomas's head and Sand point is a range of cliffs of about a mile in length, worn in the face of a mountain-limestone hill. From Sand point the coast runs southward to Brean down, a hill of mountain limestone, precipitous on every side, and surrounded by the sea except just at its eastern end, where a marshy flat connects it with the mainland. Between Sand point and Brean down, which are distant nearly 5 miles in a straight line, the coast forms two bays, Sand bay and Uphill bay, separated by the intervening cliffs of Anchor head. This headland is the extremity of Worle hill, one of the Mendips, composed of mountain-limestone, on the sides of which the magnesian or conglomerate limestone rests, and upon this the lias. The two bays are filled with sand, dry at low-water; on Uphill bay, just at the foot of Anchor head, is the little watering-place of Weston-super-Mare.

Between Brean down and Little Stoke point, which is distant from Brean down 10 miles in a direct line south-west, is the bay usually called Bridgewater bay, although the town of Bridgewater lies some miles up the Parret inland. The coast from Brean down runs about 7 miles almost in a direct line due south to the æstuary of the Parret, forming one side of the bay, and then gradually turning westward runs about 7 or 8 miles in an irregular line to Little Stoke point. The greater part of the shore of the bay is formed by sand hills, bounding the marshes which extend between the Mendip hills and the lower offsets of the Quantock range. Polden hills and the detached knolls which rise out of this flat do not, any of them, reach the shore. This flat district appears to have been once covered by the sea, but not within the period of authentic history. Toward the western extremity of the bay, between Catsford and Little Stoke point, the coast is higher, and is lined for the last 3 miles of its extent by lias cliffs; where the lower Quantock hills abut on the sea, at Little Stoke point, the cliffs are interrupted by a very narrow interval of marsh land, through which a small stream flows into the sea.

From the extremity of Bridgewater bay the coast runs westward 25 miles to the boundary of the county. For the first 9 miles, to the little watering-place of Blue Anchor, it continues to be lined by the lias cliffs of the Quantock range, with one or two trifling interruptions. These cliffs sometimes rise to the height of 100 feet (Conybeare and Phillips) or even 200 feet. (Collinson, *Hist. of Somerset.*) From Blue Anchor to Minehead, about 4 miles, the coast, which forms a shallow bay, is lined with marshes; at the back of which, about a mile inland, Grabbist hill rises. From Minehead to Bossington point, 5 miles, are lofty cliffs, formed in the face of the slate rocks of North hill. At Bossington point the cliffs cease, and the eastern side of the shallow bay of Porlock, which is 5 miles between its extremities, is formed by a low shore: but the cliffs reappear on the western side of the bay, and continue nearly to the boundary of the county: these last cliffs are formed in the slate-rocks of Oare and Porlock hills. The coast is lined, with very little interruption, by sands, but, excepting in Sand bay, Uphill bay, and Bridgewater bay, they have little breadth. These three bays are filled up with sand, dry at low-water, except in the channel of the Parret: the sands in Bridgewater Bay have in one part a breadth of three miles. The only islands are Stert island and Fenning's island, in the marshes at the mouth of the Parret; and Flat Holm (magnesian or conglomerate limestone) and Steep Holm (mountain limestone) in the midst of the Bristol Channel. These two islands are both girt with cliffs: there is a lighthouse on Flat Holm opposite Brean down. The only harbours of any importance are formed by the rivers Avon and Parret. The roadstead of King's Road is at the mouth of the Avon. Some shipping trade is carried on from the towns of Porlock, Minehead, and Watchet.

Hydrography, Communications, &c.—The general direction of the rivers is to the north-west: the only material exception is in the case of the Tone and the upper part of the Bristol Avon. The larger rivers (except the Tone) rise in the adjacent counties, and pass through the depressions which break the continuity of the border hills.

The Avon, distinguished from the Warwickshire river so called, by the title of the Lower Avon, rises in Gloucestershire, on the eastern slope of the Cotswold hills, and flows through Wiltshire by Malmsbury, Chippenham, Melksham, and Bradford; below which it reaches Somersetshire, and has a farther course, on or within the border of the county, of 31 miles into the Bristol Channel or æstuary of the Severn at King's Road. Its course to the border of the county is for the most part southward; but after that it flows north-west by Bath, having a winding course between the oolite and mountain limestone hills of the north-eastern border. It is navigable up to Bath (where the Kennet and Avon canal locks into it) for barges, and to Bristol for sea-borne vessels, the largest class of which, owing to the great rise of the tide, reach the quays of the town without any difficulty, though it is 8 miles, following the winding of the channel, above its mouth. At the mouth of the Avon the spring tides usually rise 40 feet, and have been known to rise 50 feet.

The Avon receives the Frome, the Midford brook, above Bath, and the Chew at Keynsham. The Frome rises not far from Bruton, flows northward past the town of Frome, and joins the Avon between Bradford and Bath: its course (of about 20 miles) is within or upon the border of Somersetshire.

The Avon is connected with the Thames by the Kennet and Avon canal, of which a portion is in this county; it enters by the Dundas aqueduct over the Avon, and then follows the valley of that river to Bath. The Somersetshire coal canal is cut from the coal-works near Paulton into the Kennet and Avon canal on the border of the county: it is 9¼ miles long. Connected with this canal is a railway from the adjacent coal-works at Radstock. Acts were obtained some years since for a canal to connect the Dorsetshire Stour at Blandford Forum with the Avon: it was to follow the valley of the Frome, but was never executed.

The Yow or Yeo rises at Compton Martin on the northern

Google

slope of the Mendip Hills, and flows north-west 13 miles between them and Broadfield Down into the Bristol Channel. The Axe rises in Wookey Hole or Cavern, on the southern side of the same hills, near Wells, and flows north-west 21 miles through the flats at their foot; it is navigable to the village of Lower Weare, near Axbridge, about 11 miles above its mouth, following the natural channel of the river; but this distance has been shortened to 9 miles by one or two cuts.

The Brue rises on the slope of the chalk marl and green-sand hills, on the border of Somerset and Dorsetshire, and flows westward by Bruton and Glastonbury, 35 miles through the marshy flat between the Mendip and the Polden Hills into the æstuary of the Parret. It is not navigable; but the lower part of its course is included in the Glastonbury navigation, for which an act was obtained A.D. 1827. The navigation from Glastonbury to the Brue is by a canal running nearly parallel to the river.

The Parret, antiently the Pedred, the principal river in the county, rises in the chalk downs at South Perrot, near Beaminster in Dorsetshire. It reaches the border of Somersetshire about a mile from its source, and flowing northward for 15 miles, traverses the oolitic border hills by a depression near Crewkerne and passes by South Petherton to Langport, receiving the Isle or Ile on its left bank, and the Yeo or Ivel on the right. From Langport the Parret flows north-west 12 miles, through a marshy flat to Bridgewater, receiving midway between that town and Langport the Tone on the left bank. Below Bridgewater the Parret has a winding course of 16 miles into Bridgewater Bay, in the British Channel, receiving the Cary on its right bank, and uniting just at its outfal with the Brue. The whole course of the river is thus about 43 miles; but the computation would be considerably higher were the Tone or the Yeo regarded as the principal stream.

The Isle or Ile rises in the slope of an outlying chalk hill between Chard and Crewkerne, and flows north and north-east 15 or 16 miles into the Parret, through marshes which cover the lias formation. It passes near Ilminster, but not through it. The Yeo or Ivel rises amid the oolite border hills near Milborne Port; and flows south and south-west, and then north-west 11 miles, through a valley amid the oolite hills, past Sherborne in Dorsetshire to Yeovil, receiving several streams from the Dorsetshire chalk downs on the left bank. From Yeovil it flows 8 miles in a circuitous course north-north-west to Ivelchester or Ilchester, and from thence 7 miles west-north-west, making 26 miles in all, into the Parret at Langport. All this part of its course is through marshes, which cover the lias and new red-sandstone formations. The Tone rises in the southern slope of Brendon hill, and flows 10 miles south to the border of Devonshire; its course thus far is through the hills of the slate formation in which it rises. It then turns eastward and flows 23 miles through the new red-sandstone formations of the vale of Taunton, past the town of Taunton into the Parret. The Cary rises in the oolite border hills near Castle Cary, and flows westward through the lias and new red-sandstone, and through the marshes which cover them, into the Parret; its whole course is about 30 miles.

The navigation of this system of rivers commences at Ilchester on the Yeo, which is navigable for 7 miles into the Parret at Langport; this is sometimes called the Ivelchester and Langport Canal. A little above Langport the navigation of the Parret commences, and continues to the mouth of that river. Ships of 200 tons can get up to Bridgewater. The Tone is navigable from Taunton to its junction with the Parret ten or eleven miles. The Carey is not navigable.

It was intended to make a canal from Morgan's Pill in the Avon six miles below Bristol, to the neighbourhood of Taunton, where it was to unite with the intended 'Grand Western Canal' from Exeter. There were to be two branches, one to the coal-works at Nailsea, and one to Axbridge and Cheddar. The act was obtained, A.D. 1811, and the project taken up with apparent spirit; but thirteen years afterwards (A.D. 1824) another act was obtained, abandoning the greater part of the line, retaining only the portion between Bridgewater and Taunton, which has been made. A branch to Chard is in progress if not finished. The Grand Western Canal was designed to follow the valley of the Tone from the border of the county to Taunton. Acts were obtained A.D. 1796, 1811, and 1812, but the canal has never been executed. The English and Bristol Channels ship canal was to cross the county by Chard and Bridgewater, but this undertaking, for which an act was obtained A.D. 1825, has been given up.

The river Exe has its source and the upper part of its course in the western extremity of Somersetshire, to which some of its first affluents belong, but this river belongs chiefly to Devonshire.

The two principal coach roads from London to Bristol (one by Calne and Chippenham, the other by Devizes and Melksham) enter the county near Bath, before reaching which city they unite; the road from Bath to Bristol through Keynsham is wholly in this county. The mail-road from London to Exeter through Salisbury crosses a corner of the county between Shaftesbury and Sherborne, and re-entering it beyond Sherborne, passes through Yeovil, Crewkerne, and Chard. The Falmouth mail-road by Amesbury enters the county between Mere (Wilts) and Wincanton, and runs through Ilchester and Ilminster. A road from Bristol runs by Axbridge to Bridgewater, from whence one road leads near the coast by Watchet, Dunster, and Minehead to Porlock, and from thence to Ilfracombe in Devonshire; a second by Milverton and Wiveliscombe to Barnstable, Devon; and a third to Taunton, and from thence either by Wellington and Collumpton (Devon) or by Honiton (Devon) to Exeter. A road from Bath leads by Wells and Glastonbury to Taunton; and roads from Bristol and Bath unite at Shepton Mallet, and proceed by Castle Cary and Yeovil to Dorchester. The road from London by Devizes and Trowbridge to Frome enters the county a little beyond Trowbridge. From Frome a road leads on one hand to Shepton Mallet, Glastonbury, and Taunton; and on the other to Bruton, Castle Cary, and Ilchester.

The Great Western railway, now open throughout the whole line, enters the county near Bath, and runs by Bath to Bristol, where it is connected with the Bristol and Exeter railway. The Box tunnel, near Bath, is close on the border of this county. The Bristol and Exeter railway commences at Bristol, and runs south-west between Leigh down and Broadfield down through the Nailsea coal-field, where there is a short branch, to Weston-super-Mare; its course is then south by Bridgewater to Taunton, where it inclines to the south-west, and passes by Wellington into Devonshire. There is one tunnel just on the border of the county, under White Ball hill, between Wellington and Collumpton. This railway is open from Bristol to Bridgewater.

Agriculture.—The county of Somerset possesses a soil and climate well suited to the growth of wheat and all the agricultural produce usually raised in any part of England. The hills do not rise to any great height, and are mostly cultivated or in profitable pasture. There is a fair proportion of woodland without any extensive forests. In some of the vales, such as the extensive vale of Taunton, the soil is of a rich nature, and the wheat which is produced there is of superior quality, so as to be much sought after for sowing in other parts of the country. Excellent butter and cheese are made where the land is better adapted to pasture. The Cheddar cheese, which, from its superior quality, gives its name to a great portion of the cheese made in the county, is reckoned by many to be the best cheese made in England, from pure milk without any addition of cream: the real Cheddar cheese is consequently scarce, and bought up as soon as it is made.

The cows are mostly of the Devon breed; but many short-horns are also to be found in the dairies. The oxen fatted are either Devons or Herefords and short-horns. Many of the landed proprietors have farms in their own hands, and show their tenants an excellent example in the choice of their cattle and sheep, and in introducing improvements in the cultivation of the soil, so that the state of agriculture has greatly improved within a few years: better implements are used, and more profitable rotations of crops are introduced than in the old triennial system.

The sheep on the best lands are of the Leicester or South Down breeds, with crosses between these and the Cotswold sheep, which increases their size. Some Dorset ewes are kept for early lambs, which are fatted for the Bath and Bristol markets. The railway which now traverses the county will probably increase this species of industry.

There are a few hops grown in the county, but no very extensive hop-gardens; nor is there much cider made, although there are some good orchards.

Many hogs are fatted, and very good bacon is cured; the breed of pigs is like the Hampshire and Berkshire, which have of late years been improved by crosses with the Essex and Neapolitan breeds. Greater attention is paid to the breed of pigs than formerly.

The farm horses are generally strong and active; and although some heavy waggons and old-fashioned ploughs are still met with, light carts and ploughs begin to be appreciated and gradually supersede the old implements. Somerset is decidedly improving in its agriculture, and keeps pace with the progress which is visible throughout the whole kingdom. There are many important fairs in the county. The principal are:—

Ashbrittle, Feb. 25, Oct. 15; Ashcott, Jan. 9; Ashill, Easter Wed., Sept. 12; Axbridge, Feb. 5, Mar. 25, June 11, Oct. 28; Backwell, Sept. 21; Bagber-West, May 12; Banwell, Jan. 18, July 18; Bath, Feb. 14, July 10; Binegar, Whit-Wed. and Th.; Bishop Lydeard, April 5, Sept. 9; Blagdon, last Fri. in Aug.; Bridgewater, 2nd Th. in Lent, June 24, Oct. 2, 3, Dec. 28; Bristol, Mar. 1, Sept. 1; Broadway, Sept. 14; Broomfield, Nov. 13; Bruton, April 23, Sept. 17; Buckland, Oct. 10; Buckland St. Mary, Sept. 21, 22; Burnham, Trinity-Mon.; Castle Cary, Tu. after Palm Sun., May 1, Whit-Tu.; Chard, 1st Wed. in May, Aug., and Nov.; Cheddar, May 4, Oct. 29; Chesilborough, last Th. in Oct.; Cockhill, Jan. 8; Coombe St. Nicholas, June 19, 1st Wed. after Dec. 10; Congresbury, Sept. 14; Crewkerne, Sept. 4; Crowcombe, 1st Fri. in May, Mon. after Aug. 1, Oct. 31; Curryrivel, last Wed. in Feb., first Mon. after Lammas-day; Decuman's, St., Aug. 24, Sept. 17; Dulverton, July 10, Nov. 8; Dundry, Sept. 12; Dunster, Mon. in Whitsun-week; Draycot, Sept. 10; East Brent, Aug. 28; Freshford, Sept. 6; Frome, Feb. 24, July 22, Sept. 14, Nov. 25; Glastonbury, Wed. in Easter week, Sept. 19, Oct. 11; Hinton St. George, April 23; Holloway, May 14; Huntsfield, June 29; Ilchester, Mon. before Palm-Sun., July 2, Aug. 2; Ilminster, last Wed. in August; Ivelchester, Mon.-fortnight before Easter, July 2, Aug. 2; Keynsham, Mar. 24, Aug. 15; Kilmington, Aug. 29; Kingsbrompton, Wed. before Holy Th., Th. se'nnight after Oct. 10; Langport, Mon. before Lent, 2nd Wed. in Aug., 2nd Mon. in Sept., last Mon. in Nov.; Langridge, Aug. 2; Lansdown, Aug. 10; Lifford Green, Holy Th., Aug. 12; Limpsham, April 25; Lyng, last Mon. in Aug.; Martok, Tu. before Whit-Sun., Aug. 10, Sept. 15; Martock, 2nd Th. in Oct.; Milborne Port, June 5, Oct. 28; Mells, Mon. after Trinity, Sept. 29; Midsummer Norton, April 25; Milverton, Easter-Tu., July 25, Oct. 10; Minehead, Wed. in Whitsun-week; Moorlinch, Aug. 20; Montacute, May 9, Sept. 27; North Curry, 1st Tu. in Sept.; North Petherton, May 1, Nov. 7; Nunny, Nov. 11; Otterford, Nov. 28; Pensford, May 6, Nov. 8; Petherton, July 6; Phillips Norton, Mar. 21, 27, May 1, Aug. 29; Pilton (near Shepton Mallet), 1st Mon. after Sept. 10; Portlock, Th. before May 12, October 9, Nov. 12; Portbury, Whit-Mon.; Preddy, Aug. 21, 22; Queen Camel, Trinity Th., Oct. 25; Redlyach, June 29; Road, Mon. after Aug. 29; Ruishton, Whit-Mon.; Samford Arundel, Wed. before Easter, 3rd Tu. in Sept.; Shepton Mallet, Fr. after Whit-Mon., Aug. 8; Snowdon, Whit-Th.; Somerton, Tu. in Passion-week, 3rd, 6th, 9th, and 12th Tu. after, Sept. 30, Nov. 8; South Brent, Oct. 10; South Petherton, July 6; Stavordale, Aug. 5; Stoford, June 11, Sept. 28; Stogursey, May 2, Sept. 12; Stogumber, May 6, Aug. 1; Stoke-under-Hamden, April 25; Stowey, Sept. 18; Stucklebridge, Fr. before Holy Th., Wed. after Oct. 17; Taunton, June 17, July 7, 8, 9; Ubley, Oct. 4; Watchet, Nov. 17, Aug. 23; Wedmore, Aug. 2; Wellington, Th. se'nnight before Easter, Holy Th.; Wellow, May 20, Oct. 17; Wells, Jan. 8, May 14, July 6, Oct. 25, Nov. 30; West Pennard, 1st Mon. in Aug.; Weston Zoyland, Sept. 10; White Down, Whit-Mon. and Tu.; Williton, Trinity-Mon.; Wincanton, Easter-Tu. and Michaelmas-day; Winsham, Whit-Wed.; Wiveliscombe, last Tu. in Feb., May 12, Sept. 25, last Sat. in April; Woolavington, Oct. 18; Wootton Courtney, Sept. 19; Yarlington, Aug. 26; Yeovil, June 28, Nov. 17.

Divisions, Towns, &c.—The county of Somerset is divided, according to Collinson (*Hist. of Somersetshire*), into forty hundreds and seven liberties; but in the Population Returns (1831) two of the hundreds are united with others, and two of the 'liberties' are given as hundreds; thus keeping the number of hundreds forty. The remaining liberties are not noticed. The towns of Bath, Taunton, and Bridgewater, which are given separately in the Population Returns, we have included in the hundreds in which they are respectively situated.

Name of Hundred.	Situation.	Area in Acres.	Pop. in 1831.
Abdick and Bulstone . .	Central	38,070	11,231
Andersfield	Central	10,950	2,764
Bath-Forum (including the City of Bath) . .	N.E.	16,530	59,172
Bempstone	N.W.	24,530	7,328
Brent with Wrington . .	N.W.& Central	18,210	4,828
Bruton	E.	14,250	4,490
Cannington	N.W.	25,480	5,695
Carhampton	W.	60,350	8,102
Catsash	Central	25,340	7,516
Chew and Chewton . .	Central	46,700	17,932
Crewkerne	S.	13,260	6,847
Curry (North)	Central	12,940	4,211
Frome	E.	32,900	19,884
Glaston-twelve-hides . .	Central	24,610	6,366
Hampton and Claverton (liberty or hundred) .	N.E.	2,610	587
Hartcliffe with Bedminster	N.	19,440	17,047
Horethorne	S.E.	26,370	7,663
Houndsborough, Berwick, and Coker	S.	18,890	8,163
Huntspill and Puriton .	N.W.	6,800	2,012
Keynsham	N.	24,520	9,029
Kilmersdon	Central	15,400	6,629
Kingsbury (East and West)	S.W.& S.	36,690	19,962
Martock	Central	6,930	2,841
Mells and Leigh (liberty or hundred)	Central	4,720	1,899
Milverton	S.W.	15,250	4,634
Norton Ferris	E.	18,730	5,092
Petherton (North), including Bridgewater .	Central	26,730	13,697
Petherton (South) . . .	S.	14,680	6,267
Pitney	Central	3,690	1,923
Portbury	N.	23,980	9,333
Somerton	Central	25,450	5,452
Stone	S.E.	10,720	7,433
Taunton and Taunton Dean, including the borough of Taunton . .	Central	43,240	22,427
Tintinhull	Central	7,450	4,492
Wellow	N.E.	21,900	8,974
Wells-Forum.	Central	30,090	11,420
Whitestone, or Whitstone	Central	33,150	12,412
Whitley	Central	49,640	12,794
Williton and Freemanners	W.	114,870	14,717
Winterstoke	N.W.& Central	62,030	19,511
		1,028,090	402,776
Militia under training . .			1,424
			404,200

Liberties, enumerated by Collinson.

Hampton and Claverton.

Mells and Leigh.—These are enumerated above as hundreds.

Easton and Amrill, included in Bath-Forum hundred.

Hinton and Norton, included in Wellow hundred.

East Cranmore, included in Frome and Wells Forum hundreds.

Hill-House, included in Frome hundred.

Witham Friary, included in Frome hundred.

Somersetshire contains the cities of Bath and Wells, and a part of the city of Bristol; the parliamentary boroughs of Taunton, Bridgewater, and Frome; the municipal (but not parliamentary) boroughs of Axbridge, Chard, Glastonbury, Ilchester, Langport, Milborne Port, and Yeovil; and the market-towns of Bruton, Castle Cary, Crewkerne, Dulverton, Dunster, Ilminster, Milverton, Minehead, South Petherton, Shepton Mallet, Somerton, Watchet, Wellington, Wincanton, and Wiveliscombe. To these may be added, as places of some consequence, Bedminster, Backwell, Brislington, Long Ashton, Nailsea, Clevedon, Pill, and Keynsham, all near Bristol; Bathwick, Lyncomb and Widcomb, Bath-Easton, Weston, and Twiverton, all near Bath; Beckington and the other villages supported by the woollen manufacture near Frome, and the villages in the Mendip coal-field north-west of that town; North Petherton and Huntspill, near Bridgewater; Cheddar, Banwell, Burnham, Wedmore, Wrington, and Congresbury, near Axbridge; Merriot, near Crewkerne; East Coker, Montacute, Stoke-under-Hamden, and Martock, near Yeovil; Curry Revel, near Langport; Porlock and Old Cleeve, near the Bristol Channel; Stogumber, between Watchet and Taunton; and Weston-super-Mare on the sea, between Bristol and Bridgewater. Several of these are given in their respective articles [AXBRIDGE; BATH; BRIDGEWATER; BRISTOL; CHEDDAR; FROME; TAUNTON; and WELLS], the others we notice here, giving first the towns in alphabetical order, and the other places according to their locality. All distances from London are computed from the General Post-office.

Bruton is in Bruton hundred, on the river Brue, from which it gets its name, 112 miles west by south from London, by Andover and Amesbury, and 32 miles east by north from Taunton. The manor of Bruton (or, as it is written in Domesday, Brumetone) was held by the kings Edward the Confessor and William the Conqueror; and was granted by the latter to Sir William de Mohun, whose descendants founded here a priory for black canons, on the ruins of a more antient Benedictine monastery. This priory, at the suppression, just before which it was made an abbey, had a yearly revenue of 480*l.* 17*s.* 2*d.* gross, or 439*l.* 6*s.* 8*d.* clear.

The town stands on the right bank of the Brue, which is here a small stream crossed by a stone bridge, and comprehends one main street, clean and well paved, with neatly built houses, and several smaller streets. The church, which is on the left bank of the river, is large; it comprehends a nave, chancel, side aisles, vestry, and two porches, partly of decorated English, partly of perpendicular architecture, with a pinnacled tower at the west end. Dr. Maton (*Observations on the Western Counties*) and Collinson (*Hist. of Somersetshire*) notice a second and more antient tower on one side of the north aisle. There are no remains of the priory, which was near the church: some parts of it were incorporated in a mansion occupied by the Berkeley family, now pulled down. The town-hall contains a court-room, used for petty sessions; the lower part is used as a market-house. There are an Independent meeting-house, and a well endowed and commodious hospital or almshouse, founded by Hugh Saxey, or Sexey, auditor to Queen Elizabeth; the buildings of this hospital form a spacious quadrangle decorated with a statue of the founder in a niche on the south side.

The area of the parish is 3520 acres; the population, in 1831, was 2223, of which 2031 belonged to the town. The principal manufactures are of stockings and silk: in Leland's time the townsmen were 'much occupied with making of clothe.' The market is on Saturday, and there are two yearly fairs.

The living is a perpetual curacy, of the clear yearly value of 138*l.*, with a glebe-house: it is in the archdeaconry of Wells, in the diocese of Bath and Wells.

There were, in 1833, an endowed free grammar-school, founded by Edward VI., with 11 boys on the foundation and 30 others; Sexey's hospital-school, with 15 boys; and eight other day-schools, with 97 boys and 108 girls; and two Sunday-schools, with 99 boys and 110 girls.

Castle Cary is in the hundred of Catsash, 116 miles west by south from London, by Bruton, and 28 miles east by north from Taunton, by Langport and Somerton. It is called Cari in Domesday. The castle was built or strengthened by William Gouel de Percheval, lord of the place in the reign of Stephen; it was twice besieged in the civil wars of that reign, William de Percheval having taken arms against the king. The earthworks alone remain. Charles II. was in this town in disguise after the battle of Worcester.

The town is irregularly built; the principal street, which is partially paved, but not lighted, extends near a mile on the road to Ilchester; the houses are straggling, but neatly built. The small village of Almsford is so near as almost to form part of the town. Castle Cary church is handsome, and on an elevated site; it comprehends nave, chancel, side aisles, and an embattled western tower. Almsford church is small, but neat. There are Independent and Methodist meeting-houses.

The area of Castle Cary parish is 3640 acres; the population, in 1831, was 1794; Almsford has an area of 920 acres; the population was 304; together 4560 acres and 2098 inhabitants. The market, which is very small, is on Tuesday. There are three fairs and seven great cattle markets in the year.

The living of Castle Cary is a vicarage, of the clear yearly value of 312*l.*; that of Almsford is a rectory, of the clear yearly value of 297*l.*, with a glebe-house: both are in the archdeaconry of Wells, in the diocese of Bath and Wells.

There were in the two parishes, in 1833, seventeen day or boarding schools, with 123 boys and 121 girls; and five Sunday-schools, with 86 boys and 94 girls.

Chard is in the hundred of East Kingsbury, 143 miles west-south-west of London, by Salisbury and Shaftesbury, and 13 miles south-east of Taunton. It is written Cerdre in Domesday, at the compilation of which the manor was held by the bishop of Wells. It is asserted to have been a borough by prescription; it sent members to parliament in the reigns of Edward II. and III., but not since.

The town stands on the high ground on the south border of the county, and consists of several streets irregularly laid out, and lighted with gas: the houses are generally well built. The church, which is on the south side of the town, is a large and handsome cross-church; it comprehends a nave, chancel, side aisles, north and south transepts, and a low tower at the west end. The market-house, formerly used as the borough court-house, is an antient building; as is the present town-hall, formerly a chapel. There are meeting-houses for Baptists and Independents.

The area of the parish is 5140 acres; the population, in 1831, was 5141. The manufactures are chiefly of lace and woollen cloth, in which nearly 500 men are employed; to the introduction of these manufactures the increasing importance of the town may be ascribed. The market is on Monday, it is noted for the sale of potatoes; there are three yearly fairs.

The corporation of Chard, under the Municipal Reform Act, consists of four aldermen and twelve councillors. The borough is not to have a commission of the peace, except on petition and grant. The corporation never possessed any jurisdiction. The limits of the borough comprehend nearly the whole town; and it is proposed to enlarge them so as to comprehend the whole; the borough is distinct from the rest of the parish, as respects the maintenance of the poor.

The living is a vicarage, of the clear yearly value of 436*l.*, with a glebe-house; it is in the archdeaconry of Taunton, in the diocese of Bath and Wells.

There were in the parish, in 1833, eight day-schools, one endowed with 15 boys, and seven others, with 110 boys and 105 girls; and three Sunday-schools, with 745 children of both sexes.

Crewkerne is in the hundred of Crewkerne, 135 miles from London, by Salisbury and Shaftesbury, and 19 south-east of Taunton. Crewkerne is written Cruche in Domesday, at the compilation of which it belonged to the king. The town consists of several streets meeting in the market-place, in the centre of which is a commodious market-house; the houses are generally well built. The church is a large cross church, with an embattled tower with pinnacles at the corners, rising from the intersection of the nave and transepts. It is lighted with large windows of perpendicular character, and is remarkable for a small room behind the altar, once used as a confessional. There are meeting-houses for Methodists, Baptists, and Unitarians.

The area of the parish is 5810 acres; the population, in 1831, was 3789. The principal manufacture is of sail-cloth and sacking, which employs a numbers of hands; some dowlas and stockings are also made. There are a well attended corn-market on Saturday and one yearly fair.

The living is a perpetual curacy, of the clear yearly value of 158*l.*, in the archdeaconry of Taunton, in the diocese of Bath and Wells.

There were in the parish, in 1833, seven infant or dame schools, with 121 children of both sexes; a well endowed free grammar-school, with 14 boys; and six other day-schools (two of them with small endowments), with 80 boys and 70 girls; and four Sunday-schools, with 304 boys and 270 girls.

Dulverton is in the hundred of Williton and Freemanners, 167 miles west by south from London by Andover, Frome, and Bridgewater, and 24 miles west of Taunton. It was a royal manor at the compilation of 'Domesday,' in which it is called Dolvertune. The town stands in a deep valley, watered by the Barle (a feeder of the Ex), over which there is a stone bridge of five arches. The hills round are richly wooded. The town consists of two well-paved streets, with channels of water running through them: the houses are mostly well built. The church is an antient building, comprising nave, chancel, and two side aisles, with an embattled tower, 60 feet high, at the west end. There is an Independent meeting-house.

The parish has an area of 7760 acres, and had, in 1831, a population of 1285. The silk manufacture is carried on on a small scale. The market is on Friday, and there are two yearly fairs.

The living is a vicarage, in the archdeaconry of Taunton, in the diocese of Bath and Wells, of the clear yearly value of 322*l.*, with a glebe-house.

There were in the parish, in 1833, five infant or dame schools, with 37 boys and 49 girls; two day-schools (one endowed) and one boarding-school, with 59 boys and about 30 girls; and two Sunday-schools, with about 124 children.

Dunster is in the hundred of Carhampton, 165 miles west by south from London through Frome and Bridgewater, and 21 miles west-north-west of Taunton. The West Saxon kings had a fortress here during the period of the Heptarchy. It was called Torre (tower), by which name it appears in 'Domesday,' where the manor is said to belong to William de Moion (or Mohun), who had his castle here. This castle afterwards obtained the name of Dunes-torre (tower on the downs), now Dunster. The De Mohuns supported the empress Maud against Stephen. In the reign of Edward III. the castle passed by sale, on the failure of the male line of the De Mohuns, to the Luttrell family, by which it is still held. It was a military post of the Royalists in the civil war of Charles I., and was afterwards the place of confinement of Prynne. Dunster sent members to parliament as early as the time of Edward III., and was in later times united in the exercise of the franchise with the adjacent borough of Minehead, until its disfranchisement by the Reform Act. There was a Benedictine priory here, founded by the De Mohuns, a cell of the abbey of St. Peter at Bath: its yearly revenue at the suppression was 37*l.* 4*s.* 8*d.*

The town stands at the eastern foot of Grabbist Hill, at the end of a narrow valley which here opens upon the Bristol Channel, the shore of which is a mile north-east of the town. A small stream which drains the valley runs near the town, and is crossed by a stone bridge of three arches. There are two principal streets, at the southern end of one of which is the castle, a building of the Elizabethan period and style, having behind it a richly wooded park, commanding a beautiful and extensive prospect. The church is a fine spacious building of perpendicular architecture, built in the reign of Henry VII. It consists of a nave, chancel, and aisles, west of the central tower, and a disused portion east of it. Before the suppression of the priory (which was adjacent to the church, and of which some remains still exist), in consequence of a dispute between the parishioners and the monks, the eastern part of the church was separated for the use of the monks, since whose time it has been neglected: it contains several monuments of the De Mohuns and Luttrells. There is an old market-house in the town.

The parish of Dunster contains 2500 acres: the population, in 1831, was 983. The market is on Friday, and there is one yearly fair.

The living is a perpetual curacy, in the archdeaconry of Taunton, in the diocese of Bath and Wells, of the clear yearly value of 130*l.*

There were in the parish, in 1833, an endowed day-school, with 30 children of both sexes; another day-school with 21 boys and 17 girls; and one day and Sunday school, supported by contributions, for 30 girls.

Glastonbury is in the hundred of Glaston-twelve-hides, 127 miles west by south from London by Amesbury, Frome, and Shepton Mallet, and 22 miles east-north-east from Taunton. The eminence on which the town stands is nearly insulated by the surrounding marshy flats, and was called by the Britons 'Ynswytryn,' or 'Ynys-wytryn, the glassy island,' afterwards 'Avalon;' the meaning of the latter name is disputed, as well as the reason for which the former was given. Monkish legends ascribed the foundation of a Christian church on this spot, said to be the first in England, to Joseph of Arimathea, the supposed apostle of the British Islands; and a species of thorn, still existing in the neighbourhood, which blossoms in the winter, was long believed to have sprung from his walking-staff which he stuck in the earth. A monastery or abbey was certainly established here at an early period, in the precincts of which the semi-fabulous British chieftain Arthur was said to be buried. A leaden cross, bearing the following Latin inscription, 'Hic jacet sepultus inclitus rex Arthurus in insula Avallonia,' was found under a stone seven feet beneath the surface; and nine feet below this an oaken coffin, inclosing dust and bones, was discovered. Of this discovery, which took place in the time of Henry II., and is recorded by Giraldus Cambrensis, who was an eye-witness, there can be no doubt, though the genuineness of the remains has been questioned. Upon the establishment of the Saxons, the spot obtained a new designation, Glaestingbyrig, the first part of which appears to be the Saxon equivalent for its British name 'Wytryn.' The monastery, which had fallen into decay, was rebuilt with great splendour by Ina, king of Wessex (about A.D. 708), and the establishment, enriched by the liberality of successive princes, flourished till the period of the Danish incursions, under Ethelred I. and Alfred the Great, the West Saxon princes. Under the abbacy of the famous Dunstan [DUNSTAN, SAINT], and by the munificence of the Anglo-Saxon kings Edmund I. and Edgar, it regained its former prosperity, and was conformed to the rule of the Benedictines. At the Conquest, the abbot of Glastonbury was a personage of importance in the Anglo-Saxon state; but the jealousy of William, who deposed the abbot and substituted a Norman in his room, and stripped the abbey of many of its lands, depressed the establishment for awhile; but it was restored by the carefulness and influence of subsequent abbots. The buildings were in great part rebuilt in the reigns of Stephen and Henry II., and were subsequently repaired or enlarged. It became soon after this time a mitred abbey, and was for a short period annexed to the bishopric of Wells, which was during this interval called the bishopric of Glastonbury. At the time of the suppression, Richard Whiting, the abbot, who resisted the measures of Henry VIII., was, upon a charge of embezzling the conventual plate, tried, and hanged on the adjacent eminence of the Tor Hill, A.D. 1539. The yearly revenue at the dissolution was 3508*l.* 13*s.* 4¾*d.* gross, or 3311*l.* 7*s.* 4¼*d.* clear. Some idea of the extent and magnificence of the abbey may be formed from the statements given in Dugdale's 'Monasticon' (last edition) of the abbot's munificence, and from an enumeration, at the time of the suppression, of nearly eighty apartments, offices, &c. contained in the precincts, which included a space of 60 acres. The reputation of Glastonbury for sanctity did not cease at the Reformation. As late as A.D. 1750 and 1751, a number of invalids, to the number in one month (May, 1751) of ten thousand, flocked to Glastonbury in consequence of the account of a wonderful, not to say miraculous, cure wrought by drinking the water of a spring near the town. We are not told how long the delusion lasted.

The town consists of several streets; four of these inclose a quadrangular space, in which the ruins of the abbey are comprehended; and from the corners of this quadrangle other streets extend. The houses are generally low, and many of them have been built with the stones taken from the ruins of the abbey. The remains of this splendid structure consist of some fragments of the church, the chapel of St. Joseph of Arimathea, and what is called the abbot's kitchen. The ruins of the church, which was cruciform, comprehend two of the pillars which supported the central tower, some portions of the walls of the choir, and a fragment of the wall of the nave. The architecture belongs to the period of transition from the Norman to Early English, with some portions of later date. The whole length of the church was 380 feet, the breadth of the choir and its aisles 70. St. Joseph's chapel is in better preservation than the church, at the west end of which it is placed, and with which it communicates by an ante-chapel, of somewhat later date; both however belong to the same transition period as the church, but are of a more enriched character: the length of the chapel and ante-chapel together is 110 feet, the breadth 25 feet. The abbot's kitchen is a small building, square externally, but octagonal within: it is in a very perfect state, and belongs to the late perpendicular period. The roof is surmounted by a double lantern. Glastonbury has two parish churches, St. John and St. Benedict, both elegant structures in the perpendicular style, with graceful towers; and in the town are several buildings which were formerly dependencies of the abbey: the George Inn, one of these, offers a good specimen of late perpendicular. On a hill near the town is what is called 'the Tor,' a tower, which is the only remain of a chapel dedicated to St. Benedict. It is of the decorated English character, of beautiful though simple composition, and very perfect in its details. There are places of worship for Independents, Baptists, Wesleyans, and Quakers.

The area of the parishes, and their population, in 1831, were as follows:—

	Area.	Pop. in 1831.
St. John . . .	6107½ acres.	2501
St. Benedict . .	1109	483
	7216	2984

Some hosiery and coarse gloves are manufactured. The market is on Saturday, and there are four yearly fairs.

The municipal borough comprehends nearly the whole of the two parishes; but it is proposed to contract the limits. The town was incorporated in the reign of Anne, from whom it received its only charter. The Municipal Reform Act assigns to it 4 aldermen and 12 councillors; it is not to have a commission of the peace, except on petition and grant. Glastonbury is not a parliamentary borough.

The living of St. John is a perpetual curacy, to which the chapelry of St. Benedict is united: their joint yearly value is 195*l.*, with a glebe-house: they are in the diocese of Bath and Wells, and, with several adjacent parishes, constitute the peculiar jurisdiction of Glaston.

There were in the two parishes, in 1833, one infant school, with 39 boys and 31 girls; nine boarding or day schools (three of them partially supported by endowment or subscription), with 89 boys, 51 girls, and 85 children of sex not stated; and three Sunday-schools, with 148 boys and 150 girls.

Ilchester or Ivelchester (from the river Ivel or Yeo, on which it stands) is in the hundred of Tintinhull, 124 miles west by south of London by Andover and Amesbury, and 22 miles east of Taunton by Langport. This town is of great antiquity: the British name is given by Nennius as Caer Pensavelcoit, which is said to signify 'the city at the head of the river's mouth in the wood:' it was the Ischalis of the Romans, mentioned by Ptolemy, who writes it Ἴσχαλις, as one of the chief towns of the Belgæ. The Roman town was defended by a wall and deep ditch, comprehending an oblong quadrangle, through which the Foss-way [Foss] passed from north to south. The ditch and the foundations of the wall may be traced in many places, the latter consisting of brick and stone work regularly mingled. Roman hypocausts and baths, tessellated pavements, urns, lacrymatories, pateræ, fibulæ, bracelets, and other relics of antiquity have been repeatedly discovered, and medals, especially of Vespasian, Trajan, and Antoninus Pius. 'Vast arches and immense foundations of antient buildings,' says Collinson, 'lie beneath the surface of the ground, and the entire site of the old city is filled with subterraneous ruins.' Some traces of the paved ford by which the Foss was carried across the river are still visible near the bridge. Under the Saxons, who called the place Givel-cestre, it was a place of note, and at the time of the Domesday Survey contained 107 burgesses, who had a market. It was besieged without success, A.D. 1088, by the forces of the lords, who had espoused the claim of Robert of Normandie to the crown against William Rufus. It sent members to parliament in the reigns of Edward I. and Edward II., and in the reign of Edward III. the county courts and assizes were ordered to be held here, but the elective franchise was suspended till the reign of Edward IV., and then again suspended after a short interval till the reign of James I.: it was disfranchised by the Reform Act. There were three religious establishments in the town; an hospital called White Hall, subsequently converted into a nunnery, and then into a free chapel; a house for lepers, with a chapel annexed; and a house of Dominican or Black friars.

The town is in a rich valley, and may be considered as consisting of two parts, Ilchester proper and the village of Northover; these are separated by the river Yeo or Ivel, which is crossed by a stone bridge of two large arches. Ilchester proper consists of four streets of indifferently built houses; and there are some large piles of building, formerly inhabited in separate apartments by burgage tenants, for whom these dwellings were erected by the patrons of the borough. The church is an antient building, consisting of a nave, chancel, and north aisle or chapel, with a low octagonal tower, 'constructed,' says Collinson, 'of Roman stone.' The county gaol, which is still at Ilchester, though the assizes are no longer held here, is a spacious building of freestone from Hamden hill. The town-hall is a neat modern building at one end of the market-place, at the other end of which is a sun-dial with four faces, supported by a Doric pillar. There are some remains of the Dominican friary, used some years since as a silk-factory: those of White Hall were removed some time since.

The parish comprehends an area of 690 acres; the population in 1831 was 975, without reckoning the inmates of the county gaol; to this statement we may add 220 acres and 138 inhabitants for Northover: total 910 acres, 1113 inhabitants. The trade of the place is trifling; some women are engaged in the glove manufacture, of which Yeovil is the centre. The market has been discontinued, and two of the three yearly fairs are falling into neglect. The corporation still exists, but it exercises no jurisdiction, and is of little importance; it was not included in the Municipal Reform Act.

The living of Ilchester is a rectory, in the archdeaconry of Wells, in the diocese of Bath and Wells, of the clear yearly value of 282*l.*; that of Northover is a vicarage, of the clear yearly value of 106*l.*

There were in the parish, in 1833, two day-schools, with 62 children (31 boys and 31 girls), and two Sunday-schools, with 73 children (42 boys and 31 girls).

Ilminster is in the hundred of Abdick and Bulstone, 136 miles west by south of London by Ilchester, and 12 miles south-east of Taunton. It was a market-town at the time of the Domesday Survey, when it belonged to the Benedictine abbey of Micelenie, now Muchelney, near Langport, and was called Ileminstre. The town is in a low but pleasant situation, about a mile distant from the river Isle or Ile, from which it derives its name: it consists principally of two streets forming a cross; the longer of these extends nearly a mile from east to west: the houses are neat and well built. The church is a large cross church, in the centre of the town, and consists of nave, chancel, transept, north and south aisles, and porch; at the east end is a small vestry, formerly a chantry chapel. There is a handsome tower, at the intersection of the cross, of light and uncommon construction, crowned with twelve pinnacles. The general character of the architecture is perpendicular. There are meeting-houses for Wesleyans, Independents, and Unitarians; and a neat market-house.

The area of the parish is 4390 acres; the population in 1831 was 2957. The woollen-cloth and silk and lace manufactures are carried on in a small way, and there are some tan-yards and a considerable malt-trade. The market is on Wednesday, and there is one yearly fair.

The living is a vicarage, in the archdeaconry of Taunton, in the diocese of Bath and Wells, of the clear yearly value of 200*l.*, with a glebe-house.

There were in the parish, in 1833, one dame-school; a well endowed grammar-school, with 20 boys on the foundation and about 100 others; another school of 50 boys and 40 girls, supported from the same property as the grammar-school; a third endowed school, with 27 children of both sexes; and thirteen other day-schools, with 237 children of both sexes; and four Sunday-schools, with 340 children.

Langport is in the hundred of Pitney, 131 miles west by south from London, and 13½ miles east of Taunton. It was a borough at the time of the Domesday Survey, and was held of the king; it had 34 burgesses, and was called Lanporth. A severe encounter took place here in the civil war of Charles I. (A.D. 1645), between a Royalist detachment of Lord Goring's army and a Parliamentarian force: the Royalists were beaten with considerable loss.

The town is at the junction of the Ivel and Parret, and is on the slope and at the foot of the hills which overlook the marshy flats adjacent to those rivers: the lower part of the town near the river is liable to be flooded. The principal street leads down the hill to the Parret, over which was a bridge of ten arches: this bridge is now pulled down, and a handsome bridge of three arches is erected on the site (1840-1). There are several other bridges or arches, either over arms of the river, or designed to allow a passage to the waters in the time of floods. The town is well lighted with gas, and paved throughout. A small part of the town lies west of the Parret, and is distinguished as Langport Westover, from the principal part, which is 'Langport Eastover.' The village of Huish Episcopi, or Bishop's Huish, in the hundred of Kingsbury East, is so near to Langport on the east side of the town as to form part of it. Langport church consists of nave, chancel, north and south aisles, two chapels, and a vestry-room, with a good western tower. There is an antient building with an arched gateway under which the road to Yeovil passes: it is popularly called Hanging Chapel, a name which it perhaps owes to its having been a place of execution after Monmouth's rebellion: it is now used as a museum. There are an Independent meeting-house and a neat guild-hall. On a bridge of one arch, near the middle of the town, the Register-office, an elegant little building, has lately been erected. There is also a public reading-room. The church of Bishop's Huish has a fine tower with eight pinnacles.

The parish of Langport has an area of 660 acres; the population in 1831 was 1245; to this may be added 1780 acres, and 574 inhabitants, for Bishop's Huish: together 2440 acres and 1819 inhabitants. The chief business of the place is the import of coal, iron, timber, and other articles from London, Bristol, and Wales, by means of the navigation of the Parret, which is now made navigable for several miles above Langport bridge by means of locks. The market is on Saturday, and there are four yearly fairs.

Langport is a borough; the corporate body consists of a portreeve and two bailiffs chosen yearly, and nine other capital burgesses: the portreeve and recorder are magistrates, and petty sessions are held occasionally, but the borough court of record is disused. The corporation keep the bridges in repair. Langport sent members to parliament in the reign of Edward I.

The living of Langport is a chapelry, annexed to the vicarage of Huish Episcopi; their joint clear yearly value is 210*l.*, with a glebe-house: they constitute a peculiar of the archdeacon of Wells.

There were in the two parishes, in 1833, one infant-school with 70 children; an endowed grammar-school with 30 boys; a national day and Sunday school with 80 children; eight other day or boarding schools, with 102 children; and one Sunday-school with 50 boys and 40 girls.

Milborne Port is in the hundred of Horethorne, 117 or 118 miles west-south-west of London by Salisbury and Shaftesbury, and 34 miles east by south of Taunton by Ilminster and Yeovil. It was a borough and market-town at the time of the compilation of Domesday, in which it is called Mileburne and Meleburne, and is recorded to contain 56 burgesses. It sent members to parliament in the time of Edward I., after which it ceased to send them till the reign of Charles I., when it regained the franchise, which it finally lost by the Reform Act.

The town is pleasantly situated in a valley near the sources of the Yeo: it consists chiefly of detached houses, and is irregularly built; it is small and of mean appearance. The church is a large cross church, with a square tower: there is an antient town-hall with a curious Norman doorway, and there are an Independent and a Wesleyan meeting-house.

The parish comprehends an area of 3150 acres, with a population, in 1831, of 2072. Leather-dressing and glove-making are carried on, having replaced the manufacture of woollen-cloth, linen, and hosiery, which formerly existed. The market is discontinued, but there are two yearly fairs. The corporation still exists, and consists of nine proprietors of certain pieces of land or burgage tenements; two of whom are annually appointed 'reigning bailiffs.' The borough is not noticed either in the Reports of the Commissioners of Municipal Corporations or in the Municipal Reform Act.

The living is a vicarage, in the archdeaconry of Wells, in the diocese of Bath and Wells, of the clear yearly value of 233*l.*, with a glebe-house.

There were, in 1833, five dame-schools, with 91 children of both sexes; five other day-schools, with 156 children; and three Sunday-schools, with 315 children.

Milverton is in the hundred of Milverton, 152 or 153 miles west by south of London, and 8 miles west of Taunton. It was a market-town at the time of the compilation of Domesday, and belonged then to the king, but had previously belonged to the bishop of Wells. The town is pleasantly situated in a valley drained by a feeder of the Tone, and surrounded by wooded hills. It consists principally of three streets, irregularly laid out, and neither paved nor lighted. The church is a spacious building of perpendicular character; there are meeting-houses for Quakers and Independents.

The area of the parish is 6400 acres: the population in 1831 was 2233. The only manufacture is of woollen-cloth; formerly druggets and serges were made to considerable amount: stone is quarried in the parish. The market is on Friday, and there is one yearly fair.

The living is a vicarage, united with the chapelry of Langford Budville, both in the peculiar jurisdiction of the archdeacon of Taunton, of the clear yearly value of 449*l.*, with a glebe-house.

There were in the parish, in 1833, a day-school with 90 boys and 59 girls, partly supported by endowment; and eight other day-schools or boarding-schools, with 104 boys and 79 girls; and one Sunday-school with 187 boys and 148 girls.

Minehead is in the hundred of Carhampton, 167 miles west by south of London, and 23 miles west-north-west of Taunton. It is written in Domesday Manheve, and was held by Willelmus de Moion. The town was incorporated by Queen Elizabeth, and returned two members to parliament, until disfranchised by the Reform Act. The corporation has fallen into disuse.

The town consists of three parts: the upper town, comprehending the church and some streets of mean houses, irregularly laid out, on the eastern slope of Greenaley Hill, which rises to the height of 600 feet, and is cultivated on the land side to the very top; the lower town, which is the principal part, and has some respectable streets; and the Quay-town along the shore. The church is large and handsome, with an embattled tower, 90 feet high, at the west end: it contains a monument with an effigy, but with the inscription obliterated, supposed to be that of the antient law-writer Henry de Bracton; there is also an alabaster statue of Queen Anne. There are a Baptist meeting-house and an alms-house. At Quay-town is a quay, faced with masonry and with a parapet towards the sea: also a custom-house.

The area of the parish is 3780 acres; the population in 1831 was 1481. The trade of the port a century ago consisted in the import of woollen-yarn, raw-wool, linens, and hides, chiefly from Ireland; and in the export of coals and oak-bark to Ireland, and of herrings to the Mediterranean. At present only a few vessels belong to the port, which export grain, malt, flour, and hides to Bristol and to Wales; and import groceries and iron from the former, and coal and culm from the latter. The herring fishery is carried on along the coast. The market is on Wednesday, and there is one yearly fair. Minehead is sometimes resorted to by invalids on account of the mildness of the climate.

The living is a vicarage, in the archdeaconry of Taunton, in the diocese of Bath and Wells, of the clear yearly value of 200*l.*, with a glebe-house.

There were in the parish, in 1833, six day or boarding-schools, with 75 boys and 92 girls; and two Sunday-schools, with 83 boys and 79 girls.

South Petherton is in the hundred of South Petherton, 131 miles west by south of London through Andover, Amesbury, and Ilchester, and 17 miles south-east of Taunton through Ilminster. Considerable Roman remains have been found at Wigborough in this parish, which is supposed to have been the site of a Roman town. The Anglo-Saxon kings had a palace at South Petherton. The town is called in Domesday Sudperet. It is about a mile west from Petherton bridge (a stone bridge of three arches, adorned with the figures, in stone, of two children who were drowned in the river, and by whose parents the bridge was built) over the Parret: and consists of several streets or lanes irregularly laid out. The church is cruciform, and consists of nave and chancel, with side aisles and transept; and a plain octangular tower at the intersection. There are meeting-houses for Independents and Wesleyan Methodists.

The area of the parish is 3410 acres; the population in 1831 was 2294; some stone is quarried in the parish; there are two small weekly markets and one yearly fair.

The living is a vicarage, of the clear yearly value of 475*l.*, with a glebe-house; in the archdeaconry of Taunton, in the diocese of Bath and Wells.

There were, in 1833, one endowed day-school with 20 boys; four other day-schools, with 42 boys and 49 girls; and four Sunday-schools, with 150 boys and 174 girls.

Shepton Mallet is in the hundred of Whitestone, 118 miles west by south of London through Andover, Amesbury, and Frome, and 32 miles east-north-east of Taunton. It is called Sepeton in Domesday; but, becoming afterwards part of the territory of the Malet family, took the additional designation of Mallet. The town is situated in a valley watered by a small feeder of the Brue, and consists of several streets, irregularly laid out; the principal street, which runs north and south, is broad and well built, and is paved and lighted. The church is a large and handsome cross church, on the east side of the market-place: it comprehends a nave, chancel, side aisles, transept, two chapels, and a chantry, now used as a vestry-room. There is a tower at the west end crowned with a spire. There are Unitarian, Independent, and Methodist meeting-houses, a Catholic convent, and a nunnery. The county bridewell is at Shepton Mallet. In the market-place is an antient market-cross.

The area of the parish is 3770 acres; the population in 1831 was 5330. The principal manufactures are of woollen-cloth, sorge, sail-cloth, and silks, which employed, in 1831, 109 men, besides women and children. The markets are on Tuesday and Friday; the latter is a considerable corn market · there are three yearly fairs.

The living is a rectory, of the clear yearly value of 553*l.*, with a glebe-house, in the archdeaconry of Wells, in the diocese of Bath and Wells.

There were in the parish in 1833 twenty-seven day-schools of all kinds (including four boarding-schools, a national school, and another school supported by subscription), with 236 boys, 216 girls, and 60 children of sex not stated; one evening (national) school with 20 children; and four Sunday-schools, with 627 children. There is a foundation for a grammar-school, but the school was, in 1833, in abeyance.

Somerton is in the hundred of Somerton, 127 miles west by south of London, and 17½ miles east by north of Taunton. It was a fortified town in the time of the Heptarchy, and the West Saxon kings had a palace here. It was plundered by the Danes about A.D. 877, but recovered its importance, which is attested by its having given name to the county. It is called Summertone in 'Domesday.' The town has a neat and respectable appearance: it stands on a hill on the left bank of the Carey, over which is a stone bridge, and consists of about five narrow streets, the houses of which are built of blue lias from quarries in the neighbourhood. The church is antient, and consists of nave, chancel, side aisles, porch, and vestry, with an octangular embattled tower on the south side. There are an Independent meeting-house and a range of almshouses.

The parish comprehends an area of 6030 acres, with a population, in 1831, of 1786. The market is on Tuesday, and there are seven fairs in the year. Alabaster and lias are quarried near the town.

The living is a vicarage, in the archdeaconry of Wells, in the diocese of Bath and Wells, of the clear yearly value of 259*l.*

There were in the parish in 1833 an infant-school, partly supported by contribution, with 40 boys and 30 girls; an endowed day-school, with 12 boys; three other day-schools, with 21 boys, 40 girls, and 60 children of sex not stated; and two Sunday-schools, with 93 boys and 90 girls.

Watchet is in the parish of St. Decuman, in the hundred of Williton and Freemanners, 159 or 160 miles west by south of London by Shepton Mallet and Bridgewater, and 19 miles north-west of Taunton. It was attacked, but in vain, by the Danes in their war with Edward the Elder, but was twice taken, and the last time entirely ruined, by them in their war with Ethelred II.

The town stands on the coast of the Bristol Channel, and is at the mouth of a small rivulet: cliffs extend along the coast on both sides of the town, which consists of four streets, mostly paved. The parish church of St. Decuman's is in the village of that name, about a mile south of the town, and is a large handsome church, consisting of a nave, two side aisles, and a chancel, with an embattled western tower 80 feet high. There is a chapel at the village of Williton in the parish, and four antient stone crosses in the same village. There are in the town of Watchet meeting-houses for Baptists and Wesleyans.

The area of the parish is 3250 acres; the population in 1831 was 2120. There is a small harbour, formed by a pier, and some coasting trade is carried on; coals are imported from Wales, and lime and alabaster are (at least were) exported. There is a market on Saturday, and one yearly fair.

The living of St. Decuman's is a vicarage, of the clear yearly value of 134*l.*, in the archdeaconry of Taunton, in the diocese of Bath and Wells.

There were in the parish in 1833 eight day-schools, with 103 boys and 97 girls; and four Sunday-schools, with 175 boys and 160 girls.

Wellington is in the hundred of West Kingsbury, 151 miles west by south of London by Andover, Amesbury, Somerton, and Taunton, and 7 miles south-west of Taunton. The manor of Wellington was bestowed by Alfred the Great on his friend and biographer Asser, bishop of Sherborne, and on his death was transferred to the bishop of the newly-erected diocese of Wells, by whose successor it was held at the time of the Domesday Survey, in which it is written Walintone.

The town is situated on high ground about a mile and a half south of the Tone, and consists chiefly of two streets intersecting in the middle of the town; one of them is along the road from Taunton to Exeter. Considerable improvements have been made of late years by paving the streets and removing old houses. The church is at the north-east end of the town, and is a fine Gothic building, consisting of nave, chancel, side aisles, two small chapels, vestry-room, and porch, with a handsome embattled western tower, crowned with twelve pinnacles: it contains a fine monument of Chief Justice Sir John Popham. There is an Episcopal chapel at the west end of the town: and there are meeting-houses for Baptists, Independents, Methodists, and Quakers.

The area of the parish is 4830 acres; the population in 1831 was 4762. The woollen manufacture is carried on to some extent: it gave employment in 1831 to 258 men. The market, which has declined of late years, is on Thursday; and there are two yearly fairs.

The living is a vicarage, united with the chapelry of West Buckland, in the peculiar jurisdiction of the bishop of Bath and Wells: their joint clear yearly value is 894*l.*, with a glebe-house.

There were in the parish of Wellington in 1833, two infant schools, with 82 boys and 90 girls; and three dame-schools, with 24 boys and 28 girls; nine other day-schools, with 124 boys and 90 girls; and five Sunday-schools, with 262 boys and 335 girls.

The Duke of Wellington derives his title from this town, and he is lord of the manor of Wellington. A pillar in commemoration of the Battle of Waterloo has been erected by subscription in the neighbourhood of the town.

Wincanton or Wincaunton is in the hundred of Norton Ferris, 111 miles west by south of London by Andover and Amesbury, and 35 miles east of Taunton by Langport and Ilchester. Some Roman antiquities have been found in and near the town. It is called Wincaleton in 'Domesday,' a name embodying that of the river Cale, an affluent of the Dorsetshire Stour, on which it stands. The town consists of four principal streets, through one of which the road from London to Exeter by Ilchester and Honiton runs: the houses are commonly well built and regular, which is partly owing to their having been rebuilt after an extensive conflagration in 1747. The church is a tolerably large and plain building, consisting of nave, chancel, side aisles, and western tower. There are meeting-houses for Independents and Baptists.

The area of the parish is 3860 acres; the population in 1831 was 2123. Dowlas and bed-ticking are made, but not to the same extent as formerly. The market is on Wednesday, and there are two yearly fairs. The living is a perpetual curacy, in the archdeaconry of Wells, in the diocese of Bath and Wells, of the clear yearly value of 123*l.* There were in the parish, in 1833, eleven day or boarding schools, with 100 boys and 94 girls; and three Sunday-schools, with 150 boys and 155 girls.

Wiveliscombe is in the hundred of West Kingsbury, 156 or 157 miles west by south of London through Taunton, and 12 miles west of Taunton. On a hill a mile eastward of the town is a camp, described by Collinson as Roman, and within which Roman coins have been found. During the inroads of the Danes this camp was occupied by them, but when peace was restored the Saxons built the town of Wiveliscombe in the subjacent valley. The town is in a valley or 'combe,' enclosed by hills on all sides except the south-east: it is irregularly laid out, but consists for the most part of neat and well-built houses. The church consists of a nave and side aisles, with a western tower and spire. There are Independent and Wesleyan meeting-houses, an infirmary, and the ruins of an old residence of the bishops of Wells.

The area of the parish is 5310 acres; the population in 1831 was 3047. The woollen manufacture is carried on, but not to any great extent. The markets are on Tuesday and Saturday; the former is a considerable corn-market, and the market on the first Tuesday in February is also a great cattle-market. There are two yearly fairs. The town is governed by a bailiff and portreeve, who, with other officers, are chosen annually at the court leet.

The living is a vicarage, in the peculiar jurisdiction of the bishop of Bath and Wells, of the clear yearly value of 300*l.*, with a glebe-house. There were in the parish, in 1833, fifteen day or boarding schools, with 135 boys and 156 girls; and three Sunday-schools, with 140 boys and 130 girls

Yeovil is in the hundred of Stone, or, as it is sometimes called, Stone and Yeovil, 125 miles west-south-west of London through Salisbury and Shaftesbury, and 26 miles east by south of Taunton. Roman coins and tessellated pavements have been found here: the town was called Gevele by the Saxons, and Ivle and Givele in 'Domesday,' which names may be identified with that of the river Ivel or Yeo, near which it stands. The town consists of a number of streets and lanes irregularly laid out, paved and lighted: some of the streets are spacious, and are lined with good houses of brick or stone. The church is a handsome cross church of perpendicular character: it comprehends a nave, a large chancel, side aisles, and transept, with a large plain western tower 90 feet high. It stands in a large churchyard surrounded with lime-trees. An antient building, probably a chapel, adjacent to the church, is now used as a school. There are meeting-houses for Independents, Baptists, Methodists, and Unitarians; and a range of almshouses well endowed.

The area of the parish is 3890 acres; the population in 1831 was 5921. The town is the centre of a considerable glove-manufacture, which in 1831 employed 300 men, beside women and children. The market is on Friday, and is an important market for the sale of corn, cattle, butter, cheese, hemp, and flax. There are many dairy-farms in the surrounding district, from which a good deal of butter is sent to London. There are two yearly fairs. Yeovil is incorporated, but the borough does not include more than one-third of the town: it is not noticed in the Municipal Reform Act. A court for the recovery of small debts is held every three weeks.

The living is a vicarage, united with the chapelry of Preston, in the archdeaconry of Wells, diocese of Bath and Wells, of the clear yearly value of 391*l.*, with a glebe-house.

There were in the parish, in 1833, twelve day or boarding schools, with 239 boys and 132 girls; and five Sunday-schools, with 307 boys and 323 girls.

Of the places near Bristol, Bedminster (population in 1831, 13,130) is a suburb of Bristol, and the parish is now almost entirely included in the municipal and parliamentary boundaries of that city. There is a church, which has various antient portions, amid additions and alterations of a later date; there are also a district church or chapel (St. Paul's) and several dissenting meeting-houses. There are rope-walks and tan-yards, and the place shares in the commerce of Bristol. In the outparts of the parish are numerous coal-works and market-gardens for the supply of Bristol. Bristol gaol is in Bedminster. The living is a vicarage, of the clear yearly value of 362*l.*, with a glebe-house, and the vicar presents to the chapel of St. Paul's, the benefice of which is of the clear yearly value of 180*l.*, with a glebe-house. Both are in the archdeaconry of Bath, and diocese of Bath and Wells. Long Ashton (population in 1831, 1423) and Brislington (population 1294) are distant about three miles, one south-west, the other south-east of Bristol. Long Ashton has iron-works and collieries. There are in the parish two remarkable camps, on the hills overlooking the Avon, opposite Clifton, and a neat and elegant church of perpendicular character. Brislington has a very extensive and complete private lunatic asylum. Backwell, just under Broadfield Down (population in 1831, 1038), has collieries. Nailsea, eight miles west by south of Bristol (population in 1831, 2114), gives name to the adjacent coal-field, the pits of which employ a considerable number of men; there are also stone-quarries and important crown-glass works. Clevedon (population in 1831, 1147) and Portished (population 800), on the Bristol Channel, one 12 or 14 miles west by south from Bristol, the other nearer, are resorted to as bathing-places. Pill, or Crockern Pill, in the parish of Easton-in-Gordano (population in 1831, 2255), is a pilot-station on the Avon below Bristol. Several Roman antiquities have been found here: there are an episcopal chapel and several dissenting meeting-houses. Keynsham (population in 1831, 2142), nearly midway between Bath and Bristol, was formerly a market-town. It has a spacious church of perpendicular character, which exhibits some good portions. There are flax-manufactories, which in 1831 employed 79 men, and some copper-mills near the town. It has an almshouse and an endowed school.

Bathwick (population in 1831, 4033) and Lyncombe, and Widcomb (population 8704), are suburbs of Bath, and by late acts are included both in the parliamentary and municipal boundaries. Bathwick is separated from Bath proper by the Avon, which is here crossed by Pulteney Bridge. By the extension of the buildings in later years, some of the finest parts of Bath (Pulteney Street, Laura Place, and Sydney Gardens) are in Bathwick. The Kennet and Avon Canal and the Great Western Railway run through the parish. Many Roman antiquities have been found at Bathwick. Lyncombe and Widcomb parish is separated from Bath by the Avon: it contains a number of streets, which may be considered as forming the manufacturing part of Bath; and a number of detached villas or rows of good private houses, rather more distant from the town. The valley of Lyncombe is very beautiful, and, considering its proximity to so large a city, remarkably secluded. The woollen-manufacture in 1831 employed 565 men. Bath-Easton (population 1783) is about two miles north-east of Bath, on the London road. The church has a beautiful embattled tower, 100 feet in height. Weston (population 2560) is about the same distance west-north-west of Bath. Twiverton (population 2478), about the same distance west of Bath, on the south bank of the Avon, and on the road to Bristol, is the seat of a considerable cloth manufacture, which in 1831 employed 284 men.

Beckington (population in 1831, 1340), three miles north-north-east of Frome, Road (population 954), five miles distant in the same direction, and Berkeley (population 531), two miles east of Frome, are all engaged in the woollen manufacture, of which Frome is the centre. Mells (population 1259), three miles north-west of Frome; Kilmersdon (population 2129), Radstock or Radstoke (population 1165), Midsummer Norton (population 2942), Camerton (population 1326), Timsbury (population 1367), High Littleton (population 911), Paulton (population 1784), Clutton (population 1287), Chew Magna (population 2048), are all more or less inhabited by the colliers of the Mendip coal-field, which in 1831 gave employment in these and the adjacent places to nearly 1800 men, beside boys, of whom several were employed.

North Petherton (population in 1831, 3566), about three miles south of Bridgewater, is one of the largest villages in the county: it was formerly a market-town, and though the market is disused, it retains two important cattle-fairs. Huntspill (population 1503), near the right bank of the Parret, seven miles north of Bridgewater, was formerly a market-town: it has three fairs.

Banwell (population 1623), three or four miles north-west of Axbridge, is pleasantly situated under the northern slope of the Mendip Hills. Two remarkable caverns have been discovered, one filled with diluvium, in which were embedded various fossil bones, the other covered with beautiful stalactites. There was an abbey at Banwell during the existence of the West Saxon kingdom. Alfred gave the abbacy to his friend Asser: it was destroyed in the Danish wars. There are considerable remains of an episcopal palace of the bishops of Bath and Wells, now converted into a private residence; and a modern cottage belonging to the same prelates. Burnham (population 1113), on the Bristol Channel, near the mouth of the Parret, has a church whose lofty tower is used as a sea-mark, and a lighthouse. The altar-piece of the church, sculptured in white marble, was designed by Inigo Jones. Wedmore (population 3557) is on a gentle elevation, rising out of the flats between the Mendip and the Polden hills; it was the occasional residence at one time of the West Saxon kings, and retains, in the power of choosing, at the manorial court, a portreeve and water-bailiffs, traces of former municipal organization. Wrington (population 1540), on the bank of the river (Yeo) which drains the valley between Broadfield down and the Mendips, was formerly a market-town, and had one yearly fair, but both market and fair have fallen into disuse within the last fifty years. Barley Wood, the residence of the late Hannah More, is in the parish. Congresbury (population 1327), two miles west of Wrington, had antiently a market, now disused.

At Merriot (population in 1831, 1405), two miles north of Crewkerne; East Coker (population 1330), three miles south of Yeovil; Montacute (population 1028), three miles, Stoke-under-Hamden (population 1365), five miles, and Martock (population 2841), seven miles west of Yeovil,—about 200 men are employed in glove-making or in weaving sail-cloth, sacking, and girth-web. East Coker has a fine cross church and a row of almshouses. The remains of a Roman villa were found here in the middle of the last century in a field; but the site has been ploughed up, and the fragments dispersed. Montacute has extensive quarries. Martock was formerly a market-town, but the market has fallen into disuse within the last fifty years. In the market-place are the former market-house with an assembly-room over it, and a fluted column supporting a dial. Martock church has a tower 90 feet high, and a handsome altar-piece, but of a character not in harmony with the Gothic architecture of the church. Curry Revel (population in 1831, 1378) has quarries of lias, and two cattle and sheep fairs. In this parish, on a commanding eminence, is Burton Pynsent, the seat of the great earl of Chatham, to whom a monument was erected in the park by his widow.

Porlock (population in 1831, 830) is in the hilly district which occupies the western extremity of the county, six miles west of Minehead. The Saxons gave to this place the name of 'Port-locan,' the locked or enlocked harbour; but as this title would by no means apply to the shallow bay near which Porlock stands, it is probable that the line of coast has undergone considerable change by the retreat of the sea. The principal part of the village, consisting of two streets of mean straggling houses near the church, is now above a mile from the sea. The Danes were repulsed in an attack on this place, A.D. 918; but it was burnt, and the neighbourhood plundered by Harold, in the revolt of his family against Edward the Confessor, A.D. 1052. There is an old but unfinished camp not far from the town, supposed to have been formed about this time. Porlock Quay is two miles north-west of the village, on the shore: a small harbour is here formed by means of a pier. A very few small sloops which import coal and lime from Wales, and some fishing-boats, belong to the place. The market formerly held has been discontinued. There are three yearly fairs for cattle and sheep. The antient market-cross is still standing. Old Cleeve (population in 1831, 1347) is about two miles west of Watchet: the parish extends northward to the cliffs which here line the Bristol Channel. There are the ruins of an antient Cistercian monastery; the remains, which are extensive, have been converted into a private house; the architecture is, to a considerable extent, of perpendicular character. The revenue of the monastery at the dissolution was 155*l.* 9*s.* 5*d.* An old cross with four steps, the pedestal and pillar almost entire, stands in the churchyard of the parish church. The hamlet of Blue Anchor in this parish is a little resorted to as a bathing-place. Stogumber (population in 1831, 1294), between Watchet and Taunton, was formerly a market-town: it has still two yearly fairs.

Weston-super-Mare (population in 1831, 1310) is a watering-place much frequented, especially from Bristol: it has commodious inns, lodging-houses, and baths. The Bristol and Exeter railway passes near it. It has a neat church, and some dissenting meeting-houses.

Divisions for Ecclesiastical, Legal, and Parliamentary Purposes.—The county constitutes the diocese of Bath and Wells; and is divided into three archdeaconries, and again into thirteen rural deaneries as follow:—

	Parishes according to Collinson in 1791.	Benefices according to Cox's *Clergy List*, 1841.							
		Single Benefices.			United Benefices.			Proprietary and other Chapels.	Total.
		Rectories.	Vicarages.	Perp. Curacies, &c.	Rectories.	Vicarages.	Perp. Curacies, &c.		
I. Archdeaconry of Bath:									
1. Deanery of Bath . .	24	10	4	5	2	3	4	8	36
2. Deanery of Redcliffe and Bedminster . .	53	24	12	6	2	6	6	..	56
II. Archdeaconry of Wells:									
3. Deanery of Axbridge .	36	14	14	5	..	2	2	..	37
4. Deanery of Cary . .	55	30	4	14	3	4	7	1	63
5. Deanery of Frome . .	47	25	8	8	3	1	5	2	52
6. Jurisdiction of Glaston .	20	..	4	3	1	3	7	..	18
7. Deanery of Ilchester .	36	20	8	3	1	3	2	1	38
8. Deanery of Marston .	28	17	6	..	..	1	1	..	25
9. Deanery of Pawlet . .	7	4	1	..	..	2	..	..	7
III. Archdeaconry of Taunton:									
10. Deanery of Bridgewater .	31	13	8	6	2	3	1	..	33
11. Deanery of Crewkerne .	55	17	12	12	4	3	3	1	52
12. Deanery of Dunster .	44	24	10	5	1	2	3	..	45
13. Deanery of Taunton .	46	19	9	16	..	3	4	..	51
	482	217	100	83	19	36	45	13	513
		Making a total of 400 single benefices.			These are combined in 46 united benefices.				

The number of benefices, as returned to the church commissioners, was 430, besides two not returned, and exclusive of those which are annexed to other preferments. Two of the benefices were sinecure rectories, the clear yearly revenue of which, taken together, amounted to 386*l.* The remaining 428 benefices are classified by their clear yearly revenue as follows:—under 50*l.*, 12; 100*l.*, 47; 150*l.*, 57; 200*l.*, 81; 300*l.*, 101; 400*l.*, 57; 500*l.*, 37; 600*l.*, 14; 700*l.*, 11; 800*l.*, 7; 900*l.*, 3; 1000*l.*, 1: total, 428.

It will be seen that there is a slight difference in the number of benefices as given in the report of the church commissioners and in the 'Clergy List.'

The county is in the Western Circuit. The spring assizes are held at Taunton; the summer assizes at Bridgewater and Wells alternately. The quarter-sessions are held, the Epiphany and Easter at Wells, the Midsummer at Bridgewater, and the Michaelmas at Taunton. There are a county gaol at Ilchester; a county gaol and house of correction at Wilton near Taunton; and a county house of correction at Shepton Mallet. There are a city gaol at Bath, a borough gaol at Bridgewater, and a city and county lock-up house at Wells. The city gaol and house of correction of Bristol are at Bedminster in this county. The prison at Ilchester is not large; it is not in a dry situation, nor is it well ventilated; it is used for untried and convicted prisoners and debtors. It has been proposed, but not decided, to abolish this gaol. The Wilton and Shepton Mallet prisons are too small for the number of prisoners; and the Bath and Wells prisons are altogether insufficient. The erection of a new gaol at Bath has been determined on, and is probably by this time completed. Bridgewater gaol is used as a lock-up house, and for the temporary confinement of prisoners at the assizes or quarter-sessions.

Before the Reform Act Somersetshire sent altogether sixteen members to the House of Commons; viz. two for the county, two each for the cities of Bath and Wells, and two each for the boroughs of Taunton, Bridgewater, Minehead, Ilchester, and Milborne Port. The county members were elected at Ilchester.

By the Reform and Boundary Acts the county has been divided into two parts, each returning two members. The eastern division comprehends the hundreds or liberties of Bath Forum, Bempstone, Brent with Wrington, Bruton, Catsash, Chew and Chawton, Frome, Glaston-twelve-hides, Hampton and Claverton, Horethorne, Keynsham, Kilmersdon, Mells and Leigh, Norton Ferris, Portbury, Wellow, Wells Forum, Whitstone, Winterstoke, and Witham Friary (this is included in Frome hundred), and such parts of the hundred of Hartcliffe with Bedminster as are not included in the parliamentary limits of Bristol. The court of election is held at Wells; and the polling-stations are Wells, Bath, Shepton Mallet, Bedminster, Axbridge, and Wincanton.

The western division comprehends the hundreds or liberties of Abdick and Bulstone, Andersfield, Cannington, Carhampton, Crewkerne, North Curry, Houndsborough Berwick and Coker, Huntspill and Puriton, East Kingsbury, West Kingsbury, Martock, Milverton, North Petherton, South Petherton, Pitney, Somerton, Stone, Taunton and Taunton Dean, Tintinhull Whitley, and Williton and Freemanners. The court of election is held at Taunton; and the polling-stations are Taunton, Bridgewater, Ilchester, and Williton.

Three of the boroughs, Ilchester, Milborne Port, and Minehead, were disfranchised by the Reform Act; but Frome was made a parliamentary borough, to return one member. The number of city or borough members is now nine, making, with the four county members, a total of thirteen.

The number of registered electors in the years 1835-6 and 1839-40 was as follows:—

	1835-6.	1839-40.
County, Eastern Division . .	8504	9759
" West do. . .	8854	9024
City of Bath	2892	3119
" Wells	388	414
Borough of Bridgewater . .	497	573
" Frome . . .	307	339
" Taunton . . .	1165	1010

History and Antiquities.—In the earliest historical period this county is thought to have been inhabited by the Belgae (Βέλγαι of Ptolemy), by which generic name alone it is designated. This nation appears to have possessed the greater part of the counties of Hants and Wilts, and was subdued by Vespasian during the command of Aulus Plautius, in the reign of Claudius. Of the incidents of this warfare scarcely any are recorded, none at least that can be connected with this county. According to Richard of Cirencester, the Belgae could have possessed little of this county, for the Hedui, a nation whose name links them with the Celtic stock, are placed by him in the eastern part, and the Cimbri of the same writer appear to have occupied the western.

In the Roman division of the Island, Somersetshire was included in the province of Britannia Prima. The Antonine station Aquae Solis (called also Ὕδατα Θερμά by Ptolemy, and Thermae by Richard) was Bath; the river on which it stands is called by Richard Abona, a name evidently identical with Avon. It appears from inscriptions dug up, that Sulis was the tutelary goddess of Bath, which makes it probable that the Antonine name Aquae Solis is a blunder for Aquae Sulis. The town Abone (ad Abonam, as Richard calls it), 18 Roman miles from Bath, according to Antoninus, and which is fixed by Reynolds (*Iter Britanniarum*) near the Gloucestershire end of the New Passage, is by Richard placed 6 miles from Bath, and 6 from Ad Sabrinam, at the passage over the Severn. As the distance thus measured from Bath to the Severn is insufficient, it is probable that in one the above distances, perhaps the second, VI. is a transcriber's error for XI. We are of opinion that Richard is correct in placing Ad Abonam between Aquae Solis and Trajectus or Trajectum (the name of which indicates its position at the passage of the Severn, and which Richard distinctly states to be on the Monmouthshire side), and that the present copies of Antoninus are wrong in reversing this arrangement. We agree with Mr. Hatchard (in his translation of Richard) and with the Useful Knowledge Society's map, in fixing Ad Abonam at Britton in Gloucestershire, nearly opposite Keynsham; and we are inclined to fix Ad Sabrinam at Portishead, or Portbury, west of Bristol. The Avalonia of Richard was in all probability Glastonbury; and the Ischalis (Ἴσχαλις, Ptol.), Uxella (Οὔξελλα of Ptolemy, who describes it as belonging to the Δουμνόνιοι or Dumnonii), and Ad Aquas, are placed by Hatchard, and in the Society's map, at Ilchester, Bridgewater, and Wells respectively. Ischalis, Avalonia, and apparently Aquae Solis, Ad Aquas, and Ad Abonam, were in the territory of the Hedui. The river Uxella of the same writer (the Οὐέζαλλα of Ptolemy) is supposed to be the Parret; it separated the territories of the Hedui from those of the Cimbri. The antient road the Fosse, Foss, or Foss-way [Foss] enters the county on the north-east side near Bath, and runs south-west by Radstoke, Stratton-on-the-Fosse, Shepton-Mallet, Street-on-the-Fosse near Shepton-Mallet, East and West Lydford, Ilchester, and Petherton Bridge near South Petherton; and appears to have quitted the county not far from Chard. A Roman road from the coast runs along the crest of the Mendip Hills in the direction of Sorbiodunum (Old Sarum), crossing the Foss-way at right angles. The Foss may be traced near Bath, where it united with another road coming from Londinium (London), Calleva (Silchester), and Spinae (Speen, near Newbury); it may be seen also on the hill near Combe Hay, south of Bath, and near Camerton and Midsummer-Norton. In many parts of its course it coincides with and is obliterated by modern roads.

Richard of Cirencester describes a chain of mountains, called Ocrinum, as extending from the Uxella (or Parret) to the promontory Ocrinum (the Lizard).

Roman antiquities have been found in considerable abundance. Those near Bath are mentioned elsewhere [Bath], and those at Ilchester have been mentioned in a former part of this article. At Farleigh, or Farley, near the border of Wilts; at Dishcove, near Bruton; at East Coker, near Yeovil; and at Yeovil itself, tessellated pavements have been dug up; and a piece or pig of lead, 50 lbs. weight, with a Roman inscription, was found near Bruton, and another piece at Wookey, near Wells. At South Cadbury, between Wincanton and Ilchester, is a remarkable camp (called by some old topographies Camalet castle, but more commonly Cadbury castle) of irregular form, according to the shape of the hill on which it stands, with an inner and higher fort or prætorium. It is partly hewn in the solid rock, partly formed with a rampart of loose stones, and is defended by never less than four ditches, and in one part by six or seven. Various Roman antiquities, especially coins, and pavements, and other remains of buildings, have been dug up in the enclosure, which is about 30 acres in area. Another camp, three miles in circuit, of irregular form, on Hamden Hill, is supposed to have been Roman. The vallum is almost entire; the north-western part, the most difficult of access, is separated from the rest by an intrenchment. Various antiquities have been found at and near South Petherton, indicative of a Roman settlement in that neighbourhood. Neroche castle, west of Ilminster, is supposed to have been a Roman post, and there are other reputed Roman camps, one popularly called 'the Castle,' near Wiveliscombe, near which coins have been dug up; a second at Badialton, near Milverton; and a third at Brompton Regis, near Dulverton. There is a Roman camp at Stringston, between Bridgewater and Watchet. At Cadbury, between Bristol and Clevedon, is a camp supposed to be Roman, but of less importance and extent than the camp at South Cadbury already noticed. There is a third hill called Cadbury, near Congresbury (between Bristol and Weston-super-Mare), on which also are vestiges of antient fortifications. There is a remarkable camp on the summit of Brent Knoll, a lofty eminence rising out of the flats between the Mendip and Polden hills, in which Roman coins and other antiquities have been found. The name of an adjacent hamlet, Battleborough, is the record of some now-forgotten encounter. There are two other camps, supposed to be Roman, at Long Ashton near Bristol, opposite Clifton. The name of one, Burwalls, and the nature of its construction (of limestone rubbish cemented with an almost impenetrable cement), indicate it to have been a permanent military post. The foundations of buildings, supposed to be Roman, have been discovered in the same neighbourhood. It is not unlikely that Masbury camp, or, as it is sometimes called, Masbury Castle, near Shepton-Mallet, and the 'bulwarks' or other military works at Blacker's Hill, not far from Masbury, both on the Mendips, are Roman works. And from the massive remains of antient buildings at Portbury, near the south bank of the Avon, not far from its mouth, we think it not an implausible conjecture that the Ad Sabrinam of Richard should be placed here, or in the neighbouring parish of Portishead. A Roman road from Axbridge, in many parts (sa son) still plain and visible, leads towards Por Portishead. Coins in great abundance have be various places, especially at Elm, near Frome, at Corton-Dinham, near South Cadbury camp; at Street, in Winsham parish, near Chard; at Bishops Lydeard, and Lydeard St. Lawrence, near Taunton; and at Stogumber, Bicknoller, Putsham, in Kilve parish, and Kilton, near the northern end of the Quantock Hills. Other antiquities, as well as coins, have been found at Wincanton; at Street, on the Fosse, near Shepton-Mallet; at Edington and at Chedzoy, near Bridgewater; and at Hinton Charterhouse, between Bath and Frome.

Beside the Roman camps above mentioned, there are several other antient forts or camps scattered throughout the county. Doleberry castle, on Mendip, is one of the most remarkable. Several are on Leigh down near Bristol, and on Lansdown, and the other hills round Bath; others are in the grounds and woods of Longleat and Stourhead, on the eastern border of the county. To what period or nation these are to be attributed is uncertain. Burrows are numerous, especially on the Mendip Hills, on the Quantock Hills, and the hilly districts west of these.

The remarkable entrenchment called 'Wansdike' is partly in this county. Commencing near Andover in Hampshire, it crossed the Wiltshire Downs, and entered Somersetshire near Bath-Hampton; and turning westward and then north-westward, so as to make a circuit round Bath, it ran along the hills by South Stoke, English Combe, Stanton Prior, Compton Dando, Norton Malreward, and Long Ashton, to the Bristol Channel at Portishead. It is still existing in many places, as on Claverton down and Odd down; and may be traced, with ocasional breaks, for five or six miles between English Combe and Norton Malreward. The antient camps on Bath-Hampton down, Stantonbury hill near Stanton Prior, and Mays knoll near Norton Malreward, are just on the line of Wansdyke. This entrenchment consists of a ditch, with the vallum or embankment on the south side, the top of which is, in some places, twelve feet high from the bottom of the ditch; the breadth of the ditch is from eight to ten feet. The date and origin of this singular work are unknown: it has been supposed to have been a barrier between the Anglo-Saxon kingdoms of Mercia and Wessex, with which its position would agree; but the manner in which it is intersected by a Roman road on Marlborough Downs shows it to be of earlier date than the road, and consequently earlier than the Roman conquest and settlement. This has led Collinson to regard it as a barrier made by the Belgic Britons to repress the incursions of the Celts; but the position of it does not suit this hypothesis, as the Hedui, a people whose name clearly connects them with the Celtic stock (for the Gallic Hedui, or Ædui, were undoubtedly Celts), were on the southern or supposed Belgic side of the barrier. Possibly it may have been erected by the South-Western Britons as a defence against the first Roman attack, which was probably made from the side of the Dobuni, who occupied Gloucestershire and Oxfordshire. [BRITANNIA.]

Of what are usually regarded as Druidical antiquities Somersetshire possesses but few. The principal is at Stanton Drew, east of the road between Bristol and Wells: it consists of four groups of stones, forming (or rather having formed, when complete) two circles; and two other figures, one an ellipse, the other vaguely described by Collinson as an 'oblong.' Some of the stones are 9 feet high, 22 feet in girth, and 15 tons weight.

In the Saxon invasion, this county was the scene of conflict: the battle of Mount Badon, in which the Britons under Arthur repulsed the Saxons under Cerdic, founder of the West Saxon kingdom, is commonly fixed at or near Bath: its date is uncertain; perhaps it was fought A.D. 520. In the reign of Cealwin, or Ceaulin, of Wessex (A.D. 577), after the defeat of the Britons at Deorham in Gloucesterhire, Bath was taken by the Saxons, from whom it received e characteristic names of Acemannes-ceastre, or 'the town aching men or invalids;' or Bathan-ceaster, or 'the town n the baths.' Cenwalch, king of Wessex, defeated the ctons or Welsh, Wealas, as the Saxon chronicle terms em, at Peonnum, or Pen (Pen-Selwood, or Penzlewood), ear Wincanton (A.D. 658), and drove them to Pedridan Petherton), on the Parret, and the county was permanently incorporated in the West Saxon kingdom. Offa of Mercia appears to have possessed Bath: he founded or restored the abbey there (A.D. 775). In the early Danish invasions, in the reign of Ethelwulf (A.D. 845), a body of those marauders was repulsed with great slaughter at Pedridan-muth, or the mouth of the Parret; and in the reign of Alfred, Somersetshire was again attacked by them. Alfred, when driven from his throne, found security in the marshes of the isle of Athelney [ATHELNEY, ISLE OF], at the junction of the Tone and Parret. When he emerged from this retreat, he assembled his army at Egbyrtes-stane, perhaps Brixton in Wiltshire, in Seal-wuda or Selwood Forest, which occupied the border of Somersetshire and Wiltshire. After the battle of Edington, Godrum or Guthrum the Dane was baptized at Alre, now Aller, near Langport; and Alfred and Guthrum spent twelve days at Wedmore, between Glastonbury and Axbridge, on occasion of the Danish chieftain's 'crisom leasing,' or baptismal anointing. In the subsequent struggle of Alfred with Hastings the Dane, the men of East Somerset, 'from every town east of Pedridan (the Parret), as well as west of Sealwuda' (Selwood), formed part of the force which besieged Hastings (A.D. 894) at Buttington, on the Severn. In the reign of Edward the Elder (A.D. 918), a band of marauders, probably Danes, from Bretagne landed twice, first near Watchet, and then at Porlock; but they were repulsed both times, and were afterwards blockaded in the island of Flatholm, in the Bristol Channel, until they were nearly starved, when they managed to escape to Ireland. Edred, king of England, died in this county, at Frome (A.D. 955); and Edgar, in the latter part of his reign, was 'hallowed,' or consecrated, king at Acemanneseeastre, or Bathan, now Bath (A.D. 973). On his death (A.D. 975) he was buried at Glastonbury. In the reign of Ethelred II., Watchet was plundered, apparently by the Danes (A.D. 987); and ten years after (A.D. 997) it was a second time plundered by the same enemy. Sweyn, king of the Danes, was at Bath with his army (A.D. 1013); and all the west country submitted, and gave hostages to him there. In the short reign of Edmund II. (Ironside), a severe battle took place between him and Canute at Pen-selwood; and on the death of Edmund, the same year, he was buried at Glastonbury, near his grandfather Edgar. In the troubles raised by the contests between the faction of Godwin and the Norman faction in the time of Edward the Confessor, Porlock and the neighbourhood were plundered (A.D. 1052) by Harold, the son of Godwin. In A.D. 1067, the year after the battle of Hastings, a son of Harold came with an army and fleet to the mouth of the Avon, and plundered part of the county. During the West Saxon, Anglo-Saxon, and Anglo-Danish dynasties, Somerset existed, for at least a great part of the time, as a county. A 'dux provinciæ Sumersetton' was at the battle of Ellandun (A.D. 823), in which Egbert of Wessex broke the power of Mercia. It was included in the earldom of Wessex held by Godwin and his son Harold. (Ingram's *Saxon Chronicle;* Palgrave's *Rise, &c. of the English Commonwealth.*)

In the rising of Odo and other supporters of Robert of Normandie against William Rufus (A.D. 1088), Bath and the neighbourhood were plundered by the insurgents. Some military operations were carried on in the reign of Stephen, who took Castle Cary and Richmont castles.

Of the middle ages there are several memorials, some of which are noticed elsewhere [BATH; WELLS]: the ruins at Glastonbury, Ilchester, Banwell, and Old Cleeve have been described above. Other monastic ruins, those of Stavordale priory, for canons of St. Augustin, near Wincanton, and of Woodspring priory, near Weston-super-Mare, for regular canons of St. Augustin, are tolerably entire, and are now converted each into a farm-house and offices: the latter are of more elegant architecture than the former. The remains of Montacute Cluniac priory, near Yeovil, and of Muchelney Benedictine abbey, founded by King Athelstan, near Langport, are of considerable interest. Of the Carthusian priory of Hinton Charterhouse, near Bath, there are several remains: the present manor-house was built out of the ruins. Cannington church and Stogursey church, north-west of Bridgewater, and Witham Friary church, between Frome and Bruton, were all conventual churches: the first is a very fine building. The only important castellated remains are Farleigh or Farley Castle, between Bath and Trowbridge in Wiltshire; Nunney, near Frome; and Walton Castle, near Clevedon. The ruins of Farleigh are very picturesque. There are some remains of Bridgewater and Taunton castles. The antient mansions of Montacute, near Yeovil; Shapwick, between Glastonbury and Bridgewater; Fairfield, near Stogursey, north-west of Bridgewater; Sutton Court, near Chew Magna, between Keynsham and Axbridge; Hinton St. George, near Crewkerne; and Barrow Court, near Bristol, all belong to the middle ages, or at least to the period which preceded the general revival of classical architecture.

In the civil war of Charles I. several memorable events are connected with this county. A severe battle was fought 5th July, 1643, on Lansdown Hill near Bath. The Parliamentarians occupied the top of the hill, under Sir William Waller; and the Royalists, under Prince Maurice and the earl of Caernarvon, advanced to storm the works which Waller had thrown up: the victory was not decisive, but on the whole rested with the Royalists. They however lost many of their chiefs, especially Sir Bevil Grenville, to whose memory a monument was erected on the hill, which still remains. The Royalists had previously, in their advance from Devonshire, occupied Dunster castle, Bridgewater, and Taunton, and obliged the train-bands of the county, which were raised by the Parliamentarian 'Committee,' to retire from Wells. The capture of Bristol soon after seemed to confirm the superiority of the Royalists. In 1644 Taunton was taken by the Parliamentarians under the earl of Essex, in his march into the West; and the king marched through Bath, Frome, Bruton, and Chard in pursuit of him. After Essex's infantry had capitulated in Cornwall, the king ordered Taunton to be blockaded; and next year (A.D. 1645) the blockade was converted into a siege, and the town reduced to extremity, when it was relieved by Col. Weldon. The relieving party were however beaten on their return, and obliged to retreat to Taunton, which was again besieged by the Royalists under Lord Goring, but relieved by Fairfax, who advanced for the purpose after the battle of Naseby. The garrison of Taunton was commanded by Blake, afterwards the famous admiral. Goring drew off from Taunton and advanced to Langport, where he was beaten by Fairfax, who also took by assault the strong post which the Royalists had garrisoned at Bridgewater, while a detachment of his army surprised and took Bath. Some other actions of less consequence were fought.

Somersetshire was the principal scene of Monmouth's rebellion (A.D. 1685) against James II. After landing at Lyme, in Dorsetshire (11th June), and carrying Bridport by assault (14th June), he marched (15th June) by Axminster, in Devonshire (from whence the Devonshire militia retreated) to Chard; and thence to Taunton, where he was received with great enthusiasm, and declared himself king. After a delay of some days at Taunton, he proceeded (21st June) to Bridgewater, where also he was cordially received, and next day to Glastonbury; the militia of the county, which had been assembled to oppose him, having retreated to Bath and Bristol. The duke now resolved to attack Bristol, and advanced by Shepton Mallet to Pensford; from whence he sent a detachment which secured the bridge at Keynsham, where he passed the Avon. From Keynsham he advanced on the Gloucestershire side of the river toward Bristol, which he prepared to assault; but bad weather having compelled him to return to Keynsham, he was attacked there, but without success, by two parties of the king's horse. Here he learned the approach of the king's army, 4000 strong, which induced him to march towards Wiltshire, from which he expected to be joined by a strong body of horse; but a number of his supporters, who had assembled from Warminster, Westbury, and Frome, were routed at Frome by a party of the royal forces; and Monmouth's own army was weakened by desertion and discouragement from his Wiltshire supporters not having joined him. At Norton St. Philip's, between Bath and Frome, he was attacked (27th June) by the Royalists, whose advanced guard had marched from Bath under the duke of Grafton, Monmouth's half-brother. Monmouth repelled this attack; but retreated slowly to Frome, Shepton Mallet, Wells, and Bridgewater. From thence he marched with about 5000 horse and foot on the night of the 5th July, to surprise the king's army, which, under the orders of the Earl of Feversham and Lord Churchill (afterwards the celebrated duke of Marlborough), was encamped on Sedgmoor to the number of about 3000, or, as some say, 5000. The attempt at surprise failed, but a fierce engagement ensued (6th July), in which, though Monmouth's army behaved with great spirit, they were defeated with great loss; 300 being killed on the field, and 1500 or more in the pursuit on that and the following day. Monmouth quitted the field early, but was taken before the night of the 7th, and subsequently condemned and executed in London. The most fearful severities followed the suppression of this revolt. The Earl of Feversham hanged twenty-two men at Bridgewater on the evening of the battle, without any form of trial: and on his leaving the command to Colonel Kirke, the severity and violence of the soldiery were increased, so that Kirke's name was long the object of popular execration in the West of England. But this was not all: a special commission, with Lord Chief Justice Jeffreys at its head, was sent into the West; and a great number of persons were condemned and executed at Dorchester, Exeter, and especially Taunton and Wells. The prisoners for trial in this county alone were above 1000, and of these at least 239 were executed, and probably more. The sentences were carried into effect in thirty-six different towns and villages, among which they were distributed.

(Collinson's *History of Somersetshire;* Maton's *Observations on the Western Counties;* Conybeare and Phillips's *Geology of England and Wales;* Priestley's *History of Navigable Rivers and Canals;* Rickman's *Gothic Architecture;* Turner's *Anglo-Saxons;* Ingram's *Saxon Chronicle;* Carte, Kennett, Eachard, and Vaughan's *Hist. of England;* Fox's *James II.; Parliamentary Papers.*)

STATISTICS.

Population and Occupations.—Above one-third of the population is employed in agriculture, in which occupation there were, in 1831, 6032 occupiers of land employing labourers; 3731 smaller occupiers not employing hired labour; and 28,107 labourers subsisting on wages. The remainder of the male population aged 20 and upwards, were as follows:—4350 engaged in manufactures or in making manufacturing machinery; 26,762 in retail trades and handicrafts; 4676 belonging to the professions, and bankers and capitalists; 12,183 non-agricultural labourers; 3801 domestic servants; and 7074 other males of this age whose occupations are not distinguished: the number of female servants was 18,333. The manufacture of fine woollen cloth is extensive in the county of Somerset, principally at Frome, where 730 men are so employed; Road contains 59 such manufacturers; Beckington 32; Charter House Hinton 24; at Twerton, near Bath, are 284; at Lyncombe and Widcombe 565; at Freshford 32; at Wellington 258; at Milverton and elsewhere, in small numbers, to the amount of 200; sheep-skins are tanned or dyed at Street, for hearth-rugs and gig-rugs. About 300 men are employed in sail-cloth, sacking, or girt-wed, at Crewkerne (and its vicinity), at East Coker, Merriot, West Hatch, and North Perrot; at Ilminster 21 men are variously employed in silk or lace machinery; at Chard 478; several at Bruton; at Taunton 109 men; and at Shepton Mallet as many are variously employed in making woollen cloth, serge, sailcloth, and silk goods: at Corbon Denham, Wincanton, and Stoke-Trister, dowlas is made, and ticking; and at Keynsham are flax manufactories, employing 79 men; about 600 men are employed in the glove trade, of whom 300 men are at Yeovil, 150 at Milborne Port, 45 at Stoke-under-Hamdon, Montacute, and Martock. Edge-tools are made at Mells by 56 men, and by several at Whatley, Emborrow, and other places; at Nailsea 94 men are employed in the manufacture of glass; paper-making and tanning employ 59 men at Cheddar; and at various places in the county are mentioned a few manufactures in iron, calamine, copper, brass, paper, and snuff; and a variety of small articles are made at Bath. (*Census of* 1831.)

The population of Somersetshire at each of the five following periods was as under:—

	Males.	Females.	Total	Increase per cent.
1801	126,297	146,823	273,570	..
1811	141,449	161,731	303,180	10·7
1821	170,199	185,115	355,314	18·1
1831	194,316	209,884	404,200	13·6
1841	209,421	226,581	436,002	7·8

Being an increase of 162,252, or 58½ per cent., in fort years, the increase for the whole of England during th same period being 79·9 per cent.

The only details published up to the present time (December) of the census in June, 1841, are the number of house and the gross totals of the population, distinguishing th sex. At this period there were in the county 81,632 inhabited houses, 4702 uninhabited, and 893 were building.

The following table exhibits a summary of the populati of every hundred, &c. as taken in 1831:—

HUNDREDS. BOROUGHS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of persons.	Males twenty years of age.
Abdick and Balstone	1,977	2,234	10	48	1,161	686	387	5,694	5,537	11,231	2,794
Andersfield	501	525	9	16	300	147	78	1,403	1,361	2,764	716
Bath Forum	3,683	4,643	85	316	1,084	1,752	1,807	9,392	11,717	21,109	4,696
Bempstone	1,299	1,457	12	62	926	293	238	3,595	3,733	7,328	1,894
Brent with Wriugton	769	928	4	38	555	221	152	2,350	2,478	4,828	1,126
Bruton	890	944	6	48	458	281	205	2,081	2,409	4,490	1,006
Cannington	1,001	1,161	12	28	668	330	163	2,801	2,894	5,695	1,396
Carhampton	1,487	1,628	11	42	879	450	299	4,032	4,070	8,102	1,984
Catsash	1,343	1,536	16	53	816	387	333	3,727	3,789	7,516	1,847
Chew and Chewton	3,285	3,589	29	100	1,184	660	1,745	9,027	8,905	17,932	4,240
Crewkerne	1,286	1,359	16	60	619	485	255	3,264	3,583	6,847	1,579
Curry, North	815	871	11	38	540	177	154	2,088	2,123	4,211	987
Frome	3,842	4,189	12	423	949	2,126	1,114	9,438	10,446	19,884	4,363
Glaston Twelve Hides	1,149	1,318	7	38	787	276	255	3,208	3,158	6,366	1,557
Hampton and Claverton	100	113	2	16	77	16	20	281	306	587	145
Hartcliffe with Bedminster	3,010	3,937	158	177	404	1,405	2,128	8,179	8,868	17,047	4,094
Horethorn	1,439	1,660	4	44	815	553	292	3,690	3,973	7,663	1,859
Houndsborough	1,447	1,683	16	45	780	693	210	3,973	4,190	8,163	1,867
Huntspill and Puriton	371	387	—	3	263	84	40	1,030	982	2,012	454
Keynsham	1,558	1,889	21	56	734	598	557	4,469	4,560	9,029	2,217
Kilmersdon	1,272	1,401	14	41	337	238	826	3,310	3,319	6,629	1,572
Kingsbury, East and West	3,803	4,338	59	202	1,616	2,059	672	9,666	10,296	19,962	4,579
Martock	364	557	—	16	255	164	138	1,341	1,500	2,841	638
Mells and Leigh	389	439	5	7	146	145	148	933	966	1,899	465
Milverton	849	978	7	51	479	284	215	2,257	2,377	4,634	1,140
Norton Ferris	937	1,137	2	35	510	333	294	2,473	2,619	5,092	1,255
Petherton, North	1,047	1,199	14	27	803	240	156	2,969	2,921	5,890	1,402
Petherton, South	1,221	1,359	9	39	851	283	225	3,090	3,177	6,267	1,483
Pitney	321	359	3	15	114	115	130	980	943	1,923	425
Portbury	1,665	1,895	18	46	635	444	816	4,605	4,728	9,333	2,264
Somerton	1,017	1,185	18	33	632	273	280	2,681	2,771	5,452	1,340
Stone	1,297	1,442	15	79	341	747	354	3,564	3,869	7,433	1,690
Taunton and Taunton Dean	1,935	2,260	26	92	1,276	580	404	5,546	5,742	11,288	2,886
Tintinhall	795	954	14	40	354	332	268	2,189	2,303	4,492	1,074
Wellow	1,510	1,694	58	43	525	662	507	4,445	4,529	8,974	2,142
Wells Forum	2,041	2,234	9	91	891	779	564	5,421	5,999	11,420	2,709
Whitestone	2,582	2,776	29	168	902	879	995	5,914	6,498	12,412	3,147
Whitley	2,340	2,585	35	61	1,496	597	492	6,388	6,406	12,794	3,221
Williton and Freemanners	2,678	2,969	23	104	1,746	792	431	7,410	7,307	14,717	3,801
Winterstoke	3,523	3,947	51	216	2,082	944	921	9,765	9,746	19,511	4,639
Bath (City)	5,063	9,044	40	382	221	3,907	4,916	15,587	22,476	38,063	8,556
Bridgewater (Borough)	1,400	1,507	20	85	82	629	796	3,683	4,124	7,807	1,797
Taunton (Borough)	2,024	2,261	29	108	159	1,193	909	4,953	6,186	11,139	2,510
Militia under training	—	—	—	—	—	—	—	1,424	—	1,424	—
Total	71,935	84,571	939	3,632	30,452	28,230	25,889	194,316	209,884	404,200	95,556

County Expenses, Crime, &c.—Sums expended for the relief of the poor—1748-49-50 (annual average), 25,596*l.*; 1776, 50,491*l.*; 1783-84-85 (average), 66,267*l.* The sums expended at the four dates of

		£.		s.	d.	
1801	were	121,790,	being	8	10	for each inhabitant.
1811	. .	185,407	„	12	2	„
1821	. .	153,906	„	8	7	„
1831	. .	178,047	„	8	9	„

And in each of the following years ending 25th March, the expenditure was as under:—

1835.	1836.	1837.	1838.	1839.	1840.
£154,443	£140,442	£124,699	£130,077	£155,632	£156,059

The expenditure in the last of the above years would average about 7*s.* 2½*d.* for each inhabitant, which is 1*s.* 4*d.* per head higher than for the whole of England. The expenditure for the year ending 25th March, 1834, was 176,286*l.* The saving effected between that year and 1840 amounted to 41,680*l.*, or 20 per cent.; namely, under the head of relief and maintenance, 20,227*l.*, or 11 per cent.; in suits of law, &c., 5093*l.*, or 76 per cent.; and in miscellaneous expenses, 16,360*l.*, or 78 per cent. The number of poor-law unions is 17, comprising every parish in the county. The number of paupers relieved during the quarter ending Lady-day, 1840, was 43,462 (4001 in-door, and 39,461 out-door), being 10 per cent. of the population, the proportion for England being 8·6 per cent. The social condition of the county may be further illustrated by the following facts:—Illegitimate births in 1830, 503, or 1 in 23;—in England 1 in 20. Bastard children chargeable on the poors'-rate in 1835-6, 2260, or 1 in 179;—in England 1 to 215. Lunatics and idiots chargeable on the same fund in 1836, 484, or 1 in 835;—in England 1 in 1033. Proportion per cent. of persons married under 21 years of age in 1840, 8·4;—in England and Wales, 9·6 for the two sexes.

The annual value of real property in the county assessed to the property-tax in 1815, was 1,900,651*l.* The sum raised for poor-rate, county-rate, and other local purposes, for the year ending 25th March, 1833, was 223,492*l.*, levied upon the under-mentioned descriptions of property:—

On land	£169,354
Dwelling-houses	44,936
Mills, factories, &c.	2,868
Manorial profits, navigation, &c.	6,333
Total	£223,492

The amount expended was—

For the relief of the poor	£184,595
In suits of law, removal of paupers, &c.	6,474
For other purposes	31,794
Total money expended	£222,864

The county expenditure in 1834, exclusive of that for the relief of the poor, was 19,129*l.* 19*s.* 7½*d.*, disbursed as follows·—

Bridges, building, repairs, &c.	£1,495
Gaols, houses of correction, and maintaining prisoners	7,413
Shire-hall and courts of justice, building, repairs, &c.	33
Prosecutions	5,364
Clerk of the peace	726
Conveyance of prisoners before trial	1,351
Conveyance of transports	404
Vagrants, apprehending and conveying	60
Constables, high and special	77
Coroner	585
Miscellaneous	1,681
Total	£19,129

The county-rate levied at different periods during the last half-century, and the principal disbursements, so far as they can be made out, are shown in the following table:—

	1801.	1811.	1821.	1831.	1838.
	£	£	£	£	£
Income	6,036	10,563	20,006	17,837	20,606
Expenditure:—					
Bridges	406	738	1,181	1,287	827
Gaols	148	795	287	1,895	1,087
Prisoners' maintenance	3,941	3,446	8,813	10,410	7,532
Prosecutions	876	614	3,994	4,705	4.489
Constables and vagrants	298	214	1,133	477	...

In 1839 the length of streets and highways in the county, and the expenditure thereon, were as under:—

		Miles.
Streets and roads repaired under local acts		89
Turnpike roads		876
All other highways		3,346
		4,311
Amount of rates levied		£39,165
Expended in repairs of highways	£37,060	
Law and other expenses	403	
Total expenditure		37,463

The number of turnpike trusts in the county in 1839 was 23, and the income arising from tolls amounted to 61,040*l.*; from parish compositions, in lieu of statute-duty, 595*l.*; and the total income (including 2700*l.* borrowed) was 65,230*l.*; the total expenditure for the same year being 64,652*l.* The assets, including arrears of income, amounted to 10,482*l.*; the debts to 318,583*l.* In 1836 the debt was equal to 5·17 years of the annual income;—the proportion for England being 4·56 years; the proportion of unpaid interest to the total debt was 6 per cent., the average for England being 12 per cent.

In 1839 the church-rates amounted to 14,743*l.*; and with 2904*l.* derived from other sources, were applied to defray expenses connected with the established church: in 1832 the sum derived from other sources included 684*l.* from estates and rent-charges. The sum expended for the purposes of the establishment amounted to 16,780*l.* in 1839, and 8674*l.* were expended in repairs of churches.

Crime.—Number of persons charged with criminal offences in the four septennial periods ending 1819, 1826, 1833, and 1840:—

	1813-19.	1820-26.	1827-33.	1834-40.
Total of each septennial period	2,053	3,156	4,267	6,014
Annual average	293	450	623	859

The numbers committed, convicted, and acquitted in each year from 1834 to 1839 were as under:—

	1834.	1835.	1836.	1837.	1838.	1839.	1840.
Committed	677	684	796	1028	858	843	1128
Convicted	448	484	543	722	636	589	756
Acquitted	229	200	253	306	222	254	372

In 1834 the proportion of persons committed, to the total population of the county, was 1 in 597; and in 1840, allowing for the increase of population, 1 in about 380.

Of 1128 criminal offenders tried at the assizes and sessions in Somersetshire in 1840, there were 51 charged with offences against the person; 131 with offences against property committed with violence; 836 (including 612 cases of simple larceny) with offences against property committed without violence; 3 with malicious offences against property; 10 for forgery and uttering base coin; and 97 for various misdemeanors, including 64 for riot and breach of the peace. Above two-thirds of the offences were those against property committed without violence; and above one-half were cases of simple larceny. Sentence of death was recorded in 5 cases, which was commuted for various periods of transportation. Of 756 offenders convicted, including the 5 above-mentioned cases, 13 were transported for life; 33 for periods varying from 10 to 15 years; 74 from 7 to 10 years; 47 for 7 years, making in all 172 offenders transported; 1 was imprisoned for above two years; 22 for a term exceeding twelve months; 62 for above six months; and 479 for six months and under; and 20 were whipped, fined, or discharged on sureties. The acquittals were 379 in number: in 18 cases there was no prosecution; in 128 no bill was found; and 226 persons were found not guilty on trial. Of the total number committed 915 were males and 213 females; and of those transported 151 were males and 16 were females; and of the total number 340 males and 70 females could neither read nor write; 423 males and 127 females could read, or read and write imperfectly; 81 males and 7 females could read and write well; 6 males had received superior instruction; and the state of instruction of 65 males and 9 females was not ascertained. On an average of several years the proportion of uninstructed criminals in this county was 86·3 per cent.; of those instructed, 13·7 per cent;—the average of the former for England and Wales being 89·3 per cent.

Savings' Banks.—There are 9 of these useful institutions in the county; and the number of depositors and amount of deposits on the 20th of November in each of the following years, were as under:—

	1835.	1836.	1837.	1838.	1839.	1840.
No. of depositors	11,904	14,402	15,233	16,527	17,281	18,542
Am. of deposits	£460,426	£519,962	£538,206	£565,043	£577,786	£601,374

The various sums placed in the savings' banks in 1830, 1834, and 1839, were distributed as follows:—

	1830.		1834.		1839.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	5,300	£41,069	5,843	£45,256	8,904	£63,042
" 50	3,410	105,354	3,699	112,821	4,670	143,394
" 100	2,006	137,616	186	126,599	2,207	154,194
" 150	749	88,706	661	79,462	901	108,353
" 200	424	72,416	436	72,771	463	78,785
Above 200	252	63,401	171	40,194	131	30,108
	12,141	508,784	12,625	477,103	17,281	577,786

The deposits of 144 friendly societies, not reckoned above, amounted in 1840 to 25,482*l.*; and 30,654*l.* were invested by 375 charitable institutions.

From 1835 to 1839-40, the number of county electors in the eastern division increased 1255; and in the western division 170. The number in each division at the latter period was as under:—

	E. div.	W. div.	Total.
Freeholders of every class	6,505	5,489	11,994
Copyholders and customary tenants	165	416	581
Leaseholders for life or for a term	633	849	1,482
50*l.* tenants at will	2,286	2,093	4,379
Trustees and mortgagees	10	18	28
Qualified by offices	61	5	66
Joint and duplicate qualifications	51	143	194
Defective specification	47	11	58
	9,758	9,024	18,782

Education.—Summary of the Returns made to Parliament in 1833:—

	Schools.	Scholars	Total.
Infant schools . . .	121		
Number of children at such schools; ages from 2 to 7 years —			
Males . .		917	
Females . .		1,001	
Sex not specified .		1,268	
			3,186
Daily schools . . .	1,303		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		14,748	
Females . .		12,744	
Sex not specified .		5,213	
			32,705
Schools . .	1,424		
Total of children under daily instruction . . .			35,891
Sunday schools . . .	593		
Number of children at such schools; ages from 4 to 15 years:—			
Males . .		16,923	
Females . .		17,904	
Sex not specified .		7,947	
			42,774

The number of children in Somersetshire in 1833, between the ages of 2 and 15, may be taken at about 14,000. Thirty-eight Sunday-schools, attended by 1392 children, are returned from places where there are no other schools; but in every other case the children have the opportunity of attending daily schools as well, but to what extent they do so cannot be ascertained. Seventy schools, attended by 4267 children, are both daily and Sunday schools, and duplicate returns are known to be thus far created. The children between the ages of 2 and 15 who were under instruction in this county in 1833 probably did not exceed one-half of the total number. One hundred and thirty-four boarding-schools are included in the number of daily schools given above.

The proportion of persons who attested their marriages by marks instead of writing their names, was, in 1839-40, 37 per cent. for men and 49 per cent. for women, which is a little under the average for England and Wales.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	..	..	3	248	97	1533	21	1405
Daily Schools	105	2544	76	3,079	1021	20,952	101	6130
Sunday Schools	15	1005	528	37,937	3	122	47	3710
Total...	120	3549	607	41,264	1121	22,607	169	11,247

The schools established by Dissenters, included in the above statement, are—

		Scholars.
Infant-schools	2, containing	190
Daily-schools	30, .	1,070
Sunday-schools	163, .	15,665

The schools established since 1818 are—

Infant and other daily schools .	828, containing	21,282
Sunday-schools . . .	340 .	26,512

Lending-libraries are attached to 83 schools.

SOMERTON. [SOMERSETSHIRE.]

SOMERVILLE, WILLIAM, was born in 1692, at Edstone, in Warwickshire, which had been the residence of his ancestors from the time of Edward I. He studied at Winchester School, and at New College, Oxford. Having completed his education, he resided during the rest of his life in the family mansion, partly occupied with the duties of a justice of peace, partly with the active pleasures of the sportsman, and partly with the cultivation of his poetical talents. His income, derived from the estate which he inherited from his father, was 1500*l.* a year, out of which his mother had a jointure of 600*l.* a year. Hospitable, convivial, and careless of economy, he became involved in debt, and in the latter part of his life, according to the account of his friend Shenstone the poet, 'drank himself into pains of the body, in order to get rid of the pains of the mind.' He died, July 19, 1742, and was buried at Wotton, near Henley-in-Arden, Warwickshire.

Somerville's 'Chase' is still a favourite with those who combine a taste for poetry with an attachment to the sports of the field, and has been frequently reprinted. It is written in tolerably harmonious blank verse; and as the poet was practically master of his subject, his descriptions are always accurate and frequently vivid, and he has given variety to them by comparing the rural sports of other countries with those of his own. Somerville has written another rural poem, called 'Field Sports,' which describes the amusement of hawking; and 'Hobbinol, or Rural Games,' a mock heroic. He has also written some Fables, which are mostly dull and uninteresting; some rather coarse Tales; and a few lyrical pieces, which display no great poetical power, but contain many beautiful lines. Johnson (*Lives of the Poets*) has justly praised the happy delicacy with which, in his verses to Addison, Somerville mentions the name Clio, the letters of which are used by Addison to distinguish his own papers in 'The Spectator:'—

> 'When panting Virtue her last efforts made,
> You brought your Clio to the virgin's aid.'

SOMME, River. [FRANCE; SOMME, Department.]

SOMME, one of the departments of France, bounded on the north by that of Pas de Calais, on the north-east by that of Nord, on the east by that of Aisne, on the south by that of Oise, and on the south-west by that of Seine Inférieure; it is washed on the west by La Manche, or the English Channel. The form of the department is compact: the greatest length is from east-south-east to west-north-west, from the neighbourhood of Ham to the mouth of the river Somme, 80 miles; the greatest breadth is from the bank of the river Bresle near Aumale (in the department of Seine Inférieure) to the neighbourhood of Lucheux, 47 miles. The area is estimated at 2378 square miles: the population in 1831 was 543,704; in 1836 it was 552,706; showing an increase in five years of 9002, or 1·7 per cent., and giving 232 inhabitants to a square mile. In area it is just about the average of the French departments, and about midway between the English counties of Devon and Norfolk. In population, absolute and relative, it exceeds the average of the departments in the proportion of rather more than four to three; and is in both respects considerably above either of the two English counties with which we have compared it. Amiens, the capital, is on the Somme, 70 miles in a direct line north of Paris, or 75 miles by the road through Chantilly and Clermont; in 49° 54′ N. lat. and 2° 17′ E. long.

The surface of the department is generally level, and the scenery monotonous. The coast, which has a tolerably straight outline, extending from south by west to north by east, is divided into two nearly equal parts by the mouth of the Somme; to the north of that river the shore is lined by sand-hills or downs, which protect the low grounds from the incursions of the sea; to the south of the Somme commence the cliffs which extend westward to the neighbourhood of Hâvre. The coast-line has undergone a considerable change even in comparatively recent times. In the ninth century the waves covered the low ground between the Somme and the Authie, several miles inland from the present shore. When the sea retired, there remained for some time a large lake or pool, long since dried up, and the site of which is now among the most fertile land in the department. The whole of the department is occupied by the formations of the cretaceous group. The extensive chalk-plains are intersected at intervals by valleys, watered by streams, and presenting green meadows and trees, which contrast favourably with the general nakedness of the country. Some sandstone for paving is quarried, and peat is dug in great abundance in the valleys.

The department is watered by the Somme, with its tributaries, and by the Bresle and the Authie. The Somme rises in the adjacent department of Aisne, not far from St. Quentin: it has a south-western course, past that town, of about 18 or 20 miles, and enters this department just above the town of Ham, below which it flows about 20 miles to the north-north-west to Cléry below Peronne, and from thence westward 30 miles to Amiens: below Amiens its course is north-west in a tolerably direct line, 45 miles to the sea: its whole course may thus be estimated at 115 miles, 95 of which are in this department. The navigation of the river commences at the port of Grand Sailly, between Corbie and Bray, and about midway between Peronne and Amiens: its length may be estimated at 60 miles; but it is so impeded by difficulties, that a canal, partly coinciding with the river, partly parallel to it, has been formed to improve the navigation. By means of this canal, which is carried far above Grand Sailly, a communication has been opened with the canal of St. Quentin; and by means of the two, water-carriage is provided along the valley of the river, and adjacent to it, almost up to its source, and a communication is formed with the Escaut or Schelde and the Oise. The principal feeders of the Somme are the Miraumont, the Nieve, and the Maie, on the right bank; and the Avre, which receives the Dam or Don and the Noye, and the Celle, on the left bank. These are all small; but the Avre has been made navigable for about 11 miles. The Authie rises not far from Doullens, and flows past that town in a north-west direction into the sea. Its whole course is about 50 miles, nearly the whole on the border of the department, which it separates from that of Pas de Calais. The Bresle rises in the department of Oise, near Formerie, and flows north-west into the sea; about 25 miles of its course are on the border of this department, which it separates from that of Seine Inférieure. Neither the Authie nor the Besle is navigable; but the mouth of the latter forms the harbour of La Tréport. [Seine Inférieure.]

The official return of the inland navigation of the department is as follows:—

Avre	11 miles.
Luce	1
Rivers	—12
Canal of the Somme, and navigation of the river . . .	97
Total	109 miles.

The department is traversed by ten government roads (Routes Royales), which had, in January, 1837, an aggregate length of 362 miles; viz. 304 in good repair, 8 miles out of repair, and 50 miles unfinished. The chief roads are that from Paris to Calais, which enters the department near Poix, and runs by Ayraines and Abbeville into the department of Pas de Calais; that from Paris to Dunkerque, which enters the department beyond Breteuil (department of Oise), and runs by Amiens and Doullens; and that from Paris to Cambray and Lille, which enters the department near Roye, and passes by Peronne. Roads run from Amiens to Abbeville; to Rouen (department of Seine Inférieure), by Poix; to Cambray (department of Nord), by Albert and Bapaume; and to Compiègne (department of Oise), by Montdidier; and from Abbeville to Eu and Dieppe (department of Seine Inférieure); to Neufchâtel and Rouen; to Arras (department of Pas de Calais), by Doullens; and to St. Omer (department of Pas de Calais), by Hesdin: there are some other roads of less amount. The departmental roads had, in January, 1837, an aggregate length of 109 miles; viz. 96 in good repair, and 13 unfinished. The bye-roads amounted in round numbers to 5000 miles.

The department is by no means naturally fertile: the chalky plains by which a large part is occupied have been rendered tolerably productive by the care bestowed on them. Of the whole area, which may be estimated at above 1,500,000 acres in round numbers, nearly 1,200,000 acres, or four-fifths, are under the plough. The principal crops are of wheat, rye, and maslin. The produce in wheat is about half as much again as the average produce of the French departments; and of rye and maslin the produce is nearly double that of wheat. Barley and buckwheat are grown, the former in tolerable quantity; but oats and potatoes are comparatively little cultivated. A great quantity of corn is exported into the neighbouring department of Seine Inférieure, and to those of Seine and Nord; but in oats a considerable importation is requisite to make good the shortness of the supply. The meadows do not exceed 40,000 acres, nor do the open pasture-grounds much exceed 20,000; yet horses are very numerous, because they are chiefly employed in the labours of agriculture. Cows are also numerous, nearly half as many again as in the average of the departments; and in sheep the preponderance is yet greater; but there are very few oxen. The long-woolled English sheep have been bred with great success. The wool not required for the consumption of the department is exported to the departments of Seine, Seine Inférieure, and Nord. Pulse, seeds for oil, hops, hemp, and flax are grown. There are no vineyards, but the orchards and gardens are numerous and extensive. The apple is the fruit chiefly cultivated, and a considerable quantity of cider is made: it forms, with beer, the ordinary drink of the inhabitants. Game abounds, and sea-fish and fresh-water fish are plentiful. The woodlands amount to nearly 130,000 acres. The only extensive forest is that of Crécy, on the north western part of the department. The supply of fuel is insufficient, and would be more so but for the quantity of peat dug.

The department is divided into five arrondissements, as follows:—

Chief towns.	Situation.	Area in square miles.	Population in 1831.	Population in 1836.	Communes.
Amiens	Central & S.W.	712	178,206	181,989	250
Abbeville	W.	604	132,717	133,300	172
Doullens, or Doulens . .	N.	255	58,425	59,023	88
Montdidier	S.	354	67,881	69,271	144
Peronne	E.	453	106,475	109,123	181
		2378	543,704	553,706	835

The number of cantons or districts, each under a justice of the peace, is 41.

In the arrondissement of Amiens are—Amiens (population in 1831, 31,457 town, 45,001 whole commune; in 1836, 46,129 commune), Corbie, and Picquigny, on the Somme; Poix and Conty, on the Celle or its affluents; Senarpont, on the Bresle; and Airaines (population 1930). Oisemont and Hornoy, in the district between these three rivers. Amiens is described elsewhere. [Amiens.] Corbie has some woollen manufactures and tan-mills; there are two yearly fairs. Picquigny has some historical note. Here Guillaume, Longue Epée (Long-Sword), duke of Normandie, was assassinated, A.D. 942 [Normandie]; and here Louis XI. had an interview with Edward IV. of England, A.D. 1475. [Edward IV., vol. ix., p. 296.] The town, which is on the left bank of the river, is ill built. The townsmen carry on some trade in linen. Peat is dug in the neighbourhood of both Corbie and Picquigny. Poix is a well built town: it has a large tile-yard and two yearly fairs. Conty, or Conti, was formerly the capital of a principality which gave title to one of the branches of the house of Bourbon: it has a manufactory of hosiery and a paper-mill, and the townsmen carry on trade in corn. Oisemont has lime-works and brick-yards; and the townsmen trade in grain, wool, and horses. Near Picquigny is a Roman camp in tolerably good preservation: it is ascribed to Cæsar.

In the arrondissement of Abbeville are—Abbeville (population in 1831, 19,162; in 1836, 18,247), La Ferté, St. Valery (population 3265), and Le Crotoy, on the Somme; Rue and Crécy, on the Maie; St. Riquier, between the Authie and the Somme; Cayeux (population 2549), on the coast between Somme and the Bresle; and Gamaches, on the Bresle. Abbeville and Crécy, the latter the scene of a memorable battle between the English and French, under their respective kings (A.D. 1346), are noticed elsewhere. [Abbeville; Crecy.] St. Valery is at the mouth of the Somme, on the south bank of the river which forms the harbour. The town is on the side of a hill; it has large warehouses, ropewalks, and ship-building yards. The harbour is capable of receiving ships of 300 tons, but the shifting sandbanks render the entrance difficult. The tide rises about 12 feet. Considerable trade is carried on; sail and packing cloth, cordage, and glass are exported; and an important commission-trade is carried on in the wines, brandies, and other productions of the south of France. Vessels are fitted out for the fisheries, the colonies, and the coasting-trade: the imports are conveyed by the Somme navigation up to Abbeville and Amiens in lighters of 35 to 40 tons. Communication by steam has been established between St. Valery and London. There is one yearly fair. St. Valery has a theatre, an hospital, and a free navigation-school. The remains of a Roman post or camp and several antiquities have been discovered on the slope on which the town stands. Some writers have represented this as the port from which Guillaume or William the Conqueror sailed for the conquest of England. [Normandie.] Le Crotoy is a small but busy fishing-town on the north bank of the Somme, opposite St. Valery. Rue has some trade in fish, cattle, horses, sheep, and wool: it was once a seaport, but by the resession of the sea is now three or four miles inland. St. Riquier was antiently called Centule, and took its present name from St. Riquier, native of the town, who founded here, in the seventh century, a Benedictine abbey: it is said to have contained, under Louis-le-Debonnaire, 2600 houses. The church of the abbey still remains, and is the finest ecclesiastical building in the department after the cathedral of Amiens; and there is an hospital. Some trade is carried on in corn and hemp. Cayeux is near the mouth of the Somme; it has a lighthouse to guide vessels amid the sands which line this part of the coast. Gamaches was, in the middle ages, a place of strength; and there are yet some remains of its ramparts and its castle; the town is tolerably well built; it has a linen manufactory, a pottery, and several oil-mills.

In the arrondissement of Doullens are—Doullens (population in 1831, 2511 town, 3703 whole commune; in 1836, 3912 commune) and Lucheux, on the Authie or its feeders, and Domart, on an affluent of the Nieve. Doullens or Doulens is defended by a double citadel, formed by two forts or citadels communicating with each other. It has several public offices, fiscal or judicial, a theatre, and two hospitals. There is a fine manufactory for cotton-yarn, and several oil-mills or presses for seed-oil. Trade is carried on in coarse linen for wrappers, and in corn, oil, hemp, flax, and cattle. There are two yearly fairs for horses, cattle, and hardwares. This town was taken by the Huguenots, A.D. 1567, and retaken by the Catholics next year. Domart, or Dommart, sometimes distinguished as Dommart-les-Ponthieu, has two yearly fairs for horses, cattle, drapery, and hardwares.

In the arrondissement of Montdidier are—Montdidier (population in 1831, 3769; in 1836, 3790), on the Dam or Don, a branch of the Avre; Roye (population 3636) and Moreuil (population 1930 town, 1941 whole commune), on the Avre; and Ailly, on the Noye, another affluent of the Avre. Montdidier is on a hill on the right bank of the river; it is an old ill built town, with some remains of the fortifications which formerly defended it. It has several government offices, a high school, and an agricultural society. Cotton yarn, cotton hose, and leather are manufactured; and trade is carried on in grain, pulse, cattle, poultry, peat, and coals. Roye is built on the slope of a hill on the right bank of the Avre; it has narrow streets and ill-built houses. The town-hall, a Gothic building, is in the public square, which is large. There are manufactures of cotton yarn, cotton and woollen stuffs, stockings, &c.; and considerable trade is carried on in corn and flour for the supply of Paris. There is one yearly fair. Roye was a place of strength in former times, and has been repeatedly besieged. Moreuil has manufactures of hosiery and paper. Peat is dug in the neighbourhood. Ailly, distinguished as Ailly-sur-Noye, has a paper-mill.

In the arrondissement of Peronne are—Peronne (population in 1831, 3802; in 1836, 4119), Ham (population 1663), and Bray, on the Somme; Albert (population 2668), on the Miraumont; and Lihons and Nesle (population 1565 town, 1643 whole commune), between the Somme and the Avre. Peronne was a place of importance in the middle ages. Charles-le-Simple died here in captivity, A.D. 929. It was the scene of the well-known interview (A.D. 1468) between Louis XI. of France, and Charles, duke of Bourgogne [BOURGOGNE], described by Sir Walter Scott in his 'Quentin Durward.' In A.D. 1536, it was besieged by Henri of Nassau, one of the officers of the emperor Charles V., but without success. Though still fortified by a brick rampart and a ditch, it is no longer of any importance as a fortress, from its being commanded by the neighbouring heights. The town has two suburbs; the houses are tolerably well built, and there are two churches, a nunnery, a high school, an hospital, and a theatre. Calico, dimity, muslin, lawn, and other cottons and linens are manufactured; also leather, seed oil, and beet-root sugar. Peat is dug in the neighbourhood. There are thirteen yearly fairs, and considerable trade is carried on in woven goods and cattle. Ham is situated in a marshy plain, and was in the middle ages a place of strength. It is surrounded by the ruins of its antient fortifications, and has a castle, used as a state prison, and memorable as the place of confinement of the ministers of Charles X. There are three parish churches and an hospital. The townsmen manufacture blankets and cotton goods, beet-root sugar, and oil. There are two yearly fairs for cattle and general merchandise. General Foy was a native of Ham. Bray has a number of tan-yards. Albert has a manufactory of cotton-yarn, a bleach-ground, a paper-mill, a print-work for paper-hangings and calico, and, in the suburbs, a saltpetre manufactory Trade is carried on in cattle. There is at Albert a subterraneous cavern, or quarry, vaulted with the most singular petrifactions. Nesle, or Nêle, has an hospital, and considerable works for making seed-oil, beet-root sugar, and mustard.

The population, when not otherwise described, is that of the commune, and from the census of 1831.

The department constitutes the diocese of Amiens, the bishop of which is a suffragan of the archbishop of Reims. It is in the jurisdiction of the Cour Royale of Amiens and of the Académie Universitaire of the same city. It returns seven members to the Chamber of Deputies. In respect of education it is rather above the average of France. Of the young men enrolled in the military census of 1828-29, 44 in every 100 could read and write; the average of France being between 39 and 40.

This part of France was in the earliest historical period included in the territories of the Ambiani (’Αμβιανοῖ), a Belgic nation of inferior importance. Their territories formed part of what Cæsar designates Belgium, a name far more limited, as applied to the country, than that of Belgae, given to the inhabitants. In the Roman division of Gaul; the Ambiani was included in the province of Belgica, and upon the subdivision of this, in Belgica Secunda. The river Somme was known to the Romans as the Samara. It is mentioned by Ptolemy by the name Φροῦδις (Φρούδιος ποταμοῦ ἐκβολαί). The Britanni, a people mentioned by Pliny, appear to have occupied the sea-coast near the mouth of the Somme. The Gallic or Roman towns included in the limits of the department were Samarobriva, Pontes, Teucera, Setuci, and Rodium. Samarobriva is mentioned by Cæsar, and appears to have been of some importance in his time; for he fixed upon it as the place for holding a general assembly of the Gauls (*De Bell. Gall.*, lib. v., c. 24). The name, which is Celtic, signifies 'the ford or passage of the Samara or Somme,' and indicates the situation of the place. Samarobriva obtained in the later period of the Roman domination the name of Ambiani, from the people to whom it belonged, and from this name is derived its modern name Amiens. Pontes, mentioned in the Antonine Itinerary, was probably at Ponches, a small place on the south bank of the Authie. Possibly this place may have given name to the district of Ponthieu, or Pontieu, of which Abbeville was the capital. Teucera (inserted in the *Peutinger Table*) was between Nemetacum (Arras) and Samarobriva (Amiens), perhaps at Tievre, near the Authie, which is just beyond the boundary of the department. Setuci (also inserted in the *Peutinger Table*), the name of which D'Anville conjectures to have been Catuci, was perhaps near Cayeux, between Amiens and Roye; and Rodium (*Peutinger Table*) may be fixed at Roiglise, or Roye-eglise, near Roye.

On the overthrow of the Roman empire, this district passed early into the hands of the Franks; and in the middle ages constituted part of the province of Picardie. It comprehends the greater part of the former districts of Amiénais, Santerre, and Ponthieu, in which last were Ponthieu, properly so called, Vimeux, and Marquenterre. Ham and its district were part of the province of Vermandois. It was the frequent scene of hostilities in the English wars of the fourteenth and fifteenth centuries, and in the Spanish wars of the sixteenth and seventeenth.

SOMNA'MBULISM, a word of modern origin, which means strictly and etymologically *sleep-walking;* and in this sense is synonymous with the various names, *noctivagatio*, *noctisurgium*, *noctambulatio*, *paroniria ambulans*, *hypnobasis*, *nyctobasis*, &c.; it is however generally used in a more extended signification to comprehend all the phenomena that take place when a person, apparently insensible to external objects, acts as if he were in a state of consciousness: and this is the sense which the word will bear in this article. M. Bertrand, in his 'Traité du Somnambulisme' (8vo., Paris, 1823), divides those phenomena into four classes: 1, essential (or *proper*) somnambulism, which arises from some particular disposition of the nervous system in persons who in other respects apparently enjoy perfect health; 2, symptomatic (or *morbid*) somnambulism, which occurs in the course of certain diseases; 3, artificial somnambulism, which is occasioned by the proceedings employed in animal magnetism or mesmerism; and, 4, ecstatic somnambulism, which is the result of a sort of religious enthusiasm. The same division of the subject will be here adopted.

I. *Essential* (or *Proper*) *Somnambulism* is intimately connected with the subject of sleep and dreaming; and in fact 'a somnambulator,' as Dr. Pritchard says, 'is nothing but a dreamer who is able to act his dreams.' As a minute inquiry into the physiology of these two phenomena would here be out of place, the reader must consult the articles already given on these subjects. This form of somnambulism was noticed by the antients. The author of the treatise 'De Morbo Sacro,' that commonly goes under the name of Hippocrates, says that 'he knew many persons who used to groan and cry out in their sleep, and others that seemed to pant for breath (πνιγομένους), and others that would get up and run out of the house and act like madmen till they were awakened, after which they were in good health and sound sense as before, only rather pale and weak.' (tom. i., p. 588, ed. Kühn.) Aristotle tells us that 'there are individuals who rise in their sleep and walk about, seeing as clearly as those that are awake.' Diogenes Laertius mentions (*De Vitis Philosophorum*, *Pyrrho*, lib. ix.) that a Stoic philosopher named Theon was a sleep-walker; and Galen says (*De Motu Musculorum*, lib. ii., cap. 4, tom. iv., p. 435, 436, ed. Kühn) that he would not believe that people ever fell asleep while walking, until one night when walking along the road he did so himself, and went on for about a furlong, sleeping and dreaming, till at last he was awakened by kicking against a stone. 'And this,' adds he, 'is the reason why people cannot go on walking for any distance in their sleep, because they cannot meet with a perfectly smooth road;' in which he is not quite correct, as we often find that both the bodily and intellectual powers of the individual are more active and developed in his sleep than when he is awake, and that he is then able to perform feats which at any other time he would shudder at. The instances on record of this species of somnambulism are so numerous, that it is difficult to select the most interesting; one or two examples however must be given, and for a more copious collection the reader must be referred to some of the works whose titles will be given in the following part of this article.

The following case is reported in the 38th volume of the French *Encyclopædia*, on the highly respectable authority of the archbishop of Bordeaux, and has been frequently copied into other subsequent publications. It is the case of a young ecclesiastic, who was in the habit of getting up during the night in a state of somnambulism, of going to his room, taking pen, ink, and paper, and composing and writing sermons. When he had finished one page of the paper on which he was writing, he would read over aloud what he had written, and correct it. Upon one occasion he had made use of the expression—'Ce divin enfant.' In reading over the passage, he changed the word 'divin' into 'adorable.' Observing however that the pronoun 'ce' could not stand before the word 'adorable,' he added to it the letter *t*. In order to ascertain whether the somnambulist made any use of his eyes, the archbishop held a piece of pasteboard under his chin, to prevent him from seeing the paper upon which he was writing; but he continued to write on, without being apparently incommoded in the slightest degree. The paper upon which he was writing was taken away, and other paper laid before him; but the young ecclesiastic immediately perceived the change. He wrote pieces of music while in this state, and in the same manner, with his eyes closed: the words he placed underneath the music. It happened upon one occasion that the words were written by him in too large a character, and did not stand exactly under the corresponding notes; he soon perceived the error, blotted out the part, and wrote it over again with great exactness.

Several interesting cases of somnambulism will be found in Muratori's work, *Della Forza della Fantasia Humana*; some of them given on the authority of Gassendi. One of Gassendi's somnambulists used to rise and dress himself in his sleep, go down to the cellar and draw wine from a cask. He appeared to see in the dark as well as in a clear day; but when he awoke, either in the street or cellar, he was obliged to grope and feel his way back to his bed. He always answered his wife as if awake, but in the morning recollected nothing of what had passed. Another sleep-walker, a countryman of Gassendi's, passed on stilts over a swollen torrent in the night, but on awaking was afraid to return before daylight, or until the water had subsided. This species of somnambulism has been known to be hereditary. Horstius, in his work 'De Natura, Differentiis, et Causis eorum qui Dormientes ambulant' (seu 'de Noctambulonibus'), Lips., 1595, 8vo., p. 172, mentions three brothers who were affected with it at the same time; and Willis knew a whole family that was subject to it. Perhaps however these may rather be considered as instances of the influence of example and of the power of unconscious imitation, which sometimes renders it in a manner contagious. Of this there is a curious example given by Dr. Pezzi, in a work entitled 'Scretti di Medico Argomento,' Venez., 1813. It appears that his nephew, after reading more than once the history of a somnambulist, was himself seized with this affection; and also that the servant who attended him soon began to exhibit in his own person similar phenomena.

Essential somnambulism occurs in many persons (says Dr. Good) without any manifest predisponent cause, though it is generally connected with a considerable irritability of habit. A morbid state of the stomach, where this habit exists, has very frequently proved an exciting cause; and where this is the case, the attention of the physician must of course be directed to that quarter. With respect to the mode of treatment during the fit, though it has sometimes been recommended to employ violent means, so as to awaken the somnambulist suddenly, and to repeat this as often as the attacks come on, until they have completely ceased; yet M. Bertrand warns us against such a proceeding. 'If, in the first place,' says he, 'sensibility is completely extinguished, all the means employed to awaken the somnambulist will be useless; secondly, even when it is possible to awaken him at once, the sudden shock produces serious consequences; thirdly, as somnambulism is often the result of a salutary crisis of nature, one is never sure of not hurting the patient by suppressing it; and, lastly, the sudden suspension of a habit of the animal economy that has been contracted for a long time, must in all cases be attended with danger.' He adds that the best plan is to try to put oneself in connection with the patient by entering into the course of ideas by which he is occupied during the attack, and so endeavour to direct him in a reasonable manner.

Further information respecting this species of somnambulism may be found in the following works, besides those already quoted and referred to:—Zacuti Lusitani *Medicor. Princip. Hist.*, lib. i., hist. 15; Jo. Langii *Epist. Miscell.*, lib. ii., ep. 44; Pet. Salii Diversi *Curat. Partic. Morb.*, cap. 18; Abercrombie *On the Intellectual Powers*; Macnish's *Anatomy of Sleep*; Colquhoun's *Animal Magnetism* (from which work and M. Bertrand's great part of this article is abridged); &c.

II. *Symptomatic* or *Morbid Somnambulism* generally presents itself as one of the phenomena attending catalepsy, for a general account of which singular affection the reader is referred to the article on that subject; as however this remarkable part of the disease is there only very slightly alluded to, it will not be out of place to enlarge upon it here. This form of somnambulism (as far as the writer is aware) does not appear to have been noticed by the antients; but there are many cases on record long before the time of Mesmer, as well as others described by persons unacquainted with and even opposed to the doctrines of animal magnetism. The following case is given by Colquhoun, on the authority of Sauvages, and may be found in greater detail in the 'Hist. de l'Académie des Sciences,' for the year 1742: A girl of twenty years of age was frequently attacked with cataleptic insensibility, during which she continued stiff and deprived of all sensation, whether standing, sitting, or lying, in the position she might happen to be in at the commencement of the attack, and she could be pushed forward, like a statue, when it was wished to remove her from one place to another. She was afterwards placed in a different state, which commenced with the same deprivation of sense and motion, but at intervals presented a wonderful kind of animation. She first became motionless, then, some minutes afterwards, she began to yawn, sat up on the bed, and enacted the following scene, which she repeated at least fifty times. She spoke with an unusual liveliness and cheerfulness, and what she said was a continuation of what she had spoken in her previous fit, or a repetition of some part of the catechism which she had heard read on the preceding evening. She frequently addressed her acquaintances in the house, and sometimes made ironical applications of moral apophthegms to them under feigned names with open eyes, and such gestures as she had made the previous evening. That during all this time she was not awake, is clear from various experiments. A hand was suddenly passed near her eyes, without producing any motion in the eye-lids or any attempt to evade it, or interrupting her speech in the slightest degree. The same thing happened when a finger was suddenly approached close to her eye, or a burning taper held so near to it that the hair of her eyelids was actually burnt, and also when any one called loudly into her ear from behind, or threw a stone against the bedstead. Nay more, brandy and spirit of hartshorn were poured into her eyes and mouth; Spanish snuff was blown into her nostrils; she was pricked with needles; her fingers were wrenched; the ball of her eye was touched with a feather, and even with the finger: she manifested not the slightest sensation. During these trances she always began to speak with more than usual animation; soon afterwards, she sang and laughed aloud, attempted to get out of bed, and at length sprang out of it and uttered a cry of joy. She kept the middle way between the bedsteads as well as when awake, and never came against them—turned dexterously round between the bedsteads and a concealed closet, without ever groping her way or touching the objects; and after turning round, she returned to her bed, covered herself with the clothes, and again became stiff as at the commencement. She then awoke, as if from a profound sleep, and when she perceived, from the appearance of the bystanders, that she must have had her fits again, she wept the whole day for shame, and never knew what had happened to her during the paroxysm. The above is by no means one of the most wonderful cases of somnambulism occurring during a cataleptic seizure, but it has been chosen on account of the respectable authority on which it rests. Those recorded by M. Petetin (*Mémoire sur la Découverte des Phénomènes que présentent la Catalepsie et le Somnambulisme, &c.*, 1787; and *Electricité Animale prouvée par la Découverte des Phénomènes Physiques et Moraux de la Catalepsie Hystérique, et de ses Variétés*, Lyon, 1808), are not perhaps less authentic, but certainly carry less weight with them on account of their *number;* for no one can help being struck with the somewhat startling announcement, that of 'a disease so rare that its existence has been doubted by many writers' (Copland, *Dict. of Pract. Med.*), no less than *eight* cases should have been seen by a single practitioner in the course of his practice, all of which presented similar and most remarkable phenomena. Indeed one may suspect that he was himself doubtful whether his work would be believed, as he did not venture to publish it during his life; but it should at the same time be added that there is no other reason whatever to call in question the accuracy of his statements, as his own character both for talent and honesty was highly respectable, and his experiments were performed in the presence of satisfactory witnesses. Perhaps with some persons his observations will receive more credit from the fact that, when his experiments and discoveries were first made, he was not an advocate for the doctrines of animal magnetism, and that, even after he had found reason to change his opinion on the subject, he still continued to explain the phenomena which he had observed by quite a different hypothesis. An account of the contents of his works may be found in the *Histoire Critique du Magnétisme Animal*, by Deleuze (2 vols. 8vo., Paris, 1819); and in the *Rapports et Discussions, &c. sur le Magnétisme Animal*, by Foissac (8vo., Paris, 1833). One of the most extraordinary phenomena of this species of somnambulism is the transference of the faculties from their usual and appropriate organs to the epigastrium and other parts of the body, such as the extremities of the fingers and toes; another is the still more surprising faculty of prevision. By the *faculty of prevision* it is not meant that somnambulists enjoy an unlimited power of reading the pages of futurity, but merely that they predict with the greatest precision and accuracy the different symptoms and changes that are to take place in the course of their disease. This power is sometimes further extended. In both of these phenomena, as well as in several other respects, morbid or symptomatic somnambulism offers a striking similarity to the phenomena of the two following species; but as it is impossible here to go fully into the subject, it is perhaps better to leave it untouched, and to refer the reader for the details of the facts, and for the evidence on which they rest, to some of the above-mentioned works. (See also a posthumous essay by Deleuze, entitled *Mémoire sur la Faculté de Prévision*, 8vo., Paris, 1836.)

III. *Artificial Somnambulism*, or that which is occasioned by the proceedings employed in animal magnetism, is not expressly mentioned by any antient writer, but the following curious lines by Solon have been applied to this process by Colquhoun:—

> Πολλάκι δ' ἐξ ὀλίγης ὀδύνης μέγα γίγνεται ἄλγος,
> Κοὐκ ἄν τις λύσαιτ' ἤπια φάρμακα δούς.
> Τὸν δὲ κακαῖς νούσοισι κυκώμενον ἀργαλέαις τε
> Ἁψάμενος χειροῖν αἶψα τίθησ' ὑγιῆ.

Thus translated by Grotius:

> 'Saepe dolor tenuis morbos produxit acerbos,
> Tollere quos nullis sit medicaminibus;
> Saepe illu saevo jactatum corporis aestu
> Contactu sanum reddidit una manus.'
> Stob., *Floril.*, tit. 9, § 25, v. 59.

The following verse in Plautus (*Amphitr.*, i., 1-157) has also been supposed by some persons to allude to the same manipulations: 'Quid si ego illum tractim tangam, ut dormiat?' where '*tractim* tangere' is explained to mean 'sensim et leniter tangere, manum trahendo, non infligendo; quod faciunt nutrices, blande et tracta manu palpantes infantulos, ut somnum capiant.' (Facciol., *Lex.*) As an account of the doctrines of Mesmer has been already given under the head of ANIMAL MAGNETISM, it will be sufficient here to add a few remarks upon Somnambulism as occasioned by it. There has been so much of 'knavery and credulity' (to use the words of that article) displayed in connection with the subject of animal magnetism, that it is of more than usual importance to select only those instances which rest on the most unexceptionable evidence; accordingly nothing will be noticed here except the 'Rapport sur les Expériences Magnétiques faites par la Commission de l'Académie Royale de Médecine [à Paris], lu dans les Séances des 21 et 28 Juin, 1831, par M. Husson, Rapporteur.' In this Report the experiments are distributed into four divisions: 1, Magnetism without effect; 2, Magnetism with slight effects; 3, Effects produced by *ennui*, monotony, and imagination; and 4, Effects probably depending only upon magnetism. The whole is well worth reading, but there is only room here for one extract from it, which relates to a case that was communicated to the surgical section of the French Academy on April 16, 1829, by Jules Cloquet, and which occupied two of its meetings in its investigation. It is that of a lady, aged sixty-four, who consulted M. Cloquet, April 8, 1829, on account of an ulcerated cancer on the right breast, of several years' standing, which was combined with a considerable swelling (*engorgement*) of the corresponding axillary glands. M. Chapelain, the physician attending this lady, who had magnetized her for some months, had obtained no other result than that of producing a most profound sleep, during which all sensibility appeared to be annihilated, while the ideas retained all their clearness. He proposed to M. Cloquet to operate upon her while she was plunged in this magnetic sleep. The latter, having deemed the operation indispensable, consented. The two previous evenings this lady was magnetized several times by M. Chapelain, who, in her somnambulism, disposed her to submit to the operation, although, when awake, she rejected the idea with horror. Upon the day appointed M. Cloquet found the patient dressed and seated in an elbow-chair, in the attitude of a person enjoying a quiet natural sleep. She had however been thrown into a state of somnambulism, and talked with great calmness of the operation. She undressed herself, and sat down upon a chair; M. Chapelain supported the right arm, the left was permitted to hang down at the side of the body. M. Cloquet deliberately performed the operation, which lasted from ten to twelve minutes, and the tumour was extirpated. During all this time the patient continued to converse quietly with the operator, and did not exhibit the slightest sign of sensibility. There was no motion of the limbs or of the features, no change in the respiration nor in the voice; no emotion even in the pulse. The patient continued in the same state of automatic indifference and impassibility in which she had been some minutes before the operation. There was no occasion to hold, but only to support her. A ligature was applied to one of the thoracic arteries, which had been opened during the extraction of the glands. The wound was united by means of adhesive plaster, and dressed. The patient was put to bed while still in a state of somnambulism, in which she was left for forty-eight hours. An hour after the operation there appeared a slight hemorrhage, which was attended with no consequence. The first dressing was taken off on the 14th and the wound was cleaned and dressed anew; the patient exhibited no sensibility or pain, and the pulse preserved its usual rate. After this dressing M. Chapelain awakened the patient, whose somnambulic sleep had continued from an hour previous to the operation, that is to say, for two days. She did not appear to have any idea of what had passed in the interval; but upon boing informed of the operation, and seeing her children around her, she experienced a very lively emotion, which the magnetizer checked by immediately setting her asleep. The only doubt or objection that the writer has ever seen raised with respect to the above case, is that it does not appear certain that the patient was not in a state of anæsthesia *before* she was thrown into the magnetic trance; but this is so very far-fetched and improbable, that it is almost equivalent to confessing that the fact of an artificial state of anæsthesia having been produced is indisputable. With respect to the phenomenon of somnambulism as caused by mesmerism, or animal magnetism, the writer only wishes to add most distinctly and explicitly that so much credulity and deception have been brought to light in connection with it, that a person cannot be too cautious in sifting and weighing the evidence on which each of the alleged instances rests; but that, after all this mass of knavery and folly has been cleared away, there still remain a large number of instances which cannot be disbelieved without discarding all historical evidence whatever. For more information on the subject the reader may consult, besides the works already quoted, the Rev. Chauncey Townshend's work on Somnambulism, and 'Le Magnétisme Animal en France,' by M. Bertrand, Paris, 1826.

IV. *Ecstatic Somnambulism.*—M. Bertrand has given this name to that species which is produced by a high exaltation of the mind, and becomes in a manner infectious by sympathy in such persons as are predisposed and subjected to the same influences. Of this last species, the *devotional ecstasis* is perhaps the most frequent and the most remarkable; and this has been supposed to have had some connexion with the oracles and other miraculous stories of antiquity. M. Bertrand has however, for obvious reasons, selected his instances from four different periods in modern times, in each of which the devotional ecstasis appeared as a sort of epidemic, and presented symptoms very similar to those occurring in the three former species of somnambulism. The first series of phenomena are those which took place in connexion with the burning of the unhappy Grandier on the charge of sorcery at Loudun, in 1634, an account of which may be found in Bayle (*Dict. Hist.*, art. 'Grandier'); or in the 'Hist. des Diables de Loudun,' by a Protestant Refugee, Amst., 1693, 12mo. The next instances are extracted from a scarce work entitled 'Théâtre Sacré des Cévennes,' and relate to the French Protestants who, after the revocation of the Edict of Nantes, 1685, went by the name of the 'Trembleurs des Cévennes,' and were persecuted and massacred in those mountains. The third epidemic broke out at the tomb of the Abbé Pâris in the church of St. Médard, at Paris, about the year 1731. These are perhaps the most celebrated of all, as having been selected by Hume to oppose to the miracles of the New Testament. The original and authentic account of them was published by M. Carré de Montgeron, in a work entitled 'La Vérite des Miracles opérés à l'Intercession de M. De Pâris,' &c., 2 vols. 4to., 1737, 1741; and they are examined at some length and with great acuteness by Bishop Douglas, in his 'Criterion, or Miracles Examined,' &c. To these he has added, fourthly, some considerations on the state produced in the patients who, towards the end of the last century, were exorcised by a priest named Gassner, at Ratisbon. An account of these (supposed) miraculous cures is to be found in a work entitled 'L'Antimagnétisme; ou Origine, Progrès, Décadence, Renouvellement, et Réfutation du Magnétisme Animal,' 8vo., Londres, 1784 (pronounced by M. Deleuze to be the ablest publication that had appeared against the doctrines of Mesmer), which account is extracted from a work called 'Procès-verbal des Opérations Merveilleuses, &c., par le Ministère du Sieur Gassner,' &c., Schillingsfürst, 1775. As however neither these nor many other examples that might be brought forward can be fully noticed here, it has been thought sufficient to point out the places where further information may be procured.

SOMNER, WILLIAM, was born at Canterbury, according to the account given by his wife and son, March 30th, 1606; but according to the register of the parish of St. Margaret's, he was baptised there on November 5th, 1598. His father was registrar of the court of Canterbury under Sir Nathaniel Brent, who was then commissary. He was sent to the free-school of that city, where he acquired a competent knowledge of Latin. He was next placed as clerk to his father in the ecclesiastical courts of the diocese, and afterwards preferred to an office in the courts by archbishop Laud. His natural bent was to the study of antiquities, in which he was encouraged by Dr. Meric Casaubon, one of the prebendaries.

In 1640 he published 'The Antiquities of Canterbury,' 4to., a work which gained him considerable reputation, and which was afterwards reprinted and enlarged by Nicholas Batteley, fol., Lond., 1703. Somner's next production was an Appendix to the first part (all that was published) of Casaubon's Commentary 'De Quatuor Linguis,' 12mo., Lond., 1650, showing the relation of the German with the Saxon language. In 1652 he added a most valuable Glossary to Sir Roger Twysden's 'Decem Scriptores.' He was now urged by his friends to make a Saxon Dictionary, but as this was a work which required time and great labour, it was necessary that he should have sufficient means of support while engaged upon it. Sir Henry Spelman had founded at Cambridge a lecture for 'promoting the Saxon tongue, either by reading it publicly or by the editing of Saxon Manuscripts;' and this lecture being vacant in 1657, archbishop Usher recommended Somner to the then patron Roger Spelman, grandson of the founder. Accordingly Somner had the salary, and went on with the work, which was published at Oxford, in folio, in 1659.

A short time before the Restoration, Somner was imprisoned in the castle of Deal for endeavouring to procure signatures to a petition for a free parliament.

In 1660 he was made master of St. John's Hospital, in the suburbs of Canterbury, and about the same time auditor of Christ Church. In this year he published in quarto his 'Treatise on Gavelkind,' his last publication. He died March 30th, 1669.

He left behind him various manuscript collections, and two or three treatises, one of which, 'Of the Roman Ports and Forts in Kent,' was published at Oxford, 8vo., 1693, by Brome. Another, 'De Portu Iccio,' translated into Latin by Mr. (afterwards bishop) Gibson, was published at Oxford, 8vo., 1694. To the former of these a Life of Somner is prefixed by White Kennet, afterwards bishop of Peterborough.

Somner was buried in the north aisle of St. Margaret's Church, Canterbury, where there is an inscription to his memory. His books and manuscripts were purchased by the dean and chapter of Canterbury, and they are still in the Cathedral library; a catalogue of them is appended to Kennet's Life of Somner. Somner gave great assistance to Dugdale and Dodsworth, in the first volume of the 'Monasticon Anglicanum.' Among his friends and correspondents were the archbishops Laud and Usher, Sir Robert Cotton, Sir Simonds D'Ewes, Sir William Dugdale, Burton the antiquary, Sir John Marsham, and Elias Ashmole.

(White Kennet's *Life;* Pref. to the *Roman Ports and Forts; Biographia Britannica;* and Gough's *British Topography*, vol. i., p. 443.)

SONCHUS (*σόγχος*), the name of a genus of plants belonging to the natural order Compositæ; suborder Cichoraceæ. It is characterised by a many-flowered head, involucre imbricated with scales, swelling at the base. Receptacle naked. Fruit transversely striated. Pappus simple, sessile. The species are inhabitants of Europe, Asia, Africa, and America. De Candolle enumerates forty-five species, of which four are natives of Great Britain. They are not used in medicine, but some of them are cultivated in gardens.

The most common species is the *Sonchus oleraceus*, the common sow-thistle. It has downy subumbellate flower-stalks; a glabrous involucre; lyrato-runcinate leaves, upper ones lanceolate sagittato-amplexicaul at the base, all dentato-ciliate. This plant is found commonly in waste places and cultivated ground all over the world. It has small yellow flowers and a conical involucre when in seed, and is greedily fed upon by many animals.

S. arvensis (corn sow-thistle): flower-stalks corymbose; involucre glandilose-hispid; leaves denticulate, cordate at the base, oblongo-lanceolate, lower ones sinuato-runcinate. It is frequent in corn-fields in this country and the southern parts of Europe, and in Pennsylvania. Dr. Sibthorp found it in Greece, and was of opinion that it was the same plant as the *σόγχος ἴτεοος* of Dioscorides.

SO'NDRIO. [VALTELLINA.]

SONG, a term applied to either a short poetical or musical composition, but most frequently to the two in union.

As a poetical composition it may, according to Dr. Aikin, 'be largely defined a short poem, divided into portions of returning measure, and turning upon some single thought or feeling.' As a union of the two arts, Rousseau describes Song (*chanson*) as a very brief lyrical poem, founded commonly on agreeable subjects, to which is added a melody for the purpose of singing it on familiar occasions, either at table among friends, or to a beloved object, and even when alone, to dissipate the *ennui* of the rich, or to lighten the care and labours of the poor.

As denoting a musical composition, *Song* is used, in this country, to signify a vocal melody of any length or character, and not confined to a single movement; and while the solemn, sublime air of the oratorio, and the *aria grande* of the Italian opera, are frequently, though erroneously, called by this name, the same is bestowed on the short, simple, unpretending ballad. But this is only one instance among many of the defective state of our musical nomenclature. Of the varieties of *Song*, see AIR, BALLAD, CANZONET. The term however is not absolutely unlimited in its meaning, for, as regards performance, it is confined to an air for a single voice; though formerly the word was considered as the past participle of the verb *to sing*, and signified anything sung. Thus our composers in the sixteenth and seventeenth centuries often entitled their productions for more than one voice, 'Part-Songs.'

Concerning the *Songs*, or Σκόλια, of the Greeks, we refer to our article MUSIC, p. 24, col. 2, and SCOLIUM. Of the Roman Song, musically considered, we are without information. More of war than of taste in their nature, the Romans bestowed little thought on music, and coldly adopted what was transmitted by the elegant Greeks. But as we have before ventured to assert, and now repeat, music, as the term is at present understood, is an art exclusively modern, and cannot be said to have existed till the invention, or at least the use, of counterpoint.

Rousseau claims for the French pre-eminence in song-writing; if not for the melody of the music, at least for the spirit, wit, and grace of the words. In tenderness however and in priority as to the time at which we suppose it to have had its birth, the music of the Irish far excels that of the French; and for strength of feeling and energy of expression, the early lyric poetry of Scotland may challenge comparison with that of the most favoured nation. What is commonly supposed to be Scottish music—but much of which we believe to have originated in Ireland—yields to nothing of the kind in distinctness and force of character, in beauty and pathos. In Russian, Swiss, and Spanish melodies, great and agreeable nationality is undeniable; and not less is found in the rustic music of the Neapolitans and Venetians.

In England *Song* can hardly be said to have passed out of its infant state, whether considered in relation to music or poetry, till the middle of the sixteenth century; and though we have some lyric productions of merit before the time of Shakspere, yet they are so few in number, that with him and his contemporaries this species of verse may be said to have begun really to flourish. But of the music set to these songs scarcely any remains, and what is handed down, though generally equal to that produced during the same period in other parts of Europe, is, with an occasional exception, so nearly devoid of all those elements which constitute melody, as to be almost worthless. As the seventeenth century advanced, the number of our poets who succeeded in song-writing increased fast, and Henry Lawes was the composer who at the same time wrought that change—or, rather, set that example—which his friend Milton ascribes to him. (*Sonnet to Lawes.*) The civil wars checked the progress of song, so far certainly as it is connected with music: but at the Restoration lyric poetry recovered its gaiety, and song-composers began to appear; though till Purcell rose up no one seems to have possessed much talent, if Matthew Lock's single air in *Macbeth* does not entitle him to be named as an exception.

The poetry of modern Songs has, in too many instances, degenerated, while the music of them has gradually improved. England, from about the middle of the last century till a recent period, furnished its full share of beautiful songs (this term excluding all airs of greater pretensions) to the general stock. France rather later began to contribute its fair quota; and however opinions may differ respecting the merit of earlier French melodies, it seems to be agreed that they may now compete with those of most other nations. But it must be admitted that Germany is at present, and has been for many years, taking the lead in this, as in higher departments of music. German composers most commonly think much, and hence that truth of expression and depth of feeling which are so apparent in their vocal compositions, qualities which are introducing their productions into every circle where the beauties of the art are clearly perceived and justly valued.

SONG OF BIRDS. The Hon. Daines Barrington defines a bird's *song* as 'a succession of three or more different notes, which are continued without interruption during the same interval with a musical bar of four crotchets in an adagio movement, or while a pendulum swings four seconds.' But in this definition he excludes the call of a cuckoo and the *clucking* of a hen, these consisting of only two notes; 'while,' he says, 'the short bursts of singing-birds contending with each other, are equally distinguished from what I call *song* by their not continuing for four seconds.' 'Notes,' the same author adds, 'are no more innate in birds than language is in man, and depend entirely upon the master under whom they are bred, as far as their organs enable them to imitate the sounds which they have frequent opportunities of hearing.' By such *notes* however we presume the writer means those of imitation, and in the term 'master' includes the parent of the young bird. For though birds are often taught to sing musical tunes, strictly so termed, by human masters, yet many learn what may be called appreciable melodies, from the male parent, or from others of its own species. Mr. Barrington further says that 'Birds in a wild state do not commonly sing above ten weeks in a year; while the bird in a cage sings, perhaps, nine or ten months.' He denies that the singing of the male bird in the spring is only to please its mate during incubation, for that the greater number of birds do not sing at all. The caged bird which sings during the far greater part of the year cannot do so from the alleged inducement; but, on the contrary, he is only contending with some other bird; or, indeed, against any sort of continued noise. The song of birds, he observes, is rarely reduceable to musical notation; 1st, because its rapidity is often so great, and it is so uncertain when it will stop, that the notes cannot be reduced to a musical bar, in any time whatsoever; and, 2ndly, because the pitch of most birds is higher than that of any instrument. Dr. Wollaston tells us, in vol. 110, p. 306, of the 'Philosophical Transactions,' that the pitch of the chirp of the sparrow 'seems to be about four octaves above E in the middle of the piano-forte.'

Mr. Barrington thinks that all birds of the same species sing in the same key; and from 'an experienced harpsichord-tuner,' who had paid great attention to the subject, he learnt that woodlarks sing in the key of F; common cocks in A: Bantam cocks in C; cuckoos in C, falling to A; and thrushes in A. We give these as the conjectures of the learned writer; but to his opinion, which is decidedly expressed, that for the musical scale man is indebted to the singing of birds, we cannot assent, believing that a much more satisfactory source is to be found in the harmonics of all sonorous bodies, and in the simple arithmetical divisions of a vibrating string. He agrees with most others in assigning precedence in vocal rank to the nightingale, not only on account of its 'tone and variety,' but also because it 'sings with superior judgment and taste.' He places the skylark next; and with a portion of his curious table of the comparative merit of British singing-birds, 20 being the assigned point of absolute perfection, we shall conclude this article:—

	Mellowness of Tone.	Sprightly Notes.	Plaintive Notes.	Compass.	Execution.
Nightingale . .	19	14	19	19	19
Skylark . . .	4	19	4	18	18
Woodlark . . .	18	4	17	12	8
Linnet	12	16	12	16	18
Goldfinch . . .	4	19	4	12	12
Hedge-Sparrow .	6	0	6	4	4
Thrush	4	4	4	4	4
Blackbird . . .	4	4	0	2	2
Robin	6	16	12	12	12
Wren	0	12	0	4	4

(*Philosophical Transactions*, vol. lxiii., p. 249, for 1773.)

SONG OF SOLOMON. [Solomon's Song.]

SONGA'RIA is the name of a country in Asia, which constitutes the north-western portion of the Chinese empire. The name is derived from the Songares, one of the great divisions of the Calmucks or Olöth, who had taken possession of this country, and erected a powerful empire, that was destroyed by the Chinese after the middle of the last century. Songaria lies between 42° and 49° N. lat., and extends from 76° to 95° E. long. In length it extends upwards of 900 miles; but the width varies so much, that on an average it probably does not much exceed 300 miles. This gives an area of 270,000 square miles, or about 70,000 miles more than the extent of France.

Songaria occupies a very remarkable position on the globe. It forms the most northern portion of an isthmus, which separates two great wastes, the largest deserts on the surface of the globe, with the exception of the Sahara in Africa. On the east of this isthmus is the Gobi, which, according to a rough estimate, has a surface exceeding 1,200,000 square miles. This desert constitutes an elevated table-land, and is called the Gobi or Shamo. [Gobi.] On the west of the isthmus extends a low desert. This desert, which may be called the Caspian Desert, as it surrounds the sea of that name on the north and east, is even larger than the Gobi, covering an area of nearly 1,300,000 square miles. In this estimate the Descht Kowar, between the Caspian Sea and the lower course of the Amoo, is considered as the most southern, and the Barabinza Steppe in Siberia, between the rivers Irtish and Obi, as the most northern portion: and it is assumed that the Calmuck Steppe, between the lower Volga and the Black Sea, constitutes its most western part. Both deserts, the Gobi and the Caspian Desert taken together, are equal in extent to the Sahara, and to two-thirds of the surface of Europe.

The isthmus which separates these two large deserts is connected on the south (near 36° N. lat.) with the range of the Hindu Koosh, and on the north (near 50° N. lat.) with the western extremity of the Altai Mountains. South of 40° it lies north and south, and comprehends the countries known under the names of Badakshan and Bokhara. North of 40° it lies south-west and north-east, and comprehends the countries called Kokand and Songaria. South of 40° N. lat. the descent from the elevated Gobi to the low Caspian Desert is formed by an elevated range a great part of which is always covered with snow, and the descent is rapid; but north of 40° N. lat., and especially in Songaria, it is formed by a number of extensive terraces, which taken together extend from east to west over a space of 500 miles.

On the east Songaria opens to the Gobi, and on the west to the Caspian Desert; but on the north and south it is bounded by two elevated mountain-ranges, the Thian-shan and the Altai Mountains. The space between the two ranges is traversed by numerous minor ranges, which lie in every direction, and divide the surface into several river-basins, which are entirely separated from one another, and each of which contains a lake, the receptacle of its drainage. Although such closed river-basins occur in other parts, sometimes in mountain regions, and still more frequently in deserts, they are nowhere so numerous as in Songaria, and they impress on this country a very peculiar character. It is desirable that such an extraordinary country should be open to the investigation of scientific travellers; but the policy of the Chinese prevents it, and all our knowledge of the country is derived from the scanty observations of travellers who have traversed the country with caravans, and the information given in the Chinese Imperial geography. These scanty materials have been collected by Ritter, in his 'Erdkunde von Asien,' with his usual industry, and have been compared with more than his usual sagacity.

Thian-shan Mountains.—This extensive range of mountains extends in its western prolongation far into the Caspian Desert. The most western branch is known by the name of Ak-tagh, which occurs about 50 miles north of Samarcand in Bokhara, near 41° N. lat. and 67° E. long. In these parts it rises with a moderate elevation above the adjacent steppe. From this point it extends eastward to the east of the meridian of the town of Hami in Chinese Turkistan; and seems, as far as is known, to terminate near 95° E. long. The extent from west to east is about 1400 miles, or 200 miles more than the length of the Appalachian Mountains in North America, if the Lookout Range in Alabama and the mountains at the mouth of the river St. Lawrence are considered as the extremities of the last-mentioned mountain-system. The Thian-shan do not greatly deviate from a circle of latitude, as their western extremity is near 41° N. lat., and their eastern between 43 and 44° N. lat.

The Ak-tagh rises boldly out of the steppe, but not to a great elevation, nor does it occupy a great width. Where it approaches the descent from the high table-land to the lower country, it increases in elevation and width, and takes the name of the Asferah Mountains. At the road which traverses the chain between Kashgar in Chinese Turkistan, and Khokhand in Fergana, the range is probably 100 miles across, and rises so high that it is covered with snow nearly the whole year round: some parts even seem to rise above the snow-line. East of this road the mountains are called Mus-tagh or Moossoor, and this name has been adopted to designate the range of the Thian-shan as far east as the great mass of the Bogdo Oöla Mountains, near 85° E. long. The western part of the Mus-tagh is stated to contain many high summits, which are always covered with snow; but south of the lake of Issikul or Temurtoo, where it is crossed by two roads leading from Kuldsha or Ili to Ushi and Kashgar, the mountains are much below the snow-line. About sixty miles farther east however, where the road between Kuldsha and Aksoo traverses the chain, the snow masses occupy from nine to ten miles of the central portion of the range, and those masses are stated to extend to a great distance east and west of the road. The higher portion is said to occupy about forty miles in width; and when the lower heights which are contiguous to it on both sides are added, the whole breadth of the Thian-shan at the road can hardly be less than eighty miles. East of 85° is the Bogdo Oöla, which lies north of Karashar, and seems to be the most elevated and most extensive mountain mass of the Thian-shan. According to the information of the natives, the masses of snow and ice, and the glaciers which cover its summit, occupy a great space, and attain a considerable elevation above the snow-line. There is no road over this range between that which leads from Kuldsha to Kutche (83° E. long.), and which has not been travelled by any European, and another, by which the range is traversed west of Turfan (89° E. long.), a distance of 300 miles. The most eastern part of the Thian-shan, or that which lies between 89° and 96° E. long., is very little known. Along the road west of Turfan, which leads from this place northward to Urumtsi, there are some snow-covered mountains; but farther west the range is considerably lower, and near 95° it terminates as abruptly in the eastern desert as the Ak-tagh rises in the western. It is indeed supposed that this mountain-range continues through the Gobi, until it unites, near 106° or 107° E. long., with the In-shan, which lies north of the great northern bend of the Hoang-ho; but this supposition is not borne out by the scanty information that we possess about this part of Asia, or if such continuation exists, it is only indicated by low hills and ranges which occur at great distances from one another.

Altai Mountains.—The Altai Mountains which bound Songaria on the north are described in vol. i., p. 397. We shall here only add, according to the most recent information, that the part of the range which lies south of the rivers Narym and Bukhtarma, and consequently within the Chinese empire, and in Songaria, has been found to be the most elevated part of this mountain system which is known. South-east of the Kolson Bielki, or the Snow-mountains of Kolson, which are the highest in Siberia, is what is called by the Russians the Kurtshum Bielki, or the Snow-mountains of Kurtahum, which attain a much greater elevation, and form on their snow-covered tops an extensive ice-field above which no summit rises. But a very high summit stands near 88° 20′, and this properly is called by the natives Egtag Altai, or Great Altai.

Mountain-chains within Songaria.—It was formerly supposed that a continuous elevated chain of mountains connected the Mus-tagh with the Altai Mountains, and that this chain ran in a direction south-west and north east. Such a chain does not exist. There is however an uninterrupted continuation of high ground between both mountain systems. So far as is known, this high ground does not in any place fall to the common level of the country, nor even sink low enough to lose the appellation of mountains, and in some places it rises above the snow-line. The most elevated portion is the range called Iren Khabirgan, which at its eastern extremity is connected with the mountain-mass of the Bogdo Oöla. From the point of connection with that mass it first runs north-west, but afterwards turns west, and may be said to terminate with a considerable depression north of the town of Kuldsha. The length of this chain may be about 200 miles, and we infer that it must rise to a great elevation and contain much snow on its summits, from the circumstance that the great road from Peking to Kuldsha traverses the chain at the depression north of Kuldsha, and does not cross it farther east, though if it did, the road would be considerably shorter. The western continuation of the Iren Khabirgan is called the Tokty mountains. This chain soon turns to the north-west and north, and extends along the western banks of Lake Alakul or Alaktau-kul until it terminates at the Tarbagatai mountains. This last-mentioned chain runs east and west. The Tokty mountains are of moderate elevation, but it is stated that near Lake Alakul a summit occurs which is always covered with snow. The chain is much lower which extends from the northern declivity of the Tarbagatai mountains first northward and then north-eastward, until it terminates on the banks of the river Irtish, constituting in this part the boundary between the empires of China and of Russia. This most northern prolongation is called the Kheïrek mountains. The Kheïrek mountains are separated from the Altai mountains by the narrow valley of the Irtish. Another chain of mountains is connected with the Tokty mountains near the south-western corner of the Alakul lake. It is called Ala-tau, a name frequently occurring in these parts of Asia, and it extends first eastward to a short distance, and then north-east to a great distance, until it joins the Egtag or Great Altai near the sources of the Irtish. The eastern extremity of the Tarbagatai mountains is immediately connected with the Ala-tau. The Tarbagatai mountains run about 400 miles east and west, and terminate, like the Ak-tagh, abruptly in the western desert. They seem to rise from 4000 to 6000 feet above the sea, and in some places snow in small patches is found even in summer. These ridges, and some others, less elevated or less known, divide the greater part of Songaria into numerous closed basins.

The basin of Lake Issikul or Temurtoo occupies the most south-western part of Songaria. The lake is stated to be nearly 100 miles long from east to west, and about 35 miles wide on an average. At no great distance from its shores mountains enclose it on all sides, from which the river receives a great supply of water. The superabundance is carried off by a river, which leaves the lake at its western extremity, and, under the name of Chooi, traverses a great extent of the western deserts, which is possessed by the Great Orda of the Khirghis Cossacks. [Turkistan.] On the south of the lake is the Mus tagh, and on the north of it is a chain called Ala-tau. It is said that these mountains contain iron-ore which is worked.

East and north of Lake Issikul is the basin of the river Ili, which falls into the lake of Balkash. It is the largest and most important of the basins of Songaria; it extends more than 400 miles east and west, and about 100 miles south and north, and probably has an area of 40,000 square miles, which is equal to the state of Tennessee. The river Ili rises with two branches in the Thian-shan mountains: the larger originates between 81° and 82° E. long., and runs under the name of Tekes north-east for more than 100 miles, when it meets the other and smaller branch, which originates near the place where the Iren Khabirgan is united with the Bogdo Oöla, and runs westward. From the place where these branches unite, the river is called Ili, and runs to the west, inclining towards its termination to the north-west. It falls into Lake Balkash by several arms, after a course of more than 300 miles. Lake Balkash is the largest of the lakes of Songaria, and has no outlet, though it receives several other rivers from the north and east. The eastern half of the Ili basin has a very hilly surface, but it contains numerous tracts which are fit for agriculture. Even when the Songares were in possession of the country, some of the most favoured tracts were under cultivation. But as that nation derived its subsistence from its horses and cattle, and was not accustomed to agricultural labour, it occupied nearly the whole country as pasture-ground, and these pastures were very rich in comparison with those in the deserts farther east and west. Accordingly this country was the principal seat of the empire of the Songares. Since it has fallen under the sway of the Chinese, the government has sent there, and is still sending, a great number of settlers, partly as military colonies, and partly as cultivators of the ground, but all of them are bound to apply themselves to agriculture. The military colonies consist chiefly of Mongols, especially Tshagars and Sybés, and Mandshoos, who unite agriculture with the breeding of cattle. A number of Chinese also come annually, who are condemned to death according to the laws, but the punishment is in most cases converted into transportation to the banks of the river Ili. These Chinese are said to have already greatly contributed to change the face of the country by introducing several branches of cultivation. Though the army which is kept in those parts is rather large, as it is one of the frontier provinces, and surrounded by many wandering tribes, agriculture is already in such a forward state, that no great supply of grain is required from other parts of the empire. Farther west, about 80° E. long., the hills disappear, and the surface sinks to a level. The soil is much less fertile, and is chiefly covered with extensive bogs, in which only canes and rushes abound. It is nearly a desert, mainly inhabited by innumerable herds of wild hogs and other animals; but in approaching the country of the Khirghis Cossacks south of Lake Balkash it becomes a dry steppe, affording pasture-ground for horses, cattle, and sheep for several months in the year. This portion of the basin is abandoned to some tribes of the Khirghis Cossacks.

North of the eastern part of the basin of the river Ili, and separated from it by the Iren Khabirgan and the Tokty mountains, is the basin of the lake of Borotala, which is followed on the east by that of the lake of Ayar, whose eastern extremity is contiguous to the basin of the lake Khulussutai. The three basins occupy a line of at least 460 miles from west to east, near 45° N. lat. Only the western portion of the first basin has been visited by Europeans, and of the others some account is given in the Chinese geography. According to this information, it seems that this region, which extends to the base and over the northern declivities of the Thian-shan, is well watered, as a number of small rivers descend from the snow-covered mountains, which in summer supply abundant means of watering the soil. It is stated that the Chinese and Mongols who have been transplanted to this country have made considerable progress in cultivating the ground, and that it is rather populous. But the cultivable and cultivated space is not of great width, as the rivers at a distance of 20 or 30 miles from the base of the mountains arrive at the lowest depression of the basins, and there form the three above-mentioned lakes, which are surrounded by extensive swamps, if they themselves are not rather to be considered as swamps, like the Hamoon in Seistan. [Seistan.] We have no information respecting the country to the north side of the lakes, nor respecting the extent of the lakes themselves.

North of the basins of the lakes of Ayar and Khulussutai are several smaller basins, and a larger one which is drained by the river Urunghu, which falls into a large lake called Kisilbash. We are entirely unacquainted with the natural capacities of this region, and only know that the greater part of the Turgut Mongols, who left Russia in 1771 and 1772, were settled in these parts, whence we may infer that it is more fit for pasture than agricultural purposes.

The basin of the lake Kisilbash lies south-east of the basin of the river Irtish, which occupies that extensive tract of country which is south of the Egtag or Great Altai, and north of the chain of the Tarbagatai mountains, and is closed on the west by the low ridge of the Kheïrek mountains, between which and the Altai mountains is the narrow valley by which the river Irtish runs off to the north. This extensive basin has not been seen by Europeans since the country has been subjected to the Chinese; but in the time of Peter I. of Russia it was visited by his command. The expedition sailed to the lake of Zaisang, from the north-western corner of which the river issues. The lake is about 70 miles long and 10 wide, and abounds in fish. The banks are swampy and overgrown with canes and reeds. The river Irtish, which originates in the Egtag Altai, enters the lake at the eastern extremity, after a course of about 250 miles, as it is supposed. It may be navigated to a considerable distance by large river barges. The country about the lake was, when first visited, in possession of the Songares, and no part of the basin at that time seemed to be cultivated. At present, some tribes of Khirghis Cossacks are found in these parts, and they occupy this country exclusively, with the exception of a few Chinese and Mandshoos, who are established along the boundary-line of Siberia. In the eastern districts of the basin however some tribes of the Songares have maintained their footing. Nearly all of them lead a wandering life, and some live by the produce of the chase. The Russians, who dwell farther north on the banks of the Irtish, with the permission of the Chinese authorities carry on an extensive fishery in the river below its efflux from the lake, and a few of them advance even across the lake to the upper course of the river.

Between the Tarbagatai mountains on the north, and the Ala-tau range on the south, is the basin of Lake Alakul and of the river Emyl. The lake is said to extend more than sixty miles east and west, and about half that length north and south. The course of the river does not much exceed one hundred miles. The level part of the basin has a soil consisting of gravel, and consequently of little fertility, but at the base of the mountains and along the rivers there are many fertile tracts of considerable extent, which are cultivated with care by the Khirghis Cossacks, who came after the Songares had left the country.

Volcanoes and Earthquakes.—In the lake Alakul there is a lofty island called Aral-tube, which is an extinct volcano. Two other extinct volcanoes occur in the Thian-shan mountains, the western called Pe-shan, near 83° E. long., and the eastern called Hotsheou, north of Turfan, near 90° E. long. Along the northern declivity of the Thian-shan mountains there are several tracts which are covered with volcanic products, and on which sal-ammoniac and sulphur abound. It seems therefore that here, nearly in the centre of Asia, and at a distance of from 1000 to 1800 miles from the sea, an extensive volcanic system has once been in action, and the earthquakes which even in modern times have been felt in this country show that this powerful cause is still in operation.

Climate.—We are not acquainted with the climate of Songaria. The few Europeans who have visited the country have always stayed too short a time to give any account of the climate. As however this country is placed between two great deserts, which are no less distinguished by the great heat which is experienced in summer, than by the severe cold in winter, we may suppose that Songaria partakes of both in a considerable degree. Rain, which is so rare in the deserts, does not appear to be abundant in Songaria, as we must infer from the circumstance that where the ground is cultivated irrigation is practised; in winter however snow falls in considerable quantities.

Productions.—Wheat, barley, and millet are cultivated, but rice only in the southern districts, especially on the banks of the Ili. Tobacco is very extensively grown, and vegetables abound. There are excellent melons of several kinds. But fruit-trees are not frequent, nor is the fruit so good as that which grows on the south side of the Thian-shan. The lower declivities of the mountains are covered with trees, and likewise the valleys and some parts of the plains, but the greater part of the country is destitute of trees. The most common trees are, pines, mountain-ash, poplars, willows, lime-trees, and birch. In some parts there are good timber-trees, but in general timber is very scarce.

The herds of the wandering tribes consist of horses, camels, cattle, and sheep. Wild animals are numerous, especially deer. The argali occurs in the northern as well as in the mountainous districts. Wild hogs are extremely numerous in the extensive tracts covered with reeds and canes which surround most of the lakes. As most of the larger lakes, for instance the Balkash, the Zaisang, and others, are not Alpine lakes, but have the character of lakes of the desert, it is probable that all of them abound in fish. The Russian adventurers carry on their fishing in the river Irtish and in Lake Zaisang. The fish which are taken are chiefly sterlets (accipenser ruthenius, L.), sturgeons (accipenser sturio), white salmon (salmo nelma), salmo fluviatilis, and gadus lota.

The minerals which are mentioned are sal-ammoniac, sulphur, salt, iron, and coal. The last two minerals are found in abundance a few miles west of Kuldsha.

Inhabitants.—Songaria is placed between the two great deserts of Asia, and time out of mind the nations that inhabit the Gobi have been always wandering towards the west, and expelling the nations that they found in their way; we may therefore suppose that not a trace of the aborigines of these countries at present exists. We learn from the Chinese historians that the most antient nations in Songaria belonged to the Caucasian race, but the present inhabitants are Mongols, with the exception of the Khirghis Cossacks. This last-mentioned nation, which at present is nearly in exclusive possession of the western districts, seems to have occupied this part of the country at the time when the Songares were dispersed, after the downfall of their empire. For the proper country of the Khirghis Cossacks is the great western desert. In the others parts of Songaria the different nations of the Olöth or Calmucks [CALMUCKS] form the bulk of the population. The most numerous are the Turgut, or rather Toorgoot, who emigrated from Russia in 1771 and 1772, and were then estimated to amount to about 80,000 families, or 480,000 individuals. They are mostly settled in the north-eastern districts, but occur in small numbers in other parts. The two united nations of the Olöth Proper and Songares are dispersed over the whole country, and among them are settled the nations which, since 1757, have been sent there by the court of Peking, the Tshagar Mongols, the Mandshoos, and the Chinese themselves. The Mandshoos and Chinese are engaged in agriculture, commerce, trade, or employed by government. The Tshagars are soldiers and agriculturists, and chiefly live in the military colonies. The majority of the other tribes live on the produce of their herds, but many of them have begun to apply themselves to agriculture, when the soil and other circumstances concur to render cultivation profitable.

Political Divisions and Towns.—Since the country has become subject to China, it has been divided into three parts. The eastern districts, or those which extend along the northern base of the Thian-shan mountains, have been incorporated into the province of Kansi, which constitutes an integral part of China Proper. The western districts are united under a provincial government, established at Kuldsha on the Ili, and constitute the government of Ili. These two parts together are also known under the name of Thian-shan Pelu, or the North Road of Thian-shan, as the great road from Peking to the north-western boundary of the Chinese empire traverses them in their length. The northern districts, that is, the basin of the rivers Irtish and Urung-hu, and some smaller basins, constitute a part of the government of Khobdo or Gobdo, the greater portion of which lies east of the Egtag Altai.

That part which belongs to the province of Kansi contains the towns of Barkol and Oorum-tsi. Barkol, called by the Chinese Tshin-si-fu, is near the eastern extremity of the Thian-shan mountains, north of Hami, and a fortress with a considerable garrison, which begins to have some commerce on account of the great road passing through it. The country in which it is built seems to be very elevated, as it is stated that snow sometimes occurs in July. Oorum-tsi, or Urum-tsi, which lies about 250 miles farther west, near the base of some offsets of the Bogdo Oöla, in a very fertile district, consists of two towns, Old and New Oorum-tsi, which are about two miles from one another. They are well built, with wide streets. The military colony established at these places consisted, at the time of the establishment, of 8000 families The town has a large population, and is considered to be the most thriving and industrious place in Songaria. The Chinese have established several manufactures, and they have a grammar-school, a city school, and an elementary school. The Chinese name of Oorum-tsi is Ty-hua-tshew. It is a town of the second class, the capital of the western district of Kansi. It carries on a considerable trade with Kuldsha and Tarbagatai.

The capital of the government of Ili is Kuldsha, called also Ili and Kura, and by the Chinese Hoei-Yuan-shing. It stands about a mile from the banks of the river Ili, and is enclosed with a wall built of hewn stone eighteen feet high. It contains about 10,000 houses and 50,000 inhabitants, and is the seat of the provincial government, and of the military administration of the army, which is posted along the western boundary of the Chinese empire. It carries on a considerable trade with Oorum-tsi and Signan in Shensi, and also with Kashgar in Chinese Turkistan, and with Tarbagatai. About nine miles north of Kuldsha is Kashmir or Kashmir-huré, a new-built town with 3000 houses, mostly inhabited by Chinese settlers, who are very industrious. Tarbagatai, called by the Khirghis Cossacks Toogootshuk, and by the Chinese Soui-shing-tshing, is situated not far from the southern basis of the Tarbagatai mountains, and is fortified. It contains about 600 houses, and 5000 inhabitants, of whom 2500 belong to the garrison. It carries on a considerable commerce with the Khirghis Cossacks, and has some trade with Kuldsha, Oorum-tsi, and Khobdo.

That part of Songaria which belongs to the government of Khobdo appears to be almost entirely occupied by wandering tribes, and cultivation is hardly known. There are neither towns nor villages.

Commerce.—Since the country has been occupied by the Chinese, a considerable commerce has been established, and it is still increasing. The town of Kuldsha may be considered as the centre of this commerce. The most active branches seem to be the trade with China Proper, and with the town of Aksoo in Chinese Turkistan; that with Semipalatinskaya in Siberia is less important. The road which leads to China Proper crosses the western extremity of the Iren Khabirgan mountains, north of the town of Kashmir. Where it crosses the Iren Khabirgan mountains, which are rather steep, especially on the northern declivity, an artificial road has been made over two ridges, at the expense of the Chinese government. Where the level country round Borotala begins, the road runs eastward along the northern declivity of the Iren Khabirgan mountains, and of the Thian-shan, through Oorum-tsi and Barkol. At the last place it turns south, and traverses the eastern extremity of the Thian-shan range, and passing through Hami, it enters the Gobi. That part of the road which lies within the desert between Hami and Su-tscheu is nearly 400 miles along, and runs south-east. From the last-mentioned place it continues south-east through a more fertile and somewhat cultivated region to Lan-tcheou, the capital of Kansi, where the fertile part of China begins. The principal imports from China are the numerous articles manufactured in that country, which are consumed by the Chinese and Mandshoo families established in Songaria. Some of these articles, especially china-ware, are sold to the nomadic tribes. All that is imported seems to be employed for maintaining the military establishment.

The road from Kuldsha to Aksoo in Chinese Turkistan runs directly south, and crosses the Thian-shan Mountains a considerable distance east of the town of Aksoo. On the summit of the range a space ten miles wide is covered with snow. The principal imports from Aksoo are cotton stuffs, made in the place or imported from Kashgar and Khoten. By this route also a few of the manufactures of Hindustan are brought to Kuldsha, especially muslins of indifferent qualities; some stuffs, half silk and half cotton; and several kinds of calicoes.

The road from Kuldsha to Semipalatinskaya passes over the Iren Khabirgan Mountains, along the same artificial road which is travelled by those who go to China; but at the foot of the mountains the two roads separate: the road to Russia lies in a general north-north-east direction to Tarbagatai, and from this place it continues north, passing along the western banks of Lake Zaisang, until it enters Russia, where it turns north-west to Semipalatinskaya. The Russians do not import manufactures into Songaria, but only cattle and sheep. They are not permitted to enter the Chinese empire in these places as Russians, but only as the subjects of some khan of the Khirghis Cossacks. It is therefore not an open trade, but a kind of smuggling. As the subjects of a khan of the Khirghis Cossacks, they can only import cattle. Though all the nomadic tribes bring a great number of cattle to the market, the Russians find it advantageous to send there also a considerable number, which are generally sold to the government, and paid for by the cotton stuffs of Aksoo, Kashgar, and Khoten.

Government.—The government of this province is on a military footing. The commander-in-chief of the troops is also invested with the civil authority. The governor is called Zianghium, and is assisted by a council of five persons, called galai-das. The army stationed in Songaria probably consists of more than 60,000 men, of whom 28,000 are quartered in Kuldsha and the neighbourhood. The whole population of the country probably falls short of two millions, and three-fourths of this number are wandering tribes, who are very lightly taxed. The expenses therefore are much greater than the revenues; and the Chinese government accordingly sends many goods from China, which are partly disposed of to the Khirghis Cossacks for cattle and sheep for the soldiers as part of their pay: a considerable quantity of silver also is annually received from Peking.

History.—We shall not state what nations successively in antient times settled in this country, nor at what times and under what circumstances they were obliged to give way to other intruders, who always advanced from the Gobi towards the West. The fate of the most distinguished of these nations is described in Ritter's 'Erdkunde von Asien,' vol. i., p. 431-441. We shall only give a short account of the events which led to the occupation of Songaria by the Chinese. After the Eastern or Proper Mongols had conquered China, in the second half of the thirteenth century, the greater part of that nation settled in the conquered countries. Thus the population of their own native country was considerably diminished; and their neighbours on the West, the Western Mongols or Olöth, also called Calmucks, which up to that time had been the less powerful branch of the great nation, began to extend farther to the east, and to increase in numbers. On the downfall of the Yuen dinasty, or that of the Mongols in China, in 1366, the greatest number of the Eastern Mongols who had been settled in China perished in the war which accompanied the destruction of their power, and only a small remnant returned to their native country, where they again united with those who had not emigrated to China. They found that their neighbours were now more powerful than themselves; but the great fame which the Eastern Mongols had acquired by the exploits of Ghengis Khan and the conquest of China, kept the Olöth in awe for more than two centuries. In the sixteenth century however the war between the chiefs of the Khalkas Mongols, and several claims on the part of the Olöth, led to a war between these two nations. The two other great branches of the Mongols had already submitted to the Mandshoos [MONGOLS], when that nation had succeeded in getting the government of China into its hands (1644). For some time neither of the two belligerent powers had a decided advantage; but when the Galdan, the khan of the Olöth Proper, who had compelled the Songares, another band of the Olöth, to acknowledge his supremacy, made the same claims on the Khalkas Mongols, a war arose (1685), in which the Khalkas were expelled from their country, and compelled to fly towards the country occupied by the Sunnites and Tshagar, two tribes which were already subject to the Mandshoos. To avoid destruction they submitted to the Chinese emperor (1688), and requested protection against their enemies. The emperor Kang-hi tried to settle the matter in a peaceable way, but without success. He then sent three armies against the Galdan; but he would hardly have been successful if Tse-vang Arabdan, the khan of the Songares, who had been offended by the Galdan, had not alienated his nation, and also a part of the Proper Olöth, from the Galdan. After having been defeated several times, and at last been abandoned by nearly all his followers, the Galdan died by taking poison (1697). By these wars the Chinese emperor gained only the submission of the Khalkas Mongols, who returned to the country from which they had been expelled by the Olöth. On the ruins of the empire of the Olöth rose that of the Songares. Tse-vang Arabdan was no less enterprising, and more successful, than Galdan had been. He subjected to his authority all the chiefs of the Olöth Proper, conquered Turkistan, obliged another branch of the Western Mongols, the Toorgut, who then occupied the greater part of the Caspian Desert, to abandon the country west of Songaria, and to retreat to the banks of the Volga and Don, and he took possession of Tibet. Thus nearly all the elevated region of Central Asia was subjected to his sway. A was with China seemed unavoidable. Arabdan tried to ward it off, by offering to submit to the emperor, but his offers were not accepted. The Chinese armies were generally successful in expelling the Songares from the conquered provinces, but they could not get possession of Songaria. The death of the emperor Kang-hi and that of Arabdan occurred about the same date (1723), and for some time the Chinese did not interfere with the disputes and internal wars which broke out after the death of Arabdan between the members of the royal family of the Songares. During the disorders which originated in these wars the throne of the Songares was occupied by two usurpers, called Davatsi and Amursana. Though at first closely united, they soon disagreed, and Amursana took refuge in China, where he was well received, and sent back (1755) with a Chinese army, as the lawful occupant of the throne of the Songares. The expedition was successful: Davatsi was taken prisoner, and died soon afterwards. But Amursana did not intend to be a vassal of the emperor: he soon collected a large force, and destroyed two Chinese armies which were sent against him; but he was obliged to yield to the third (1757), which took possession of the whole country of Songaria and Turkistan. Amursana went to Siberia, and died soon afterwards, at Tobolsk, of the small-pox. These continual wars, and the severity with which the Chinese punished Amursana's adherents, nearly extirpated the Proper Olöth as well as the Songares, and the country was turned into a desert. As a great portion of it is unfit for cultivation, the Chinese wished to re-people it with some nomadic tribes; and induced the Toorgut, who had taken refuge in Russia when pressed by Arabdan, to return to their native country in 1771 and 1772. [CALMUCKS.] It seems that the Khirghis Cossacks, who, upon the destruction of the Songares, had taken possession of the western districts of Songaria, joined the insurrection of the Turkish tribes in Chinese Turkistan in 1825, and that a great number of them have been put to death. It appears to be the policy of the Chinese emperor to punish all revolts of the nomadic tribes with unsparing severity.

(Ritter, *Erdkunde von Asien*, vol. i.; Humboldt, *Fragments Asiatiques*.)

SONNERA'TIA, a genus of plants of the natural family of Myrtaceæ, so named by the younger Linnæus in compliment to M. Sonnerat, well known by his 'Voyage à la Nouvelle Guinée,' and his 'Voyages aux Indes Orientales et à la Chine,' and who made known many new plants. The genus is characterised by having a 4-6-cleft campanulate calyx, adhering to the ovary at the very base; petals 4 to 6, alternating with the valvate lobes of the calyx; stamens numerous; styles filiform, with a peltate stigma; fruit baccate, appearing half-superior, many-celled; seeds numerous, nestling in a fleshy pulp, curved; the species form moderate-sized trees, with opposite leaves, which are entire, thick, and almost veinless; flowers usually solitary, large. *S. acida* is the best known species, being the Pagapate of Sonnerat, and the Blatti of Rheede, which has an acid eatable fruit. The branchlets tetragonal; leaves oval, oblong; calyx 6-cleft; petals 6; berry globose. The tree is forty feet high, and is a native of New Guinea and the Moluccas, as well as of the Malabar coast and of the delta of the Ganges. S. alba is another species of the Moluccas, and S. apetala, a native of Ava, near Rangoon, as well as in moist situations along the Burmese coast.

SONNET (Italian, *Sonata*, *Sonetto*), a form of poetry much used by the Italian and Spanish poets, but which our deficiency of rhymes has caused to be more sparingly used in English. The sonnet properly consists of two quatrains and two tercets. The last six lines are susceptible of various arrangements; the one usually adopted in English is the rhyming of the fifth and sixth lines together, frequently after a full pause, so that the sonnet ends with a point, as in an epigram. The Italians consider the best form to be the rhyming together of the three uneven and the three even lines; but our poverty of rhymes causes us to prefer the rhyming of the first and fourth, second and fifth, third and sixth lines: this, with a break in the sense at the third line, constitutes also a legitimate sonnet, of which the Italians have given abundant precedents. We need scarcely observe that all our poets have held themselves at liberty to vary the form of the sonnet. The lightness and richness of the Italian and Spanish languages enable their poets to express every feeling or fancy in the sonnet; but with us it has been found most suitable to grave, dignified, and contemplative subjects. Hence Milton and Wordsworth are our best writers of sonnets.

SONNITES. [MOHAMMED.]

SONNINI DE MANONCOURT, CHARLES NICOLAS SIGISBERT, was born at Lunéville, Feb. 1, 1751. He was the son of Nicolas Sonnini, seigneur of the fief of Manoncourt in Vermois, and councillor of Stanislaus, king of Poland. He was educated at the Jesuit university of Pont-à-Housson, and made rapid progress in his studies. At an early age he became acquainted with Buffon and Nollet, who encouraged his taste for natural history. Having a wish to travel, he obtained a commission in the marine engineer service, and in 1772 was sent to Cayenne in consequence. Here he showed great energy and courage in exploring the country and dislodging from their strongholds the savages with whom the colony was molested, and succeeded, at great personal risk, in making a passage by water from Cayenne to the mountain La Gabrielle, the accomplishment of which had been much desired by the colonists but abandoned by reason of the natural difficulties of the route. He was, in consequence of this enterprise, promoted to the rank of lieutenant on his return to France. In 1775, after a visit to the western coast of Africa, he resumed his post as an engineer at Cayenne, and spent two years in researches in natural history. Returning to France, in consequence of ill health, he passed the winter of 1776 with Buffon, assisting him in his labours, till he joined the African expedition of Baron de Tott, in 1777. After remaining some time in Egypt, and exploring the country, he travelled in Greece, the Archipelago, and Asia Minor. He returned to France in 1780, and employed himself in the improvement of agriculture, introducing several valuable exotic vegetables into his country. At the beginning of the Revolution he was appointed one of the administrators of the département de la Meurthe; but being deprived of this office by St. Just, and reduced to poverty, on account of his noble birth, he employed himself in arranging and publishing the materials collected in his travels. He was afterwards placed at the head of the college of Vienne, in the département de l'Isère; but failing in his projects of reform there, gave up this situation after holding it two years, and returned to his literary labours. In 1810 he went to Moldavia, and, while traversing that country, caught a fever, from which he never recovered. He died at Paris, May 29, 1812. His principal works are, 'Voyage dans la Haute et Basse Egypt,' Paris, 8vo., 1799; 'Voyage en Grèce et en Turquie,' Paris, 8vo., 1801.

Buffon's 'Histoire Naturelle,' Paris, 1799-1808, to which he contributed 13 vols. of fishes and 1 vol. of cetacea, and, jointly with M. Latreille, 4 vols. of reptiles; and the 'Nouveau Dictionnaire d'Histoire Naturelle,' 8vo., 1803-4, were edited by him: in the latter he wrote the articles 'Man,' 'Quadrupeds,' 'Birds,' and 'Cetacea.'

Sonnini deserves great praise for his labours as a naturalist. Like other great travellers, though eager and enthusiastic, he was somewhat inconstant in the direction of his energies, as we may infer from the events of his life, not less than from the remarks of his French biographer. In his 'Travels in the East' he treats of the natural and artificial productions of each country, and gives also archæological and topographical notices not remarkable for their research or originality. (*Biographie Universelle*, by the author of his 'Eloge Historique,' where is a list of his other publications.)

SONO'RA. [MEXICAN STATES.]

SOODAN, or BELE'D EL SU'DAN ('the Country of the Blacks'), is a term applied by the Arabs to designate the interior of Africa; but, according to the geographical position of the country in which it is used, this term indicates different portions of that continent. The inhabitants of Egypt apply it to the countries south of the second cataract of the Nile (22° N. lat.), and the present pasha of that country has formed a province of all the countries in these parts which he has subjected to his sway, under the name of Beled el Súdan. [SENNAAR.] The Arabs who trade to or are settled in Bornou, which is about 400 miles west of the Egyptian province, call 'Soodan' the countries which are still farther west, towards the middle course of the Quorra. The geographers of Europe have given it a more comprehensive application, and they designate all the countries along the southern edge of the Sahara from Senegambia and Sierra Leone on the west, to Dar Fur on the east, by the term Soodan. Thus Soodan extends from 10° W. long. to 25° E. long., and is 2400 miles in length. Its northern boundary towards the Great Desert cannot be exactly fixed, as the fertile and cultivable country changes into the sandy waste so imperceptibly, that the boundary appears to vary according to the seasons, and in different years: it is also very imperfectly known. In one part, at the most northern bend of the Quorra or Joliba, the fertile country extends to 17° N. lat.; but in other places, as in the vicinity of Lake Tshad, it does not come up to 14° N. lat. The southern boundary-line is almost entirely unknown. West of the course of the Quorra it is formed by the Kong Mountains, which, according to information obtained from the natives, occupy the greater part of the space between 8° and 10° N. lat., and, on the banks of the river, occur between 7° and 11° N. lat. East of the Quorra, the extent of Soodan toward the south is entirely unknown. If we suppose that the average width of Soodan is about five degrees, or 350 miles, the surface will cover an area of 880,000 square miles, which is more than four times the area of France.

Nearly up to the end of the last century this country was only known by the descriptions of the Arabian geographers and of Leo Africanus. At that time (1790) the first European traveller, Houghton, entered Soodan from the west; but he was killed in 1791. Mungo Park however succeeded in traversing the north-western portion of Soodan in 1796 and 1797, and collected very valuable information. The expedition under Denham and Clapperton (1822-24) made us acquainted with a large portion of Central Soodan (between 6° and 17° E. long.), to which Clapperton, by his second journey (1826), added the south and south-west countries of Central Soodan; and Richard Lander, the vale of the river Quorra (1830). Caillié succeeded in traversing a large portion of South-western Soodan in 1828. As these travellers, with the exception of Denham and Clapperton, who remained there for more than two years, traversed these countries only in one direction, our knowledge would be very limited were it not for the great uniformity which the country exhibits, and which enables us to form a general idea of a large portion of it. We shall take a survey of the western and central districts, observing that the eastern (between 17° and 25° E. long.) has not been visited by Europeans, and that the information collected from the natives is very scanty, and cannot be relied upon.

Western Soodan comprehends the country west of the course of the Quorra, from Timbuctoo to its entrance into the delta at Abbazaca. The elevated tract which divides Soodan from Sierra Leone and Senegambia, and along the base of which the Joliba runs in a north-western direction as far north as Yamina, appears to be rather a huge swell of the country overtopped by rocky masses, than a mountain-range: at least it is traversed by the native traders in many places with little difficulty. The southern border of Western Soodan is formed by the Kong Mountains, with which we are still less acquainted, no part of the mountains having been seen by European travellers. Caillié, who seems to have approached the place where they are laid down in our maps, between 6° and 7° W. long., saw only one elevated peak at a distance. It would therefore seem that this range too is rather an extensive and elevated swell of the country than what may be called properly a mountain-chain. Most of the rivers that descend from it to the south and north have also very little water in the dry season, though several of them run many hundred miles. This leads us to believe that its elevation is not very considerable. The most eastern portion of the Kong Mountains (between 3° and 5° E. long.) has been traversed by Clapperton and Lander; and, according to their account, in passing from Ekwa to Katunga, they ascended many short and gentle acclivities, until they had attained an elevation of about 2500 feet above the sea-level, when they descended in nearly the same way towards the vale of the Quorra. This elevated region occupies not much more than a hundred miles in width, but we must include in it the country north of Katunga as far as Yaouri, which is about 150 miles farther north; for though it is less uneven and hilly, it resembles the more southern parts in soil and productions. In this eastern mountain-tract the highest part of the country hardly anywhere, except in the centre and at the southern edge, takes the appearance of a continuous ridge; but the surface is a succession of wide valleys and plains of considerable extent, and single hills connected by rising grounds slightly elevated above the general level. The surface generally consists of a fertile soil, which, in many parts, is covered with forests, but in others is cleared and cultivated. The forests consist chiefly of tall trees, with very little underwood, and the intervening places are covered with luxuriant grasses. These forests abound in deer, antelopes, lions, leopards, elephants, wild asses, buffaloes, and hyænas; and in the Quorra the hippopotamus is common. The country, where cultivated, yields plentiful crops of indigo, tobacco, yams, wheat, and other kinds of corn, rice of a superior quality, onions, and several other vegetables; and in the extensive pastures, great numbers of horses, bullocks, sheep, and goats are fed. Between Yaouri (11° N. lat.) and Rabba (9° N. lat.) the hilly country approaches the banks of the Quorra, and only a comparatively narrow tract of well-cultivated alluvial soil extends along the river. Between Rabba and Egga, where the river runs south-east, the alluvial valley is much wider; but a great part of it is a swamp even in the dry season, and destitute of wood. But between Egga and Abbazaca the rocky masses advance so close to the banks of the river, that there is very little level ground along them. The hills on both sides rise nearly to the height of mountains. They are entirely covered with wood, and the trees are higher than farther upward. This region is rather densely inhabited, and villages are very numerous, as well near the river as farther inland. There are also several large towns.

The country extending from the northern base of the Kong Mountains to the edge of the Sahara may be considered as a plain, which in extent exceeds the area of France. No continuous ridges of high land branch off from the Kong Mountains. In the vicinity of the range indeed hills are met with, and many of them are rocky; but they occur at considerable distances from one another, and never form ridges more than a few miles in length. The level country which lies between them sometimes extends fifty miles in every direction. This part of the plain is rather uneven when compared with that farther north, and occupies along the base of the mountains a belt about a hundred miles in width. Only one of the hills was observed by Caillié to rise about 500 feet above its base: in several places large granite blocks are dispersed over the surface, rising about six or seven feet above it. The soil of this extensive tract is chiefly grey sand, alternating in some places with red sand. This sand is very frequently mixed with gravel, but sometimes with argillaceous earth, clay, and mould. In some places occur red and porous stones. In the vicinity of the watercourses it is subject to inundations for more than six months of the year. The more distant parts have the advantage of abundant rains, and are so far fertilised by them that no considerable part of the country can be called a useless waste. There occur indeed large tracts covered with trees, many of which are applied to no uses; but among them are also many shea-trees and nedés, the fruits of which are much esteemed by the natives; and the indigo plant abounds in several parts. The more fertile tracts are cultivated. Caillié is of opinion that the agricultural industry of the inhabitants of Wassoolo is not inferior to that of most parts of France. The most common objects of cultivation are maize, millet, rice, tobacco, which however is inferior to that brought from the coast, yams, onions, cotton, French beans, water-melons, and calabashes. Near the base of the mountains a kind of long pepper and pimento is grown. In the same districts the colat or gora nuts are collected, which constitute an important article of commerce all over Western Soodan, and are carried from the Kong Mountains to Timbuctoo, and even to Tripoli, a distance of respectively 500 and 2000 miles. As the places where these nuts are collected have never been visited by Europeans, the tree or plant on which they grow has never been described. Besides the shea-trees and nedés, the forests contain several other useful trees, as the baobab, some kinds of mimosas, and the *Nauclea Africana.* The most common fruit-trees are pistacias, which are grown to a great extent, tamarinds, and oranges; wild fig-trees occur in the forests. Domestic animals abound in most parts, especially black cattle of good size, sheep, and goats; the horses are of a small breed, except at Tangrera, where they are rather large and of fine form. There are also asses and abundance of poultry. Dogs, serpents, lizards, rats, and mice serve as food to the natives. Other wild animals are not numerous. Caillié mentions only gazelles and wild boars, and of wild birds, green parrots, Guinea-fowls, and Barbary ducks. Fish abounds in the rivers, and is prepared for sale by drying. Wild bees are extremely numerous, and wax and honey are not only largely consumed, but also sent to other parts of Africa.

Caillié, who remained in this country about six months, gives some account of its climate from the beginning of August to the end of January. The month of August is exceedingly stormy; the rains pour down day and night, the sky is cloudy, and the air heavy and cool. The south-west wind prevails, but at intervals eastern winds blow, and they are followed by a small cold rain. The sun is rarely seen. The natives always keep a large fire in their huts. In September the rains are more interrupted, but still they fall every day until October, when they become less frequent, but they continue to be heavy, and set in with hurricanes from the south-east. In proportion as the rain diminishes, the heat increases, and the air becomes less damp and more salubrious. About the end of October the rains cease entirely, the days become exceedingly hot, and the nights cool. In November and December the weather is very fine, and the wind blows frequently from the north-east and sometimes from the north. A cold north wind begins to prevail at the end of December, and the natives then cover themselves with woollen wrappers, and kindle larger fires than usual in their huts. At this season the trees shed their leaves.

The country between 10° 30′ and the southern banks of the Joliba river is still more level, but less fertile. Even small hills are of very rare occurrence; the highest appear to be those which Mungo Park saw at Bammakoo, and considered as an offset of the Kong mountains. The surface of the country is slightly undulating or a level. Several tracts which are a little depressed below the general surface are swamps during the greatest part of the year, whilst others are always in this state. The first are either used as pasture-grounds, or rice is cultivated on them, as well as on the borders of the others, and along the alluvial banks of the rivers. The soil of the higher grounds consists chiefly of grey sand and gravel, often intermixed with ferruginous stones. In some places bushes are met with, but there are no forests. Shea-trees and nedés are dispersed over large tracts, and here nearly all the vegetable butter is collected, which is consumed on the banks of the Joliba as far as Timbuctoo; for farther north the shea-tree becomes rare, and disappears at some distance from the banks of the river. In a few places the baobab trees abound, whose leaves and fruits supply another article of trade to the countries farther north. In the more fertile tracts millet is extensively cultivated, but other grains and vegetables are scarce or do not grow at all, as yams and maize. Of fruit-trees only tamarinds and the Rhamnus lotus occur. The Hibiscus cannabinus abounds in many places, and ropes are made for the markets on the Joliba, where these ropes are used to fasten together the boards of which the barges are made. The marshes are frequented by numbers of aquatic birds, as pelicans, egrets, trumpet-birds, marabous, puffins, Barbary ducks, and teals. From the ferruginous stones, which are so frequent in this region, iron is extracted, and is an article of export to the banks of the Joliba. The country along the banks of this river is a dead flat, and is annually inundated to a considerable extent. A great part of it has been converted into marshes, which serve as pasture-grounds; but on the drier parts rice, maize, and other grains are cultivated. This low country is destitute of trees.

That part of Western Soodan which is north of the Joliba and the marshes contiguous to the river is tolerably fertile to a considerable distance from its banks. It is a plain, but here and there interspersed with sandy hills, and in other places with rocky eminences. The soil is rather fertile, and produces plentiful crops of millet and maize. Villages and towns are frequent. But in proceeding farther north, the soil becomes less fertile, as the sand of the Sahara is frequently thrown upon it by the strong north-eastern winds. The surface in many places is covered with hillocks of white sand, between which numerous bushes, but only a few large trees grow. The wild animals, which hardly appear south of the Joliba, as elephants, lions, panthers, leopards, and wild hogs, are frequent, as well as wolves, antelopes, and ostriches. Park also mentions wild horses, which are eaten. Among the domestic animals are camels, which are not found south of the Joliba.

The country on both sides of the Joliba is sultry and oppressive before the setting in of the rains. About the middle of June the heated atmosphere is agitated by violent gusts of wind, accompanied with thunder and rain. These usher in the rainy season, which continues to the month of November. During this season the diurnal rains are very heavy, but not so continual as near the Kong Mountains. The prevailing winds are from the south-west. The termination of the rainy season is likewise attended with violent tornadoes, after which the wind shifts to the north-east, and continues to blow from that quarter for the rest of the year. With the setting-in of the north-east wind the face of the country begins to change. The grass soon becomes dry and withered, the rivers subside very rapidly, and the trees shed their leaves. At this period the *hamattan* is commonly felt, a dry and parching wind blowing from the north-east, and accompanied by a thick smoky haze, through which the sun appears of a dull red colour. As this wind passes over the Great Desert, it becomes exceedingly hot and dry as it approaches Soodan, and parches up everything which is exposed to it.

A great part of Western Soodan, lying on both sides of the meridian of Greenwich, and extending along the banks of the Joliba or Quorra from Timbuctoo to Yaouri, has never been visited by Europeans, and it is remarkable that the travellers who visited the countries west, south, and east of this tract, have not been able to collect any important information respecting this country. Lander states that many years before his stay at Yaouri a large boat arrived at that town from Timbuctoo on a trading voyage, and that the crew returned by land to their native town. This proves that the navigation on the middle course of the Joliba is far from being so active as on the upper part, and, together with the scanty information which travellers have collected, it seems to show that this part of Soodan is much less populous than the other districts.

Central Soodan comprehends that portion which extends from the river Quorra, where it flows southward, as far east as Lake Tshad and the river Shary, which falls into the lake, or from 5° to 16° E. long. It may be divided into two regions, a hilly and an alluvial plain. The first occupies the country west of 11° E. long., and the plain occupies the remainder.

The hilly region seems to extend to the very border of the Sahara, which in these parts occurs between 14° and 15° N. lat. The surface is extremely diversified. In many places the higher grounds extend in level plains, some of which are of considerable extent, but in others these tracts are diversified by a succession of open valleys and gentle rising grounds. In several places however ridges of hills extend across the region, mostly running from south to north, or rather from south-west to north-east. Where the country is traversed by watercourses, the surface is more broken, the valleys being in general much narrower, and the hills rising with a steep and sometimes a perpendicular ascent. The highest hills which have been seen are not much more than 700 feet above their base, and the general level of the country seems to be about 1000 or 1200 feet above the sea. A great part of this region extends in level plains, which are chiefly converted into large swamps or temporary lakes during the rainy season, but this circumstance is favourable to fertility. There is however a large tract in which the swamps exist all the year round. This tract is situated north of 13° N. lat. and between 6° and 8° E. long., east of the town of Soccatoo, and is known by the name of the Gondami Swamps. Hills of granite, of moderate elevation, enclose this tract on all sides, and prevent the water which collects on its surface from running off in any direction. These hills are covered with stunted trees, whilst the country between them and the swamps is overgrown with forests. Though the soil is of the best quality, this tract is nearly uninhabited, and the haunt of wild animals. Nearly all the rivers and watercourses of this region are very rapid and deep during the rainy season, but in the dry season only pools, sometimes single, sometimes in rows, occupy the lowest part of their bed. The soil retains moisture all the year round. Clay constitutes the predominant soil; in several places it is intermixed with gravel, and in others covered with a thin layer of sand. In some places large blocks of granite rise out of the earth like towers, and in others rocks of sandstone are embedded in the clay; but clay, mostly of a light or deep red colour, is found nearly everywhere. Its quality of retaining moisture for a long time, even under a burning sun, renders this region the most fertile tract of Africa north of the equator, and is populous in spite of the continual wars between its sovereigns, and its being situated in the centre of Africa, and being nearly secluded from commercial intercourse with other parts of the world. In some parts the villages are very numerous, and the towns are of considerable extent and contain a great population. Where the country is not cleared for cultivation, it is covered with forest trees, especially mimosas and acacias; only the more elevated and dry ridges are overgrown with bushes or stunted trees, and rarely a spot is without vegetation.

The products are extremely various. Wheat succeeds in some of the more elevated tracts, but the grains which are generally cultivated are rice, Indian corn, Guinea corn, and millet. Cotton, tobacco, and indigo are grown to a great extent. Other objects of cultivation are yams, sweet potatoes, beans, French beans, water-melons, musk-melons, and onions. In the districts south of 10° N. lat. palm-oil and cocoa-nut trees abound, but they do not thrive farther north. In the same places plantains and bananas are grown in abundance. In the eastern districts date-trees are common, but they do not occur in the western. The fruit-trees which are most common are figs, pomegranates, limes, papaws, cashew-nuts, plums, Guinea nuts, shaddocks, nuttabeans, and tamarinds; the butter-tree also abounds in several places; the mango-tree is cultivated, and occurs also in a wild state. The fields are often watered from deep wells.

The domestic animals are goats, sheep, asses, horses, and cattle. The horses are small, but along the northern border they are large and of a good breed, which is derived from that of the Tuaricks of the Sahara, but it is not equal to the Arab breed. In these districts many camels are also raised. Poultry abounds. In some woody parts, especially in the neighbourhood of the swamps of Gondami, elephants and lions are numerous: Lander mentions tigers, hyænas, tiger-cats, jackals, and monkeys. Buffaloes are only found in the southern districts, but wild hogs and several kinds of deer are met with in many places, and among the latter the kari-goom, which is as high as a full-grown mule. Guinea-fowls, partridges, the ibis, storks, cranes, adjutant cranes, jays, and several kinds of pigeons are enumerated. The hippopotamus and alligator are found only in the Quorra. Iron is the only mineral: it occurs in many places, and a small quantity is exported to the countries farther east.

As no European has stayed a whole year in this region, we are only in possession of partial meteorological observations. According to these, the rainy season sets in at the end of May or beginning of June, and continues to the middle of September. It differs greatly from that of the coast of Guinea. The rains are much less abundant, and not so continual. Even in the height of the season, in August, there are several days without rain, and a continuation of rain for twenty-four hours is a rare occurrence. The prevailing wind changes regularly to all quarters of the compass. From October to March it blows almost always from the north-east, turning occasionally to the north and east, but in March it varies between east and south, and in April between south and west. In the beginning of the rainy season its direction is more variable, but it usually varies between south-west and north-west. The diurnal change of the temperature is very great. The difference between six o'clock in the morning and three o'clock in the afternoon is hardly ever less than 12 degrees, often amounts to 20 degrees, and sometimes rises to 25 and even 30 degrees, especially during the north-eastern winds. The natives keep fires all the year round in their huts. The greatest heat which was observed was 104°, and the least was 57°.

The Plain of Central Soodan extends from 10° E. long. to Lake Tchad and the river Shary, and from 14° to 10° 30′ N. lat., where it lies contiguous to a hilly country. The greatest part if not the whole of this plain is alluvial. It is probably the largest alluvial tract on the globe which occurs far inland, if the plain surrounding the Caspian Sea is excepted, which is of a different character. The alluvial plain of Soodan is nearly a dead level. It is very fertile, but not easily cultivated, as a large part of it is converted into lakes during the rains, which give rise to a rank vegetation, and thus create great obstacles to the clearing of the ground. The southern districts however are in general rather populous, and a considerable portion of them is cleared and cultivated, but the country on both sides of the river Yeou is not much cultivated, and it is exposed to the predatory incursions of the Tuaricks, who inhabit that part of the Sahara which extends north of the plain. Thus by far the greater part of the plain is covered with thick underwood, high coarse grass, and parasitical plants; in many parts there are extensive forests. The soil is a dark clay, which cracks during the dry season.

The climate of this region differs considerably from that of the hilly region. It is in general much hotter, but the daily range of the thermometer is much less. The country therefore, notwithstanding the moisture of the air during and after the rainy season, is more healthy than in the hilly region. According to the meteorological observations of Denham, which embrace nearly two years, the mean annual temperature is 83·6°, that of the winter (December-February) 76·2°, of the spring (March-May) 90·8°, of the summer 84·6°, and of the autumn 82·7°. From the beginning of March to the end of July the heat is excessive, but not uniform. About two o'clock the thermometer sometimes rises to 105° and 107°, and occasionally to 110°, and at this season winds from the south and south-east prevail. The nights are oppressively hot, but towards sun-rise the thermometer usually falls to 86° or 85°. Towards the middle of May the rains set in with violent tempests of thunder and lightning. The rain pours down in torrents, and continues sometimes for two or three days. Up to the end of June, the ground, having been parched during the dry season, absorbes all the rain, but towards the end of July the lakes and rivers begin to overflow, and tracts of many square miles in extent are quickly converted into large lakes. The weather is without interruption cloudy, damp, and sultry; the wind hot and violent, and generally from the east and south. In October the rains are less frequent, the air mild and more fresh, and the weather serene; the wind blows from the north-west. December and January are rather cold. Clapperton and Oudney experienced on the morning of the 27th of December an unexpected degree of cold. The water in the shallow vessels was crusted with thin flakes of ice, and the water-skins were frozen as hard as a board. The thermometer generally does not rise higher than 74° or 75°, and at sunset it sinks to 58°. In February the heat increases rapidly.

The principal objects of cultivation are gussup, which is a kind of millet, Indian corn, cotton, and indigo; the two last grow wild near Lake Tchad and the overflowed grounds. Rice is not much grown, and is of inferior quality; large quantities are exported from the hilly region. Kasheia and meloheia are two kinds of grass growing wild, the seeds of which are used as grain. Onions and four kinds of beans are extensively grown. The senna-plant is found wild. The fruit-trees consist of limes, tamarinds, figs, jujube, and locust-trees. Near the Sahara are date-trees, and towards the hilly region mango-trees in the forests. Several wild trees bear edible fruits.

The domestic animals constitute the wealth of this country. Sheep, goats, cows, and oxen are numerous. In the lowlands, along the banks of Lake Tchad and the river Shary, many thousand head of cattle are pastured, and all over the country black cattle are very numerous. There is also a good breed of horses, much superior in size and form to those of the hilly region, to which great numbers are exported. Domestic fowls are very common; they are small, but well flavoured. Bees are very numerous, and honey constitutes an important article of food. Locusts frequently lay waste a part of the country, but the natives eat them with avidity, both boiled and roasted, and formed into paste. The wild animals are lions, panthers, tiger-cats, leopards, hyænas, jackals, civet-cats, foxes, monkeys of different kinds, and elephants, which are so numerous on the low banks of Lake Tchad, that they are frequently seen in herds of from fifty to four hundred. Buffaloes, wild hogs, gazelles, antelopes, and several kinds of deer abound; among the last is the kurigoom. The most common wild birds are pelicans, spoonbills, and Balearic cranes of large size. The woods abound in Guinea-fowls, large partridges, small grouse, and the tuda, a bird resembling the thrush. In the lower grounds are geese, wild ducks, and snipes. Ostriches are found along the northern boundary-line. Fish are very numerous in the lake and the lower course of the river, and fishing is much attended to by the inhabitants of these tracts. No minerals are found in this region.

Rivers.—The largest river is the Quorra, which in the upper part of its course is called Joliba. Though in the lower part of its course, where it divides the mountain region of the Kong from the hilly region of Central Soodan, the bed is traversed at several places by ledges of rocks, which render the navigation difficult during low water, this river is navigated in its whole extent, nearly from its source. [QUORRA.] Its tributaries are still less known than the principal river. In the upper part of its course the Quorra is joined from the right, above the town of Sego, by the rivers Bagoe and Kuaruba, which are navigable for small craft more than 100 miles from their junction with the Quorra. The largest affluents of the Quorra, in the lower part of its course, are the Mayarrow, the Coodonia, and the Shary, which fall into it from the left. The first does not appear to be navigated, and nothing is known of the second as to its navigability. The Shary has been ascended about 100 miles from its junction with the Quorra, but the navigation is much impeded by shoals and sand-banks. The other rivers of Soodan fall into Lake Tchad. The largest are the Yeou and the Shary. The Yeou does not appear to be navigated to any extent, but the Shary is navigated to a distance of more than a hundred miles.

Lake Tchad is of great size, and its length is stated to be five days' sail. Its eastern and north-eastern shores have never been visited by a European traveller. It is nearly surrounded by a low flat country, which for several miles from its banks is overflowed during six months of the year, and the other six months is mostly a swamp.

Inhabitants.—The population is composed of aborigines and foreigners. The aborigines belong to the negro race. The negroes are almost exclusively the inhabitants of the mountain region of Kong, but in the plain north of that range they live intermixed with Mandingoes and Foolahs. In the hilly region of Central Soodan the negroes constitute the bulk of the population, but they are governed by Fellátahs, and in the eastern plain they are intermixed with Arabian tribes, which have here obtained the ascendency, which the Fellátahs have acquired in the hilly region. These negroes have attained a certain degree of civilization. They live in small well-built huts, and generally wear a slight but decent dress, which is adapted to the climate. They apply themselves to agriculture, and in some parts the ground is cultivated with a considerable degree of skill. Their isolated situation has also obliged them to manufacture several objects. They manufacture great quantities of cotton-cloth, only from five to six inches wide, but of good texture. The cotton-cloths made at Nyfi are of a superior kind, and fetch a high price on the coast of Guinea. They are also expert in forging iron. Clapperton mentions several villages which were inhabited almost exclusively by blacksmiths. They make arms, especially daggers, knives, and axes; agricultural implements, especially hoes, fire-tongs, and even needles. They also make earthenware of a greyish colour, which they glaze, and which constitutes an important article of inland trade. Where the Fellátahs or Arabian tribes have acquired the ascendency, many negroes have been converted to the religion of Mohammed, but by far the greater part of them are pagans, and have their fetishes and greegrees.

The foreigners settled in Soodan are Mandingoes, Fellátahs, and Arabian tribes. The Mandingoes are only met with in the plain north of the Kong Mountains, where they have settled as merchants. Though they have not acquired any political power over the negroes, they have attained a superiority by their higher degree of civilization, and still more by being Mohammedans. [MANDINGOES.] Their language is generally spoken in all that part of the country in which they have settled.

The Fellátahs are the same nation which in Senegambia is known by the name of Foulahs [FOULAHS], and they speak the same language. Clapperton and Denham agree in this statement, and the latter found that a native of Footatoro in Senegambia easily made himself understood by an inhabitant of Mandara, though their native places were 1500 miles distant from one another. It appears that the Fellátahs first settled in considerable numbers in the negro towns, like the Mandingoes, but towards the end of the last century they entered the country as conquerors, under the conduct of Danfodio, with a large army, and were eminently successful, subjecting in a few years the whole of Central Soodan to their sway. After the death of Danfodio however the sheik of Bornou succeeded in expelling them from the alluvial plain [BORNOU], but in the mountain region south of Mandara they have maintained their footing. Several of the negro tribes that inhabit the hilly region have risen against their new sovereigns, but it does not appear that they have been so successful as the inhabitants of Bornou. Lander observes that the Fellátahs have even passed the river Quorra and obtained a firm footing in the region of the Kong mountains.

The Arabs settled in Soodan are only found in the neighbourhood of Lake Tchad, where they lead a wandering life, living on the produce of their cattle, and are known by the name of Shouaas. They are a very extraordinary race, and have scarcely any resemblance to the Arabs of the north; they have fine open countenances, with aquiline noses and large eyes. Their complexion is a light copper colour, and they resemble some of the best formed gypsies in England, particularly the women. Their Arabic is nearly pure Egyptian.

Political Geography and Towns.—Soodan contains many large and small states, and there occur also extensive tracts, in which the inhabitants live in a peaceful state of society, without having entered into a political union. We shall notice these political divisions in the order of the natural regions.

1. The *Mountain Region* of Western Soodan, or that of the *Kong Mountains*, is only partially known between 3° and 7° E. long., and comprehends two extensive countries, Yarriba and Borgoo. The first occupies the southern portion, and extends to a short distance from the shores of the Bight of Benin. The small river Moussa, which falls into the Quorra near 9° 20′ N. lat. here divides Yarriba from Borgoo. Borgoo, of which we are only acquainted with the tract adjacent to the banks of the Quorra, seems to extend westwards to a great distance. This region is very populous, and judging from the numerous villages and towns which Clapperton and the Landers saw in passing through it, must be compared with the best inhabited regions of the continent of Europe, with the exception of some parts of Italy and the Netherlands.

The kingdom of *Yarriba* seems to extend westward to the very boundary-line of Ashantee: on the south-west and south it is separated from the Bight of Benin only by the kingdom of Dahomey and a country called Jaboo, of which we have no knowledge. It is not known if it immediately joins the kingdom of Benin, or if some other independent country lies between them. The Quorra divides Yarriba from the kingdoms of Nyfi and Yaouri. Though only the banks of the river and the road leading from Badagry to Eyeo, the capital of Yarriba, have been visited by European travellers, they have seen upwards of thirty towns of large or middling size, each containing a population of from 5000 to 30,000 individuals. The present capital is Eyeo, or Katunga, which is situated in a fertile plain, or rather a wide valley, about 20 miles from the river Quorra. It is enclosed by walls built of clay, about 20 feet high, and surrounded by a dry ditch. They are about 15 miles in circumference, of an oval shape, about four miles in diameter one way, and six miles the other. At the south end of the town are hilly rocks. The king's houses and those of his women occupy about a square mile: they are built of clay and have thatched roofs. A considerable part of the space enclosed by the walls is laid out in gardens or cultivated, and the population does not exceed 20,000 individuals. The second town of the kingdom is Bohoo, which was the capital of the kingdom about fifty years ago. It has an immense triple wall, which is rather more than 20 miles in circuit, and is built on the slope of a very gentle and fertile hill, in an exceedingly well cultivated country, in appearance not inferior to any part of England in the best season of the year. The population is not stated.

There are several large towns built on the banks of the Quorra, as Lever or Layaba, near the boundary of Borgoo, which is very extensive and has a great population; Bajiebo, a flourishing and important trading town of great extent; Lechee, a very large and thriving place; Egga, which is of prodigious extent, and has an immense population, but a large portion of it is frequently inundated by the river; and Kakunda, which is governed by a sovereign independent of Yarriba, and consists of three or four considerable villages, situated within a short distance of one another, but unconnected.

On the road leading from Badagry to Eyeo several other large towns are situated. Between Eyeo and Bohoo are Eetcho, Atoopa (6000 inhabitants), and Jaguta, a large and well fortified town. South-west of Bohoo is Kooso, a large double-walled town, which has at least 20,000 inhabitants, and is a place of great trade; Cháadoo, with 7000 inhabitants; Duffoo, with 15,000 inhabitants, and considerable manufactures of cotton-cloth; Assoudo, with 10,000 inhabitants; Assula, with 6000 inhabitants; and Jenna, with from 8000 to 10,000 inhabitants.

Within the territories of the kingdom of Yarriba the Fellátahs have established some independent states, among which the towns of Racca, not far from Eyeo towards the north-east, and Alorie, south-west of the capital, are said to be very populous. These places have not been visited by Europeans.

Borgoo, which lies to the north of Yarriba, consists, so far as we know, of ten states, governed by independent kings, and loosely connected with one another. The most powerful is the sovereign of Niki, and he is styled, by way of distinction, king or sultan of Borgoo. His country has never been visited by Europeans. Only the countries of the kings of Wawa, Kiáma, and Boosa are partly known, having been visited by Clapperton and the Landers. These countries are inferior in population and cultivation to Yarriba, and there occur tracts of considerable extent which are without cultivation. The capitals have the names of the countries

Kiáma is built on the southern side of a rocky ridge, and surrounded by an extensive low clay wall; it is a commercial town, with 30,000 inhabitants. The houses consist of circular huts, built of clay and thatched; a number of these houses enclosed in a square fence of matting generally form but one house. Inside the walls are plantations of corn and yams. Wawa, or Wowow, is a very neat and compact built town, in the form of a square, and may contain from 18,000 to 20,000 inhabitants; it is surrounded by a good high clay wall and dry ditch. The streets are wide and airy, and the houses as in Kiáma. The town of Boossa is built on the banks of the western arm of the Quorra, which at this place divides into three branches, and it contains from 10,000 to 12,000 inhabitants. The houses are built in clusters inside the wall, and do not occupy above one-tenth of the ground enclosed.

Two caravan roads traverse this region, and are much frequented by merchants from Haussa and other countries of Central Africa. The most northern passes through Kiáma, and the southern through Bohoo and Kooso. These two roads lead to Gonja, a country lying west-north-west, either within the range of the Kong Mountains or along their northern base. In this country alone the colat or gora nuts are found, which are carried by the caravans all over Soodan, as far north as Timbuctoo, and as far east as the Lake Tchad, whence a small quantity finds its way to Tripoli. This important article is exchanged for elephants' teeth, trona, rock-salt, and cotton-cloths made in Soodan, which are brought from the eastern countries. The frequent fairs and market-days, which are regularly held in all the larger towns, show the degree of civilization which this country has attained. All articles grown or manufactured in the country and in places situated at a great distance farther east, are exposed for sale, and generally in considerable quantities. European articles are chiefly obtained from Dahomey and the European settlements east of the river Volta or Adiri.

II. The southern part of the *Plain of Western Soodan* presents a remarkable instance of people living in society and having attained a certain degree of civilization without entering into a closer political union. Towards the west, near the boundary of Soolima in Sierra Leone, and of Foota Jallon in Senegambia, there are indeed some small states, among which we know Sangara, Amana, Kankan, and Wassoolo; but east of 7° W. long., each town and village, according to Caillié, is independent of the neighbouring towns and villages, and what renders this circumstance more remarkable, each place is inhabited by a mixture of Mandingoes, who are Mohammedans, and of Bambarras, most of whom are pagans. Still they live peaceably together, and the elders of each nation decide the differences arising among the people belonging to their nation. The Mandingoes however have acquired some ascendency by their wealth and greater civilization, but their pre-eminence is nowhere supported by law or political establishments. In this region no large towns are met with; some of them, which are situated on the caravan roads, contain a population of from 5000 to 7000 inhabitants, as Kankan, Tangrera, Toomaneh, and Dooasso. Kayaye is said to be a larger place, but it has not been visited by Europeans. The commerce of this country is not considerable, and consists almost exclusively in the transport of the colat-nuts from Gonja to the countries on the banks of the Joliba, where salt is the principal article taken in exchange. No beasts of burden are usually employed in this trade, but the merchandise is transported by the merchants and their slaves on their heads.

On the banks of the Joliba several kingdoms occur. That of Booreh comprises the greater part of the country between 9° and 7° W. long. on both sides of the river. It is entirely inhabited by Mandingoes, according to the information of the natives, and the mountains which divide it from Senegambia are very rich in gold, of which a considerable quantity is annually got, which partly goes to the European settlements on the western coast, and is partly carried down the Joliba to Yamina, Sego, Sansanding, Jenneh, and Timbuctoo, whence some of it finds its way to the countries situated on the shores of the Mediterranean. The town of Booreh is said to be of considerable extent, but it has never been visited by Europeans.

East of Booreh is the kingdom of Bambarra [BAMBARRA], in which several towns of considerable extent are situated on the banks of the Joliba: Bammakoo, a town from which the gold obtained from Booreh is sent downward; Marraboo and Koolikorro, two places of some extent, which trade extensively in salt; Baba; Yamina, a place of considerable trade; Sai; Sego [SEGO]; Sansanding [SANSANDING], and Silla.

East of Bambarra is the kingdom of Jenneh, which comprehends the country on both sides of the river where it makes its great bend, after which it flows northward. This country seems to extend to the vicinity of 15° N lat. It has obtained its name from Jenneh the principal commercial town, but the capital and residence of the sultan is called Ellam doo Lillahi ('to the praise of God'), which has never been visited by Europeans, and where there are said to be public schools in which children are taught gratuitously, and also schools for adults. The town of Jenneh is about six miles from the banks of the Joliba, but the whole country between the town and the river is cut up by numerous watercourses, so that river vessels of 80 or 100 tons of burden can come up to the town in the rainy season, and smaller vessels all the year round. This place is about two miles and a half in circumference, and surrounded by a wall ten feet high and fourteen inches thick, and the houses are built of sun-dried bricks. The population may amount to 10,000 individuals, all of whom are occupied in commerce, Mandingoes, Foulahs, Bambarras, and Moors. The sultan is a Foulah. The principal merchants are the Moors. They send great quantities of ivory, gold, rice, millet, honey, bees'-wax, cured provisions, and onions, and also tamarinds, pimento, long pepper, leaves and fruits of the baobab, pistachia nuts, beans, and colat-nuts to Timbuctoo. Great numbers of wax candles are made in Jenneh, and sent to Timbuctoo.

North of the kingdom of Jenneh is Masina, on the left side of the Joliba, and Banan on the right; they extend to the lake Debo. [QUORRA.] These countries are unknown, except the tract along the banks of the river, which is alluvial. North of the lake Debo, and on the east of the river, is an extensive country, called Dirimans, whose capital is said to be Alcodia. This country apparently extends to the vicinity of Timbuctoo, with which place our knowledge of this part of Soodan terminates. [TIMBUCTOO.]

In the north-western corner of Soodan, and contiguous to the boundary of Senegambia, are the two kingdoms of Kaarta and Ludamar. Kaarta lies partly within the mountain-range which constitutes the boundary between Senegambia and Soodan; and Kassan, which formerly was an independent kingdom, but has been conquered and united to Kaarta, is properly within Senegambia. Kaarta contains several very fertile plains and valleys. The capital is Kemmo, which was visited by Mungo Park, but he says nothing respecting this place. Gray visited the large towns of Asamangatary and Somantari. The walls of the first-named place are higher, stronger, and better constructed than those of any other town in these parts of Africa, and the town is an extensive plain, noted for the quantity of earthenware which is there manufactured, and its great fertility in rice and onions. The kingdom of Ludamar borders on the Sahara, and consists of a succession of fertile and cultivated tracts and sandy deserts. The capital, Yarra, is of considerable extent, and the houses are built of stone cemented with clay. Other large places are Deena and Sampaka, which lie farther east than Yarra.

That large tract of Soodan which extends along the southern border of the Sahara, between Ludamar and Timbuctoo, has not been visited by Europeans. According to the information which was obtained from the native merchants, the greater part of it belongs to the kingdom of Boroo, which appears to resemble Ludamar in productive powers, but is separated from the neighbouring states by sandy deserts. Its capital, Wallet, is said to be as large as Timbuctoo, and to carry on a very extensive trade in salt, which is brought from the great rock-salt mines of Shingarin [SAHARA], and sent to Sansanding, Sego, and Yamina, in Bambarra, where it is exchanged for corn and provisions.

III. The greater part of the hilly region of Central Soodan constituted at the beginning of the present century an integral part of the kingdom of Haussa, or was subject or tributary to it. This kingdom was either founded by Danfodio, or he raised a small state to a decided eminence in Central Africa by continual wars, which were always attended with success, subjecting or annexing to it several large and populous countries, inhabited by negroes, and governed by kings of that nation. But after his death most of these countries rose against his successor Bello, and though in the beginning Bello was rather successful, it seems that several of those countries have recovered their independence; but our information on this point is very incomplete. The most populous districts are those which lie along the course of the Quorra, and the northern districts, between 11° and 13° 30′ N. lat. Those which are at a great distance from the river, or farther to the south, appear to be much less cultivated and less populous.

Along the banks of the river Quorra, from north to south, are Yáoori, Nyfi, and Funda. The capital of Yaoori bears the same name. It is a place of great extent, and very populous. The wall is high and excellent, though made of clay alone, and may be between 20 and 30 miles in circuit. The space enclosed is not laid out in streets, but covered with clusters of huts, between which are cultivated tracts. In this place very neat saddles, country cloth, and gunpowder are manufactured. Where the countries of Yáoori and Nyfi join one another, is the basin of the river May-yarrow, which is extremely fertile and thickly inhabited. Several large towns are found here: Tabra, on both sides of the river, about 30 miles above its mouth, with from 18,000 to 20,000 inhabitants; Koolfu, on the northern banks of the river, a central point of inland trade, with from 12,000 to 15,000 inhabitants; Rajadawa, with from 6000 to 7000 inhabitants; Womba, with from 10,000 to 12,000 inhabitants; and Guari, a large and well fortified place, the seat of a negro chief, who has made himself independent of Háussa. The capital of Nyfi is Nyfi, a town known over all Western Africa for the excellent cotton-cloth which is made there. It has not been visited by Europeans. In Nyfi is the town of Rabba, built on the banks of the Quorra, on a gentle slope. It is the emporium of all the surrounding countries to a great distance, and several articles are brought to this place from Tripoli on the Mediterranean. It contains a population exceeding 40,000, and has rather extensive manufactures of saddles and bridles, made of red and yellow leather, cloth, shoes, boots, and sandals. Opposite the town, and near the western banks of the Quorra, lies the island of Zagózhi, which is 15 miles long and three in breadth, and though low and partly inundated in the rainy season, it is covered with clusters of huts, which, taken together, constitute a populous town. The inhabitants are partly sailors and fishermen, and partly employed in the manufacture of country cloth, which is of excellent quality. They make also a variety of caps of cotton interwoven with silk, of the most excellent workmanship; and also wooden bowls and dishes, mats of various patterns, shoes, sandals, cotton dresses and caps, brass and iron stirrups, bits for bridles, hoes, chains, saddles, and horse accoutrements for the Rabba market. Funda, the capital of the kingdom of the same name, is situated some miles from the banks of the river Shary; it contains about 30,000 inhabitants, and has some manufactures of cotton-cloth.

In the central districts of this region we are only acquainted with the countries of Zegzeg, Kano, Kashna, and Haussa Proper. Zegzeg apparently extends between 8° and 11° E. long. and 9° and 12° N. lat. In this country Richard Lander visited, among other smaller places, the towns of Kuttup, Eggebee, and Zaria or Zegzeg. Kuttup, the most southern (near 9° 40′ N. lat.), consists of nearly 500 small villages, almost adjoining each other, which occupy nearly the whole of a vast and beautiful plain, and in which a considerable traffic is carried on in slaves and bullocks. Eggebee (near 9° E. long. and 10° 50′ N. lat.) is a very large and extremely neat town, surrounded with a high wall, and situated in the centre of a fine and highly cultivated plain. Zaria or Zegzeg, the capital of this country, is enclosed by good walls, and contains a population of between 40,000 and 50,000 individuals, but a large portion of the area is occupied by swamps, corn-fields, and green plots. Rice of the finest quality is raised in the neighbourhood, and sent to distant countries.

North of Zegzeg is Kano. Among the most remarkable places is Baebaegie (11° 34′ N. lat. and 9° 13′ E. long.), which is built in the midst of a large plain, and contains about 20,000 or 25,000 inhabitants, who are all engaged in trade. East of it is the town of Girkwa, a large place, and north-west of Girkwa is Kano, the capital of the country, and, as it appears, the most commercial town of Central Africa. It may contain from 30,000 to 40,000 resident inhabitants, of whom more than one-half are slaves. During the dry months this place is resorted to by numerous travellers from all parts of Africa, from the Mediterranean and the Mountains of the Moon, and from Sennaar and Ashantee. The city is of an irregular oval shape, about 15 miles in circumference, and surrounded by a clay wall thirty feet high, with a dry ditch in the inside, and another on the outside. Not more than one-fourth of the ground within the walls is occupied by houses. The vacant space is laid out in fields and gardens. A large morass nearly intersects the city from east to west, and is crossed by a neck of land on which the market is held. The houses are built of clay, and are mostly of a square form, in the Moorish fashion. They have generally two floors. Clapperton observes that the commercial intercourse is regulated with the greatest fairness, and the regulations are strictly and impartially enforced. If a tobe (cotton dress) purchased at Kano is carried to a distant place without being opened, and is there discovered to be of inferior quality, it is immediately sent back as a matter of course, the name of the *dylala*, or broker, being written inside every parcel. In this case the *dylala* must find out the seller, who, by the laws of Kano, is forthwith obliged to refund the purchase money. This traveller was solicited by some merchants of Ghadamis settled at Kano to takes supplies of goods or money to any amount for a bill on the British Tripolitan consul. Nearly every day during the dry season caravans arrive from all parts of Northern Africa, and sometimes they consist of 3000 camels. Kano is not only a commercial, but also a manufacturing town; and the division of labour is carried to a considerable extent. Cotton, before it is fit to be consumed, passes through five or six hands. The weaver, the dyer, and the cloth-glazier are separate persons, and carry on their business in separate establishments. Tanning is executed with considerable skill, and ingenuity is shown in the manufacture of leathern jars, which are used to hold fat, melted butter, honey, and bees'-wax. Within the walls of the city is a separate district or village for blind people, who are maintained at the expense of the government.

In the country of Kashna are the large towns of Jaza, Ratah, and Kutri, but the largest is the capital, also called Kashna, which is still a commercial town of the first rank, though it has lost some part of its business by the rise of Kano. The walls are of clay, but the houses do not occupy one-tenth of the space within them. The commerce of this place is now limited to its intercourse with Ghadamis, Tuat, and the Tuaricks. From the first two places unwrought silk, cotton and woollen cloth, beads, and a little cochineal are imported, and in return are taken the blue cotton-cloths manufactured in the country, especially tobes and turkadoes. The Tuaricks bring salt, and buy several kinds of provisions, especially corn and dried beef. The principal manufactures are of leather, such as tanned bullocks' hides, water-skins, red and yellow cushions, and bridles of goat skin.

In Haussa Proper, which lies west of Kashna, is the large town of Zirmie, and the capital, Sackatoo, or Sockatoo, which is built on the banks of the river Zirmie, which runs south-west, and is said to join the Quorra. Sackatoo was built about the year 1805, by Danfodio, the Fellátah conqueror. Clapperton considers it the most populous town in the interior of Africa. The houses are not thinly scattered, as in other towns, but laid out in regular well-built streets, and come close up to the walls. The walls are between 20 and 30 feet high, and have twelve gates, which are regularly closed at sun-set. The inhabitants are principally Fellátahs, and possess numerous slaves, of whom a considerable number are employed in manufacturing cotton-stuffs, and in tanning and iron-work. The slaves from Nyfi are numerous, of whom the men are considered the most expert weavers and the women the best spinners in Soodan. The commerce of Sockatoo is much less important than that of Kashna. The exports are principally civet and blue-check tobes, and the imports gora-nuts, coarse calico, and woollen-cloth, with brass and pewter dishes, and some few spices from Nyfi. The Arabs from Tripoli and Ghadamis bring unwrought silk, otto of roses, spices, and beads, and take in return principally slaves. The Tuaricks take Guinea corn in exchange for their salt.

IV. Nearly the whole of the *alluvial plain of Central Soodan* constitutes the kingdom of Bornou, or may be considered as an appendage of it. [BORNOU.] It contains many towns, some of which are very populous. The capital, Kouka, is only a few miles distant from the banks of Lake Tchad. It is the residence of the sheik, and may have a population exceeding 10,000. The walls are well built of clay, and the whole space enclosed by them is occupied with houses, but the extensive market in the centre and some other open places take up about one-fourth of the area. Angornou, the largest and most populous place in Bornou, is likewise only a few miles from the Tchad. It contains above 30,000 inhabitants, but is a straggling place without walls. It is the principal commercial town of the country, where the caravans arriving from Fezzan or from Kano dispose of their goods. A few miles west of Angornu is New Birnie, the residence of the sultan, which contains about 10,000 inhabitants. Farther south are the towns of Dugoa, with 30,000 inhabitants, and Affagay, with 20,000. On the banks of the river Shary is Loggan, where much cotton-cloth is made and dyed. On the banks of the river Yeou are several towns of middling size, as Kabshari, which had been destroyed by their neighbours, when Denham was there; Kukabonee, with 6000 inhabitants; Bedeekarfi, a large and populous town; and Katagum, with from 7000 to 8000 inhabitants. Burwha, north of the mouth of the river Yeou, and not far from Lake Tchad, is a well fortified place, with about 5000 inhabitants.

South of Bornou is the kingdom of Mandara, which comprehends the northern portion of the hilly region south of the alluvial plain of Central Soodan, and extends from 10° 30 to 9° 30° N. lat.. Steep and rather high ridges enclose wide and open valleys, which are abundantly watered, and on this account, as well as the fertility of the soil, it is rich in natural productions, well cultivated, and densely peopled. The inhabitants are exclusively negroes, and are governed by a sovereign of their own race, who is independent both of the sheik of Bornou and the Fellátahs, who are in possession of the more elevated and mountainous country which lies farther south. These mountains have only been seen at a distance by Denham, and, according to information obtained from the natives, they are connected with still higher mountains, which appear to be the Jebel al Kamar or Kumri (the Mountains of the Moon) of the Arabian geographers. The valleys of Mandara contain some considerable towns. Delow contains at least 10,000 inhabitants, and Mora, the residence of the sultan, is a strongly fortified place, but of less extent.

Eastern Soodan extends from 17° to 25° E. long. We have no account of this extensive country from eye-witnesses, as no part of it has ever been visited by a European traveller, and the information collected from the natives of Africa, who have penetrated so far, is very scanty. According to them it is divided into three countries or states. Kanem is contiguous to the eastern banks of Lake Tchad, and south of it lies Begharmi. Between those two countries and Dar-Fur, which is considered as lying to the east, and without the boundary-line of Soodan, lies Dar-Zaleh, or Wadai, which seems to extend over the greater part of Eastern Soodan. A large river is said to traverse Wadai in a north-west direction, and to be lost in a large lake, called Fittreh, which lies east of and at a considerable distance from Lake Tchad.

As a comparatively small portion of Soodan has been seen by Europeans, it would be premature to give a decided opinion as to the relative importance of this part of Africa. But if we may judge from what we know of it, we must pronounce it superior to any other part in fertility, cultivation, and population, not excepting the countries situated along the Mediterranean or even Egypt. It must therefore be very satisfactory to every person interested in the extent of English commercial enterprise, that the government has taken decisive measures for gaining a firm footing for Englishmen in the most populous parts of Soodan, namely, those which are contiguous to the lower course of the Quorra. [QUORRA, vol. xix., p. 227.]

(Park's *Travels in Africa;* Caillié's *Travels through Central Africa to Timbuctoo,* &c.; Gray's and Dochard's *Travels in Western Africa;* Denham's, Clapperton's, and Oudney's *Narrative of Travels and Discoveries in Northern and Central Africa;* Clapperton's *Journal of a Second Expedition into the Interior of Africa;* Richard and John Lander's *Journal of an Expedition to explore the Course and Termination of the Niger;* Laird and Oldfield's *Narrative of an Expedition into the Interior of Africa,* &c.)

SOOFFEE DYNASTY. [PERSIA—*History*.]

SOOLIMA'S, a people of Western Africa, who take their name from, or, it may be, give their name to, their proper country of Soolimana. This country is situated among the sources of the rivers which enter the sea at and immediately to the north of Sierra Leone. This territory extends between 9° 20′ and 10° 28′ W. long., and mostly south of the 10th parallel of N. lat., being about sixty miles in breadth from north to south, and reaching from the present site of Falaba to the left bank of the Joliba or Niger. This is the native country of the Soolimas; but they now chiefly occupy a strip of land in the adjoining Kooranko territory, which is bounded on the south by the river Rokelle, on the north by Foota Jallon, on the west by Limba and Tamisso, and on the east by Kooranko Proper and Soolimana, which latter is now used merely as a farming-ground, and only as a temporary residence.

The Soolima country is exceedingly picturesque, being diversified with hills, extensive vales, and fertile meadows, belted with strips of wood, and decorated with clumps of trees of the densest foliage. The hills are composed of a light whitish granite, principally consisting of mica and felspar, with occasional strata of blue mica-slate imbedded in the granite. The valleys have a rich vegetable and mineral soil mixed with sand. This soil is remarkable for its fertility, and requires very little labour to prepare it for the seed. In its cultivation, a hoe, shaped like a carpenter's adze, supplies the place both of the plough and the harrow. After sowing, which is generally before the 15th of June, the Soolima leaves his farm in Soolimana, until October, to the care of his wives, who clear the crop of weeds in the early stages of its growth. In October the husband return from Kooranko, and both sexes labour together in getting in the harvest. Rice is the chief object of culture. Yams and ground-nuts, bananas, pineapples, and oranges are the principal fruits, but the first only in any degree of perfection. The Soolimas have numerous herds of cattle; and they also rear sheep, goats, and poultry, the last of a very diminutive sort. Horses are few, and not reared in the country. The wild animals are numerous, principally elephants, buffaloes, a species of antelope, monkeys, leopards, and wolves.

All the principal towns of the Soolimas are in Kooranko. These are Falaba, the capital, Sangouia, Semba, Mousaiah, and Koukodoogore, containing in all about 25,000 souls, of which Falaba has about 6000. This town, which appears to have been built in 1768, is a favourable specimen of the first-class native towns of Western Africa. It derives its name from the Fala-Ba, or river Fala, on which it stands, and is nearly a mile and a half long by a mile in breadth although closely built for an African town. The town is fortified, impregnably according to the African system of warfare, by being surrounded by a thick stockading of hard wood, and by a ditch 20 feet deep by as many broad. The town is of an oblong shape, containing about 4000 circular houses or huts, which, though built of clay, and covered with conical roofs of thatch, are extremely neat, clean, and in many cases elegant. The palaver or court house stands on an open piece of ground towards the south end of the town, and is a place of recreation as well as business. In the centre of the town, a large open piece of ground is left vacant for the purposes of exercise, of receiving strangers, and of holding grand palavers. Here, on such occasions, the king sits on the root of a large tree for his throne, the branches serving as his canopy, as simple in his appearance as the meanest of his subjects.

In Major Laing's time (1822), the king and some of the elders were Moslems, while the younger part of the community were pagans; but it is more than probable that in the steady progress which Islam has since been making in this quarter of Africa, it has by this time acquired the predominance among the Soolimas.

The Soolimas are short and muscular: their stature averages from five feet six inches to five feet eight inches. They are thus well formed for the warlike enterprises to which they are much addicted. In battle they use the spear, musket, sling, and bow:—the first more for ornament than use; the second more for noise than effect; but in the use and management of the two latter they are most expert. Warlike songs and exercises figure largely in all their public rites and amusements. Where their predatory habits do not interfere, their dispositions are mild and inoffensive, and they exercise the most open hospitality to the strangers who visit them as traders.

The king monopolises the whole trade of the country, and no barter takes place without his knowledge and actual presence. The trade is chiefly with the Sangaras on the one side, and with the Mandingoes on the other. The former bring horses and gold, for which they receive a share of the goods—cloth, powder, flints, beads, &c.—brought from the coast by the Mandingoes, who, in their turn, receive slaves and other spoils of war, with a little ivory.

Men and women seem to have exchanged occupations among the Soolimas. Except sowing and reaping, the principal cares of husbandry are left to the females, while the men look after the dairy and milk the cows. The women build houses, plaster walls, act as barbers and surgeons, while the men employ themselves in sewing, and often in washing clothes. The dress of both sexes is very similar to that of the Mandingoes. Indeed the dress among the pagan nations of Western Africa differs little. There is another dress, essentially Arabian, which spreads together with the Mohammedan faith. This dress was affected by the Soolimas before their great contest with the Foulahs in the early part of this century, since which it has been the fashion to make themselves as different as possible from their enemies, in dress as well as in religion.

Among the Soolimas murder is the only crime punished with death; for all other crimes, fines, stripes, or slavery are the punishments. Death is inflicted by strangling; but there is a reluctance to inflict it, unless for a peculiarly atrocious murder, and there is a disposition to lay hold of any mitigating circumstances. The mode of trial appears to be very fair, not unlike our trial by jury; and the desire to decide justly is strongly manifested in the sentences.

The general customs of the Soolimas do not differ materially from those of other nations in this part of Africa; and therefore need not be particularly described. Major Laing thinks them peculiarly open to the operations of the missionary and the civilizer.

(Laing's *Travels in Western Africa*, London, 1825.)

SOOLOO ARCHIPELAGO, which is called by the Spaniards Archipelago de Felicia, consists of a considerable number of islands, situated in the Indian Ocean, between the Philippines on the north-east and the island of Borneo on the south-west. They consist of two chains of islands, which lie nearly parallel in a south-western and north-eastern direction, and, together with Borneo and the Philippines, enclose a portion of the ocean which is usually called the Sooloo Sea, and also the Mindoro Sea, the latter name being derived from that of one of the Philippines which lies at its northern extremity. The southern chain of islands, which is properly called the Sooloo Islands, begins on the west opposite to the peninsula of Unsang in Borneo, near 119° 30′ E. long. and 5° N. lat., and extends east-north-east to 122° 30′ E. long. and 6° 50′ N. lat., where it is separated from the south-western part of the island of Magindano by the Straits of Basilan. The northern chain, which is called the Palawan Islands, begins on the south near 7° N. lat. and 116° 30′ E. long., opposite Cape Pirate's Point or Sampanmangio in Borneo; and its southern portion, which is on both sides of the Straits of Balabac, lies nearly south and north, but the remainder lies south-west and north-east. It terminates with the island of Busvagon on the Straits of Mindoro, near 12° 20′ N. lat. and 120° 30′ E. long. Large vessels enter and leave the Sooloo Sea by the Straits of Basilan, Balabac, and Mindoro; that branch of the last-mentioned straits which is on the west of the Bajo de Apo is called Northumberland Strait.

Though there are volcanoes in the islands which lie east and south east of the Sooloo Archipelago, as in the Philippines and Moluccas, it does not appear that any of the numerous islands that compose these groups is of volcanic origin. The larger islands of the chain are of moderate height, but the mountains on the island of Palawan attain a considerable elevation. Some of them are covered to the very summits with lofty trees, and others with rich pasturage, here and there intersected by cultivated grounds, whilst others again exhibit cultivation to the highest point, and are only chequered with groves of fruit-trees. Along the foot of the hills there are level grounds two or three miles wide, which are partly swampy, but mostly cultivated or planted with fruit-trees.

The wet season occurs from May to September, during the prevalence of the south-western monsoon, and the dry season lasts from October to April. But neither of these seasons has that invariable character by which they are distinguished in Hindustan; for showers frequently occur during the dry season, and the rains of the other season are much more interrupted and irregular than in Hindustan. The monsoons themselves are very irregular. In April and May the winds are light and variable, but rather inclining to the south-west; they are often interrupted by calms. In June and July strong gales from the west prevail, and often blow for many days. In August and September southerly winds blow, and sometimes in very hard gales. In October and November the winds are again light and variable, inclining to the north-east. In the following two months it blows in hard gales from the north, but in February and March the variable winds return. The heat is considerable, but not oppressive, being mostly tempered by the land and sea breezes. In summer it varies between 76° and 87°. The thermometer however falls to 75° only early in the mornings. The interior mountainous districts have a much lower temperature.

The soil of the country is generally rich, and the crops are abundant. But though agriculture is not so neglected as in many other islands of the Indian Archipelago, the produce of the rice, of which eight species are cultivated, is not sufficient for the consumption of the inhabitants, partly because the population is comparatively very great, and partly because the rains frequently fail, and consequently the crops of rice also. Rice constitutes one of the most important articles of importation, and it is brought from the Philippine Islands, especially from Panay and Magindano, and from the eastern coast of Borneo, which is subject to the sultan of Sooloo. Many roots however are cultivated with the best success, as two kinds of yams, sweet potatoes, and the Chinese potato, with many others which are peculiar to the Indian Archipelago. Wheat is cultivated in several districts, but not on a large scale. Their gardens produce pumpkins, cucumbers, radishes, and a great number of plants peculiar to the country. Their fruit-trees are well attended to. From their intercourse with the Chinese, many of whom have settled here, the inhabitants have learned the art of ingrafting and improving their fruit, which is extremely plentiful and of a delicious flavour. The mangoes are small, but sweet and luscious; the oranges are equal to those of China; the mangustan, durian, jack, champaka, and all the varieties of the plaintain kind are equal to those cultivated in Java, and the dukoo is thought to be superior. A great number of other fruits are cultivated, which are unknown in Europe, except the pine-apple and the cocoa-nut. The sago-trees are numerous, and part of the produce is exported to China. Pepper was formerly cultivated with success, but this branch of agriculture has been discontinued in modern times for want of demand; only a little is grown for home consumption, and some parcels occasionally sent to China. The cinnamon is particularly fine, not so pungent as that from Ceylon, but it differs essentially from the *Laurus cassia*. The cacao-tree is not mentioned by Forrest (1775), who found only a few of them on Magindano; but Hunt, who was in the Sooloo Archipelago in 1814, says that it grows all over the island of Sooloo, and that it is used for the common beverage of all classes. The Spaniards generally export from 100 to 200 peculs (1 pecul = 133 lbs.) to Manilla, where it is much esteemed. Indigo equal to that of Manilla is manufactured to some extent, but consumed in Sooloo. Very good cotton is grown in various parts, but not exported; tobacco also is grown. The plant from which the Manilla white rope is made and the gamuty are plentiful, and also a species of hemp and flax, of which the inhabitants manufacture their fishing-lines. Turmeric and ginger grow to perfection.

The woods, with which a large part of the surface of the islands is covered, supply many articles for domestic use and exportation. Timber-trees of the best quality and of the largest dimensions may be got in any quantity. The teak-tree flourishes in great luxuriance, and is abundant in nearly all the higher islands. The mahogany is equal to that of Honduras; and the black wood or ebony, to that of Luzon; masts and slabs of these woods are exported to China. Many of the useful trees which grow in this archipelago are not yet known to botanists. The camphor barus collected in these woods is not inferior to that of Sumatra, and sells well in Japan and China. Sapan-wood, red-wood, and various dyeing-woods are exported to Amoy in China. The sandal-wood, and the clove and nutmeg trees are said to exist here, and the bread-fruit and laka trees are abundant.

Buffaloes are not numerous; but Sooloo black cattle abound, and they are used as beasts of burden, and even for the saddle. The horses are of good breed and hardy. Hogs are not rare, though the inhabitants, being Mohammedans do not eat them; they are consumed by the Chinese. Wild hogs are abundant. There are goats, some with skins spotted like leopards, and some beautiful small antelopes. The Sooloo Islands are the most eastern country in which the elephant is found. The elephant was introduced from Borneo, but it is no longer used for religious purposes, since the Islam has spread among the inhabitants. The breed of elephants is now kept up only in one place; but there are still wild elephants in the more extensive forests, and as they damage the crops, there is a grand hunt of them every year. The swallow which makes the edible bird's-nest is common in most of the islands.

The seas are abundantly stocked with fish. Hunt enumerates thirteen species which are found in Europe or the West Indies, and forty-one which are peculiar to these seas. The most important productions of the sea, as yielding articles of commerce, are the sea-slugs, which under the name of *tripang* are sent to China, and the prawns and shrimps, which, after being pounded in a mortar into a soft mass, are an important article of commerce all over the Indian Archipelago and the countries beyond the Ganges, under the name of *blachang*. Sea-weed, collected from the rocks that surround the islands, is exported to China. There are several places in which excellent pearls are found; the pearls go to China.

A little gold has been found. Common salt is not used, but a salt made from burnt sea-weed is in general use.

The Sooloo chain consists of three groups, those of Basilan on the east, Sooloo in the middle, and Tawi-Tawi on the west. The first-mentioned group is composed of the large island of Basilan and several smaller ones. Basilan is about 45 miles long, and the average width may be 12 miles; the surface is therefore 540 square miles, or somewhat more than Monmouthshire. The centre is hilly, but the sea-coast low and woody. It is very fertile, and sends much rice to Sooloo. It exports besides birds'-nests, tepoy or mother-of-pearl shell, some tortoise-shell, and a few pearls; cowries are abundant. The principal ports are Maloza on the south-west side and Gubawang on the north-east coast.

The Sooloo group consists of the larger island of that name and of several small islands. Sooloo is about 40 miles long and 10 wide on an average. The area is about 400 square miles. The surface presents two hilly tracts, separated by a low and level plain. It is very populous. Forrest estimated the population at 60,000, but Hunt states it to be 200,000, or 500 to each square mile. There are many small towns on the coast. The largest is Sooloo, or Soog, near the western extremity of the island, with a permanent population of 6800 souls, among whom are 800 Chinese. More than half of the inhabitants are always engaged in trading voyages, in the pearl and tripang fisheries, and the collecting of birds'-nests. On the north coast is Bokol, with 6000 inhabitants, and on the south coast Parang, with 8000. It exports all the products which have been mentioned as articles of export. The larger of the other islands belonging to this group are Pargutaran, Tapul, and Sibasi, lying north-west and west of Sooloo.

Tawi-Tawi is about 40 miles long and 12 wide. The surface may amount to 400 square miles. In the centre are some hills of considerable elevation, and two lakes of some extent. One of the lakes, called Dungon, is united to the sea by a channel which is from five to seven fathoms deep, but has a bar, on which there are only 1¾ fathoms at low-water, and about four at spring-tides. The lake itself is about eight fathoms deep and is fresh at low water. It is an excellent harbour for vessels which can pass the bar. The island is thinly inhabited. It exports tepoy, white and black tripang, white and black birds'-nests, and many valuable pearls, but does not produce rice enough for the consumption. The principal town is Dungon, on the banks of the lake. The chain of small islands which extends along the southern coast of Tawi-Tawi consists of low islands, with numerous shoals between them. The channels that divide them are from six to eight fathoms deep, but they are extremely intricate, and so narrow that the Chinese junks in some places require to be pushed on with poles. The most valuable pearl fishery is in those straits, which are accessible at all seasons, and fish is very plentiful and of large size. North of Tawi-Tawi is the Tahaw Bank, which consists of coral rocks covered with a layer of sand, and is in some places overgrown with shrubs and trees. It has no fresh water, but the pearl fishery is very valuable.

Between the north-eastern extremity of Borneo and the large island of Palawan are several smaller islands, and the three islands of Banquey, Balambangan, and Balabac, which are of some extent. They are thinly inhabited, and overrun with jungle and timber-trees. They produce chiefly wax, tripang, and tortoises. Balambangan, together with the north-eastern part of Borneo, was ceded to the British by the sultan of Sooloo, and a settlement was established there in 1763. But the British were expelled in 1774 by the Sooloos, who, finding the garrison weak and sickly, and off their guard, murdered them and set fire to the settlement. In 1803 the settlement was re-established, but again abandoned in the following year, on account of the expense of maintaining it.

The large island of Palawan, or Palwan, is more than 275 miles long, and on an average 32 miles wide. The area is therefore about 8700 square miles, which exceeds that of Wales by 600 square miles. A continuous range of hills runs along the west side of the island. But along the eastern shores a low and generally level country extends from 10 to 20 miles inland. The northern portion of the island is subject to the Spaniards, and called Paragua. It forms a part of the province of Calamianes, one of the political divisions of the Philippines, and contained in 1818 a population of 11,097, among which there was only one Spaniard and 28 Spanish creoles. In this census some adjacent islands were included. The low country south of 10° 20′ N. lat. is tolerably well peopled, and subject to the sultan of Sooloo, but the hilly and mountainous region is in possession of the aboriginal inhabitants, who resemble the Papuas, and are continually at war with the inhabitants of the plains. The productions of the low lands and the adjacent seas are canes, especially ratans, cowries, wax, tortoises, tripang, and gum copal, of which last forty or fifty peculs may be had yearly. Rice is also exported. The principal town is Babuyan, which is well fortified, and has a population of about 2000.

The islands north of Palawan, viz. Linacapan, the Calamianes, and Coron, form politically a portion of the Philippines, and are little known.

Besides the islands hitherto noticed, the sway of the sultan of Sooloo extends over a large portion of the north-eastern part of Borneo. This country, which was ceded to the English in 1763, extends from the river Kimanis, which enters the Chinese sea opposite the island of Pulo Tiga, not many miles east of the town of Borneo, to Cape Kaniongan, which forms on the west the entrance of the Straits of Macassar comprehending a sea-coast probably exceeding 800 miles in length. It may seem strange that the sovereign of such comparatively small clusters of islands has been able to subject to his sway such extensive countries, and to preserve his dominions, but the peculiar constitution of his government and the want of powerful neighbours account for this apparently extraordinary fact.

The government of Sooloo resembles that which existed in the last century in Poland, and in the beginning of this century in the Mahratta dominions. Each chief or nobleman is sovereign in the country which belongs to him, and his authority depends on the number of his followers, or rather slaves, called ambas, who are his soldiers. The sultan is a mere cipher, and his orders are disputed by the meanest individual; he is unable to decide the most trivial points without the concurrence of his privy council called 'Ruma Bechara.' In 1814 this council was composed of eighteen members, the most wealthy and powerful of the chiefs, and most of them were relations of the king, and assumed the title of 'datu.' They hold their seat however not by hereditary title, but may be deprived of it by the sultan with the advice and consent of the Ruma Bechara. The sultan seems to derive all his revenues from his own estates, as no taxes are paid by the noblemen or their subjects, and the only revenue, consisting of the customs on goods imported, is shared in unequal proportions among the sultan and the members of the Ruma Bechara, according to their rank. The petty chiefs of the more remote islands and those on the coast of Borneo do not appear to have any share in the government, but they acknowledge the authority of the sultan, in order that they may be protected from the piracy of his subjects, or share the advantages arising from such predatory expeditions.

The Sooloos belong to the Malay race, and most of the chiefs speak the Malay language. But the indigenous language is the Bisayan, which is generally spread over the southern Philippines, also commonly called the Bisayas and contains a great number of words which are used in the language of Sumatra. Many of the chiefs speak the Spanish language, and some the Chinese fluently; the former they have learned from the Christian slaves, kidnapped by the pirates in the Bisayas, and the latter from the Chinese, who are settled all over the Sooloo possessions. The Sooloos have made considerable progress in civilization in the last two centuries. From their commercial intercourse with the Chinese and Spaniards they have learned the comforts of various articles of civilised life, and though their houses are small and mean, they are usually furnished with various objects of Chinese and some of European and Indian manufacture. Every rich man has a considerable number of Chinese chests with locks for holding his valuables, and many of them dress in silks and satins of all colours imported from China. The court-dress of the datus on solemn occasions is of the most splendid Chinese mandarin robe, made of costly silks and satins, embossed and filagreed with gold, and pink satin breeches decorated with gold dragons and splendidly embossed. The people are Mohammedans, but they know little of the tenets of their faith, and observe its religious rites still less, which is partly ascribed to the great number of Christian slaves annually imported by the pirate prows from the Philippines.

Besides the Christian slaves, there are two classes of men, the 'Bajows' (fishermen), also called 'Orang lant,' and the Lanuns or Illanos. The Bajows fish for the pearls, tripang, and sea-weed. They are very numerous in all the eastern islands of the Indian Archipelago, where a great number of them are continually fishing, shifting their places according to the prevalence of the moonsoons. In the Sooloo Islands they are stationary, and inhabit the small towns on the seashore. They speak the same language as the Sooloos, and are Mohammedans. Though free, they are much oppressed by the datus and other chiefs.

The Lanuns, or Illanos, are properly from the island of Magindano, the most southern of the Philippines, and, without exception, the greatest pirates on the globe. Their depredations are conducted in large fleets of small prows in the Straits of Macassar, among the Moluccas, but more particularly among the Bisayas. The whole produce of their enterprises is sold at Sooloo, which is their grand entrepôt. But they have many stations on most of the other islands. Hunt has enumerated twelve larger stations. They are intimately connected with the piratical establishments on the island of Magindano. They have obtained the protection of the sultan by giving to him and the Ruma Bechara 25 per cent. on all their captures; but they must respect the Sooloo flag, and commit no depredations on vessels actually at anchor in Soog roadstead. The chiefs advance them guns and powder, for which they are paid by a stipulated number of slaves.

The principal force of the sultan and chiefs consists of their personal slaves (*ambas* or *humbes*), who are Christians purchased from the pirate prows. They are very numerous all over the islands, and constitute the bulk of the population of the capital, Soog, but hundreds annually effect their escape to the Philippines or to the interior. The Chinese who are settled in these islands are for the most part engaged in traffic. They keep shops in the towns, or in the trading prows, and many of them carry on the pearl and tripang fisheries, or birds'-nesting, but as soon as they have scraped together a small competency, they retire to their native country. At Soog alone more than 800 of them are settled; but in all places they are much oppressed by the chiefs.

The manufacturing industry of the inhabitants is very limited; but a large number of prows is built. Certain cotton-cloths, called *sarongs* and *tanjam*, are of a very fine texture and tartan-striped; some of them are exported to the neighbouring islands. Sugar, indigo, saltpetre, and chocolate are only made for home consumption. There are cutlers who make *creeses* or daggers, and some goldsmiths who make jewellery.

The position of the island of Sooloo is very favourable for commerce, being situated between the Moluccas, Celebes, Borneo, the coasts of Cochin China, China, and the Philippines, and the trade would be very considerable if it were not continually interrupted by the pirates. At present it is limited to the produce of the country, which chiefly goes to China, being less adapted for other markets. It is carried on by the Chinese from the province of Fukian, and especially from the harbours of Amoy and Pactow. The Chinese junks always arrive from the middle of March to the middle of April. They are from one to five in number, and from 3000 to 7000 pekuls burden. They leave Sooloo by the 1st of August. Their cargoes consist of furniture, particularly of chests, brass utensils and wire, iron unwrought and iron pans, raw silk, nankeens, linen, a great quantity of porcelain and crockery, some piece-goods of flowered silk, cutlery, sugar-candy, tea, and some smaller articles. They take in return tepoy or pearl shells, cut betel-nuts, tripang, wax, sugar, agar-agar, or sea-weed, white and black birds'-nest, shark fins, camphor barus, tortoise shells, pearls, ebony, sapan-wood, clove-bark, cinnamon, cowries, pepper, and sago. Sometimes British vessels from Singapore visit the Sooloo Islands. Their cargo consists mostly of opium, cotton goods from the coast of Coromandel and from Bengal, with some others from Java, English chintzes, Swedish flat iron and steel, large spike nails for prow building, and some hardware. They receive in return the various products of the country, which they take to Canton, and thence return with a cargo of tea and other Chinese articles. The trading season in the town of Sooloo does not extend beyond August. After the departure of the junks, the fair, which up to that time is actively maintained at the port, is broken up, and the remaining produce is either sent to the port of Yloylo, in the island of Panay, or retained on hand for the next season. The people then disperse to Borneo and the other islands in search of articles of commerce for the next season.

(Forrest's *Voyage to New Guinea;* Moor's *Notices on the Indian Archipelago*, Singapore, 1837.)

SOOT is that portion of fuel which escapes combustion, and which is mechanically carried up and deposited in chimneys. The soot of coal and that of wood differ very materially in their composition; the former indeed does not appear to have been accurately analysed, but it evidently contains more carbonaceous matter than the latter. Coal-soot contains substances usually derived from animal matters; it contains sulphate and hydrochlorate of ammonia, and has been used for the preparation of the carbonate; to hot water it yields a brown bitter extract, and it contains an empyreumatic oil; but its great basis is charcoal in a state in which it is capable of being rendered soluble by the action of oxygen and moisture, and hence, combined with the action of the ammoniacal salts, it is used as a manure, and acts very powerfully as such. Sir H. Davy observes that for this purpose it is well fitted to be used in the dry state, thrown into the ground with the seed, and requires no preparation.

The soot of wood has been minutely analysed by Braconnot, who found it to consist of the following substances:—

Ulmin (about)	30·20
Azotised matter	20·00
Carbonate of lime and traces of carbonate of magnesia	14·66
Water	12·50
Acetate of lime	5·65
Sulphate of lime	5·00
Acetate of potash	4·10
Carbonaceous matter insoluble in alkalis	3·85
Ferruginous phosphate of lime	1·50
Silica	0·95
Acetate of magnesia	0·53
Asbolin (a peculiar acrid and bitter principle) about	0·50
Chloride of potassium	0·36
Acetate of ammonia (about)	0·20
Acetate of iron (a trace)	—
	100·

Braconnot considers the ulmin as absolutely similar to that obtained artificially by the action of potash on wood-sawdust, but Berzelius is of a different opinion, and calls it *geine*. The azotised matter is very soluble in water, and insoluble in alcohol. As coal-soot contains much more carbonaceous matter than wood-soot, and also a much larger portion of ammoniacal salts, it must be more active as a manure, and altogether a more useful substance.

SOPHIA CHARLOTTE. [FREDERIC I. of Prussia.]

SOPHIA of RUSSIA. [PETER of Russia; RUSSIA—*History*.]

SOPHISM (Σόφισμα), that superficial and incomplete aspect of the truth, which at first sight looks like the truth, but on closer inspection turns out to contain some radical error. This seems the most correct definition, but the word is used loosely. Its general signification, viz. a *specious* proposition, is perhaps nearest the mark. Truly considered, most errors are sophisms, for errors are not direct contradictions to the truth, but simply the leaving out of view one or more elements of the truth, and seizing on only one or two elements, and declaring them to constitute the whole truth. Victor Cousin defines error to be 'One element of thought considered exclusively, and taken for the complete thought itself. Error is nothing but an incomplete truth converted into an absolute truth.' (*Introduction à l'Hist. de Philosophie*, Leçon 7.) Spinoza had before defined 'falsity to be that privation of truth which arises from inadequate ideas.' (*Ethica*, b. ii., prop. xxxv.) A selection of some of the celebrated sophisms of antient philosophers will best illustrate the meaning of the definition. The 'lying' sophism was this: if, when you speak the truth, you say you lie, you lie; but you say you lie, when you speak the truth, therefore in speaking the truth you lie. The 'occult' sophism: Do you know your father? Yes. Do you know this man who is veiled? No. Then you do not know your father, for it is your father who is veiled. The 'sorites:' Is one grain a heap? No. Two grains? No. Three grains? No. Go on adding one by one, and if one grain be not a heap, it will be impossible to say what number of grains make a heap. (Enfield, *Hist of Philos.*, i., p. 200.) In all of these we see that important omission, or confusion of ideas or names, constitutes the apparent contradiction. In the common example of—Bread being better than paradise; because bread is better than nothing, and nothing is better than paradise—the confusion arises from both the 'nothings' being used substantively; whereas it is only the first that is so used; the second is affirmative, and expresses 'there is nothing better.' A sophism is therefore the use of some word in a different sense in the premises from that in the conclusion, and this is the definition of Aristotle (*Top.*, viii. 11): 'When the discourse is a demonstration of anything, if it contains anything which has no relation to the conclusion, there will be no syllogism; and if there appears to be one, it will be a sophism, and not a demonstration.'

This confusion of words and ideas, though carried to a ridiculous excess in the above examples, is the origin of all errors and sophisms; but though errors and sophisms are logically constituted alike, yet the instinctive sense of mankind marks the difference between incomplete views (error) and wilful perversion (sophism). In all cases a sophism is supposed to be recognised as such by the sophist. It is an endeavour on his part to 'make the worse appear the better reason.' It is the consciousness then of the sophist which distinguishes and renders odious his error as a sophism.

SOPHIST (Σοφιστής). 'It is well known,' says Dr. Wiggers, 'that the word *σοφιστής* at first had an honourable meaning, and was synonymous with *σοφός*, a sage, a scholar in its widest sense, for even artists were comprehended in it. Protagoras was the first who adopted the name of *σοφιστής*, to distinguish more decidedly one who makes others wise, especially one who taught eloquence, the art of governing, politics, or, in short, any kind of practical knowledge. From that time the word sophist acquired that odious meaning which it retains at the present day. Afterwards, in the time of the Roman emperors, the name of sophist again became an honourable appellation, and was applied to the rhetoricians.' (*Life of Socrates*, p. xiii., trans.)

The race of Sophists, whose enmity to Socrates, their great opponent, has perhaps been the principal cause of their celebrity, was not without influence on the philosophy and literature of Greece. They were a class of men who went about Greece discoursing and debating, and sometimes educating the youthful sons of rich and noble families. The cause of their success lay in the very nature and habits of the Greek people, who were so much addicted to talk and so little to study—who were so passionately fond of and so easily led by rhetoric. And the easy triumph which a fluent talker can always attain by a rapid and artful confusion of words and ideas, must also have operated in their favour. The period at which the Sophists flourished was one of obsolete creeds—one lifeless from the want of some vivifying faith. Religion was attacked by open scepticism; the whole sect of the Eleatæ, with the exception of Empedocles, appear to have handled the history of the gods with arbitrary and allegorising boldness. Even the pious Pythagorean adopted the old religion merely in a peculiar sense of his own; Heraclitus argued against its probability; Anaxagoras understood it allegorically; and lastly, Hippo was regarded as an open and avowed atheist. Euripides, Protagoras, Diogenes, Prodicus, and Critias, all denied the existence of the gods. (Ritter, *Geschichte der Philosophie*, vol. i.) Everything human and divine had lost its earnest nature, and came to be regarded as an art—an exercise of ingenuity. The art of the Sophists was oratory. Assuming that there was nothing right in its nature, but only by position (*τὸ δίκαιον καὶ τὸ αἰσχρὸν οὐ φύσει, ἀλλὰ νόμῳ*, Plato, *Gorg.*, p. 482), it was their boast that they could make the worse appear the better cause. (Aristotle, *Rhet.*, ii. 24.) Their doctrines closely resemble those of the Sceptics, since they equally denied the possibility of truth, and even interdicted inquiry into it; but the distinction between these sects consists in the Sophists' not masking their arrogance under doubt, but boldly and distinctly averring that there was no truth at all, and seeking to communicate this wisdom to others, to save them the trouble of investigation.

The doctrine of Protagoras tends to deny the possibility of anything objective being represented by thought, and by making human thought the standard of all truth (*πάντων χρημάτων μέτρον ἄνθρωπος*, Plato, *Craty.*, 385), and affirming that each manner of viewing things has its contrary, so that there is as much truth on one side as on the other, it is deduced as a consequence that the end of philosophy is persuasion; and oratory being the art of persuasion, it was to that which they directed their greatest attention. (Plato, *Theætetus*.) Ritter however observes that 'Plato, it is certain, attributed much to Protagoras that did not actually belong to him.' (*Geschichte der Phil.*, vol. i.)

But Protagoras, however sophistical his doctrines, appears to have been in earnest, and to have deduced them rigorously from his premises. Among his followers, as always happens, this earnestness was wanting, and accordingly we find Gorgias (as sketched by Plato) without a single claim to respect; and Euthydemus a despicable babbler. With these latter men it was truly sophistry—quackery; and answered their purposes, for they amassed considerable wealth thereby. (Ritter, vol. i.)

Gorgias wrote a work on nature, or non-being, fragments of which are preserved in Aristotle and Sextus Empiricus, in which he endeavoured to prove that nothing is; that if anything is, it cannot be an object of knowledge; and finally, that if even anything is, and can be known, it cannot be imparted to others. (Ritter; Tennemann, *Manuel*, p. 123.) He reasons thus: if anything is, it must be either being or non-being, or even at one and the same time both being and non-being. (Sextus Emp. *adv. Math.*, vii. 66.) All these cases are impossible; for a non-being cannot *be*, because it is the opposite of *being*; and therefore, if the latter is, the former cannot be; because if it were, it must be at the same time being and non-being. Aristotle, according to Ritter, gives the reasoning and proofs differently, but his text is so corrupt as to prevent any confidence being placed in it. Nor is being possible: for it cannot be either produced or unproduced, neither one, nor many, nor yet both at once. Nor can it be at once being and non-being; for if there is both that which is and that which is not, then must they, in reference to being, be one and the same. But if they are the same, then that which is is also that which is not; the non-being however is not, and consequently the being cannot be. (Sext. Emp. *adv. Math.*, vii. 75; Ritter.) As consequences of this arid sophistry, he deduces that if we suppose being to be an object of thought, it must be similar to being; or in other words, that it must be being itself, for otherwise being cannot be an object of thought. Now if thought is being, then every thought must be true, and non-being is inconceivable. In vain do we object that only those thoughts are true which are confirmed by perception; for as the object of sight is true, though it be not heard, so a thought may be true, though it cannot be perceived. (Sextus Emp., *ib.*, 77, *et seq.*) A notable instance of the sophistical argument which assumes an analogy as a proof, taking care the analogy itself shall be false.

It is curious to contemplate a highly intellectual nation delighting in such barren quibbles as these, and the fact of the prevalence of sophistry indicates an important phasis in Greek history. We have a parallel in our schoolmen of the middle ages, who were quite as sophistical and as trifling. But it is also important to notice the influence which such a sect had on philosophy and literature. It was the practical demonstration of the incompetence of all previous philosophy, by carrying out their principles to the ludicrous extreme (as Hume's doctrines were but the consummation of all the materialism of Hobbes and Locke), and thereby necessitating an entire reformation and rebuilding of principles. In the person of Socrates, philosophy again recommenced its attempts to solve its own mysteries. We must also add what Ritter says with regard to the effects on language. It is not to be denied, he thinks, that the Sophists contributed greatly to the perfection of prose; which was in itself a great benefit to philosophy. The Sophists applied themselves to manifold arts of persuasion, and in their attacks upon each other, labouring to expose and lay bare the delusions of appearance, they acquired great nicety in the distinction of terms. Prodicus was celebrated for his skill in the distinctions of synonymous terms (as we learn from Plato, who ridicules him for it (Protag., p. 337; Crat., p. 384); but Prodicus is honourably mentioned by him (Euthyd., p. 277-305). The sophisms turning upon the words 'to learn,' 'to understand,' to know,' also contributed to the more accurate knowledge of these terms. The very circumstance that their rules were intended to be subservient to the ends of fallacy and deception, must have afforded a stronger motive to the philosophical spirit to bring under investigation the true forms of thought and expression which had been neglected by earlier philosophers; and accordingly we find that they occupied much of the attention of Socrates. (See Ritter's Remarks on the Sophists, *Geschichte der Philosophie*, vol. i.)

SO'PHOCLES, son of Sophilus, was born in the Attic demus or village of Colonus, and, according to the most authentic accounts, in the year B.C. 495, fifteen years before the battle of Salamis, when Æschylus was thirty years old. He appears to have received as good an education as could be had at the time. In music he was instructed by Lamprus, and in this art, as well as in gymnastic exercises, he gained laurels even when a youth. At the age of fifteen, when the Greeks had defeated the Persians in the battle of Salamis (480 B.C.), Sophocles, on account of his beauty, was selected by those who had the management of the solemnities which followed the victory, as leader of the chorus which danced around the trophies in Salamis and sang the hymn of victory. (Athen., i., p. 20.) The anonymous Greek biographer of Sophocles states that Æschylus was his master in tragedy, but such a relation between the two poets is improbable, and is contradicted by a passage in Athenæus (i., p. 22), where Sophocles says of Æschylus, that he followed the rules of his art without knowing them. It is a favourite practice with antient historians and grammarians to describe the relation of two persons who lived at the same time and practised the same art, as that of master and pupil, when there is no evidence of such fact, except that the one was younger than the other. The first time that Sophocles produced a tragedy on the Attic stage was in the year B.C. 468, and the piece was probably the 'Triptolemus,' which is now lost. (Euseb., *Chron.*, p. 167; Plin., *Hist. Nat.*, xviii. 12.) Æschylus was at this time the great dramatist of the Attic stage, but his young rival, who ventured to contend with him for the prize, won the victory, which was attended by the following memorable circumstance. On the day when the drama was acted, Cimon had just returned from the island of Scyrus, bringing with him the remains of Theseus, who was believed to have been murdered and buried in that island. When Cimon, with his nine colleagues, entered the theatre to offer the customary libations to Dionysus, he was detained by the chief archon Aphepsion, whose duty it was to preside at the dramatic performances and to nominate the judges. Aphepsion appointed no judges, but called upon Cimon and his colleagues to determine the prize. Cimon, recognising the great genius that the tragedy displayed, gave the prize to Sophocles. (Plut., *Cim.*, 8.)

From this time twenty-eight years of his life passed without any memorable event being recorded, though Sophocles must have been extremely active in the exercise of his art, for during this period he is said to have composed thirty-one dramas, not including the 'Triptolemus.' (Aristoph. Byz., *Argum. ad Antig.*)

In the year B.C. 440 he brought out the 'Antigone,' his thirty-second drama; and he gained the prize. The Athenians, who perceived in this play the wisdom of a statesman and general, appointed him one of the commanders to conduct the war against the aristocrats of Samos, who, after being expelled from the island by the Athenians, had returned from Anaea in Caria (whence the Greek biographer calls it the war of Anaea), and endeavoured to induce the Samians to revolt against Athens. In this campaign Sophocles was the colleague of Pericles. No military feat is recorded of him, and it is only stated that he availed himself of the opportunity to enrich himself. In Samos he is said to have made the acquaintance of Herodotus, for whom he wrote a poem. (Plut., *An Seni sit gerenda resp.*, 3.) Whether Sophocles, after this expedition, which ended in 439 B.C., took any further part in public affairs, is not certain. His life seems to have passed in the glorious career of a successful dramatist, and has left no traces in history; we only hear that several kings invited him to their courts, but that he preferred staying at home. He was married twice. His first wife was Nicostrate of Athens, by whom he had a son, Iophon; his second wife was Theoris of Sicyon, by whom he had a son called Ariston. Ariston again had a son called Sophocles, who is generally distinguished from his grandfather by the epithet 'the Younger.' Sophocles was very partial to this grandson, and it was believed that during his lifetime he intended to transfer to him a considerable part of his property. Iophon, fearing lest his inheritance should be diminished, brought a charge of mental incapacity against his father before the members of his phratria, and proposed that he should not be allowed to have the control over his property. Sophocles is said to have made no reply to this charge, but with a strong conviction of the excellence of the 'Œdipus in Colonus,' which he had just composed, to have only read to his phratores, who had to examine him, the parodos of this play. The consequence was that he was allowed to retain the management of his property.

Sophocles died in the year 406 B.C., at the very advanced age of ninety. The accounts of the cause of his death are not consistent. Some state that he was choked by a grape, which stuck in his throat; others, that in the loud reading of the 'Antigone' he exerted himself so much, that at last his voice failed him and he expired; and others again, that he died of joy at the announcement of a victory gained by one of his dramas. He was buried in the tomb of his fathers near Decelea.

As regards the private life of Sophocles we know nothing, except that he was addicted to sexual pleasures (Athen., xii., p. 510); but the anecdotes in Athenæus (xiii., p. 603, &c.) seem to belong to that sort of scandal from which no great man can escape.

Sophocles is said to have written 130 dramas, but Aristophanes of Byzantium declared seventeen of them spurious, which would leave 113 genuine dramas, which number includes his satyric dramas. At the age of forty-five he had written 32 dramas, so that more than two-thirds of his works were composed during the latter half of his life. The 'Œdipus in Colonus,' his last production, was written a short time before his death, but was not brought out till the year B.C. 401. With these plays he disputed the prize with the greatest dramatists of the day, Æschylus, Euripides, Chœrilus, Aristias, Iophon, and others; and gained twenty times the first prize, several times the second, but never the third. Of all his plays there only remain seven; of others we only possess some fragments, and sometimes no more than the titles. The earliest of the extant pieces is the 'Antigone,' and the probable chronological order in which the others followed is this: 'Electra,' 'Trachiniæ,' 'King Œdipus,' 'Ajax,' 'Philoctetes' (first acted in B.C. 409), and the 'Œdipus in Colonus,' which was first acted in B.C. 401.

The antients themselves regarded Sophocles as the most perfect of all dramatic poets; they called him the tragic Homer, and the Attic bee, to express the unrivalled beauty and sweetness of his productions. Their admiration was well-founded, for the tragedies of Sophocles, as far as we can judge, excel everything of the kind that appeared in Greece either before or after him. Sophocles abandoned the pomp, grandiloquence, and harshness of Æschylus, for which he substituted the noble simplicity and tenderness which the antients admired: his heroes are not beings of a superior nature, his men are not the sport of an inscrutable destiny: the world which he represents is peopled by men, agitated indeed by sufferings and passions, but the good and the beautiful do not appear under the iron rule of destiny; all his characters are men in the truest sense of the word, beings with whom we can sympathise. Hence his dramas are of an ethical and practical character, while those of

Æschylus are more calculated to inspire religious awe. Sophocles knew the laws of his art and what it required, as appears from an expression ascribed to him by Plutarch (*De Prof. Virt.*, *Sent.* 7). During his whole career he appears to have been striving to realize the idea which he had formed of tragedy. In the three earliest of the extant plays there appear occasionally traces of an artificial style and studied obscurity, but the remaining four are entirely free of this fault. But even the 'Antigone' is so different from any play of Æschylus in design and execution, that he must have long before been aware of the necessity of the changes which he introduced. The more particular changes to which we here allude are as follows. Each drama of Sophocles turns upon one great action, the 'Antigone' perhaps excepted; and one idea, which is the leading idea of the drama, is perfectly developed in one play; while with Æschylus the three plays of a trilogy are like so many acts of one drama. Although therefore Sophocles may usually have brought out three tragedies at once, each of them was complete in itself. The lyric part, or the chorus, in Sophocles has no longer that prominent place which it has in Æschylus, nor does it take part in the action in the same degree; it no longer expresses the feelings supposed to be called forth in the audience; but the tragic development of the characters of the drama, or, in other words, the action, is the most prominent part of the drama. The chorus is subordinate, and it would seem that Sophocles used it as a means to let the spectator see what was going on in the minds of the actors rather than in that of the spectators. As the action was thus extended, Sophocles also introduced a third actor, or the tritagonistes, so that now three actors might appear upon the stage at once, whereas before his time there had not been more than two at a time, which rendered the action, as well as the dialogue, monotonous. Lastly Sophocles introduced several improvements in scene-painting and in other mechanical parts of stage performance. At first he is said, like Æschylus, to have acted in his own dramas, but as his voice was too weak, he gave it up.

Besides his dramas, Sophocles also wrote an elegy, several paeans, and other minor poems, and also a prose work on the chorus, which was directed against Thespis and Choerilus. Several antient grammarians, such as Didymus, Horapollon, Aristophanes of Byzantium, Androtion, Praxiphanes, and others, wrote commentaries upon the dramas of Sophocles.

Respecting the life and works of Sophocles, see the Life, by an anonymous Greek writer, which is prefixed to several editions of his works; Suidas, *s. v* Σοφοκλῆς; the masterly treatise of Lessing, 'Leben des Sophocles,' which has unfortunately been left a fragment by the author; Ferd. Schultz, 'De Vita Sophoclis Poetæ,' Bonn, 1836, 8vo.; Adolph Schöll, 'Sophocles, sein Wirken und Leben,' Frankfurt, 8vo.; Müller, 'Hist. of the Lit. of Antient Greece,' i., p. 337-356; A. W. v. Schlegel, 'Lectures on Dramatic Literature,' vol. i., lect. 4.

The works of Sophocles were first printed by Aldus, Venice, 1502, 8vo. The best of the subsequent editions are those of H. Stephens, Paris, 1568, 4to., with valuable [illegible]es, and that of Brunck, Strassburg, 1786, 2 vols. 8vo., [illegible] a Latin translation and notes. In the same year Brunck published his great edition in 2 vols. 4to., or 4 vols. 8vo. It was reprinted in London, 1823, in 3 vols. 8vo., with some additions by Burney. The text of Brunck has served as the basis for all subsequent editions. The best among them are that of Musgrave, Oxford, 1800, &c., 2 vols. 8vo.; of F. H. Bothe, Leipzig, 1806, 2 vols. 8vo., the last edition of which appeared in 1827 and 1828; of Erfurt, Leipzig, 1802, &c., 7 vols. 8vo.; of Elmsley, 1826, reprinted at Leipzig in 8 vols. 8vo.; of Erfurt and G. Hermann, Leipzig, 1823-25, 7 vols. 12mo. An edition by G. Hermann including the notes of Erfurdt has been published in parts. The plays that were published last are: 'Antigone' (1830), 'King Œdipus' (1833), and 'Philoctetes' (1839), forming vols. 1, 2, and 6; vols. 3, 4, 5, and 7 having appeared before, at Leipzig, 1822-1825. The most useful edition of Sophocles for students is that by E. Wunder, Gotha and Erfurt, 1831-1841. The editions of single plays and dissertations upon them are almost innumerable. The titles and remains of the lost pieces of Sophocles have been collected by Welcker, in his 'Die Griechischen Tragödien,' p. 59, &c. He has classed them according to the legendary cycles to which they belong, and also given the probable contents of the leading idea of each play, as far as this can be made out from the fragments.

The translations of Sophocles are very numerous. The best German is that by Solger, the last edition of which appeared at Berlin, 1824, 2 vols. 8vo. There are numerous English translations: in prose, by George Adams, London, 1729, 2 vols., and others subsequently; in verse, by Franklin, London, 1758-9, 2 vols. 4to., and 1766 and 1788, 8vo.; by Robert Potter, London, 1788; and by Thomas Dale, 1824.

SOPHONISBE. [NUMIDIA.]

SOPHORA, a genus of plants of the natural family of Leguminosæ, said to be so named from an Arabic name (*Sophera*) of one of the species. These are ornamental shrubs and trees, found in central and tropical Asia, also in the warm parts of North America and the equinoctial and subtropical parts of South America. The genus is characterised by having a 5-toothed campanulate calyx; corol papilionaceous; petals of the keel usually united together at their apex; stamens 10, distinct; legumes moniliform, without joints or wings, and containing several seeds; the leaves are impari-pinnate, usually exstipulate and terminal; the inflorescence is in racemes or panicles of yellow, white, or blue flowers. The species best known in England are S. japonica and S. chinensis, which, being from the northern latitudes of the countries from which they are named, are hardy enough to withstand the climate of England; and it has been proposed to engraft the Nepaul *S. velutina* on the S. japonica. Being handsome trees, with both leaves and trees differing much from European trees, they are well adapted for standing singly in lawns. They are raised from layers, but also from seeds, and require a little protection when young.

SO'PHRON, son of Agathocles, a native of Syracuse, was born about the year B.C. 420. He is believed to have been the inventor of a peculiar kind of poetry called mimes. [MIMES.] He wrote his works in the vulgar dialect of the Doric Greek as spoken in Sicily, and in a kind of rythmical prose. Plato, who had become acquainted with the productions of Sophron through Dion of Syracuse, valued them very highly, and is said to have made the Athenians acquainted with this species of poetry. (Quinctil., i. 10, 17.) Besides the few fragments of the mimes of Sophron which yet remain, we only know the titles of some others of his poems, so that we are scarcely able to form an exact idea of this species of poetry. The circumstance that Sophron wrote in a popular dialect full of peculiarities and solecisms, was probably the reason why his works were studied by the grammarians. Apollodorus of Athens wrote a commentary upon them.

The fragments are collected by C. J. Blomfield, in the 'Classical Journal,' vol. iv., p. 380, &c., to which a supplement and some corrections were added by the same scholar in the 'Museum Criticum,' No. VII., p. 640, &c. Compare Grysar, 'De Sophrone Mimographo,' Coloniæ, 1838.

SOPORIFICS. [ANODYNES; NARCOTICS.]

SOPRA'NO (Italian), the highest of the various voices; the Treble. [VOICE.]

SORA. [LAVORO, TERRA DI.]

SORA'NUS (Σωρανός), an eminent antient physician, the son of Menander, was born at Ephesus, probably about the end of the first century after Christ, and raised the sect of the Methodici to its highest degree of reputation. He had been brought up at Alexandria, but under the reign of Trajan and Hadrian he came to Rome, where he taught and practised medicine with great success. (Pseudo-Gal., *Introduct.*, cap. 4, p. 184, tom. xiv., ed. Kühn; Suidas.) He passed some time also in Aquitania, and very successfully treated the leprous diseases which prevailed there. (Marcell. Emp., *De Medicam*, cap. 19, p. 321, ed. H. Steph.) In his time the leprosy, which had been brought from the East into Italy and Gaul, was making there the greatest ravages; and the physicians, who were not yet well acquainted with this disease, were anxious to recommend certain preparations against each of its particular symptoms. Some of those employed by Soranus have been preserved to us by Galen. (Gal., *De Compos. Medicam.*, *sec. Loca*, lib. i., cap. 2, 8, p. 414 et sq., 493 et sq., tom. xii.) Their object was in a great measure to effect a metasyncrisis, or the re-establishment of the pores in their natural state. To him we are indebted for the first observations (Paul. Ægin., *De Re Med.*, lib. iv., cap. 59, p. 73, ed. Ald.) upon the species of worm called by the Greeks δρακόντιον, by the Latins *Gordius*, *Filaria*, or *Vena Medinensis*; for an account of which see a dissertation by Justus Weihe, entitled *De Filaria Medinensi Gmel. Commentariolum*, Berol., 1832, 8vo., and especially the very learned work by Georg. Hieron. Velschius, entitled *Exercitatio de Vena Medinensi, ad Mentem Ebnsinæ* (*i.e.* Avicennæ), *sive De Dracunculis Veterum*, 4to., August.-Vindel., 1674. He made the interesting remark, that children while at the breast are sometimes attacked with hydrophobia. (Coel. Aurel., *De Morb. Acut.*, lib. iii., c. 11, p. 221, ed. Amman.) His theory on the Nightmare (Id., *De Morb. Chron.*, lib. i., c. 3, p. 289), and his opinion on the use of magical songs and incantations in the treatment of diseases, prove how little he was imbued with the prejudices of his age. He seems to have been the first to reduce the opinions of his predecessors to certain principles (Id., *De Morb. Acut.*, lib. ii., cap. 9, p. 91), and therefore did not, like them, show contempt for the antients, but tried to refute them by the arguments of the Methodici. (Id., *ibid.*, cap. 19, p. 127; cap. 29, p. 142.) Indeed he was the first who gave a plausible reason for the necessity of rejecting purgatives, in saying that they evacuated indiscriminately the healthy humours as well as the bad ones. (Id., *ibid.*, cap. 9, p. 91.) He always employed venesection in pleurisy, because it proceeds evidently from the *strictum*, and had no regard to the difference of climate. (Id., *ibid.*, cap. 22, p. 132.) In pneumonia he considered that the whole body suffered, but that the lungs are particularly affected; for Soranus did not admit a single local disease, in the strict acceptation of the term. (Id., *ibid.*, cap. 28, p. 139.) The cholera morbus, said he, is a relaxation of the stomach and intestines, accompanied with imminent danger. (Id., *ibid.*, lib. iii., cap. 19, p. 254.) Sprengel (*Hist. de la Méd.*) thinks that he is not the Soranus who is mentioned by Coelius Aurelianus (*De Morb. Chron.*, lib. ii., cap. 10, p. 391) as having recognised three causes of hæmorrhage, viz. eruption, lesion, and putrefaction, because the study of these particular causes would not agree with the spirit of the school of the Methodici. We know also from Suidas that at least two different physicians bore the name of Soranus. His work, Περὶ Γυναικείων Παθῶν, *De Arte Obstetricia Morbisque Mulierum*, shows that he possessed very considerable anatomical knowledge, though he introduces the description of the sexual organs by saying that the study of anatomy is quite useless (ἄχρηστος), and that he only inserted these chapters in order that people might not say he disparaged anatomy because he was himself ignorant of it (cap. 3, p. 5, ed. Dietz). Indeed he described the uterus in such a manner as to prove (what he himself assures us) that he derived his ideas of anatomy from the dissection not of animals, but of human bodies. (*Ibid.*, cap. 4, 5, p. 11, 13.) He denies the existence of the cotyledons (*Ibid.*, cap. 4, p. 10), but he still gives to the ovaries the name of testicles, compares the form of the uterus to that of a cupping-glass, points out the relations of this viscus with the os ilii and the sacrum, and mentions the changes that its orifice experiences during pregnancy. (*Ibid.*, p. 10, sq.) He attributes the prolapsus of the uterus to the separation of its internal membrane (*ibid.*, p. 11); he speaks of the sympathy that exists between it and the mammæ (*ibid.*, p. 12), and accurately describes the hymen and the clitoris (*ibid.*, cap. 5, p. 13).

A fragment by Soranus, Περὶ Σημείων Καταγμάτων, *De Signis Fracturarum*, was published by Cocchi, in his *Græcorum Chirurgici Libri*, Gr. et Lat., Florent., 1754, fol. It is also inserted by Jul. Lud. Ideler, in his *Medici et Physici Græci Minores*, Berol., 1841, 8vo., Gr. His work *De Arte Obstetricia Morbisque Mulierum* consisted originally of one hundred and sixty-four chapters, of which only one hundred and twenty-seven remain, which were first published, Regim. Pruss., 8vo., 1838, Græcè, from a manuscript prepared for the press before his death, by the late learned professor F. R. Dietz. An anatomical fragment of this work, Περὶ Μήτρας καὶ Γυναικείου Αἰδοίου, *De Utero et Pudendo Muliebri*, was published in Greek, together with Rufus Ephesius, Paris, 1554, 8vo., and is to be found in Ideler's collection mentioned above. A Latin translation is added to the edition of Oribasius, by Rasarius. There is also a dissertation by H. Häser, *De Sorano Ephesio, ejusque* Περὶ Γυναικείων Παθῶν, *Liber nuper reperto*, Jenæ, 1840, 4to. Whether the Life of Hippocrates, that goes under the name of Soranus, was written by the author who is the subject of this article, is uncertain; and indeed the writer is not quite sure that all that has been id refers to the same individual. The Life of Hippocrates (which is of little or no authority) is prefixed to several editions of his works, and is also inserted by Fabricius in his *Biblioth. Græca*, vol. xii., p. 675, ed. Vet., and by Ideler in his collection above mentioned. A work which exists only in Latin, and which bears the title *In Artem Medendi Isagoge*, is undoubtedly the production of a later writer, as Galen is mentioned in it by name (cap. 13). It is in the collection edited by Torinus, Basil., 1528, fol., and in that published 'apud Aldi Filios,' Venet., 1547, fol.

SORBONNE, a celebrated College which existed in France for several centuries. Its founder was Robert de Sorbonne, an ecclesiastic of the thirteenth century, born (A.D. 1201) at the village of Sorbon, in the territory of Rethel, now in the department of Ardennes, of poor and obscure parents. His talents and acquirements introduced him to the notice of Louis IX. (St. Louis), king of France, who retained him at his court as his confessor and chaplain, and showed him great favour. In 1251 he was made a canon of Cambray, and, mindful of the difficulties which he had experienced in early life, he formed the plan of an institution for the assistance of poor students. His intention was to establish a society of secular priests, for whom a maintenance in common should be provided, and who should devote themselves wholly and gratuitously to the work of instruction in theology. A society on this plan was founded by him with the aid of his friends, all of them ecclesiastics, A.D. 1252 or 1253; and was encouraged by the liberal patronage of the king. Robert de Sorbonne was the first head of the establishment, *directeur;* and it was not until after eighteen years' official experience that he settled the constitution and regulations of the establishment, which were not in any respect changed until the suppression of the college at the Revolution. Robert established another college, for the study of the humanities and philosophy, that of Calvi, sometimes called 'the little Sorbonne,' near his principal foundation, to which it seems to have been preparatory. This minor establishment was destroyed in order to erect the church when Richelieu rebuilt the college premises. In A.D. 1258 Robert was made canon of the cathedral at Paris, and died in 1274, bequeathing all his property to the college which he had founded.

The members of the college were all either doctors or bachelors of theology. There has been some difference of opinion as to their number in the first instance. Du Boulay, in his *Historia Universitatis Parisiensis* (*History of the University of Paris*), gives it as sixteen; but Ladvocat, himself a professor of the Sorbonne, contends strenuously that the number was larger. The original regulations indicate that the members were more than thirty; but these were not finally settled till the college had been established eighteen years. The members of the college consisted of two classes, 'socii et hospites,' or 'fellows and commoners,' and persons of any nation or country were eligible. The socii, if not the hospites, were in holy orders. The hospites were bachelors of the faculty of theology at Paris, and were elected by a majority of the socii, after a triple scrutiny, having previously maintained a thesis called Robertine, after the name of the founder. The hospites were boarded and maintained in the college, and were allowed to study in the library, but they had no voice in the assemblies of its members, and they were obliged to quit it upon taking a doctor's degree. The socii were either bachelors or doctors, were obliged to pass through the same ordeal as the hospites, besides having to deliver gratuitously a course of lectures on philosophy, and then to be elected by the fellows after two additional scrutinies. A bursary of trifling value was granted from the revenue of the college to those fellows whose yearly revenue, whether arising from private property or from an ecclesiastical benefice, was under forty livres of Paris (the livre of Paris was equal to twenty-five sous, or rather more than a shilling): these bursaries were granted for a limited term, ten years, not for life; and ceased immediately upon the bursar acquiring a private income of forty livres a year: after the decree of the Council of Trent, which required a certain income as a title to priests' orders, they sunk into disuse. At the end of seven years the bursars were strictly examined, and those who were found incapable of serving the public usefully as teachers or preachers, or in some other way were deprived of their bursaries. The fellows who were not bursars (*socii non bursales*) paid to the college a sum equal to that which, as bursars, they would have received. Every fellow bore the title of doctor or bachelor of the House and Society of the Sorbonne; the commoners were doctors or bachelors of the House of the Sorbonne. The whole management of the society, and, so far as appears, its property, were vested in the fellows, among whom there was no gradation of authority; all were equal; there was neither 'Superior' nor 'Principal;' some distinctions of office and precedence there appear to have been, but no power of one over another; and so strictly was this equality observed, that no regular ecclesiastic could be a fellow, because he was subject to his 'principal' or 'superior;' and a fellow entering into any religious order, forfeited his fellowship thereby. The fellowships appear to have been appointments for life. The officers appear to have been elected by the fellows from among themselves; they were--the superintendant (proviseur), who was always a man of eminence; the prior, who presided at their assemblies, examinations, &c., and was always chosen from among the bachelor-fellows; the elder (senieur); the professors, the librarian, the conscripteur, the procureurs, &c. There were apartments in the college for thirty-six persons, and latterly thirty-seven. The doctors and bachelors were from the first allowed to receive poor scholars as pupils They taught theology gratuitously, and from 1253 to the suppression of the college there were at least six professors who gave gratuitous instruction in the different branches of theology.

The college was from time to time enriched by legacies and donations. Robert de Sorbonne took great pains in the establishment of a library, which became one of the most valuable in France: in 1289-90, when a catalogue was made, it consisted of above a thousand volumes, worth more than 30,000 livres, or 1500*l.*, a large sum in those days, and so far increased in 1292, that it became necessary to make out a new catalogue. The accessions between this year and 1338 amounted in value to 3812 livres, or 190*l.* All the more valuable books were antiently chained to little desks or stands (tablettes), and were arranged according to their subjects. Antient catalogues of the dates of 1289-90 and 1338 were in existence when Ladvocat wrote (A.D. 1760).

The buildings of the college, which are in the south of Paris, near the palace of the Luxembourg, having become much dilapidated, were rebuilt by Cardinal Richelieu, who demolished the college of Calvi in order to build the church. He had engaged to restore this smaller college, but died before he could effect his purpose, and it was never restored. The church itself, after the suppression of the college, was appropriated to other purposes, but has since been restored to its original use as a place of public worship. The other buildings of the college are occupied by the three faculties of theology, science, and literature of the Académie Universitaire of Paris.

The college of the Sorbonne was one of the four constituent parts of the faculty of theology in the university of Paris; and though the least numerous part, yet from the number of eminent men belonging to it, this college frequently gave name to the whole faculty; and graduates of the university of Paris, though not connected with this college, frequently styled themselves doctors or bachelors of the Sorbonne. The high reputation of the college caused it to be continually appealed to for the judgment of its members on questions of theology or morals. One question referred to their decision, illustrative of the character of the age, was the validity of the gift made by Philippe le Bel, king of France, of the heart of his father (Philippe le Hardi) to one of the churches of the Dominicans; and which heart the monks of St. Denis claimed to have interred in their abbey. It was more to the honour of the doctors of the Sorbonne that the first printing-presses in Paris were established in their house. They supported the faction of the Guises in the religious wars of the sixteenth century.

(Ladvocat, *Dictionnaire Historique;* Duvernet, *Histoire de la Sorbonne; Biographie Universelle;* Dulaure, *Histoire de Paris.*)

SORBUS, the Linnæan name of a genus of plants, comprising the mountain-ash, rowan-tree, and service-tree. It is now made a subgenus of Pyrus. [PYRUS; ROWAN-TREE.]

SORE'CIDÆ, or, more accurately, *Soricidæ*, Mr. Swainson's name for the family of *Shrews* or *Shrew-mice*, genus *Sorex* of Linnæus.

Mr. Swainson observes, that the Shrew-mice stand at the head of the *Sorecidæ*, the second aberrant family of the order *Feræ*, according to his views, and which, he states, corresponds, without any variation, to the INSECTIVORA of Cuvier a name which he says that he would have retained for the group, were it not highly expedient to preserve a uniformity of nomenclature throughout the animal kingdom; and he acts upon the rule of naming every family from the typical genus by which it is represented.

Mr. Swainson enters among these 'carnivorous mice, as he terms them, by the genus GYMNURA, which bears the closest affinity to *Cladobates* [TUPAIA], and also bears a strong resemblance to *Didelphys*. Cuvier, he remarks, was of the same opinion, and adverted to the affinity of *Gymnura* with the shrews, as seen in its pointed snout and scaly tail, &c., although he omitted to remark that the stiff *setæ*, or bristles, interspersed among the woolly hairs of the body, point out another and a very important link of connection, namely, to the *Hedgehogs*, close to which however he admits that Cuvier arranged that interesting genus.

'The Sorecidæ,' says Mr. Swainson, in continuation, and following Cuvier, 'like the bats, have the grinders furnished with conical points; but they are destitute of wings or lateral membranes, and they possess clavicles: they have no cæcum, and they all press the entire sole of the foot on the ground in walking. In their economy they are nocturnal, leading for the most part a subterraneous life, and deriving their principal support from insects: those that are natives of cold countries pass the winter in a lethargic state: their feet are short, and their motions, when on the surface of the earth, slow and feeble.' Mr. Swainson, then, after some remarks tending to show that Cuvier's views indirectly favour the natural analogy which Mr. Swainson holds to exist between the *Sorecidæ*, *Tarsius*, the *Glires*, and the *Vespertilionidæ*, each of which, in Mr. Swainson's opinion, truly represents the other in their respective circles, observes, that in the moles there are four large canine teeth, separated from each other, between which are small incisors; an arrangement, he remarks, more in unison with the general dentition of the *Quadrumana* and the *Carnivora*.

Mr. Swainson then proceeds to notice the group more particularly, observing, that the genus *Gymnura* will probably connect the hedgehogs, so well known by their prickly spines, and their remarkable property of rolling themselves up into a ball when disturbed, either with *Cladobates*, or that the latter may come in between the shrews and the hedgehogs, the former being much the most numerous. These, with but two exceptions, he remarks, one of which is the *Sorex Indicus*, are peculiar to the European continent. They are remarkable, he observes, for having on each flank, under the ordinary skin, a little band of stiff and close hairs, from which an odoriferous humour can be distilled. They dig holes in the earth, which they seldom quit until the evening, when they search for insects and worms. He then notices the Desmans (*Mygale*) as being also European animals, and much resembling the shrews, from which they chiefly differ in their teeth. *Scalops*, in his opinion, seems to represent either these animals, or the moles in the New World. Lastly, he observes, we find in the African CHRYSOCHLORIS a representation of this little group. *Macroscelides* does not appear to have been known to Mr. Swainson, though the genus was described in the fourth volume of the 'Zoological Journal,' in 1829; neither does he seem to have been aware of Brandt's description of SOLENODON (1832).

The second division of the family, according to the same author, is composed of mole-like animals, apparently connected to the shrews by the American *Scalops*, and the African *Crysochloris*, and includes three genera, the Tenrecs (*Centetes*, Ill., *Centenes*, Desm.) [TENREC], TALPA, and CONDILURA. At the end of the volume, the Family *Sorecidæ* is made to contain the Shrews, Moles, and Hedgehogs, with the following character:—

Muzzle lengthened, pointed; legs short, feeble; feet pentadactylous; lower incisors generally very long, pointing forwards; no lateral membranes; mammæ ventral. The family thus characterized includes the genera *Erinaceus*, L.; *Sorex*, L.; *Mygale*, Geoff.; *Scalops*, Cuv.; *Chrysochloris*, Cuv.; *Talpa*, L.; *Centenes*, Cuv.; and *Condylura*, Desm.

The *Insectivora* of Cuvier consist of the Hedgehogs (*Erinaceus*); the Tenrecs (*Centenes*); the Shrews (*Sorex* and *Scalops*); the Desmans (*Mygale*); *Chrysochloris*; *Talpa*; and *Condilura*.

The genus *Sorex* of Linnæus is placed between *Talpa* and *Erinaceus*; and this article will be confined to the true

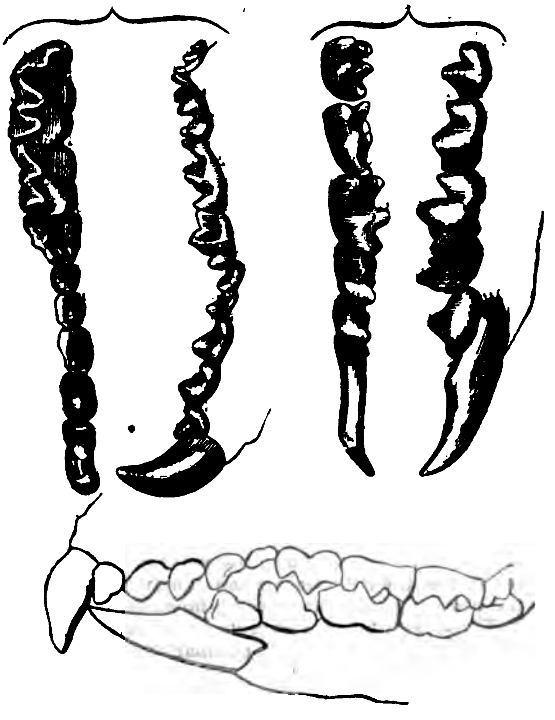
Shrews (*Sorex*); and the forms which most closely approximate to that genus.

The *Geographical Distribution* of the forms of these *Soricidæ* is wide: examples of them occur in Europe, Asia, Africa, and America.

Sorex.

General Character.—Upper incisors curved and toothed or notched at the base; lower incisors nearly horizontal, all much produced. Body covered with soft and velvety fur. Muzzle very much attenuated; ears short and rounded. Five toes with moderately strong claws on each foot. Tail generally long.

Dental Formula:—incisors $\frac{2}{2}$; canines 0; molars $\frac{8-8}{5-5}$ = 30.



Teeth of Sorex, from a large species taken in the Isle of France, six times larger than nature.

Example, *Sorex araneus*.

Description.—Reddish mouse-colour above, paler beneath; tail somewhat quadrangular, rather shorter than the body, not ciliated beneath.

This appears to be the *Musaraigne* of the French; *Toporango* of the Italians; *Murganho* of the Spanish; *Spitzmaus* and *Zismaus* of the Germans; *Nabbmus* of the Swedes; *Næbmuus* and *Muaseskier* of the Danes; and *Llygoden goch*, *Chwistlen*, and *Llyg* of the antient British.

Mr. Bell, whose description we have above given, states that he has ventured, after some consideration, to retain the name of *Araneus* for the common Shrew of England, notwithstanding the doubts which have existed in the minds of many zoologists, and in which he had till lately participated. These doubts, he observes, have arisen from what he believes to be an erroneous statement of Geoffroy, who, in his paper on the Shrews, in the *Annales du Muséum*, has given as a character of *Sorex araneus*, that the teeth are all white; and as Daubenton, in his memoir on the same subject, in the *Mémoires de l'Académie des Sciences*, does not mention the colour of the teeth at all, the authority, he adds, of Geoffroy has been sufficient to produce considerable hesitation as to whether the *Sorex araneus* of the Continental authors be identical with our common Shrew, which has invariably brown teeth. 'It seems however,' says Mr. Bell in continuation, 'to have been overlooked, that Daubenton, in his description of the Shrews in Buffon's *Histoire Naturelle*, has set the question at rest, as far as regards the colour of the teeth; for, in describing the 'Musaraigne,' *Sorex araneus*, he refers, for the account of the teeth, to his description of the 'Musaraigne d'eau,' *S. fodiens;* and we there find that the teeth of the 'Musaraigne' are brown at the tips. Now, as he invariably speaks of this species without any adjunct to the name, in contradistinction to the Water Shrew, there can be no doubt, as far as this character is concerned, that the Continental and British animals may be identical; and there appears to be no reason, from any other characters, to doubt that such is the case. That more than one species have been confounded amongst the common Shrews of this country, I have long entertained a decided prepossession; but I have not at present sufficient ground to warrant me in describing them as distinct.' (*History of British Quadrupeds.*)

Food, Habits, Nest, &c.—Insects and worms are the food of the Common Shrew. Pennant states that it inhabits old walls, heaps of stones, and holes in the earth, and is frequently found near hay-ricks, dunghills, and similar places. The annual autumnal mortality among these animals, at which season (about August) they are so often found dead, has been observed by most, and satisfactorily accounted for by none, as far as we know. Pennant says, and Agricola, as we shall presently see, noticed the fact before him, that cats will kill but not eat them, being probably disgusted by their peculiar and somewhat musky smell; and the bodies of the dead shrews have been observed to be marked by a nip near the loins, as if by the bill of some rapacious bird. Kestrels and Owls however are known to prey upon them, and the bones of the head have been found in the stomach of the Barn Owl. Mr. Turner, of Bury St. Edmunds, detected among twenty casts from that owl, taken from a considerable mass, the skeletons of seven Shrews.

Shrews are very pugnacious; and Mr. Bell remarks that, if two be confined in a box together, a very short time elapses before the weaker of the two is killed and partly devoured; he also gives his reasons for supposing that shrews fall victims to the rapacity of moles. The nest, which is framed of soft grasses and other plants, is generally found in a hole more or less shallow in the ground, or a dry bank, and is entered at the side, being, so to speak, roofed over. Here the female produces in the spring from five to seven little Shrews.

Among the antients, the Shrew-mouse had a very bad reputation. Thus Aristotle declares that its bite is dangerous to horses and other beasts of burthen; and that it is more dangerous if the Shrew-mouse be with young. The bite, he says, causes boils (φλύκταιναι), and these burst, if the Shrew-mouse be pregnant when she inflicts the wound; but if she be not, they do not burst. (*Hist. Anim.*, viii., 24.) Pliny states that the bite of the Italian Shrew-mice is venomous:—'In Italia muribus araneis venenatus est morsus.' (*Nat. Hist.*, viii., 58.) With reference to this supposition, it is worthy of remark that the French apply the term 'musaraigne,' or 'musette,' to a disease of the horse, which manifests itself in a small tumour (*anthrax*) on the upper and internal part of the thigh, and is often accompanied by very severe symptoms.

Agricola, in his book *De Animantibus Subterraneis*, does not forget the antient traditions of the Shrew's venom, and thus hands them on:—'The *Mus Araneus*,' says he, 'took its name among the Latins, because it injects venom from its bite, like a spider.' The Greek name, μυγάλη, he derives from the facts that it is of the size of a mouse, whilst it is of the colour of a weasel. In his description of the animal, he notices the termination of the teeth in both jaws in bifid points, whence, he remarks, animals bitten by it receive quadrifid wounds. He tells us that its bite in warm regions is generally pestiferous; but that in cold climates it is not, consoling those who may suffer by the not unusual assertion in such cases, that the animal itself torn asunder or dissected and placed upon the wound is a remedy for its own venom. Agricola states also that cats kill it, but abhorring this same venom, do not eat it.

This harmless little animal was also an object of fear and superstition to our ancestors. Mr. Bell gives the following etymological observations made by Mr. Thompson, of the London Institution:—'*Schreava*, Angl.-Sax., a Shrew-Mouse; which, by biting cattle, it venometh them that they die.' (Somner.) Lye adds the orthography of *Schreova*. The etymon may possibly be found in *Schreadan*, to cut, or *Schrif*, to censure bitterly; or rather *Scheorfian*, to bite or gnaw (all Angl.-Sax.); and the ordinary notion is that the biting disposition expressed by the word Shrew comes from the name of the Shrew-Mouse; though Todd prefers deriving it from the German *Schreien*, to clamour, or from the Saxon *Schryvan*, to beguile. In the word Erdshrew the prefix is clearly the Anglo-Saxon *Eorth*, earth—designed to express the animal's habitation.' The cry of the Common Shrew is shrill, but feeble.

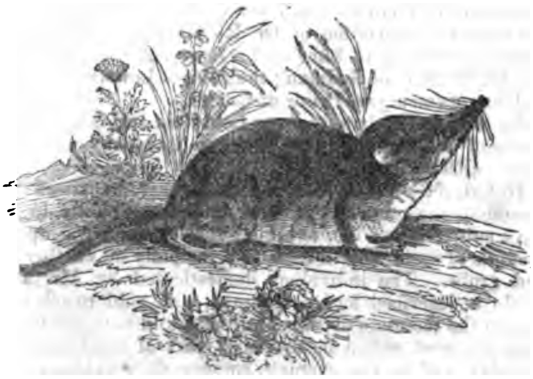
The etymological remarks here noticed prepare us for White's account of the superstition itself, involving the supposed injury and the alleged remedy. 'At the south corner of the *Plestor*, or area near the church,' says the author of the 'History of Selborne,' there stood about twenty years ago a very old grotesque hollow pollard-ash, which for ages had been looked on with no small veneration as a *shrew-ash*. Now a shrew-ash is an ash whose twigs or branches, when gently applied to the limbs of cattle, will immediately relieve the pains which a beast suffers from the running of a *shrew-mouse* over the part affected: for it is supposed that a shrew-mouse is of so baneful and deleterious a nature, that whenever it creeps over a beast, be it horse, cow, or sheep, the suffering animal is afflicted with cruel anguish, and threatened with the loss of the use of the limb. Against this accident, to which they were continually liable, our provident forefathers always kept a shrew-ash at hand, which, when once medicated, would maintain its virtue for ever. A shrew-ash was made thus: into the body of the tree a deep hole was bored with an auger, and a poor devoted shrew-mouse was thrust in alive and plugged in, no doubt with several quaint incantations long since forgotten. As the ceremonies necessary for such a consecration are no longer understood, all succession is at an end, and no such tree is known to subsist in the manor or hundred. As to that on the *Plestor*—

"The late vicar stubb'd and burnt it,"

when he was way-warden, regardless of the remonstrance of the bystanders, who interceded in vain for its preservation, urging its power and efficacy, and alleging that it had been—

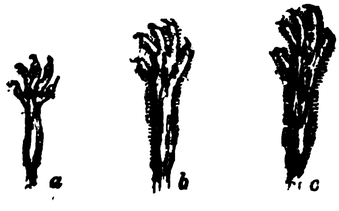
"Religione patrum multos servata per annos."'

Thus do old superstitions die away. It would seem that the antidote was not confined to an ash-tree, but that different kinds of trees were used for the same purpose. If a person or animal, thus shrew-afflicted, was passed through the arch of a bramble, both ends of which were rooted and growing, his cure was considered as effected. In Staffordshire a tree endowed with the curative power was called *a nursrow-tree*. Those who saw one of these little animals running over cattle and attributed that action to its malignity, never stopped to inquire whether their approach had not suddenly disturbed it from its feast of insects harbouring in cattle droppings, which are generally to be found in the close vicinity of the spot where the cattle are lying.



The Common Shrew.

The other British Shrews are the Water-Shrew, *Sorex fodiens*, Pallas, and the Oared Shrew, *Sorex remifer*, Geoff.



Under surface of hinder feet of Shrews. (Bell.) *a*, Common Shrew. *b*, Water-Shrew. *c*, Oared Shrew.

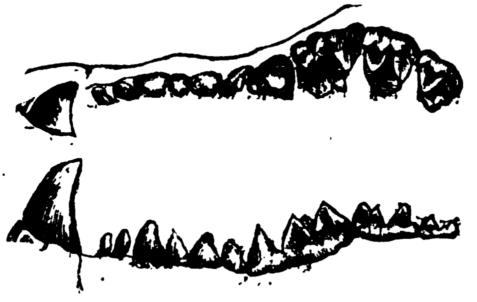
The Water-Shrew, whose habits are graphically described by Mr. Dovaston, in *Loudon's Magazine* (II.), appears to be the *Musaraigne d'Eau* of the French. The Oared Shrew seems to have been first published as British in Sowerby's *British Miscellany*, from a specimen taken by Dr. Hooker in Norfolk, under the name of *Sorex ciliatus*.

The *Sorex Indicus* (*S. myosurus*, Pallas), or *Musk-Rat of India*, has much the same appearance in point of colour and the size of its naked ears as our common Shrew, but is nearly as large as our common brown rat, and the tail is round and thinly furnished with hairs. This species diffuses a most powerful odour of musk, which impregnates everything that is touched by it. It has been alleged that even the wine in a well-corked bottle over which the animal has run has been rendered unfit for use in consequence of the flavour imparted to it. Cuvier states that this species is found throughout the East Indies and in a part of Africa, and that it is among the animals embalmed by the antient Egyptians; but, according to others, it is *Sorex Olivieri*, Desm., which Olivier found in a mummy state in the catacombs of Sakkara.

Mygale.*

Generic Character.—Great lower incisors having between them two very small teeth. Muzzle in a very small and very moveable proboscis. Ears short. Five unguiculated toes on each foot united by a membrane. Tail long, scaly, compressed laterally.

Dental Formula:—incisors, $\frac{2}{8}$; canines, $\frac{0}{0}$; molars, $\frac{10-10}{7-7}$ = 44.†



Teeth of the upper jaw of Mygale moschata, F. Cuv.

Example, *Mygale moschata*, *Castor moschatus*, Linn.

Description.—Tail shorter than the body, scaly, nearly naked, contracted at its base, cylindrical, and convex in its middle, very much compressed vertically at its extremity; fur brown or dusky above, whitish ash below: total length, including the tail, about 15 inches, of which the tail measures eight.

This appears to be the *Dæsman* of the *Fauna Suecica*; *Le Desman* of the French; the *Biesamratze* of the Germans; the *Wychozhol* of the Russians; and the *Muscovy* or *Musk-rat* of the British.

Locality.—The river Wolga, and the adjacent lakes from Novgorod to Saratov.

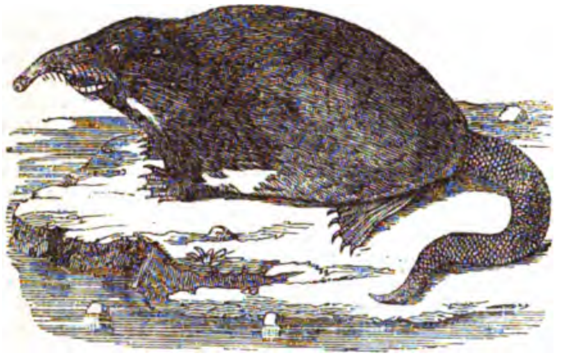
Habits, &c.—This species does not appear to have been seen on dry land; and indeed it is broadly asserted that it never goes there, but wanders from lake to lake in fortuitous floods only. It is often seen swimming or walking under the water, and coming for air to the surface, where, in clear weather, it is apt to sport. Stagnant waters shut in by high banks are its favourite localities, and in such places it makes burrows some twenty feet in length. Its principal food is alleged to consist of fish, leeches, and the larvæ of water-insects; but fragments of roots have been found in its stomach. Its pace is slow; but it does not seem to be torpid in winter, at which season it is often taken in nets. The holes which it makes in cliffs and banks have the entrance far beneath the lowest level of the water, and the animal works upwards, never however reaching the surface, but only sufficiently high to secure itself from the highest rise of the river. Fish, as we have seen, forms part of its food, but the quadruped in its turn falls a victim to the Pikes and *Siluri*, whose flesh becomes so impregnated with the flavour of musk in consequence, as to be not eatable.

---

* N.B. This name having been pre-occupied among the moderns for a genus of insects, Fischer proposes that of *Myegalea*, and Brandt that of *Myegale*; but Ælian uses Μυγάλη to designate a Shrew-mouse, and so does Aristotle.

† This formula, given by M. Lesson, has the authority of M. F. Cuvier for the teeth of the upper jaw, and of Geoffroy (in the case of *Mygale Pyrenaica*) for those of the lower jaw.

Utility to Man.—From the region about the tail a sort of musk, resembling the genuine sort, is expressed; and the skins are put into chests and wardrobes among clothes, for the purpose of preserving them from moths. These skins were also supposed to guard the wearers of them from fevers and pestilence. The price at Orenburg for the skins and tails was formerly twenty copecs per hundred. They were so common near Nischnei-Novgorod, that the peasants were wont to bring five hundred each to market, where they sold a hundred of them for a ruble.



Mygale Moschata.

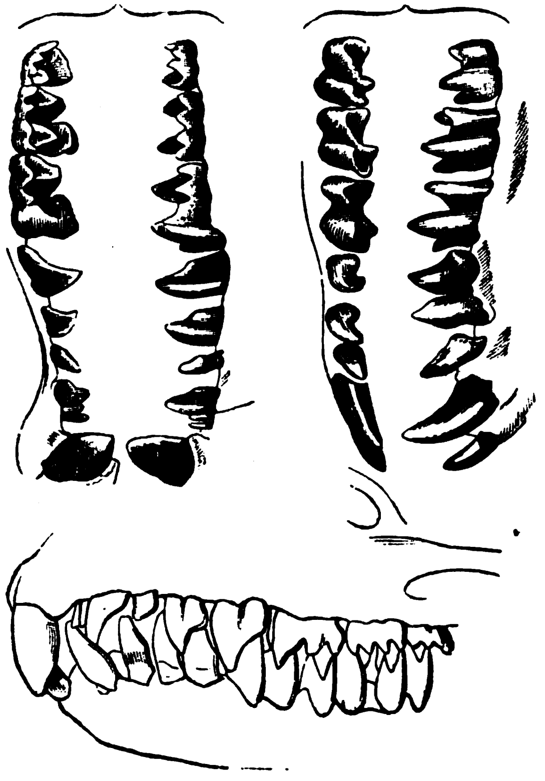
There is a species more than eight inches in length (*Mygale Pyrenaïca*) inhabiting Tarbes at the foot of the Pyrenees.

Scalops.

Generic Character.—Muzzle pointed and cartilaginous; no external ears. Three toes on the anterior feet, which are short, wide, and armed with strong claws fit for burrowing; posterior feet feeble, with five toes. Tail short.

Dental Formula:—Incisors $\frac{2}{2}$; grinders $\frac{10-10}{10-10} = 44$.

The above is the formula given by Dr. Richardson; but F. Cuvier (and he is followed by Lesson) makes the number 36, viz. Incisors $\frac{2}{4}$; canines $\frac{0}{0}$; molars $\frac{9-9}{6-6} = 36$. We subjoin the teeth as given by F. Cuvier, but Dr. Richardson's description appears to be very carefully given, and his accuracy is well known.



Teeth of Scalops.

Example, *Scalops Canadensis*, **Cuv.,** *Sorex aquaticus*, **Linn.**

Description.—Body thick and cylindrical, like that of the common mole, without any distinct neck; limbs very short, being concealed by the skin of the body nearly down to the wrist and ankle-joints; fore extremities situated nearly under the auditory opening; the moveable snout almost linear, and projecting about four lines and a half beyond the incisors, naked at its extremity, particularly above, thinly clothed with hairs below for about two-thirds of its length next the incisors: a conspicuous furrow extends nearly its whole length, on the upper surface, and beneath there is also a furrow, reaching half its length from the incisors, beyond which last the snout is transversely wrinkled beneath, and its small, flat, or truncated extremity is smooth and callous; the small oblong nostrils open in an inclined space immediately above this circular callous end. The eyes are concealed by the fur, and scarcely to be found in dried specimens. According to Godman the aperture in the skin is just big enough to admit an ordinary human hair. The auditory openings covered by the fur, and no external ear; tail thickest about one-third from its root, and tapering thence to the acute tip; it is whitish, sparingly clothed with short hairs, and its vertebræ are equally four-sided; fore-arm slender, projecting about three lines from the body, and consequently concealed by the fur; the five extremely short fingers, united to the roots of the nails, form, with the wrist, a large nearly circular palm; the nails are large, white, and semilanceolate in form, with narrow obtuse points, convex above, and slightly hollowed beneath; the middle one is the largest, the others gradually diminish on each side, and the exterior one is the smallest; the palms are turned outwards and backwards, and the whole fore-foot bears a close resemblance to that of the common mole; the hind-feet are more slender than the fore-feet, and the nails are one-half shorter, much more compressed, and sharper, in fact nearly subulate. They have a slight curvature laterally corresponding with the direction of the toes inwards, and are somewhat arched, but cannot be said to be hooked; they are excavated underneath. Both fore and hind feet are thinly clothed above with adpressed pale hairs; the palms and soles are naked, but are bordered posteriorly with white hairs, which curve a little over them; the fur has the same velvety appearance with that which clothes the common mole, and is considerably lustrous on the surface. In most lights it is brownish-black; when blown aside, it shows a greyish-black colour, from the roots to near the tips. Such is the general colour over the whole body, but there is a slight chesnut-brown tinge on the forehead and about the base of the snout. On the throat the fur is shorter and paler. Length of head and body 7 inches 8 lines, and of tail 1 inch 6 lines. Such is, in substance, the accurate description by Dr. Richardson of this species, which, according to him, is the *Brown-Mole* of Pennant; the *Shrew-Mole* of Godman; the *Mole* of Lewis and Clarke; and the *Musaraigne-Taupe* of Cuvier.

Locality.—The banks of the Columbia and the adjoining coasts of the Pacific, where it occurs in considerable numbers. (Richardson.)

Habits, &c.—Dr. Richardson states that the Shrew-Mole resembles the common European mole in its habits, in leading a subterranean life, forming galleries, throwing up little mounds of earth, and in feeding principally on earth-worms and grubs. The individual domesticated by Mr. Titian Peale is described by Dr. Godman, who paid much attention to the manners of these animals, and who relates that they are most active in the early part of the morning, at mid-day, and in the evening, coming daily to the surface, when in their natural state, at noon. Then they may be taken by driving a spade beneath them, and throwing them on the ground, but they are hard to be caught at any other time of the day. They burrow in a variety of soils, but in wet seasons they retire to the high grounds. Mr. Peale's shrew-mole fed largely on fresh meat, cooked or raw, drank freely, was lively and playful, followed the hand of its feeder by scent, burrowed for a short distance in loose earth, and, after making a small circle, returned for more food. It employed its flexible snout in a singular manner whilst it was eating, in order to thrust the food into its mouth, doubling it so as to force it directly backwards.

The same author remarks that Sir Charles Mackenzie saw many animals, which he terms 'moles,' on the banks of a small stream near the sources of the Columbia; but as it may be inferred that they were in numbers above ground, Dr. Richardson is inclined to think that they were

Sewellels, belonging to the genus *Aplodontia* [MURIDÆ, vol. xv., p. 515], and not Shrew-moles; but the latter did not obtain recent specimens of the Shrew-mole during the expedition to which he was attached, and is unable to say what are the exact limits of its range to the northward. He does not think however that it can exist, at least on the east side of the Rocky Mountains, beyond the fiftieth degree of latitude; because the earth-worm on which the Scalops, like the German mole, principally feeds, is unknown to the Hudson's Bay countries. On the milder Pacific shore, it may, perhaps, he thinks, reach a somewhat higher latitude. He remarks that there are two specimens of the Shrew-mole from the Columbia preserved in the museum of the Hudson's Bay Company, and he states that Mr. David Douglas had kindly furnished him with others which he obtained in the same quarter. Dr. Richardson further observes that the Columbian animal seems to be of larger dimensions, and has a longer tail than the Shrew-moles of the United States, but he had not detected any other peculiarities by which it might be characterised as a distinct species; and he adverts to the fact that authors, probably from their specimens being of different ages, have varied considerably in their descriptions of the dentition of the Scalops, and that several of them have mentioned edentate spaces between the incisors and grinders. In the adult animal from which his description was taken, no such spaces existed.

M. Lesson makes the *Scalops Pennsylvanica* the type of his genus *Talpasorex*, acknowledging however that it only differs from *Scalops* in its dental formula, which he gives thus:—Incisors $\frac{2}{4}$; Canines 0; Molars $\frac{11-11}{6-6}=40$. It will be well for the student to bear in mind, with reference to the genus proposed by M. Lesson, Dr. Richardson's observations on the dentition of Scalops above noticed.

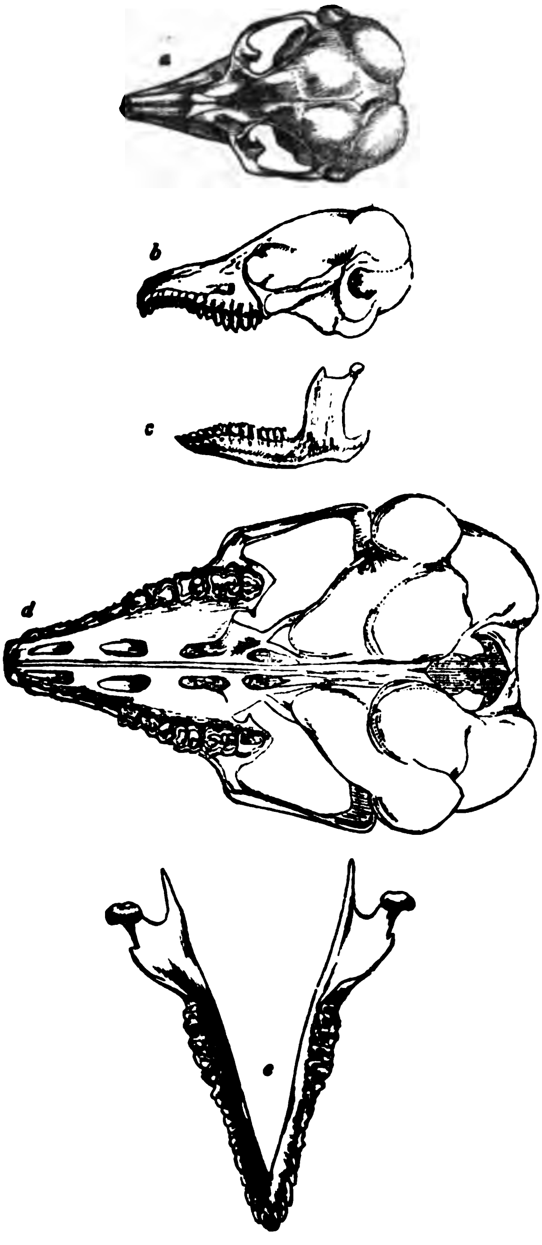
With regard to the question of the existence of true Moles in North America, the following remarks of the last-mentioned accurate and diligent author are also worthy of attention. 'From the great resemblance of the shrew-mole to the common one,' says Dr. Richardson, 'they might be readily mistaken for each other by a common observer; and Bartram and others, who have asserted the existence of a species of the genus *Talpa* in America, are, on this account, supposed, by later writers, to have been mistaken. There are however several true moles in the Museum of the Zoological Society which were brought from America, and which differ from the ordinary European species in being of a smaller size, and in having a shorter and thicker snout. Their fur is brownish-black. I could not learn what district of America they came from.' (*Fauna Boreali-Americana.*)

Scolops aquaticus.]

Macroscelides.

Generic Character.—Muzzle narrow, ending anteriorly in a long and subcylindrical proboscis, having nostrils at its apex. Eyes moderate. Ears large and round. Body furry. Tail elongated, scaly, annulated, and furnished scantily with hairs. Feet distinct, plantigrade, and five-toed; the claws falcular. Hind-legs much shorter than the fore-feet.

Dental Formula.—incisors $\frac{2}{2}$; canines $\frac{4-4}{4-4}$; molars $\frac{5-5}{5-5}$ = 40. (Smith.)



Skull and teeth of Macroscelides Typicus.

a, Upper surface of the skull of *M. Typicus*, nat. size; *b*, lateral parts of the same, nat. size; *c*, lower jaw of the same, nat. size; *d*, under surface of the skull of the same, double the nat. size; *e*, lower jaw of the same, double the nat. size. (Smith.)

Example, *Macroscelides typicus.*

Description.—Above brown, brightened by an intermixture of tawny; beneath whitish; extremities covered with a very short whitish hair; ears within, scantily furnished with some of a similar colour, without, nearly bare; tail thinly clothed with a stiff short black hair; whiskers near the base of the proboscis, each hair variegated black and white; claws short, black, compressed, and pointed. Length from nostrils to root of tail four inches and three-quarters; length of tail three inches and a quarter.

The colour of both sexes is nearly alike.

Locality, Habits, &c.—Inhabits the open country in the interior of South Africa, and is occasionally seen during the day about the roots of bushes or amongst brushwood, from whence, upon being discovered, it instantly retreats to its natural and subterraneous habitation. (*Zool. Journ.*)

Dr. Smith, in his *Illustrations of the Zoology of South Africa*, thus further describes the appearance and habits of *M. typicus* which he had first recorded in the *Zoological Journal* under the name of *M. Typus*. 'The shape, breadth, and shortness of the ears, together with the comparatively dense coating of fur by which both their inner and outer surfaces are covered, enable us readily to distinguish this species from any of the others which have yet been discovered in Southern Africa. It is found inhabiting open arid plains, particularly such as bear a thin coating of brushwood. It lives in burrows under ground, the passage to which is usually for some distance below the surface almost perpendicular; it vacates these during a great portion of the day, and is employed either in seeking its food or basking in the solar rays. To the latter it is very partial, and for the purpose of insuring the greatest *quantum* of heat, it usually sits erect upon its hinder legs, and facing the direction from which the heat proceeds. When disturbed while occupied in either of the ways mentioned, it flies immediately to its subterranean retreat, and its progress is effected with such rapidity, that it is impossible to discover anything either of the form or the real nature of the animal as it advances. On this account I was familiar with the general appearance it presents on such occasions long before I had any idea of its real character. It feeds upon insects. The discovery of this little animal in 1828, rendered the institution of a new group of *Insectivora* necessary. When its characters were indicated in 1829, *M. typicus* was only known; at present the number of described species are seven, six of which belong to Southern Africa and one to Algiers.'

Dr. Smith, in the *Zoological Journal*, places this genus immediately after *Sorex*, and the reader will find most of the species beautifully depicted and accurately described in the *Illustrations of the Zoology of South Africa* above quoted.

Macroscelides typicus. (Reduced from Dr. Smith's figure.)

This, or one of the species,—but most probably this,—seems to be the Elephant Shrew of Pennant, and thus described: 'S. with a very long, slender, and little nose; the whole animal of a deep brown colour. Inhabits the neighbourhood of the Cape of Good Hope: called the *Elephant*, from its proboscis-like snout: engraven from a drawing by Mr. Paterson.' Pennant further remarks that this animal has been very ill represented by Petiver, in Tab. xxiii. of his *Gazophylacii Naturæ et Artis Decas tertia*, and truly so it is: but Pennant's figure is not much better. Petiver's description is '9. *Mus araneus Capensis maximus.* Taken from a painting of Dr. Sherard's, now consul of Smyrna.'

SOREL. [Canada.]

SOREL, AGNES. [Charles VII. of France.]

SOREX. [Soricidæ.]

SORGHUM, a genus of grasses, said to be named from the Oriental name of one of the species, of which *sorgo* is the Italian name. The species have sometimes been referred to Holcus, sometimes to Andropogon, but from their habit and uses they seem well entitled to be considered as a distinct genus, which may be characterized as having the flowers monœcious, panicled; glume coriaceous, cartilaginous, 2-flowered; the upper flower hermaphrodite, the lower palea more or less deeply bifid and awned between the lobes, the upper often wanting. The species form tall grasses with succulent stems, and are found in the tropical parts of Asia, whence they have spread to the warm parts of Europe. *S. vulgare* is the largest of the small cereal grains, and may be considered the representative of the Indian corn (*Zea Mays*) in America, where it is usually called Guinea corn, and in some works the Great or Indian Millet. The different kinds are usually called *joar* in India, where they form principal objects of culture, and one of much more importance than would appear in Europe, as many of the inhabitants live as much upon these small or dry grains as upon rice. The *joar* is the *durra* of some Arab tribes, and the *zurrut* of others; its Indian origin is indicated by the Persian name, *jawurs Hindee.* It is extensively cultivated throughout Asia, and appears to be the *tall corn* of the Chinese. It has been introduced into the south of Europe, where it is chiefly employed for feeding cattle and poultry, but it is also made into cakes. The flour is white and a good deal resembles that of the Indian corn in nature. The species commonly sown in India are *S. vulgare* and *S. bicolor* (*kala-joar*). *S. cernuum* is a distinct species, which forms the principal food of the mountaineers of the Munnipore district. *S. saccharatum* is also cultivated in many parts during the rainy and cold seasons, on land which is too high for rice. The stalks and straw of all are much valued as fodder for cattle, being cut into small pieces, commonly called *kurbee.*

SO'RIA, a small province of Spain, bounded on the north by the province of Logroño, on the south by that of Siguenza, to the east by Aragon, and to the west by the province of Burgos. The capital, Sória, is situated on the right bank of the river Douro, about 30 miles from its source, in 41° 34′ N. lat. and 2° 24′ W. long. It is supposed to occupy the site of the antient Numantia. It owes its foundation to the Syrian Arabs, who settled in Spain after the conquest of the country by Músa, and gave it the name of Súria, whence Sória. The town is surrounded by a thick and strong wall, built in the year 1290, by one of the kings of Castile, and is commanded by a strong citadel, now in ruins, which is the work of the Moors. The population, according to Minaño, did not exceed 7000 souls in 1832. The chief trade of the inhabitants consists in the breeding of cattle, and a few tan-yards. It contains nine parishes, one of which is collegiate.

SORREL. [Rumex.]

SORSO. [Sardegna.]

SORUS, in botany (from σωρός, 'a heap'), a term applied to the collections of the sporangia or capsules which are found on the edges or the under surface of the fronds of ferns. In most instances, as in the Aspidiaceæ, Aspleniaceæ, Davilliaceæ, &c., the sori are covered with a peculiar projecting portion of the epidermis, which is called the *Indusium*, and forms an important part in the systematic arrangement of these plants. In some instances, as in Adianthum and Ceratopteris, the substance of the leaf has a share in the formation of the indusium. It has been generally admitted that the indusium is the analogue of the bract in the higher plants, but Treviranus maintains that it is an entirely peculiar organ, nor, according to this view, can it be looked upon as a mere extension of the epidermis. In looking for analogies between flowering and flowerless plants, Kölreuter supposed that the indusium represented the stamens. [Spore.]

The term sorus is sometimes applied to mere collections of spores or granules, as seen in many Algæ, of which *Delesseria alata* and *D. sinuosa* are examples.

SOSI'GENES, an Egyptian astronomer, who was brought to Rome by Julius Cæsar, to superintend the correction of the calendar. He is said to have lived at Rome till the time of Augustus, and to have assisted in the further correction which took place in the reign of that emperor. But beyond this nothing is known of his life, death, or pursuits. For some detail of the correction see Year.

SOSPELLO. [Nice.]

SO'STRATUS of CNIDUS. [Alexandria.]

SOTHIAC PERIOD. The antient Egyptian year consisted only of 365 days, without any intercalation; and was divided into 12 months of 30 days each, with 5 days added at the end. (Herodotus, ii. 4.) The Scholiast on Aratus informs us that the priests were sworn never to alter this year. This oath, we may conjecture, only came into use after the discovery of the fact that a fraction of a day more would have been desirable to make the civil year conform to the sun. As long as 365 days was imagined to be the real year, it is not likely that they would have sworn each other to its observance; but if, after the discovery, a party were formed in favour of an alteration, the attempt to preserve the antient institution by an oath would be almost a matter of course. Again, Diodorus Siculus (i. 50) says, that the Egyptians add five days and a quarter to the 360 days of their 12 months, which statement is generally supposed to refer to a more correct year which had been introduced among the people, while their religious festivals continued to be regulated by the old year. The propriety of this mode of reconciling the two authorities is made probable by the known existence of the Sothiac period (also called the Canicular year, Annus Magnus, &c., derived from Sothis, a name for the star Sirius) mentioned by Geminus, and also by Censorinus and Clement of Alexandria, from older writers. It is obvious that 1461 years of 365 days each, make 1460 years of 365¼ days. This period of 1460 Julian years was the Sothiac period. It is impossible to fix any time at which this period was introduced, or to say whether, during its existence as a recognised cycle, it had time to run its whole career. Had it been a real cycle of experiment, it must be imagined that it would have been found to be wrong, to the extent of requiring an addition to the oath; for 1508 real years is nearer to the time in which a year of 365 days would have its beginning in all the seasons successively, and recommence the same process. It is obvious that such a cycle of recurrence was the intention of the Egyptians in constructing the period: their vague year (*annus vagus*) of 365 days, combined with their nearly fixed festivals, depending upon the heliacal rising of Sirius, made the latter take all consecutive positions among the months of the former, gradually falling later and later. Again, if the Egyptians had really gone through a whole recorded period, it is difficult to see how they would avoid discovering that another cycle would be necessary. In the time of their antient kings the heliacal rising of Sirius would have advanced, by the precession of the equinoxes, about 12 days in one Sothiac period. The beginning of the vague year (365 days) was continually falling back; so that if at the beginning of a period they had noted the day of their vague year on which the equinox fell, and also the day on which Sirius rose heliacally, they would have found that the latter came again to the same day of the vague year fifty years, or thereabouts, before the equinox was similarly restored. This, so far as the star was concerned, would fit their erroneous period very well (1460 instead of 1508); but it is difficult to suppose that astronomers who had discovered the odd quarter of a day which the year requires, should not know within 12 days the time of the equinox. But, on the other hand, those who incline to believe in a very long period of star-gazing, too rude to be called observation, may assert the possibility of a period of 1460 years, or thereabouts, being discovered by noting the period elapsed between successive heliacal risings of Sirius on the same day of the vague year, and the theory of the discovery of the additional quarter of a day must be looked upon as a subsequent (and of course mistaken) mode of explaining the period.

The epoch of commencement of a Sothiac period is not well determined, and only from comparatively modern writers. Censorinus asserts that the consulship of Ulpius and Pontianus (usually placed in A.D. 238) was in the hundredth year of such a period: accordingly B.C. 1322 was the beginning of the preceding period. Clement of Alexandria says that the period began 345 years after the migration of the Israelites from Egypt, a date which differs considerably from that of Censorinus, according to modern chronologers. The point is however of no importance, as no dates were ever recorded in written history by means of Sothiac periods.

SOTIES. [English Drama, p. 416.]

SOTO, DOMINGO, a learned Spanish ecclesiastic, was born at Segovia, in 1494. His father, who was a gardener, destined him for the same occupation, but seeing him make rapid progress in his studies, he gave him as good an education as his means could afford, and placed him as sacristan to the church of a neighbouring village. Having, whilst there, rendered himself qualified for the study of philosophy, Soto repaired to the university of Alcalá, where he made the acquaintance of a young nobleman named Saavedra, who took him to Paris as one of his suite. Soto pursued his studies there, and received the degree of master of arts. On his return to Spain, in 1519, he taught philosophy, first at Alcalá, and then at Salamanca; and in 1524, entered into the Dominican order. It was about this time that he published his treatise on the Dialectics and Physics of Aristotle, entitled 'Summulæ,' Salamanca, 1525, 4to. So high was his reputation for ecclesiastical learning, that in 1545 the emperor Charles V. sent him as his first theologian to the council of Trent, where he became one of the most active and esteemed members of that assembly. As he spoke frequently, and was consulted on difficult points of canonic law, he was one of the members charged with recording the decisions of the assembly and drawing up its decrees. This peculiar distinction was the more remarkable, as there were above fifty bishops and several eminent theologians of the same order as his in the assembly. Finding that a brother of his own order, named Catharin, dissented from him on several material points, he composed his 'Apologia contra R. Patrem Ambrosium Catharinum, qua ipse de certitudine gratiæ respondet,' which was afterwards published at Antwerp, 1556, fol., and Salam., 1574, fol. On his return from the council Charles V. appointed him his confessor, and offered him the bishopric of Segovia, which he declined. He was soon after chosen by that monarch to arbitrate in a dispute pending between Las Casas and Sepulveda respecting the Indians, which he decided in favour of the former. [Sepulveda.] In 1550 Soto left the court and retired to Salamanca, where he died on the 17th of December, 1560, at the age of sixty-six. Besides the above-mentioned works, Soto wrote the following:—'In Dialecticam Aristotelis Commentarii,' Salmanticæ, 1580, fol.; 'In Categorias Aristotelis Commentarii,' Venetiis, 1583, 4to.; 'De Natura et Gratia Libri iii.,' Antwerp, 1550; 'De Justitiâ et Jure,' Antw., 1568. In this last treatise Soto defends the proposition which he had maintained at the council, 'that the residence of bishops is of divine right.' 'De Cavendo Juramentorum Abusu,' Salmanticæ, 1552, and several more, a list of which may be seen in Nicolas. Ant., *Bib. Hisp. Nova*, vol. i., p. 332.

SOUBISE, BENJAMIN DE ROHAN, baron of Frontenai, and brother to the famous Duc de Rohan. [Rohan.] He was born in 1589. Under Maurice of Nassau, in Holland, he learnt the art of war. Soubise was through life a zealous reformer, and figures in all the assemblies of the Huguenots for putting in force the Edict of Nantes. In 1615 he joined the party of the Prince de Condé, but the civil war terminating shortly after, he has little opportunity for exhibiting that audacity and those talents for intrigue which he subsequently displayed in the religious wars which commenced in 1621. His reputation for courage and his talents as a leader induced the assembly of Rochelle to give him the general command in Bretagne, Anjou, and Poitou. Undazzled by the brilliant offers which had seduced so many of the corrupt chiefs to submit to the court, Soubise, with his brother, the Duc de Rohan, remained true to their party. But seeing themselves deserted by their friends and reduced to despair, they resolved on a decisive blow, and proclaimed open war against the king. Louis XIII. marched against them in person, and commenced the siege of Saint Jean d'Angeli. Soubise undertook its defence, and with his usual audacity, when summoned to surrender, he wrote the following reply:—'I am his majesty's very humble servant, but the execution of his commands is not in my power. Benjamin de Rohan.' The siege was vigorously pressed, but it was not till after a month's hard fighting that the place surrendered. On the entrance of the royal army, Soubise, throwing himself on his knees before Louis, vowed inviolable fidelity. 'Serve me better than thou hast done hitherto,' replied the king, and pardoned him.

The 'inviolable fidelity' of Soubise disappeared with the absence of danger, and accordingly we find him very soon after flying to Rochelle, there to form new intrigues. He was not so warmly seconded however as he had anticipated. He soon after collected a few troops and seized Royan; and in the winter of 1622 made himself master of Bas-Poitou, together with the isle of Ré, Perier, and Mons. This success drew 8000 men to his standard, with whom he seized Olonne, and threatened Nantes. Louis again marched to meet him, and routed his army after a short conflict. Soubise escaped to Rochelle, whence he passed over to England to ask for succour, but failing, he went to Germany, and with no better success. The king declared him a rebel, but by the edict of pacification published at Montpellier, October 19, 1622, he was restored to his honours and estates.

Peace tired him, inactivity was abhorrent to him; and restless unless plotting, Soubise soon recommenced intriguing with Spain and England, and, in the beginning of

1625, he again appeared as a traitor; and publishing a manifesto, seized the isle of Ré, with three hundred soldiers and one hundred sailors. Encouraged by this success, he descended on Blavet in Bretagne, where the royal fleet was at that moment; and suddenly attacking one of the largest ships, boarded it, sword in hand. He took the other ships in succession, and then attacked the fort. He was repulsed in his attack on the fort; and after a fruitless siege of three weeks, he set sail for the isle of Ré with fifteen ships. He seized the isle of Oleron, and was thus master of the sea from Nantes to Bordeaux.

His daring had surprised every one; and the Huguenots, who had hitherto regarded these exploits as those of a brigand, now acknowledged him chief of the reform. The king, occupied with the Spanish war, offered him the command of a squadron of ten ships in an expedition against Genoa, as an honourable way of returning to his allegiance. Soubise refused the offer; and naming himself admiral of the Protestant church, persisted in the war. Attacked by the Royalists near Castillon, he regained his ships with a precipitation very unfavourable to his reputation for courage. We may observe that his life exhibited a contrast of audacity and cowardice. He was more reckless than bold, more vehement than courageous. On his return to the isle of Ré, he was met by the royal fleet, augmented by twenty Dutch vessels. As he was still in negociation with the court, he obtained a suspension of arms, and the two admirals exchanged hostages. Without awaiting the result of the negociation, Soubise redemanded his hostages, which were returned by the Dutch admiral, on the condition that the suspension of arms should not terminate till news was received from the court; but Soubise suddenly attacked the fleet, and fired the admiral' ship. The result of this perfidy was the confirmation of Louis in his pacific intentions with regard to the Protestants; but the people of Rochelle, blinded by prosperity, were more exacting in proportion to the concession of the court, and the war continued. On the 15th September, after a sharp conflict, Soubise was beaten by the royal fleet; and quitting his ship, he regained the isle, where the victorious royalists had landed, and attacked them with 3000 men. Here too his army was vanquished, and he saved himself by ignominious flight.

He again came to England. Charles I., interposing on behalf of the French Protestants, obtained for them a new edict of pacification, April 6, 1626. Soubise was created a duke; but he still remained in England, endeavouring to win over the Duke of Buckingham to support the Huguenots, and he succeeded. Louis seriously determining to besiege Rochelle, Soubise prevailed on Buckingham to put himself at the head of a fleet, which Soubise conducted to Rochelle; but the Rochellois refused to admit the English ships into their port, or Soubise within their walls. Soubise returned to England and solicited a second fleet, which, commanded by Denbigh, Buckingham's brother-in-law, was equally unsuccessful. Nothing daunted, he again returned to England; and after pressing Charles for some time, had a third fleet granted, under the command of Buckingham. This fleet was at Plymouth, ready to start; but Buckingham, having quarrelled with Soubise, annoyed him by all sorts of delays. On the 2nd September, 1628, the two had an animated discussion in French on the point, which the officers who were present, not understanding the language, viewed as a quarrel. A few hours after this Buckingham was stabbed by Felton. In the first moment of horror at the murder, the officers accused Soubise and the deputies of the deed, and the infuriated people were about to sacrifice them, when Felton declared himself.

The command of the fleet was then bestowed on the Earl of Lindsey. When they arrived before Rochelle, Lindsey repulsed all Soubise's proposals, and it was found impossible for them to act in concert. Meanwhile Rochelle capitulated; but Soubise, refusing the conditions proposed by Louis, returned to England, where he ceased not to intrigue against his country His restless career was terminated in 1641, when he died, regretted by few and less respected. (*Biog. Univ.*; Voltaire, *Siècle de Louis XIV.*)

SOUBISE, CHARLES DE ROHAN, born July 16, 1715. He was an inefficient general, but a fortunate courtier; for, befriended by Louis XV., he became maréchal of France, minister of state, and allied to royalty itself. His life was tinged with many licentious and foolish acts, but his bravery and generosity gilded over his faults and vices. He married Mdlle. de Bouillon, daughter of the chamberlain of France. She died soon after the birth of her first child, a daughter, whom he subsequently (1753) married to the Prince de Condé. In 1745 Soubise married the Princess Christina of Hesse-Rheinfels. He served Louis as aide-de-camp in all the campaigns of 1744 to 1748, and is thus alluded to by Voltaire:—

> 'Maison du roi, marchez, assurez la victoire;
> Soubise et Pecquigny vous menent à la gloire.'

His services were rewarded by the appointment of field-marshal in 1748, and in 1751 with the government of Flanders and Hainault. Being defeated by the Prussians at Rosbach, he returned to court, the object of a thousand malicious epigrams. The favourite of Madame Pompadour, he was hated as a favourite by all the other courtiers; but Louis remained firm in his attachment to him, and made him minister of state, with a pension of 50,000 livres.

In 1758 he commanded a new army, burning to efface the disgrace of Rosbach, and defeated the Hessians, Hanoverians, and English, first at Sondershausen, July 13, and next at Sutzelberg, Oct. 10, by which he completed the conquest of the landgraviat of Hesse. When Louis XV. had taken Madame Dubarry as his mistress, and presented her at court, the ladies refused to receive her, or acknowledge her presence, except in the most distant manner Soubise induced the Countess de l'Hôpital, his mistress, to receive her at her house. This delighted Louis, and made Madame Dubarry his friend. Soubise indeed carried his venality so far as to consent to the marriage of his cousin Mdlle. de Toromon with the Vicomte Dubarry, the favourite's nephew; but we must add however, as a set-off to this baseness, that on the death of Louis, Soubise alone of all the courtiers followed the funeral procession, which consisted only of a few valets and pages, and never left the remains of his kind master till he saw them fairly deposited in the tomb. He had resolved to retire from the court, but Louis XVI. touched with his fidelity, requested him to retain his place as minister, which he did. He died on the 4th July, 1787. (*Biographie Universelle*; Voltaire, *Siècle de Louis XIV.*)

SOUFFLOT, JACQUES GERMAIN, was born at Irancy, near Auxerre, in 1713. His parents gave him a good education, but without any intention of bringing him up to the profession to which his own inclination strongly prompted him. Fortunately, instead of attempting to thwart this bias, his father assisted him in pursuing the requisite preparatory studies. At what time he went to Rome, where, through the influence of M. de Saint-Aignant, the ambassador, he was admitted as a pensionary at the French academy, is not precisely known, but he remained there three years, after which he spent several more at Lyon where he commenced the practice of his profession; and besides the Exchange (now converted into the Protestant church), and some other works of less importance, he executed one of the largest public edifices in that city, the Great Hospital, the façade of which is somewhat more than 1000 feet in extent. The distinction he thus acquired caused him to be invited to Paris, where he was admitted into the Royal Academy of Architecture. Within a short time an opportunity presenting itself of revisiting Italy, in company with M. de Marigny (Madame Pompadour's brother) the superintendent of the crown buildings, he availed himself of it, and examined the antiquities of Pæstum in 1750. [Pæstum, Architecture of.] In 1754 he was again employed at Lyon to erect the Grand Theatre, which was capable of containing 2000 spectators, and was considered to be excellently contrived in every respect, but has since been replaced by another structure.

It having been determined to rebuild the antient and greatly decayed church of St. Généviève, several architects presented designs for the new edifice, among which those by Soufflot obtained the preference; and in 1757 the works commenced, but they proceeded so slowly, that the ceremony of laying the first stone by Louis XV. did not take place till the 6th of September, 1764. [Paris, page 257.] In this work Soufflot entirely changed the system which had till then prevailed in all the modern churches of Paris; and although he could not attempt to rival the magnitude of St. Peter's at Rome, or St. Paul's, London, his aim seems to have been to produce greatness of effect of a different kind, together with decided difference of character. Avoiding two orders, as in the latter building, and the attached columns and heavy attic of the former, he has employed a single order of insulated columns 60 feet high as a prostyle, occupying the entire width of the façade at that extremity of the cross; and has moreover confined the order to that feature of the building, the entablature alone being continued along the other elevations, which else present little more than unbroken surface of solid wall, a circumstance that gives the whole a degree of severity, not to call it nakedness, that contrasts most strongly with the breaks and multiplicity of parts in the two other buildings. The portico itself is therefore a feature which strikingly distinguishes this from both the Italian and the English church. Like St. Paul's, Soufflot's edifice has a Corinthian peristyle of thirty columns, encircling the tambour of the dome, with the difference that all the columns are insulated, whereas in the other instance eight of them are attached to four *massifs*, or piers. Another marked distinction in regard to the effect of the dome in the exterior composition generally is, that the plan of the building being a Greek cross, it comes in the centre, consequently is not thrown so far back from the front as in the other two instances. In the interior, again, Soufflot's design differs from them still more: it has colonnades, comparatively shallow as to depth, instead of aisles separated from the naves by massive piers and arches; neither has it any windows, except in the tambour of the dome and the arches in the vaultings of the roof, so that the light is admitted entirely from above. In consequence however of settlements and fractures taking place, it was afterwards found necessary to deviate from the original plan, filling up the spaces between the columns at the four angles beneath the dome, so as to convert them into solid piers. These remarks might be greatly extended, but the only one we will add is, that a detailed parallel between this edifice, St. Peter's, and St. Paul's, might be rendered a highly interesting architectural disquisition, especially if illustrated with drawings made to the same scale.

Soufflot did not live to see his great work completed, for he died on the 29th of August, 1781, after which period many repairs in the construction took place, an account of which, and criticisms upon the building, may be found in Wood's 'Letters of an Architect,' vol. i. At the time of the Revolution, the destination of the building was changed, and it was then called the Pantheon, by which name it is still generally spoken of, although now restored to its original purpose, and the dome, &c. decorated with paintings by Gros and others. Among other buildings by Soufflot may be mentioned the Ecole de Droit (1775) in the Place du Panthéon (which last formed part of his plan for a uniform architectural area round the church), the Orangery at the Château de Menars, the sacristry of Notre Dame, and several private hotels.

SOUI-MANGA. [SUN-BIRDS.]

SOULTZ. [RHIN, HAUT.]

SOUND. [ACOUSTICS.]

SOUND-BOARD, or SOUNDING-BOARD, a board placed over a pulpit or other place occupied by a public speaker, to reflect the sound of his voice, and thereby render it more audible. Sounding-boards are usually flat, and placed horizontally over the head of the speaker; but a different form and position, contrived by the Rev. J. Blackburn, of Attercliffe-cum-Darnell, near Sheffield, has been adopted in some cases with great advantage. In the new church erected at that place in 1826, it was found that the speaker's voice was rendered so indistinct and confused as to be scarcely audible, and the common sounding-board was tried, but with very imperfect success. The body of the church is 95 feet long, and 72 feet wide; but the extreme length is increased to 105 feet by an elliptical recess at the east end, 32 feet wide, and 10 feet deep. The extreme height from the floor to the roof is 56 feet, and the roof is groined and vaulted. In the hope of overcoming the difficulty, the pulpit was tried in several different situations; but that finally chosen was in the centre of the church, 15 feet in advance of the altar rails; the floor of the pulpit was about 9 feet above that of the church. All other means having failed, Mr. Blackburn conceived that the object might be attained by the use of a concave parabolic sounding-board, so placed as to intercept and reflect to a distance the sound that would otherwise escape behind the speaker, and echo in the vaulted roof. The experiment succeeded perfectly, and similar sounding-boards have been erected in other places with great advantage. The Rev. W. Farish, Jacksonian professor in the university of Cambridge, had one put up in his church, and states that he could, by its assistance, converse in a low whisper with a person in any part of the building. He recommends that the mouth of the speaker should be a little behind the focus of the reflector. Mr. Blackburn's reflector, or sounding-board, was made of pine-wood, and so ornamented as to have a handsome appearance. 'The surface,' he states, 'is concave, and is generated by half a revolution of one branch of a parabola on its axis.' The axis is inclined forward at an angle of about 10° or 15° to the plane of the floor, so that the sounding-board comes partly over, but chiefly behind the speaker. Models of the pulpit and sounding-board were exhibited to the Royal Society in 1828, and subsequently deposited in the museum of the Society of Arts; and full descriptions have appeared in the 'Philosophical Transactions,' vol. cxviii., p. 361; the 'Transactions' of the Society of Arts, vol. xlviii., p. 192; and in an octavo pamphlet, published in 1829, entitled 'Description of a Parabolic Sounding-Board erected in Attercliffe Church.' Mr. Blackburn concludes his pamphlet by suggesting whether, in erecting a new church, it might not be advisable to give to the east end of the building itself the form of a paraboloidal concave, and to place the pulpit in its focus.

SOUNDINGS, in hydrography, are properly the depths of water in rivers, harbours, along shores, and even in the open seas; but the term is also applied to the nature of the ground at the bottom of the water.

If the operation of taking soundings is to be performed while the vessel is in motion, and the depth of the water is comparatively small, a man who is stationed for the purpose in the main or mizen chains, on the windward side, throws out a mass of lead, which is attached to one end of a line between 20 and 30 fathoms in length. On this line are fixed, at intervals of two or three fathoms, pieces of leather or cloth of different colours; and the mark which is next above the surface of the water when the lead strikes the bottom affords an indication of the depth.

The sounding-lead is usually in the form of a frustum of a cone, and weighs eight or nine pounds. The man takes care to throw it towards the head of the vessel, so that as the latter advances the line may be nearly in a vertical position when he observes the mark. That which is called the deep-sea lead is a mass of metal, weighing from 25 to 30 lbs., and attached to a line of great length, on which at the distance of every ten fathoms are knots expressing the number of times ten fathoms in the depth (thus five knots denote 50 fathoms, &c.): it is used nearly in the same manner as the hand-lead, but generally the motion of the ship is stopped before it is thrown, in order that the line may be as nearly as possible in a vertical position when the depth is observed. The bottom of the lead is covered with a coating of tallow for the purpose of ascertaining, by the sand, shells, or other matter which may adhere to it, the nature of the ground.

When soundings are to be taken in the survey of a coast, a harbour, or the mouth of a river, the surveying ship and its boats are disposed at convenient distances from each other (suppose from two to five miles), so that the lines imagined to join them and any remarkable objects, should there be such, on the shore, may form triangles as nearly as possible equilateral. If the number of boats are not sufficient, the deficiency may be supplied by beacons formed of water-casks. The distances of the boats or beacons from one another and from the ship, when all have been moored, may be ascertained by the velocity of sound, guns being fired for this purpose, or by observing the angle subtended by the known distance from the surface of the water to the top of a mast; but the officers in the ship and boats observe also the angles which lines supposed to join their several stations make with one another, and thus the positions which they occupy may be determined. The boats then row or sail along the directions of the lines joining each other, sounding as they proceed at equal intervals, suppose ten minutes, of time. If it be necessary to sound close to a reef or shore, or within the mouth of a river, the boats move from one remarkable point to another, taking such angles as may be necessary to determine the positions of those points, and sounding as before: thus the outline of the shoal, reef, coast, or river will be determined, as well as the depth of the water. All the soundings must be afterwards reduced to the depths below the surface of the sea at the level of low-water.

In order that the rise and fall of the tide may be ascertained, the ship should remain in its position during twenty-four hours, and at certain intervals of time the depth of the water should be observed. For this purpose the ship is usually provided with a graduated pole about fifty feet long, and having at its lower extremity a heavy mass of lead; this pole, being let fall into the sea, retains a vertical position in consequence of the ballast attached to it, and the graduation at the surface of the water expresses the depth. When this depth exceeds the length of the pole, the sounding-lead must of course be used.

It is sometimes difficult to ascertain the precise moment when the lead strikes the bottom; and to meet this inconvenience an electro-magnetic sounding apparatus has been invented by Mr. Bain, who has contrived also some other recently ingenious machines for rendering available the power of electricity. The line itself is formed of wires, protected from the action of the water; and it is so arranged that the electrical current shall be uninterrupted so long as the ring attached to the weight remains in contact with the ring or hook at the lower end of the line, but shall be broken when, owing to the lead touching the bottom, the contact of the rings is interrupted. The effect thus produced is instantaneously communicated through the wires to an apparatus on deck, where it causes a bell to ring. This invention is exhibited at the Polytechnic Institution, in Regent Street, London.

SOUSLIK, the name of certain marmots with cheek-pouches (*Spermophilus*, F. Cuv.).

The European and Asiatic *Souslik*, or *Zizel* (*Mus Citellus*, Linn.), has the face cinereous and a white line over each eye. The teeth are yellow and the whiskers black and long. It is grey-brown above, undulated or spotted with white below.

There appear to be several varieties. One spotted (guttatus); one undulated (the Zizel); and a third of a yellowish uniform brown (*Yevrashka* or *Jevraschka*, the Siberian Marmot). Length a foot: that of the tail to the end of the hairs four inches and a half.

Geographical Distribution.—Bohemia, Austria, Hungary; from the banks of the Wolga to India and Persia, through Siberia and Great Tartary to Kamtchatka; some of the intervening isles, such as Kadjak; and even the continent of America itself. (Pennant.)

Habits, &c.—This marmot or ground-squirrel (as these *Spermophili* have been termed from their more slender forms) burrows and provides for its winter food by laying up a magazine of corn and nuts. Some inhabit the fields, and their holes have a double entrance: others inhabit granaries, and these are said not to sleep in winter like the field sousliks, but to remain in motion during the cold season. They sit in multitudes near their holes, and only one inhabits each burrow. The females remain separate from the males except during the breeding season, which is in May, and produce from five to eight young ones: these they bring up in their burrows and cover with hay.

The sousliks are very quarrelsome among themselves, and bite very hard. They whistle like the common marmot. They are supposed to be very fond of salt, and have been taken in numbers on board the barges laden with that commodity at Solikamsky, which drop down into the Wolga below Casan The sousliks are said to have an appetite for flesh, and to feed on the young of little birds and the lesser mice, as well as on corn, nuts, &c.

Utility to Man.—Pennant says that the Bohemian ladies were wont to make cloaks of the skins of these animals; and adds, 'we see them at this time made use of for linings, and appear very beautiful for that purpose, especially the spotted kind.'

Dr. Richardson, in his *Fauna Boreali Americana*, notices the *American Souslik* ('*Arctomys* (*Spermophilus*) *guttatus Mus Citillus* var. *guttata*, Pallas? *Spermophilus guttatus*, Temm.?') Dr. Richardson says, 'Mr. Douglas brought a small marmot from the western side of the Rocky Mountains, and several injured specimens of the same species exist in the museum of the Hudson's Bay Company. I can detect no external characters (except that the spots on its fur are more crowded and indistinct) to distinguish it from the *Mus Noricus* of Agricola, or Hungarian Souslik, which I know only from the descriptions and figures given by authors; but a skull of the latter preserved in the College of Surgeons, although of the same size with the American animal, differs from it in having a more arched facial line, and in possessing an uniform degree of curvature from the occiput to the end of the nose. The American Souslik has a convex nose, with the frontal bone depressed between the orbits, as in the *A. Richardsonii*. It resembles the *A. Parryi* very closely in the colours and markings of its fur, though it has not, when recent, one-third of the weight of that animal, and its feet and claws are much smaller, being less than those even of the *A. lateralis*. I have been able to collect no particular information respecting its habits. It seems to be confined to the western declivity of the Rocky Mountains. Buffon mentions that the name of Souslik, given to the *A. guttatus* on the Wolga, is intended to express the great avidity that animal has for salt, which induces it to go on board vessels laden with that commodity, where it is often taken.'

The description of the *Prairie Marmot*, or, as it is often called, the *Prairie Dog* (*Arctomys* (*Spermophilus ?*) *Ludovicianus*) will be found under WISTONWISH.

SOUTH FERRY, properly and generally called Ferry-port-on-Craig, a small seaport village in the county of Fife situated about 12 miles north-east from Cupar, the county town, and 10 north from St. Andrews. It lies on the margin of the left banks of the Tay, sloping towards the river, and near to its mouth. There is a good and convenient stone pier, where vessels of considerable burthen can discharge at high water, and great numbers not unfrequently come to anchor in the roads, to wait for favourable weather previous to putting out to sea. A passage-boat crosses at every alternate hour to Broughty Ferry, which stands close on the opposite shore, and a trader sails daily to Dundee, whence steam-boats ply regularly to and from Perth, and during the greater part of the year the steam-vessels which ply betwixt Edinburgh and Dundee touch here in landing and taking passengers on board. The salmon fishery, both by coble and stake net, and ship-building, are carried on to a pretty considerable extent. The inhabitants are chiefly employed in weaving and navigation. A line of railway is at present in contemplation through the county as a means of communication betwixt the shores of the Forth and the Tay, crossing the latter river at or near this village, and joining the Dundee and Arbroath railway on the opposite side. In 1831 the population was 1680 (*Communication from Scotland.*)

SOUTH POLAR COUNTRIES. The southern hemisphere, as is now well known, contains a much less proportion of land to sea than the northern. But it was formerly supposed that the remote and then unknown parts of the southern hemisphere were occupied by an extensive continent, which surrounded the antarctic pole, and extended to a great distance from it. This imaginary continent, called *Terra Australis Incognita*, makes a conspicuous figure on all maps which are more than a century old. Nothing could be adduced in support of the supposed existence of this continent, except the fact that a coast had been seen in 1599 by Dirk Gerritz, a Dutchman, west of Cape Horn, but in a much higher latitude. His vessel, which belonged to a Dutch fleet commanded by James Mahu, on leaving the straits of Magalhaens for the Pacific, had been separated from the other vessels, and carried by winds and currents as far south as 64°, where he found a lofty coast, which Gerritz compared with that of Norway. He was unable however to determine the position of this newly discovered coast. It is probable that the coast which he saw was that which Biscoe discovered in 1832, and called Graham's Land.

In the middle of the last century, when the spirit of maritime enterprise was active in Great Britain, and the Pacific particularly attracted attention, it was determined to solve the problem of the existence of this Terra Australis, and Cook undertook his second voyage (1772-1775) for the purpose. He found large masses of floating ice, and only in three places succeeded in penetrating beyond the antarctic polar circle. In one place he attained 71° 10′ S. lat., but he was generally unable to go much farther south than 60° S. lat. This was the case between 90° and 150° E. long., within which limits the most extensive and continuous line of coast was discovered two years ago. This line of coast however lies between 4 and 5 degrees south of Cook's track. As Cook had found no land south of 60°, the Terra Australis disappeared from our maps, though he himself thought that there must be land in the vicinity of the pole, being convinced that ice can only be formed in the neighbourhood of land.

Thus the matter rested up to 1819, when the South Shetland Islands were seen by William Smith, on a voyage from Monte Video to Valparaiso. This discovery rekindled the spirit of enterprise in Great Britain and other countries. In 1821 Powell discovered Trinity Land, south of the South Shetlands and the South Orkneys, between 60° 30′ and 61° S. lat., and 44° 30′ and 46° 30′ W. long. Palmer, an American, discovered a coast-line west of Trinity Land, which is called Palmer's Land; and the Russian navigator Bellingshausen discovered Alexander's Land, south-west of Palmer's Land. All these lands are south and west of the South Shetland Islands. In 1823, Weddell tried to find land east of the meridian of these islands. He did not find land, but he succeeded in advancing as far as 74° 15′ S. lat., where he found a sea clear of ice. In 1831 and 1832 Biscoe sailed round the icy masses which enclose the south pole, and added to former discoveries Enderby's Land and Graham's Land. The first lies at a great distance from the countries south of the Shetland Islands, between 49° and 51° E. long.; but Graham's Land is between Alexander's Land and Palmer's Land. Thus a nearly continuous coast-line has been discovered south and west of the South Shetland Islands, extending from 36° to 70° W. long., and comprehending from east to west Trinity Land, Palmer's Land, Graham's Land, and Alexander's Land. In 1833 Kemp sailed towards Enderby's Land, and found certain indications of land to the east of it, though he was prevented by ice from approaching near enough to see it. In 1837 the French government sent some vessels to these parts, under the command of Dumont d'Urville, who explored the coast which Powell named Trinity Land, and changed its name to that of Louis-Philippe's Land. In the following year Balleny directed his course to those parts of the ocean which are south of New Zealand and Australia, and discovered some islands near 165° E. long., which he called Balleny Islands. He also discovered a projecting coast-line near 116° E. long., which was called Sabrina Land. But the largest tract of sea-coast was discovered in 1840. In 1839 the French government and that of the United States of North America sent out expeditions for the purpose of making discoveries in the antarctic seas. The French expedition consisted of two vessels, under the command of Dumont d'Urville, and the American of four vessels commanded by Charles Wilkes. Both directed their course to the seas which the year before had been visited by Balleny. Wilkes found a coast-line in 154° 27′ E. long.; and in continuing his course westward for four weeks, he had either always a coast in sight or unequivocal indications of land being at no great distance. He advanced as far as 97° 30′ E. long., so that, including Sabrina Land, he discovered a coast-line extending over near fifty degrees of longitude. Dumont d'Urville reached the same coast in 140° 41′ E. long., and pursued his course westward to 130° E. long. He called it Adélie Land. It is remarkable that the coast of this Antarctic Continent, for this appellation cannot be denied to it, lies near the polar circle, either to the south or to the north of it, and this is also the case with Enderby's Land and Graham's Land, both of which are traversed by that line. Only the tract of coast south of the South Shetland Islands extends farther north, and approaches to 63° S. lat.

An expedition was fitted out in England for the purpose of making an attempt to reach the south magnetic pole, and placed under the command of Captain James Clarke Ross. He directed his course several degrees east of Balleny Island, and on the first day of this year (1841) passed the antarctic polar circle, near 178° E. long. On the 11th of January he discovered land near 70° 41′ S. lat. and 172° 36′ E. long., and soon found that it was a continuous coast trending southward, and rising in mountain peaks to the height of 9000 to 12,000 feet, and covered with snow. On the 12th of January he effected a landing, and took possession of it in the name of the queen. He continued his course along the shores to 78° 4′ S. lat. In 77° 32′ S. lat. and 167° E. long. he saw a mountain about 12,400 feet above the sea-level, which sent forth abundance of fire and smoke, to which he gave the name of Mount Erebus. East of this volcano he observed an extinct crater of somewhat less elevation, which he called Mount Terror. At 78° 4′ S. lat. his progress to the south was prevented by a barrier which presented a perpendicular face of at least 150 feet, along which he sailed eastward until he attained 191° 23′ in 78° S. lat. The coast-line discovered by Ross is above 600 miles. Adding to these the discoveries of Balleny, Wilkes, and Dumont d'Urville, which comprehend a coast exceeding 1200 miles, we find that within the last two years more than 1800 miles of the coast of the Antarctic Continent have been discovered south of New Zealand and Australia, between 170° and 97° E. long.

The discoverers of these new countries have only in a very few cases been able to effect a landing, the coasts being skirted with a bank of either solid or broken ice, which generally extends from five to ten, and, in some places, even to twenty miles from the shore. The land is elevated, and even mountainous, at no great distance from the shores. Dumont d'Urville estimates the average elevation of the mountains in Adélie Land at about 1500 feet. They are covered with snow, even in February, and might easily be mistaken for ice-bergs, if some rocks did not rise from them, to the perpendicular sides of which the snow cannot adhere. Between the mountain-ridges valleys are observed, but they are filled with snow and ice nearly to the summits of the mountains, and these icy masses, being converted into glaciers, protrude into the sea. In summer enormous pieces are broken off from them, and to this cause are owing the numerous icebergs which render the navigation along these coasts more difficult and dangerous than in the most northern latitudes which have been visited by our whalers. Some portions of the coasts are of volcanic origin, especially those which lie south of the South Shetland Islands. Bellingshausen found an active volcano near 69° S. lat., and there is another on Palmer's Land. These volcanoes seem to be connected with those in the South Shetland Islands. [NEW SOUTH SHETLAND ISLANDS.] A volcano occurs also on Balleny's Islands, which continually emits smoke, and Mount Erebus and Mount Terror have been noticed above.

No traces of vegetation have been discovered on any part of this coast, nor any terrestrial quadrupeds. The birds were albatrosses, penguins, eaglets, Cape pigeons, king-birds, and nellies. Whales have been observed in several places, especially hump-backed and fin-backed whales; as also several kinds of seals.

(Weddell's *Voyage towards the South Pole*; Biscoe's *Discoveries in the Atlantic Ocean*, in *London Geogr. Journal*, vol. iii.; Wilkes's *Voyage*, in the *Globe* newspaper, 14th Aug., 1840; Dumont d'Urville, *Expédition au Pôle Antarctique*; and *Nautical Magazine* for Sept., 1841.)

SOUTH, ROBERT, was the son of Mr. South, an eminent London merchant. He was born at Hackney in Middlesex, in 1633. In 1648 he was a king's scholar in the college of Westminster, at which time Dr. Busby was master of the school. He read the Latin prayers in the school on the day of the execution of Charles I., and prayed for his majesty by name; apparently an indication that even then he had embraced those principles of attachment to the established form of government in church and state, of which he was all through his long life a most strenuous and able champion. In 1651 he was admitted a student of Christ Church, Oxford, having been elected at the same time with John Locke. In 1655, in which year he took his degree of Bachelor of Arts, he wrote a copy of Latin verses for the purpose of congratulating Oliver Cromwell on the peace which he had made with the Dutch. Those who have reflected upon South for this compliment to the Protector, need to be informed that the copy of Latin verses was a University exercise of the kind which was then usually imposed on bachelors of arts and undergraduates. He met with some opposition to taking his degree of Master of Arts, in 1657, from Dr. John Owen, who then filled the place of dean of Christ Church, and was, or pretended to be, favourable to the principles of those who were then in power. In 1658 South was ordained by a deprived bishop, and in 1660 he was made University orator, for which he was perhaps partly indebted to his excellent sermon preached before the king's commissioners, entitled the 'Scribe Instructed' (*Matth.*, xiii. 52). After describing the qualifications of a scribe as the result of habitual preparation, by study and exercise, he takes the opportunity of observing on the qualifications of the sectarists then lately in power, and this passage is a good sample of the kind of warfare which he carried on to the end of his life against those who dissented from the ecclesiastical constitution as established by law, and also of his style. The teachers of those days, he says, 'first of all seize upon some text, from whence they *draw* something (which they call doctrine), and well may it be said to be *drawn* from the words, forasmuch as it seldom naturally *flows* or *results* from them. In the next place, being thus provided, they *branch* it into several heads, perhaps twenty or thirty or upwards.

Whereupon, for the prosecution of these, they repair to some trusty concordance, which never *fails* them; and by the help of that they range six or seven scriptures under each head; which scriptures they prosecute one by one: *First* amplifying and enlarging upon one for some considerable time, till they have spoiled it; and then that being done, they pass to another, *which in its turn* suffers accordingly. And these impertinent and unpremeditated enlargements they look upon as the *motions, effects, and breathings of the spirit*, and therefore much beyond those *carnal ordinances of sense and reason*, supported by industry and study; and this they call a *saving way of preaching*, as it must be confessed to be a way to save much labour, and nothing else, that I know of.'

The Chancellor Clarendon made South his domestic chaplain, in consideration of an oration delivered by South as public orator on the occasion of Clarendon being installed chancellor of the university of Oxford. In 1663 he was made a prebendary of Westminster, and took his degree of doctor in divinity; and in 1670 he was made a canon of Christ Church, Oxford.

Charles II. having appointed Lawrence Hyde, son of the Chancellor Clarendon, and afterwards earl of Rochester, as ambassador extraordinary to congratulate John Sobieski on being elected king of Poland, the ambassador took South with him as his chaplain. South had been his tutor, and Hyde was much attached to him. A long letter from South, dated Danzig, Dec. 16th, 1677, to Dr. Edward Pococke, regius professor of Hebrew in Oxford, contains his remarks on Poland: it is printed in the volume of his posthumous works. This letter, from a man of South's observation and ability, is a very curious and valuable historical record. He says that Sobieski spoke Latin with great facility, and was acquainted with French, Italian, German, and Turkish, besides his own language. Altogether the doctor formed a high opinion of Sobieski's abilities. South's remarks on the ecclesiastical state and constitution of Poland are marked by his usual penetration and good sense.

Soon after his return from Poland, South was presented to the rectory of Islip in Oxfordshire by the dean and chapter of Westminster. He rebuilt the chancel of the church, as appears from a Latin inscription over the entrance; and also the parsonage-house. In 1681 he preached before Charles II., being then one of his majesty's chaplains in ordinary, on these words, 'The lot is cast into the lap, but the disposing of it is of the Lord.' This sermon, which is a good specimen of his vehement invective, contains the following singular passage, which is not much in favour of the doctor's good taste particularly considering the occasion:—'And who that had beheld such a bankrupt beggarly fellow as Cromwell, first entering the parliament-house with a threadbare torn cloak and greasy hat (perhaps neither of them paid for), could have suspected that in the space of so few years he should, by the murder of one king and the banishment of another, ascend the throne.' On which the king fell into a violent fit of laughter, and turning to Lord Rochester, said, 'Ods fish, your chaplain must be a bishop, therefore put me in mind of him at the next death.' But the chaplain did not preach in order to please those in power, or with a view to promotion in the church. He would not take any preferment either during the reign of Charles or James, or after the revolution of 1688, though he was often pressed to accept the highest dignities in the church.

He strongly disapproved of all James's measures towards the restoration of the Roman Catholic religion, being a most zealous upholder of the Protestant church. But he had also strong opinions of the duty of submission to his lawful prince; and accordingly, when the archbishop of Canterbury and the bishops who signed the invitation to the Prince of Orange to come over, wanted him to do the same, he replied that 'His religion taught him to bear all things; and however it should please God that he should suffer, he would, by the divine assistance, continue to abide by his allegiance, and use no other weapons but his prayers and tears for the recovery of his sovereign from the wicked and unadvised councils wherewith he was entangled.' On the abdication of James and the settlement of the crown on the Prince and Princess of Orange, South at first made some opposition, but ultimately he acknowledged the new government; yet he would accept nothing, though certain persons then in power offered to exert themselves in his behalf on the vacating of several of the sees by the bishops who refused the oath of allegiance to King William and Queen Mary. He declared 'that notwithstanding he himself saw nothing that was contrary to the laws of God and the common practice of all nations to submit to princes in possession of the throne, yet others might have their reasons for a contrary opinion; and he blessed God that he was neither so ambitious, nor in want of preferment, as for the sake of it to build his rise upon the ruins of any one father of the church who, for piety, good morals, and strictness of life, which every one of the deprived bishops were famed for, might be said not to have left their equal.'

South did not like the Act of Toleration, and he vigorously exerted himself with the commissioners appointed by the king in 1689 for a union with dissenting Protestants, in behalf of the Liturgy and forms of prayer, and entreated them to part with none of its ceremonies. He continued to preach against dissent, exposing the insufficiency of the dissenting ministers, and pouring forth upon them his inexhaustible sarcasm, ridicule, and contempt. One of his strongest sermons to this effect was preached in the Abbey Church of Westminster in 1692, on the text, 'Now there are diversities of gifts, but the same spirit' (1 *Cor.*, xii. 4). His controversy with Dr. Sherlock, then dean of St. Paul's, who had written a book entitled 'A Vindication of the Holy and Ever-blessed Trinity,' was carried on with great power of argument, and infinite wit and humour, more indeed than suited the solemnity of the subject. South was admitted to have the better in the discussion. The king at last interposed by his royal authority, by directions addressed to the archbishops and bishops, that no preacher should in his sermon or lecture deliver any other doctrine concerning the Trinity than what was contained in the Holy Scriptures, and was agreeable to the three Creeds and the Thirty-nine Articles of Religion. A ballad, which was much circulated at the time, beginning

'A dean and prebendary
Had once a new vagary,' &c.,

turned the two combatants into ridicule, together with Dr. Burnet, master of the Charter-House, who, about the same time, published his 'Archæologia.'

South lived till the 8th of July, 1716. He was buried in Westminster Abbey near the grave of his old master Busby. Neither children nor wife are mentioned by his biographers. By his will he disposed of a good deal of his property for charitable purposes, having all through life been a most generous giver. The residue, after the legacies and charities were satisfied, he gave to his executrix Mrs. Margaret Hammond, his housekeeper, who had lived with him above five and thirty years. There is a Life of South in a volume of his 'Posthumous Works,' London, 1717, which is the authority for what has been stated. This volume also contains three of his sermons, his will, and his Latin poems and orations delivered in his capacity of public orator in the University of Oxford.

Though South is only known by his sermons, he must be viewed both as a political and a theological writer. He defended by argument, and by his example he enforced, passive obedience and the divine right of kings. He says that the 'absolute subjection' which men yield to princes comes from 'a secret work of the divine power.' He believed the Church of England to be perfect, and the express image of the primitive ordinances. Many of his sermons are directed against the Puritans. 'He dwelt with delight on their meagre mortified faces, their droneing and snuffling whine, their sanctimonious hypocritical demeanor; but in the midst of his pleasantry, he shot some shafts dipped in the bitterest gall, and pointed by the most inveterate hatred. With a proud consciousness of superior learning, and perhaps a pharisaical conceit of superior integrity, with the keenest sarcasm and the most undisguised contempt, he held up to the detestation of mankind these impudent pretenders to the gift of the Spirit.' According as a man's affections are disposed, he will view South as a furious bigot, or as an uncompromising defender of the state and the church as established.

As a writer he is conspicuous for sound practical good sense, for a deep insight into human character, for liveliness of imagination, and exuberant invention, and wit that knew not always the limits of propriety. In perspicuity, copiousness, and force of expression he is almost unrivalled among English writers; and these great qualities fully compensate for the 'forced conceits, unnatural metaphors, absurd similes, and turgid and verbose language which occasionally disfigure his pages.' With all his faults, he was a truly honest man, a firm friend, and a generous benefactor. The sincerity of his principles is shown in the purity of his life, and the vigour of his understanding is stamped on all that he wrote.

(*Sermons preached upon several Occasions*, by Robert South, D.D., third edition, 6 vols. 8vo., 1704; *Retrospective Review*, No. 18.)

SOUTHAM. [WARWICKSHIRE.]

SOUTHAMPTON, a town within Hampshire, though forming a county of itself, situated on a point of land between the river Alre, or Itchen, on the east, and the Test, Teese, or Anton on the west. These rivers here unite to form the æstuary called 'Southampton Water.' Southampton is 70 miles in a direct line south-west of the General Post-office, London, or 79 miles by the London and South-Western Railway; in 50° 54′ N. lat. and 1° 24′ W. long.

The Roman town of Clausentum, though not on the exact site of Southampton, may be regarded as its predecessor. Clausentum was on a point of land formed by the winding of the Itchen, on the left or east bank of that river, about a mile north-east of Southampton, now occupied by Bittern Farm. The present road from Winchester to Southampton, as far as the village of Otterbourn, coincides with the line of the Roman road from Venta Belgarum (Winchester) to Clausentum; at Otterbourn the Southampton road diverges a little to the right, while the Roman road may be traced along the hills running straight onward towards Bittern. (*Ordnance Survey.*) There are at Bittern the traces of a fosse and vallum, which defended the place on the land side; and fragments of Roman bricks and pottery, also urns and coins, have been found in abundance. Within the enclosure is a farmhouse, built partly from the ruins of a castellated mansion formerly belonging to the bishops of Winchester. [HAMPSHIRE.]

The foundation of the present town is ascribed to the Anglo-Saxons. There is reason to believe that the castle was early erected by the Saxons. The town was attacked, but without success, by the Danes, A.D. 837; plundered by them A.D. 980; and again occupied as their winter-quarters A.D. 994. It is said to have been the scene of the memorable rebuke which Canute [CANUTE] administered to his courtiers. In the Saxon Chronicle the town is called Hamtune and Suth-Hamtun; in 'Domesday,' Hantone and Hentune. In the reign of Henry II. it had four churches. Leland and Grose have supposed the Southampton of this period to have been at St. Mary's, a little to the east or north-east of the present town, which they suppose to have been removed to its present site after the sack of Southampton by the French or Genoese fleet, A.D. 1338. [HAMPSHIRE.] But Sir H. C. Englefield (*Walk round Southampton*) has given good reason for doubting the correctness of this opinion. The year after this disaster the defences of the town were repaired and strengthened. Richard II. rebuilt the castle. It was at Southampton that Henry V. embarked in his first invasion of France (A.D. 1415), at which time the Earl of Cambridge, Lord Scrope, and Sir Thomas Grey were executed in the town for conspiring against him. In the war of the Roses a smart skirmish took place between the partizans of the rival houses, in which the Lancastrians were worsted: several of them were executed by order of Edward IV. In A.D. 1512 the marquis of Dorset, who was sent to the support of Ferdinand the Catholic in his war against France, embarked with 10,000 men at Southampton; and in 1522 the earl of Surrey, admiral of England, sailed from this place with a considerable fleet, with which he escorted the emperor Charles V. (who had been visiting Henry VIII.), on his return to his dominions, and afterwards attacked the French coast. Philip II. of Spain landed here A.D. 1554, when he came to marry Queen Mary.

The county of the town comprehends the whole of the point of land between the rivers, and extends along the bank of the Itchen about three miles; its area is 1970 acres; the population, in 1831, was 19,324; in 1841, 26,900, including 800 or 900 persons employed in constructing the docks; it is rapidly increasing. The town is on a gravelly soil, somewhat elevated on the bank of the Anton, which washes it on the west and south sides. The principal street (High Street) runs north and south, and is divided into two parts by an antient 'bar' or gateway belonging to the old town wall, considerable portions of which, with the west gate and south gate, are still standing. That part of the street which is south of the bar was included in the town, and is about half a mile long; the remainder, distinguished as 'High Street above bar,' or 'Above-bar Street,' belonged to the suburbs. The room in the upper part of the gateway forms the town-hall, which is small and ill-constructed. The other streets or lanes lead from the High Street at right angles or are nearly parallel to it. The principal streets are well paved and lighted; but several of those which consist of smaller tenements are not paved or lighted, and are in a very disorderly state. (*Munic. Corpor. Commissioners' Report; Parl. Papers for* 1835.) On the south side of the town is the quay, near which, at the south-western corner of the town, is the pier, a structure of considerable extent and elegance, erected some years since, and called Victoria Pier, after her Majesty, by whom, before her accession, it was opened. At the east end of the quay is a raised walk or causeway along the shore extending about half a mile. On the platform or battery near the quay is a singular gun of the time of Henry VIII. In the more modern part of the town, comprehending Above-bar Street and the adjacent streets, are some handsome ranges of building. The Winchester road is adorned by a fine avenue of elms, after leaving which it passes through an extensive field of open ground, beautifully wooded, called Southampton Common, affording delightful walks, drives, and rides. High Street is a handsome street throughout. The eastern side of the town is occupied by the poorer class of inhabitants; and a new road from the southern part of the town to the Itchen leads to the floating bridge which forms the communication with Fareham, Gosport, and Portsmouth.

Southampton has five parish churches. Holy Rhood church, a large and antient structure, consists of a nave with side aisles and a choir or chancel; it has a tower and spire at the south-west angle, and a colonnade or portico, which occupies the whole front. The church contains several stalls of neat workmanship, a wooden screen of the time of Elizabeth or James I., a neat Gothic font, and some fragments of fine painted glass in the windows. St. Lawrence's church is small, and almost choked up with the surrounding houses. For ecclesiastical purposes this parish is united with that of St. John. All-Saints' church is of Grecian Ionic architecture, and has been much admired; it contains the monuments of Carteret, the circumnavigator, and of Bryan Edwards, the historian of the West Indies. These churches are all in High Street. St. Michael's, the most antient of any in the town, is in the west part of the town, in a square (formerly the fish-market) of which it forms the east side; it has a tower between the nave and chancel; there are several Norman portions and some of later date; the windows are chiefly of perpendicular character. This church has an antient font of Norman character, and the monument of Chancellor Wriothesley. St. Mary's church in the suburbs, east of the town, was rebuilt in the last century on the foundations of the older structure, which yet appear a few feet above ground: its large burial-ground is the principal place of interment for the town. There is a proprietary episcopal chapel (St. Paul's) in All Saints' parish, erected a few years since; the architecture is Gothic, and the 'Clergy List' contains a notice of the chapel of the Holy Trinity and of Jesus' free chapel.

There are several dissenting places of worship, including one each for Independents, Baptists, Quakers, Roman Catholics, and Wesleyan Methodists.

The corporation have, besides the Guildhall, a handsome audit-house, a borough gaol, and a debtors' prison. There are several places of amusement, a theatre, and two sets of assembly-rooms, a racecourse, a subscription reading-room, circulating libraries, billiard-rooms, and bathing-rooms; and a botanic garden. There are scarcely any remains of the antient castle, but a tower has been erected on the site and from the materials of the antient keep.

Southampton was antiently a place of great trade; wool and tin were exported; but it declined very much when the export of wool was prohibited, and at the beginning of the eighteenth century was reduced to a very low ebb. During the eighteenth century it revived; but the improvement, though considerable, was not to be compared with its increase during the present century, in which it has trebled its population. It is much frequented as a watering-place. The harbour, which is secure, affords good anchorage. Ship-building is extensively carried on, though the vessels built are chiefly small; and considerable docks are in course of construction. Timber is imported from the Baltic and from America; coals, of which a great quantity is sent up the country as far as Salisbury, from the north of England; stone from the western counties; and wine and brandy from Spain, Portugal, and France. There is a considerable Irish trade. There are a custom-house and four banking establishments. The port of Southampton extends to Christchurch westward, and nearly to Portsmouth eastward. The customs produced 60,000*l.* in 1830, and 78,000*l.* in 1840. The vessels inwards from foreign ports with cargoes in 1830 were 336, tonnage 31,000; outwards 184, tonnage 15,000: in 1841 (first 11 months), inwards 520, tonnage 83,036; outwards 247, tonnage 50,444. In December, 1841, the mail packet steam-ships to the West Indies commenced running, of which 14, admeasuring from 1800 to 2000 tons each, are destined for this service. They are expected to lead to a considerable extension of the commerce of Southampton, already the largest packet-port in the kingdom. Passengers to the East embark here, there being a direct communication to India once a fortnight, as well as weekly, by steamers, to Vigo, Oporto, Lisbon, Cadiz, and Gibraltar, and daily to the Isle of Wight, France, and the Channel Islands.

The trade of Southampton is promoted by the Andover Canal, which follows the valley of the Anton, and by the navigation of the Itchen, which extends to Winchester. There are general markets on Tuesday, Thursday, and Saturday; a fish-market every day; and two yearly fairs, at one of which a great number of cattle are sold.

Southampton is a very antient borough: the earliest known charter, which is simply confirmatory, is of Henry II. The borough limits, which are coextensive with the county of the town, include the six parishes of All Saints, Holy Rhood, St. Lawrence, St. John (united for ecclesiastical purposes to St. Lawrence), St. Michael, and St. Mary, and the tithing of Portswood, in South Stoneham parish: it has one sheriff and two coroners, besides numerous other corporate officers. Quarter-sessions are held; a court-leet from time to time by adjournment, and a civil court for mixed and personal actions of unlimited amount. Under the Municipal Corporation Act the borough was divided into five wards, with ten aldermen and thirty councillors. The revenue of the corporation, arising from rents, a proportion of the harbour dues, fines, and other sources, amounts to about 1500*l.* per annum. The borough returns two members to parliament, which privilege it has exercised ever since the time of Edward I.; the number of voters in 1835-36 was 1226, viz. 581 ten-pound householders, 20 burgesses, 540 scot and lot voters, and 85 persons possessing more than one qualification; in 1841-42 the number was 1570, viz. 1301 ten-pound householders, 29 burgesses, 460 scot and lot voters, and 214 persons having more than one qualification. The court of election for the southern division of Hampshire is held at Southampton, which is also a polling-station.

The living of All Saints is a rectory, of the clear yearly value of 400*l.*, with a glebe-house; that of Holy Rhood, a vicarage, of the clear yearly value of 379*l.*; that of St. Lawrence, a rectory, united with the vicarage of St. John, of the joint clear yearly value of 148*l.*; that of St. Michael, a vicarage, of the clear yearly value of 145*l.*; and that of St. Mary, a rectory; all, except the last, which is a peculiar of the bishop of Winchester, are in the archdeaconry as well as in the diocese of Winchester.

There were, in 1841, three infant-schools, with 150 children; an endowed grammar-school, founded by Edward VI.; another endowed school, with 40 scholars (boys), 10 of them on the foundation; three national schools, with about 300 boys and girls; one Royal British school, with 250 boys and 100 girls; the Holy Rhood parochial school, with 20 girls; a school in the workhouse; and an adult school, attached to Holy Rhood church, with from 17 to 20 scholars. The school of the Military Asylum has been removed to Chelsea; its place is occupied by the Surveying and Mapping department of the Ordnance Office, since the late fire in the Tower. There are about 70 private boarding or day schools, and 13 Sunday-schools attached to various places of worship.

There are several ranges of almshouses, a penitentiary or refuge for destitute females, a dispensary, and several other charities. Dr. Isaac Watts was a native of this town, and was educated at the grammar-school.

There is a Mechanics' Institution, which comprises about 300 members, and has a library, reading-room, and museum attached to it. Lectures are delivered every week during the winter. There is also a Literary and Scientific Institution, which has its museum and rooms, where lectures are delivered weekly during the season. An Infirmary has been established, which is conducted by a committee of gentlemen, who are making strenuous efforts to enlarge it. An Harmonic Society, composed of amateurs, is well supported.

(Sir H. C. Englefield's *Walk round Southampton*; *Beauties of England and Wales*; *Report of Commissioners of Municipal Corporations*; other *Parliamentary Papers*; *Communication from Southampton*.)

SOUTHAMPTON, COUNTY OF, the name, in legal proceedings, of Hampshire.

SOUTHCOTT, JOANNA, was born in Devonshire about the year 1750, of humble parents. She was employed, chiefly at Exeter, as a domestic servant, and up to the age of forty or thereabouts seems to have aspired to no higher occupation; but having joined the Methodists, and become acquainted with a man of the name of Sanderson, who laid claim to the spirit of prophecy, the notion of a like pretension was gradually communicated to Joanna. She wrote prophecies, and she dictated prophecies, sometimes in prose and sometimes in rhymed doggrel; her influence extended, and the number of her followers increased; she announced herself as the woman spoken of in the 12th chapter of *Revelation*, and obtained considerable sums by the sale of seals which were to secure the salvation of those who purchased them. Her confidence increased with her reputation, and she challenged the bishop and clergy of Exeter to a public investigation of her miraculous powers, but they treated her challenge with contemptuous neglect, which she and her converts imputed to fear. By degrees Exeter became too narrow a stage for her performances, and she came to London on the invitation and at the expense of Sharp the engraver. [Sharp, William.] She was very illiterate, but wrote numerous letters and pamphlets, and her prophecies, nearly unintelligible as they were, had a large sale. In 1803 she published 'A Warning to the whole World, from the sealed Prophecies of Joanna Southcott, and other Communications given since the Writings were opened on the 12th of January, 1803,' Lond., 8vo. In 1804 appeared 'Copies and Parts of Copies of Letters and Communications written from Joanna Southcott, and transmitted by Miss Townley to Mr. W. Sharp in London.' In 1813-14 she published 'The Book of Wonders, in Five Parts,' London, 8vo.; and also, in 1814, 'Prophecies concerning the Birth of the Prince of Peace, extracted from the works of Joanna Southcott,' London, 8vo. Of the Prince of Peace she announced that she was to be delivered on the 19th of October, 1814, at midnight, being then upwards of 60 years of age. There was indeed the external appearance of pregnancy, and in consequence the enthusiasm of her followers, who are said to have amounted at that time to not fewer than 100,000, was greatly excited. An expensive cradle was made, and considerable sums were contributed, in order to have other things prepared in a style worthy of the expected Shiloh. On the night of the 19th of October, a very large number of persons assembled in the street where she lived, to hear the announcement of the looked-for advent; but the hour of midnight passed over, and the crowd were only induced to disperse by being informed that Joanna had fallen into a trance. On the 27th of December, 1814, she died, having a short time previously declared that 'if she was deceived, she was at all events misled by some spirit, either good or evil.' Her body was opened after her decease, and the appearance which had deceived her followers, and perhaps herself, was found to have arisen from dropsy. Dr. Reece, one of the medical men by whom she had been examined, and who had publicly expressed his belief in her pregnancy, published, 'A correct Statement of the Circumstances that attended the last Illness and Death of Mrs. Southcott; by Richard Reece, M.D.,' London, 1815. The number of her followers continued to be very great for many years after her death; they believed that there would be a resurrection of her body, and that she was still to be the mother of the promised Shiloh. There are still (1841) believers in Joanna Southcott.

SOUTHEND. [Essex.]

SOUTHERN, THOMAS, an English dramatist, was born at Oxmantown, in the county of Dublin, in 1660 He was admitted student of Trinity College, Dublin, in his seventeenth year, March 13, 1676, and in 1678 entered the Middle Temple, London. Preferring poetry to law, he became a popular writer of plays, the first of which was the 'Persian Prince,' acted in 1682: in the character of the Loyal Brother in this drama, a compliment to the Duke of York was intended, according to the biographer of Southern, in the Life prefixed to his works, 1774. At the time of the Duke of Monmouth's landing, Southern served in the king's army as ensign in Lord Ferrers's regiment, and was afterwards presented with a company by the Duke of Berwick, to whom he had been recommended by Colonel Sarsfield. At the duke's request he wrote the 'Spartan Dame,' which however was not acted till 1721. For the copyright of this play he received 120*l.*, a large sum in those days. After quitting the army, Southern continued to write plays, enjoying great popularity as an author, and living on terms of intimacy with those of his contemporaries most distinguished for wit or rank. Dryden, for whom he finished the play of 'Cleomenes,' and afterwards Pope, were among his friends. Southern died May 26, 1746, at a very advanced age.

In the delineation of character, the conduct of plots, and all the niceties of dramatic art, Southern shows but little skill; he is neither imaginative, as were the elder English dramatists, nor witty in his comic dialogues, like Congreve and others, his contemporaries. But his language is pure, and free from affectation; his verse has a pleasant fluency, and he has been successful in the expression of simple and natural pathos, particularly in the last scenes of the 'Fatal Marriage,' a tragedy which has been much and deservedly admired, and which was popular on the stage in the last century, under the title of 'Isabella.' Some of his plays were published by Tonson, 1721, 12mo.; a complete edition of his works in 1774; they consist of comedies, and of tragedies with an infelicitous mixture of comic scenes. There is a short account of Southern prefixed to this edition, and in the prefaces to the plays are a few particulars of his life, stated by himself. He is wrongly inserted in the 'Athenæ Oxonienses' by Wood. See his Life in that work, ed. Bliss, where will be found a letter from Southern to Dr. Rawlinson, denying that he ever was at Oxford. See also Malone, 'Life of Dryden,' i., 176.

SOUTHGATE. [MIDDLESEX.]

SOUTHWARK, one of the divisions of the metropolis of England, extending along the south bank of the river Thames, opposite the city of London. As this part of the metropolis is included in the general description given elsewhere [LONDON], we have here only to add some particulars of its local history.

The flat, which is bounded on three sides by the Thames, in the bend which it makes between Greenwich and Vauxhall, was originally overflowed by the tide, and formed a large marsh extending to the foot of the eminences which skirt the fourth (*i.e.* the south) side. It is probable that this space was banked in by the Romans so as to secure it from being overflowed; and Roman remains which have been dug up in St. George's Fields and in other places in Southwark or its neighbourhood, indicate that they had a settlement of some kind there. As Ptolemy says that London was in the territory of the Cantii (*Κάντιοι*), it has been inferred that it was on the south side of the Thames; but this opinion has been very generally rejected, as contrary to all the evidence. It is probable that on the site of Southwark there was a suburb of London, with which it communicated by a ferry near the site of the old bridge. At this ferry the great road Watling Street crossed the Thames.

In the early part of the Saxon times there is no notice of any town or other place on this spot; but a tradition of Bartholomew Linsted, or Fowle, last prior of St. Mary Overie, preserved by Stow (*Survey of London*, book i., c. xiii.), notices that the profits of the ferry were devoted by the owner, 'a maiden named Mary,' to the foundation and endowment of a nunnery, or 'house of sisters,' afterwards converted into a college of priests, by whom a bridge of timber was built, which with the aid of the citizens was afterwards converted into one of stone. If this tradition is entitled to credit (which Maitland denies, *Hist. of London*, book i., c. vii.), it would carry back the time of the foundation of the monastery of St. Mary Overie to a much earlier period than any existing historical notice of Southwark: and however doubtful the claim of the priests to the honour of building the bridge may be, we think the tradition may be taken as fair evidence of the early foundation of a religious house, and of its endowment with the profits of the then existing ferry. In A.D. 993, Anlaf, king of Norway, sailed up the river as far as Stane (Staines) (*Saxon Chron.*), from which it has been inferred that there was no bridge between London and Southwark; but this inference is hardly authorised by subsequent events. In A.D. 994 there was a bridge which obstructed the flight of Sweyn's forces when he attacked London, and was repulsed by the citizens. (Willielm. Malmesb., *De Gestis Regum Anglor.*, lib. ii.; and *Sax. Chron.*) In A.D. 1016, when Canute attacked London, the bridge formed an obstacle to the advance of his fleet, and in order to avoid it he dug a trench on the south side, by which he dragged his ships to the west side of the bridge. (*Sax. Chron.*) In the account of these transactions there is no mention of Southwark; yet there must have been some defence for the south end of the bridge; and in A.D. 1023, we read in the *Saxon Chronicle* that 'on the sixth day before the ides of June, the illustrious king (Cnut, or Canute), and the archbishop (Egelnoth of Canterbury), and the diocesan bishops, and the earls, and very many others, both clergy and laity, carried by ship his holy corpse (*i.e.* the body of Aelfeah, or Alphege, saint and martyr) over the Thames to Suthgeweorke, or Southwark, on its way to Canterbury. This is, we believe, the earliest distinct mention of the place. In A.D. 1052, Godwin, then in rebellion against Edward the Confessor, came with his fleet to Southwark, and passing the bridge without opposition, proceeded to attack the king's navy which lay at Westminster; but hostilities were averted by the offer of peace. At this time, Southwark had a harbour for ships (St. Saviour's dock?) and a monastery or church (St. Mary Overie?), both belonging to the king. Southwark was burned by William the Conqueror, when the citizens of London, after the battle of Hastings, closed their gates against him. In 'Domesday' the name appears under the form Sudwerche.

The wooden bridge which connected Southwark with London was burned in a fire which consumed great part of the city (A.D. 1136). It was however repaired in a few years afterwards; and in A.D. 1163 still more thoroughly restored. It is probable that the charge of these repairs led to the erection of a more stable fabric of stone (A.D. 1176-1209), which remained till within the last few years. The old timber bridge appears to have been opposite Botolph Wharf, midway between the Custom-House and the present bridge: the former stone bridge was between the timber bridge and the present one, at the foot of Fish Street Hill. In order to the erection of the stone bridge, a new channel was cut for the stream, so as to lay the natural bed of the river nearly dry. It appears that the bridge was not at first wholly occupied with houses, for in A.D. 1395 there was a tournament held on it. Stow infers from this that there were then no houses at all on the bridge, but such an inference is by no means necessary. In A.D. 1471 there were houses, several being burned by the Bastard of Fauconbridge. There appears to have been from the first a drawbridge, so as to allow the passage of vessels above bridge: also a chapel on the east side; and two towers for defence, one at the south end of the bridge, and the other at the north end of the drawbridge. The bridge underwent many alterations and sustained many injuries before its final removal. The most remarkable alterations were the removal of the drawbridge and the clearing away of the houses and other buildings: the last alteration took place A.D. 1756. The bridge itself was taken down in 1831, after the opening of the present London Bridge.

In A.D. 1213 Southwark was nearly destroyed by fire; and the flames having communicated to the northern end of the bridge, a number of the inhabitants of London, who had come to assist in putting out the fire, were destroyed by it or drowned in their attempts to escape: about 3000 are said to have perished. In A.D. 1327 Southwark was, by charter of Edward III., in the first year of his reign, given to the city, great inconvenience having been found to arise from its affording a refuge to offenders of various kinds. The city was to pay to the Exchequer a yearly sum of 10*l.* as fee-farm rent. Though in this grant it is called a 'village,' it must have been of considerable size; for it had four parish churches—St. Mary's, a chapel of the great conventual church of St. Mary Over-the-Rie (or water); St. Margaret's, where the town-hall now stands; St. Olave's; and St. George's; besides the priory and church of St. Mary Over-the-Rie (or Overy), for the canons of St. Augustin; the hospital of St. Thomas; two prisons, the King's Bench and the Marshalsea; and the houses of several prelates, nobles, or abbots. Near it were the villages of Rotherhithe or Redriffe; Bermondsey, with its Cluniac priory (afterwards an abbey); and Walworth; and the market-town of Lambeth, the residence of the primate, and in the parish of which, at Kennington, was a royal palace.

In A.D. 1381 the insurgent populace, under Wat Tyler, took possession of Southwark, broke open the prisons and released the prisoners, and destroyed the 'stews' or brothels on Bankside, which were farmed of the city. They then, by threats of burning Southwark, obliged the lord mayor of London to admit them into the city, where they committed great excesses. In Cade's insurrection (A.D. 1450), Southwark was again occupied by the rebels, who, by intimidation, forced their way into the city. Twenty years afterwards (A.D. 1471), Southwark was seized by the Bastard of Fauconbridge. He attempted to storm the bridge, but was repulsed with great slaughter. In A.D. 1554 Southwark was occupied by Sir Thomas Wyatt, who was joined by the townsmen; but he could not gain admission into London. It appears from these events that Southwark was destitute of fortifications.

In the time of Elizabeth, Southwark appears to have consisted of a line of street extending from the bridge nearly to where is now the King's Bench, formerly called Long Southwark; Kent Street, then the high road to Dover, and of which only the part near St. George's Church was lined with houses; a line of street, including Tooley (*i.e.* St. Olave's) Street, extending from the bridge foot to Rotherhithe Church; another line of street, running westward by Bankside to where the Blackfriars Road now stands; and Bermondsey Street, branching off from Tooley Street to Bermondsey church. Except near St. Mary Overy's (now St. Saviour's) Church, there were scarcely any back or cross streets. Near Bankside were the bishop of Winchester's palace, the Globe theatre, the 'stews,' before spoken of (which were however suppressed at the Reformation), and two bear-gardens for baiting bulls and bears. The villages of Lambeth, Kennington, Newington, and Walworth were then separated by open fields.

In the civil war of Charles I., Southwark was included within the circuit of the fortifications erected by order of parliament. Towards the close of the seventeenth century it had considerably extended. The houses on the east side of Blackman Street extended to Newington and Walworth, which were thus united to the metropolis; but St. George's Fields, on the opposite side, still remained open. Back streets had been formed on each side of the High Street as far as St. George's Church. In the early part of the following century the buildings extended along the river bank to Lambeth; and Rotherhithe Street was continued to and even beyond Cuckold's Point, where the river bends to the southward. Later still, the opening of Blackfriars Bridge led to the formation of Great Surrey Street; and towards the close of the century St. George's Fields were enclosed and laid out in new streets. Since the commencement of the present century, Lambeth Marsh, which formerly separated Southwark from Lambeth, has been covered with new streets and buildings; and in every direction Southwark has spread, till it has united with the surrounding villages, from Greenwich to Battersea, and combined them into one large town, forming the southern division of the metropolis, and having a population of 300,000, of which town Southwark may be regarded as the nucleus.

Since its annexation to the city, its ecclesiastical divisions have become more numerous. The two parishes of St. Mary and St. Margaret have indeed been united into one, of which the fine old priory church of St. Mary Overie, better known as St. Saviour's, is the parish church; but the parish of Christ Church has been formed from this united one of St. Saviour; and within the last year or two, a new district church, St. Peter's, in Park Street, Bankside, in the same parish (St. Saviour's), has been completed. St. John's, Horslydown, has been formed out of St. Olave's, and St. Thomas's Hospital church has become parochial. That part of St. Saviour's parish of which Christ Church parish was formed, appears not to have been included in the grant to the city of London, which probably comprehended only the king's manor of Southwark, from which that of Christ Church (antiently the manor of Paris Garden) was distinct. Another portion of St. Saviour's parish, 'the Clink Liberty,' belongs to the bishop of Winchester, who appoints a steward and bailiff, and appears never to have been granted to the city.

The grant of Edward III. appears only to have conveyed to the city the lordship of the manor: this jurisdiction was augmented by new privileges in subsequent reigns; and in the reign of Edward VI., Southwark was by letters patent incorporated with the city, and constituted the ward of Bridge Without. Certain lands were excepted from this arrangement, as Southwark Mansion and Park, belonging to the king. The ward appears never to have been represented in the Common Council, nor do the inhabitants now elect their alderman. The senior alderman of London is always alderman of this ward, and on his death the next in seniority succeeds. He has no ward duties to perform. In the article LONDON [vol. xiv., p. 117] this is said, but not accurately, to be the case with the alderman of 'Bridge' Ward. There is a Bridge Ward Within, which is properly a part of the city; and Bridge Ward Without, which comprehends Southwark. The alderman of Bridge Ward *Within* has the same duties as any other alderman. The city of London appoints a high-bailiff and steward for Southwark, but the county magistrates for Surrey exercise jurisdiction in several matters: it is also in the district of the metropolitan police.

Southwark is a parliamentary borough, and has sent two representatives to parliament uninterruptedly from 23 Edward I. It is by Londoners colloquially termed 'The Borough.' By the Boundary Act, the Clink Liberty, and the parishes of Christ Church, Bermondsey, and Rotherhithe, have been added to it for parliamentary purposes. The number of voters on the register in 1835-6 was 5388; in 1839-40, 5047, viz. 4096 ten-pound householders, and 951 scot and lot voters.

The borough as thus enlarged comprehends an important manufacturing and commercial district. Along the waterside there are numerous wharfs, and various establishments which are necessary for the construction, equipage, and freight of vessels. A considerable hat-manufacture is carried on in St. Saviour's parish and in Bermondsey, in which latter there are a number of tanners and curriers. Southwark is the chief place of business of those connected with the hop-trade; the largest porter brewery in London, and indeed in the world (Messrs. Barclay and Co.'s), and a very extensive vinegar-yard (Messrs. Potts'), are included within it.

(Stow's *London;* Manning's *Surrey; Parliamentary Papers;* &c.)

SOUTHWELL. [NOTTINGHAMSHIRE.]

SOUTHWELL, ROBERT, descended from an antient family in Norfolk, was born in 1560. He was educated on the Continent, and in 1578 entered the Society of Jesuits at Rome. In 1585 he was appointed prefect of the English Jesuits' College in that city, and was soon afterwards sent to England as a missionary. He resided chiefly with Anne, countess of Arundel, who was imprisoned in the Tower of London, and died there. Southwell was apprehended in July, 1592, and was strictly examined by Queen Elizabeth's agents as to a supposed plot against the queen's government. No disclosures could be obtained from him, and he was committed to the Tower, where, in the course of three years, he was ten times subjected to the torture. At length he admitted that he was a Jesuit, and that he came to England for the purpose of making proselytes to the Roman Catholic faith. By an act passed in 1585 (27 Eliz., c. 2) an Englishman who was a Jesuit and refused to take the oath of supremacy was declared to be guilty of treason. It was probably under this act that, on the 20th of February, 1595, he was brought to trial in the Court of King's Bench. Our authorities however do not state what was the precise charge against him, but he was found guilty, was condemned to death, and on the following day was executed at Tyburn. His demeanour was firm, he declared that he was proud to profess himself a Jesuit, and thanked God that he had been called upon to suffer martyrdom. In the 'Gentleman's Magazine,' vol. 67, there is a notice of his life, with a copious list of his works. His writings, which are both in prose and verse, were once very popular among the Roman Catholics. He writes rather elegant English for the age in which he lived, but the matter will hardly repay the trouble of perusal, at least to Protestants.

Southwell's principal works are the following:—'A Consolation to Catholics imprisoned on account of Religion,' and a 'Supplication to Queen Elizabeth,' London, 1593; 'St. Peter's Complaint; with other Poems,' 1593; 'Mæoniæ; or Certain excellent Poems and Spirituall Hymns,' 1595, 4to., 1600, 4to., 1620, 1630, 1634, 12mo.; 'The Triumph over Death,' 1595, 1596; 'A Short Rule of Good Life,' 8vo.; 'Mary Magdalen's Funeral Tears,' 1609; 'Epistle of Comfort to those Catholics who lie under Restraint,' 1605, 8vo.; 'Peter's Complaint,' Mary Magdalen's Tears,' and the 'Triumph over Death,' were printed together in 8vo., London. 1620.

SOUTHWELL, NATHANIEL, became a Jesuit in 1624, and twenty-four years afterwards was made secretary to the general of the Order, which office he held during seventeen years. He died at Rome in 1676, in which year he published his continuation of the Jesuits' *Library*, 'Bibliotheca Scriptorum Societatis Jesu, Opus inchoatum à R.P. Petro Ribadeneira, et productum ad Annum 1609; continuatum à Philippo Alegambe ad Annum 1643; recognitum et productum ad Annum 1675, à Nathanaelo Sotwello,' Rome, 1676, folio. Southwell's continuation is considered inferior to that of Alegambe. The work was afterwards continued by Oudin, who commenced his task in 1733, and performed it to the general satisfaction of the Society.

SOUTHWOLD. [SUFFOLK.]

SOUZA, MANUEL FARIA E, was born at Souto in Portugal, 1590, of a noble and antient family. He manifested great precocity, and when nine years old was sent to the university of Braga, where he distinguished himself. In 1605 he was taken as secretary by one of his powerful relations, and then commenced his diplomatic education. In 1618 he married and went to Madrid; but though well recommended, his rough manner hindered his advancement at court. In 1632 he was sent on an embassy, under the Marquis Castel Rodrigo, to Rome, where his learning attracted the attention of Urban VIII. and the men of letters at the pontifical court. Having some quarrel with the marquis, he quitted him and returned to Spain; but he was arrested at Barcelona by order of the marquis, and was only released by the powerful intercession of some friends. He then renounced politics, and devoted himself exclusively to literature. Such was his activity, that he himself states that he daily wrote forty-eight pages, each page containing thirty lines; and he possessed such rhetorical facility, that in one day he could compose a hundred addresses of congratulation and condolence, all different from each other. (Bouterwek, *Hist. of Port. Lit.*, 278.) He obtained a small pension from Philip IV. and the cross of chevalier; but to his pen he trusted for subsistence. He died in 1649, at Madrid. His manners were very eccentric, and his dress the same; neither the entreaties of his wife nor of his friends could prevail on him to cut off the immense beard which disfigured him. He was proud, independent, and vehement, but affectionate and amiable.

As a poet, Souza ranks high in Portugal, though most of his works are written in Spanish; but his works are little relished by foreigners, nor have they been translated. His talents were vitiated by the bad taste of the age. He was but a reflex of the extravagancies and conceits of Lope de Vega, Marino, and Gongora. Prodigious facility and fertility of images and rhymes he certainly displays, but they are of themselves vices when not corrected by a refined judgment. Most of his ideas are intolerably fantastic, as where he speaks of the 'ten lucid arrows of crystal which were darted from his Albania's eyes, which produced a rubious effect on his pain, though the cause was crystalline:'

Flechando de sus manos peregrinas,
De cristal diez luzientes passadores,
De rubi fue el efeto en mis dolores
Si de Albania las causas cristalinas.'

And yet he sometimes hits a very fanciful image, as where he says of his mistress's eyes, 'Love has written my fate in the beauty of those eyes, which are as large as my pain and dark as my destiny:'

'Ojos, en cuya hermosura
Cifrò mi suerte el Amor,
Grandes como mi dolor,
Negros como mi ventura.'

But when we add that he wrote six hundred sonnets, besides eclogues, and all in this strained fanciful style, it may be conceived how tedious his works become.

As a critic he has been long revered as an oracle, 'de ser venerado por Oraculo,' says Machado; but an inspection of his treatises on the sonnet and on poetry will show the worthlessness of them. They are curious evidences of what a nation will consent to as regards criticism. Souza also published a 'Commentary on the Lusiad,' which is interesting for the same cause as his treatises, and which Bouterwek thinks 'a production more calculated to obscure than illustrate the original.' Souza's works are:—1, 'Discursos Morales y Politicos,' Madrid, 1623; 2, 'Commentarios sobre la Lusiada,' 1639; 3, 'Defensa por los Commentarios sobre la Lusiada,' 1640; 4, 'Rimas varias de Luis de Camoes, commentados por Manuel de Faria y Souza,' Lisbon, 1685; 5, 'Epitome de las Historias Portuguesas,' 1626; 6, 'Europea Portugesa,' 1666; 7, 'Imperio de la China, y Cultura Evangelica por los Religiosos de la Compañia de Jesus,' 1643; 8, 'Fuente de Aganipe, varias Rimas,' 1646.

(Bouterwek, *Hist. of Port. Lit.*; Heyse, *Grundriss einer Gesch. der Port. Lit.*; *Biog. Universelle*; Sismondi, *Lit. du Midi*.)

SOUZA, JEAN DE, born at Damascus in Syria, 1730, of Roman Catholic parents. He came to Lisbon with some French Capuchins in 1750, and was there protected by the house of Saldanha. Gaspar Saldanha presented him to the Marquis of Pombal, who appointed him as interpreter and secretary to the embassy which Joseph I. sent in 1773 to the emperor of Marocco. He was often employed in such negociations, and always acquitted himself with credit. The queen having founded a chair for the Arabic language in the University, she named Souza professor, and be composed for it the Grammar which is still in use. He was made correspondent of the Royal Academy of Sciences, and retiring to the convent of Jesus, died there January 29th, 1812. (*Biographie Universelle.*)

SOUZA-BOTELHO, DOM JOSE-MARIA, born at Oporto, 9th March, 1758. His father was governor-general of the province of St Paul in Brazil. Souza was educated at the university of Coimbra, and in 1778 he entered the army, where he served till 1791. He was then nominated ambassador-plenipotentiary to Sweden. From Stockholm he passed in 1795 to Copenhagen in the same capacity. His father's death recalled him in 1799 to Lisbon. He was next sent on a mission to England, but the object of his mission was frustrated by the French not admitting him to the congress at Amiens in order to look after the interests of Portugal. On the general peace in 1802, Souza went to France as plenipotentiary, and stayed there till 1805, where he had every possible exercise for his diplomatic ingenuity. It was a perilous position; and, disgusted with public affairs, he resolved to confine his attention to literature, for which he had always manifested a strong disposition. Camoens, the pride of Portugal, had ever been his favourite author, and he resolved on producing an edition of his works which should be a lasting monument. He spared neither time, trouble, nor expense. He corresponded with all the learned, and after twelve years' labour he had the satisfaction of completing it in 1818. He prefixed a dedication to the king of Portugal, a mass of curious bibliographical researches, and a critique on Camoens, where in his editorial enthusiasm he extols Camoens over all modern poets, and even implies that he equals Homer and Virgil. He formed the project of writing a History of Portugal, but his declining health only allowed him to finish some fragments of it. He died in 1819. (*Biographie des Contemporains*; Heyse, *Grundriss*, &c.; *Biog. Univ.*)

SOVEREIGN. [MONEY.]

SOVEREIGNTY. *Supranus* is a low Latin word, formed from *supra*, like *subtranus*, another low Latin word, formed from *subtra*. (Ducange *in vv.*) These words however, though they do not belong to classical Latinity, are formed according to the same analogy as the classical word *supernus* from *super*. From *supranus* have been derived the Italian *soprano* or *sovrano*, and the French *souverain*, from the latter of which has been borrowed the English word *sovereign*. In the old English writers the word is correctly spelt *soverain* or *soverein* (Richardson *in v.*); the received orthography seems to be founded on the erroneous supposition that the last syllable of the word is connected with *reign*, *regnum*. Milton spells the word *sovran*, deriving it from the Italian; but it passed into our language from the French.

Having explained the etymology of the word *sovereign*, and its derivative, *sovereignty*, we proceed to consider the meaning of the term sovereignty as it is understood by political and juridical writers.

In every society, not being in a state of nature or a state of anarchy [ANARCHY], some person or persons must possess the supreme or *sovereign* power.

The marks by which the possession of the sovereign power may be distinguished are mainly two, the one positive and the other negative; viz.:

1. A habit of obedience to some determinate person or persons, by the community which he or they affect to govern.

2. The absence of a habit of obedience, on the part of the same person or persons, to any person or government.

Whenever these two marks meet in any person or body of persons, such person or body possesses the sovereign power; on the other hand, if either of the two marks be wanting, the person or body is not sovereign. For example, the local government of Jamaica or Sydney, being in the habit of obeying the English parliament, is not a sovereign or supreme government; whereas the government of Tuscany, or the States of the Church, although it may occasionally defer to the wishes of Austria, is not in a habit of obedience to that or any other state, and therefore is a sovereign government. Again, a body of persons calling themselves a government, but unable through their weakness to secure the habitual obedience of the people, are not sovereign, and would not be recognised as a sovereign government by foreign states.

Inasmuch as it is impossible to fix the precise moment at which a habit of obedience to a foreign government ceases, it is difficult for foreign states to determine when they will recognise the sovereignty of a territory, once dependent, which has achieved its independence.

The sovereign powers include all the powers which can be exercised by a government. They include the legislative power, the executive power, the power of making *privilegia* [Law; Legislation], the power of declaring peace and war, the power of concluding treaties with foreign states, and the power of instituting inquiries.

The sovereign power is unlimited by any legal check or control. The securities for its beneficial exercise are derived exclusively from the balance of interests and the influence of public opinion.

Sovereign or supreme governments are divided into Monarchies and Republics; and Republics are divided into Aristocracies and Democracies.

It is commonly, but erroneously, thought that the sovereignty resides in every person who bears the name of *king*; in other words, that every king is a monarch. Accordingly those kingdoms in which the king is not strictly a monarch are called 'limited monarchies;' and the king is supposed to be a sovereign whose power is checked or controlled by certain popular bodies; whereas, in truth, the sovereignty is divided between the king and the popular body, and the former does not possess the entire sovereignty. This subject is further explained in Monarchy and Royalty.

A sovereign government may cease to exist as such by becoming a subordinate government (as was, for example, the case with the governments of the islands of the Ægean, conquered by Athens, and the governments of the states which became Roman provinces), or by its dissolution, in consequence of a successful rebellion of its own subjects, or any other cause.

The subject of sovereignty will be found best explained in Mr. Austin's 'Province of Jurisprudence determined.' The received doctrines upon the subject will likewise be found in the treatises on international law. The *Leviathan* of Hobbes contains a very correct view of the nature of sovereignty, which has been often misunderstood and misrepresented by later writers.

SOW-THISTLE. [Sonchus.]

SOWING AND SOWING-MACHINES. The sowing of the seed has always been looked upon as one of the most important operations of husbandry. Much of the success of the future crops depends on the time and the mode in which the seed is committed to the earth. After the land has been well prepared by judicious tillage and manuring, many accidents and circumstances may disappoint the hope of the farmer, and the crop may be scanty or fail altogether. The weather and the seasons are not under his control, and he must submit to the dispensations of Providence with pious resignation; but much also depends on his own judgment and skill. If he selects the best seeds chooses the proper season for sowing them, and has them carefully distributed and properly covered with earth, as their nature requires for the most perfect germination, and thus also protects them from the voracity of birds or insects, he will have a much greater prospect of success, under all circumstances, than if he were careless or negligent.

The most common mode of sowing the seed is by scattering it as evenly as possible over the ploughed surface, as it lies in ridges from the plough. The harrows follow, and crumbling down the ridges, cover the seed which has fallen in the hollows between them. It requires an experienced sower to scatter the exact quantity over a given surface, without crowding the seed in one spot, and allowing too great intervals in another. Hence the farmer who does not himself sow the seed, invariably chooses the most experienced and skilful labourer to perform this work. Notwithstanding every care and attention on the part of the farmer or master, the labourer will often relax and become careless, and the result appears only when it is too late to remedy it. This has given rise to the various attempts which have been made to invent machines for sowing the seed, such as should insure perfect regularity. Of some of these we will now give a short account.

One of the simplest of these machines consisted in a hollow cylinder, with one or more rows of holes in a line parallel to the axis. These holes can be stopped in part if required. The seed is put into the cylinder, the length of which is equal to the width of the land, or stitch, which it is desired to sow at a time. By shaking this when held horizontally and at right angles to the path of the sower, the seed is scattered with considerable regularity: one inconvenience of this instrument is that it requires to be filled frequently, and that much still depends on the attention of the operator. Accordingly it was very soon laid by. The idea however was followed up and improved upon in the *sowing-barrow*, an instrument still extensively used for sowing grass-seeds. It consists of a wooden trough placed on the frame of a light wheelbarrow. An iron spindle, furnished with circular brushes at regular intervals, runs the whole length of the trough, and is turned by means of simple machinery connected with the wheel. Opposite each brush is a brass plate, with holes of different sizes, which can be partly closed by means of a circular slide. According to the size of the seed to be sown and the quantity to be scattered, the holes are opened or shut. The seed is put into the trough, which has a cover or lid; and by merely wheeling the barrow in a straight line, a breadth is sown equal to the length of the trough, usually 12 or 15 feet. But this machine cannot conveniently be used in windy weather, which disperses the seeds irregularly; and it is very little superior to sowing by the hand, except in the case of small seeds, which cannot so well be spread evenly by the hand.

The drill husbandry has suggested other more complicated machines, of which some account will be found in the article Drill. The principle of these is to deliver the seed by means of funnels, each corresponding to a small furrow made by a coulter placed immediately before the funnel; and some of these machines perform the work very regularly and satisfactorily. As the inequalities of the ground require that the coulters should move up or down, to allow for these inequalities, the seed cannot be accurately deposited at a given depth; and some improvement in the mode of drilling is yet desirable, and has in some measure been effected. The patent lever-drill in common use is very imperfect in its work, and the remedy lies in the greater attention to the preparation of the surface. When this is effected, the levers may be set aside, and a much simpler drill, such as was used at first, may replace it. The object is to make furrows of equal depth in which to deposit the seed, and to cover this uniformly. The land must consequently be more carefully prepared by repeated harrowing and rolling, till the surface resembles the seed-beds in a garden. A simple drill, which makes equidistant furrows at a given depth, in which the seed drops regularly, will then do better work than a more complicated machine; but if still greater accuracy and perfection are desired, the dibble must be had recourse to. No one will deny that seed deposited by means of a dibble is distributed more equally and covered with a more equal depth of soil than by any other means, and that there is a great economy of seed in this mode of sowing; but the slowness of the operation, and the number of hands it would require to dibble all the seed on a large farm, have prevented its being very generally adopted. [Arable Land.] Many attempts have been made to invent machines to imitate the work done by hand in dibbling, and hitherto with no marked success, owing chiefly to the difficulty of clearing the dibbles from the adhering soil, and making a clean hole, and also of letting the seed fall exactly in the dibble-holes. Several patents have lately been taken out for dibbling-machines, of which we shall only notice three. The first machine consists of large hollow disks, armed at the circumference with blunt projections or knobs, which make a depression in the surface as the disk revolves: these knobs are hollow, and open by one half sliding upwards as the knob leaves the depression it has made. The seed which has been deposited in the hollow knob falls into the hole. This machine is said to do its work well, and was exhibited at the meeting of the Royal Agricultural Society at Liverpool, in 1841.

The next is Bradshaw's patent, which is not so generally known, having only been tried by the inventor and his friends. Here the dibbles are moved up and down by means of a crank or excentric circle, and are twisted in the ground by means of a projection from the shank of the dibble, which is connected with the frame of the machine; and when the dibble is moved by the crank, the rod is twisted by the difference in the motion of the crank and the machine. The seed is delivered by means of a cylinder with cavities in its surface, which revolves very near the ground, the seed being kept in these cavities by a leather belt, which only lets them out at the lowest part.

The last, of which the specification was only enrolled the 25th Nov., 1841, and is somewhat on the same principle, was invented by the Rev. W. L. Rham, of Winkfield, Berkshire. This machine, which was exhibited at the meeting of the Royal Agricultural Society of England at Liverpool, in 1841, is thus noticed by the judges of the implements appointed by that Society:—

'The Rev. W. L. Rham, of Winkfield, Berkshire, exhibited an implement, the principal object of which is to extend and improve the system of drilling and dibbling wheat, beans, &c. It is chiefly in its latter capacity, as a dibbler of seed and manure, that we shall attempt to give a slight description of it. The operative part of the machine is suspended upon an iron carriage having four wheels, the two hinder ones being fast upon their axle and turning with it. On this axle is a spur-wheel, giving motion to a pinion on an intermediary axle, which carries a wheel geared into a second pinion fixed on its axis, having six cranks arranged spirally. The velocity given to the axis is such that the cranks make one revolution for every six inches of the circumference of the hind wheels, or whatever is the distance desired between dibble-holes. The radius of each crank is such that this distance shall be equal to the circumference described by one revolution. Thus the space described by every crank coincides with that passed over in the same time by the hind wheels; and as the cranks turn, during the half of a revolution, in an opposite direction to that of the wheels, the result of this compound motion is a pause or rest of short duration, at the point where the crank in its rotation commences to retrograde from the line of progress of the machine, *i.e.* at the lowest point, and when the dibbles are in the ground. The crank raises the dibbles up and down by means of connecting rods and levers, which double the vertical without increasing the horizontal motion; and in order that the point, when in the ground, may be perfectly stationary, it is made the centre of motion while the machine progresses; and to enable it to retain that position for a sufficient length of time for the purpose of leaving a hole truly vertical, the dibbles move between checks in the rod which connects it with the crank, and which has a spring to restore it quickly to its proper place as it rises out of the ground. During therefore the entire time occupied in its piercing the hole and being withdrawn from the soil, the dibble retains its perpendicularity.

'By an ingenious and simple contrivance, a slow rotatory motion about its own axis is given to the dibble, by which means its point may be said to *bore* into the ground, thus assisting in the formation of the hole; and by the same action the dibble is cleared of any adhering soil, and the hole left firm and clear.

'The seed-valve consists of a cylinder, with a cavity in it of dimensions sufficient to hold one or more seeds. This cylinder is *tumbled* over, and the seed discharged into a recipient of the shape of a quadrant, from which it is *pushed out*, when the cylinder returns to its first position and takes in a fresh supply. As this motion is sudden, the seed is surely delivered, even when rather damp: when the cylinder is delivering, the quadrant is receiving, and *vice versâ*. The delivery of manure is effected by a similar apparatus only of a larger size, the valves being furnished with brushes or other means to remove the superfluity.

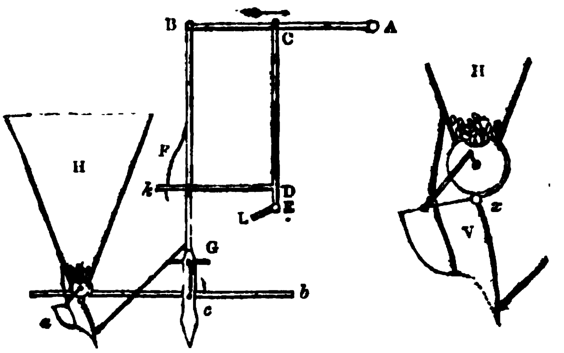
'The valves are connected with the dibbles in such a manner as to deposit the manure and seed in the hole last formed, whilst the dibbles are stationary in the advancing one. The dibbles bore their holes in shallow drills made by the pressure and sliding action of an iron shoe shaped like a boat, and forming a smooth furrow.

'The whole of the machinery is supported by an iron frame, one end of which rests on trunnions attached to a projecting part of the back of the carriage. It is suspended at the other end by a cross shaft carrying two pinions, working in arcs of circles fixed on the frame, so that it can be raised or depressed at pleasure, or elevated clear of the ground by one turn of a winch. At the same time, the pinion connecting the machinery with the hind wheels is put out of gear, and the whole can be moved about on the carriage. The implement is steered in a manner somewhat similar to Lord Western's drill.

'The object of the Rev. gentleman in contriving this original and singularly ingenious implement has been to imitate the more minute and certain manipulations of the gardener; and so to adapt his machinery to the drilling and dibbling of seed upon land previously laid flat and well prepared, that every field, however extensive, should present the neatness and regularity of a highly-finished garden.

'The distinguishing peculiarities of this remarkable piece of mechanism are the arrangements for the dibbles to *bore* holes, causing them to be perpendicular and truly cylindrical, and the apparatus for giving certainty to the valves in receiving and delivering the manure.'

In order to render the above highly commendatory report of the judges more intelligible to those who have not seen this implement, we will add a slight diagram to explain the most essential parts.



ACB is a lever, whose fulcrum is at A; BG the rod of the dibble M, which turns on it by means of a socket; CDE is the rod which communicates the motion to the lever ACB, by means of the crank LE moved by the machinery. KD is a rod connecting the crank with the rod of the dibble and having a slit or cheeks in which this rod moves. F is the spring which keeps the rod in its place when the dibble is out of the ground. *ab* is an iron plate with a slit or cheeks to keep the dibble from swerving from the line of the furrow made by the shoe. *c* is a pin projecting upwards from this plate and bent at its upper end. This pin meets one of four arms projecting horizontally from the shank of the dibble whenever it descends into the ground: and as it proceeds with the carriage while the dibble is at rest, it gives this a motion round its rod to the extent of a quarter of a circle. When the rod rises, it clears the arms from the pin, which, at the next descent, meets with another arm; and thus a complete revolution is effected in four descents of the dibble.

The valve consists of a cylinder *d* with a cavity sufficient to contain the required number of seeds to be deposited in each hole, a brush *e* to remove any superfluous seeds, and a recipient *v* in the form of a quadrant, in which they drop when the cylinder is suddenly turned half round on its axis. This is effected by a small crank fixed to the axis, and connected by a rod *r* with the quadrant *v*. The quadrant itself moves ½ round its centre *x* by means of a rod *q* which connects it with the dibble, or with the crank, when the dibble is not used; and the seed is dropped into the dibble-hole or the furrow when the quadrant is pushed back in its place. A rake and roller are attached to the implement to complete the operation.

This may give some idea of this new machine, and if it answer the expectations of the inventor, it will cause a great saving in the seed and labour of sowing, while it will deposit the seed much more regularly, and at an equal depth.

The stimulus which has been given to improvements in the implements and operations of husbandry by the establishment of the Royal Agricultural Society of England, will greatly increase the number of useful inventions by which all the common operations will be simplified, and the labour of the hands will be performed by machinery, wherever there is a deficiency of labourers or a great demand for them in more profitable mechanical employments, and where machinery, which works automatically and with certainty, becomes superior to manual dexterity.

SOY. [SOJA.]

SOYA, or **SOWA**, an umbelliferous plant cultivated in India. It is the *Anethum Sowa* of Roxburgh, of which the aromatic seed is much used by the natives in cookery, as well as for medicinal purposes; the green parts also are cut down, and sold in the bazars, as the plant is used as a vegetable both by Mussulmans and Hindus. The seeds are the *shubit* of Avicenna, which is usually translated Anethum; by the Arabs it seems to have been considered the Anethum (ἄνηθον) of Dioscorides.

SOYMI'DA, a genus of plants of the natural family of Meliaceæ, named by Adr. Jussieu from the Telinga name of the tree, which was referred to Swietenia, and called *S. febrifuga* by Dr. Roxburgh. This is a large forest-tree, a native of the mountainous parts of the Rajahmundry Circars, and likewise of the jungly parts in general of the central parts of India. The genus is characterised by calyx 5-leaved, imbricate. Petals 5, shortly clawed. Stamen tube cup shaped; 10-lobed, each lobe bi-dentate at the apex. Anthers 10, included within the tube and lodged between the teeth of the lobes. Ovary 5-celled, seated on a broad disk. Ovules numerous, pendulous from the centre of the cells. Style short, stigma peltate, 5-cornered. Capsule woody, 5-celled, 5-valved. Seeds winged. The only species known attains a height of 80 feet, with abruptly pinnate leaves. The inflorescence a large diffuse and terminal panicle.

This tree, which is called *rohuna* in Hindustan, is particularly noted on account of its bark. This is of a dull red colour, of a fibrous nature, and astringent, and has been much employed in India for the cure of intermittent fevers. It was first introduced to public notice by Dr. Roxburgh in India, and by Dr. Duncan in this country, and is no doubt suited to the milder class of agues, but probably is not to be depended on in the more severe affections of this nature.

SOYUTI, a philosopher, called by Wüstenfeld ('Geschichte der Arabischen Aerzte und Naturforscher,' 8vo., Göttingen, 1840, p. 156) Abul-Fadhl Abd el-Rahman Ben Abu Bekr Ben Mohammed Jelál ed Din el-Soyuti, or Osyuti, was born on the 1st of Rajeb, A.H. 849 (2 October, A.D. 1445) at Cairo. He received a good education, so that in his fifteenth year he entered the academy, where he heard the most distinguished teachers, and at the same time began to give instruction himself in some departments. He was most deeply versed in the exposition of the Korân, the criticism of traditions, jurisprudence, and the syntax of the Arabic grammar. His studies embraced almost all the sciences; but he himself confesses that his knowledge of medicine was very slight and superficial, and to attempt to solve a mathematical problem seemed to him as if he were obliged to carry a mountain: notwithstanding this, he composed some works on medical subjects. He was so voluminous a writer, that the number of his writings is said to have amounted to 560; of these however some are said to have consisted of a single sheet, many were nothing more than a pamphlet, and others were only extracts and compilations from larger works. His extensive learning is duly acknowledged by his contemporaries, but at the same time he is justly reproached for being too much taken up with himself, and thinking himself equally raised above the scholars of his own time and his predecessors. Although on this account he had few friends, he succeeded in being appointed professor at the Academia Sheichunia, A.H. 872 (A.D 1467) as his father had been before him; and besides other appointments, he afterwards received also the professorship at the Academia Bibarsia.* However, he was deprived of the latter appointment A.H. 906 (A.D. 1500), and when it was offered him again, A.H. 909 (A.D. 1503), he refused it. He died on the 18th Jomada I., A.H. 911 (17th Sept., A.D. 1505). The following list of such of his works as relate to medicine, or have been published, is given by Wüstenfeld: 1, 'Codex Animalium,' an extract out of Demiri's *Historia Animalium*, with a sketch of the medical uses to be obtained from animals, and an appendix; printed in Latin, with the title *De Proprietatibus et Virtutibus Medicis Animalium*, ed. Abraham Ecchellensis, Paris, 1647; and again, with remarks by John Eliot, London, 1649, or Leyden, 1699; 2, 'Inscriptio Codicis de Nominibus Animalium,' a continuation of the former; 3, 'Tractatus de Febre ejusque Speciebus;' 4, 'Revelatio Nubis de Praestantia Febris;' 5, 'Hortus Mundus de Puritate à Menstruis;' 6, 'Via Plana et Locus Adaequationis Irriguus, de Dictis, Factisque Mohammedis ad Medicinam Spectantibus;' 7, 'Liber Classium Virorum qui Korani et Traditionum Cognitione excelluerunt, Auctore Abu Abdalla Dahabio, in Epitomen coegit et continuavit Anonymus, e Cod. Goth.,' ed. H. F. Wüstenfeld, Gottingae, 1833; the *Anonymous* author is Soyuti; 8, 'Conversatio Pulchra de Historia Misrae et Cahirae; Fragmenta quaedam Auctore Gelal-eddino Sojuthensi e Cod. Upsal. excerp. Car. Joh. Tornberg,' Upsaliae, 1834; 9, 'Sojutii Liber de Interpretibus Korani,' ed. Alb. Meursinge, Lugdun. Batav., 1839. Wüstenfeld considers that the work translated by Reynolds, with the title 'History of the Temple of Jerusalem,' by Jalál Addin al Siuti, Lond., 1836, 8vo., is not to be attributed to the subject of the present article.

SOZO'MENUS, HERMIAS, called, by some, of Salamis in Cyprus, otherwise named Salamanes Hermias Sozomenus, or Hermias, son of Sozomenus, a church historian of the fifth century, was born in Palestine, probably at Gaza. He was educated in a monastery, and, after studying law at Berytus, went to Constantinople, where he practised as an advocate, and also wrote in Greek his 'Church History,' which consists of 9 books, and embraces a period of 117 years, from 323 to 439 A.D. He is superior to his contemporary Socrates in his style, which is modelled upon that of Xenophon; but in other respects there is such a close resemblance between the works, that Sozomen, who was the younger of the two, is supposed to have seen the work of Socrates, and to have used it without acknowledgment. He sometimes mentions facts that are not in Socrates, but these are generally of little importance, and relate chiefly to the hermits and monks, of whom he expresses unbounded admiration. He is deficient in judgment, and makes many chronological errors. His ninth book relates chiefly to political history. Sozomen lived in the reign of Theodosius II., to whom he dedicates his History. He had previously written an epitome of church history from the ascension of Christ to the defeat of Licinius, which is not now extant.

The history of Sozomen is printed with all the editions of Socrates.

(Valesius, *De Vit. et Script. Socratis et Sozomeni*; Lardner's *Credibility*; Schoell's *Geschichte der Griechischen Litteratur*, vol. iii., p. 317.)

SPAA is a town in the province (formerly the bishopric) of Liege, in the kingdom of Belgium. It is situated in 50° 30′ N. lat. and 5° 50′ E. long., on the banks of a rivulet, 25 miles from Aix-la-Chapelle. It is in a deep valley, with pastures and corn-fields in the immediate vicinity, but surrounded at no great distance with steep richly wooded mountains, which exhibit a great variety of wild and romantic scenery. Though a small town, with fewer than 4000 inhabitants, it is celebrated throughout Europe for its medicinal springs, which were known to the Romans. They issue from the ground in more than four hundred places, but there are only six of any importance, of which the four principal are called Pouhon, Geronstère, Sauvenière, and Tonnelet; the two others are Watroz and Groesbeck. The Pouhon springs from the hill to the north of Spaa, but is conducted to the middle of the town, where it is made to issue from a fountain. The three others are at some distance from the town; the Geronstère is about a mile and a half distant. Peter the Great derived great benefit from the waters of this spring in 1717, of which his physician left a written certificate, which is carefully preserved. The Tonnelet is three-quarters of a mile and the Sauvenière half a league from Spa. Here are the cold baths, which are called *plongeons*. The strongest of these springs is the Pouhon, and the only one the water of which is exported, which is to the amount of 150,000 bottles in a year. The waters are all chalybeate. They are diuretic and exhilarating, more cooling than common water, and they also more effectually allay thirst. They are chiefly recommended in cases of relaxation of the bowels, and likewise in obstruction of the liver and other disorders. The town consists of four straight and wide streets, crossing each other at right angles, in the form of a cross. The inhabitants derive their chief support from the great influx of visitors who come to take the benefit of the waters during the season, which commences with the warm weather, and continues about four months. The company, chiefly composed of great numbers of persons of rank and property from England, France, the Netherlands, and Germany, is superior to the ordinary description of visitors at such watering-places, mingled but occasionally, it is true, with adventurers, who seek to derive a harvest from gambling, which is too often resorted to as a resource against ennui. There are however other means provided for the entertainment of the company, such as the public breakfast in the Vauxhall, one of the finest buildings of the kind on the Continent, the assembly-house, and the beautiful public walks which connect the four springs. Two of these walks are called La Prairie (or La Promenade) de Quatre Heures, and the other La Prairie (or La Promenade) de Sept Heures, those being the hours at which they are usually frequented. There is likewise a theatre. The adjacent country abounds in game. It must be added that the accommodations both at the hotels and in private lodgings are generally good. The inhabitants manufacture elegant painted and varnished articles, such as work-boxes, writing-desks, teaboards, &c., for which there is a considerable demand, especially during the season. (Hassel; Stein; Hörschelmann: Cannabich.)

---

* This is doubtless the same as that called *Daheriyah* by Makrizi, who says that it was built in the street *Bein-al-kasrein* ('between the two palaces') by Malek-al-Daher Bibars of the first or Tartar dynasty of Mamluke Sultans.

SPACE AND TIME. (Mathematics.) We do not here propose to enter into any discussion of the doctrines of metaphysicians upon the idea of space, or whether it is innate or acquired. Space and time are essential to thought, and are, come by the notions how we may, necessary attendants on our own consciousness of existence. It is possible for imagination to picture the annihilation of all things, itself included, or to fancy that it can form such a picture, which is the same thing; but what then would remain (in the thoughts)? Infinitely extended empty space, lasting through infinitely extended time. Existence of space and successions of existence we may defy the speculator to deprive himself of for one moment. The greatest proof we have of our ignorance of the Creator of all things is the absolute impossibility which we find of making the necessity of his existence as real a conception of our minds as that of space or time. The most religious man will read with pleasure a work on natural theology tending to prove that there must be a God; but who would bear ten pages of a serious attempt to demonstrate the existence of space and time?

In these ideas we have the foundation of the mathematical sciences; for from space follows form, which is the conception of the manner in which one part of space is separated from the rest, and from the investigation of forms arises geometry. Again, time is only apprehended by succession of events or ideas, and succession or repetition gives the notion of *numbering*. And though *collection* is sometimes stated to be the leading idea in *number*, which may be the fact, yet it may be asserted that number in the last sense is not the object of arithmetic, except as furnishing the subject of numbering. The leading phrases of arithmetic suggest the idea of time, and are derived from it. How often is 2 contained in 12? Six times. The 2 presented to the thoughts at six different times is the mode in which the collection of 12 is counted by twos.

From both space and time we get the notion of direction, but in very different manners. The extremities of a portion of space give the idea of a point of space, a fundamental notion of an indivisible index of commencement or termination. The extremities of time give the notion of points of time, or indivisible portions of duration. No point of space contains any space; no point of time lasts any time. If we choose a point of space or a point of time, we can in our thoughts set out from the former in an infinite number of different ways: from the latter, in only two. This is the law of thought, upon which it is useless to speculate; but it is followed by important consequences. As long as algebra, the science of reasoning by symbols, was founded only on notions of arithmetic or succession, its ideas were not competent to furnish explanation to all the results of its mechanical processes. As soon as the same rules were transferred to ideas of space, or made to spring from geometrical explanations, the mysteries of that science gradually vanished.

From space and time also we get the idea of infinity, a subject which has been already treated [INFINITE]; but only in such a point of view, as would meet the objections of those who cannot reason clearly on absolute infinity. That space and time are unbounded, is the simple consequence of their being necessary to our notion of the existence of anything: we speak of our conceptions of them. For if it could be imagined that *space ceased* at a certain boundary, it would be as easy to make it cease in our own neighbourhood; and if duration could be imagined to have an end, it would not be difficult to place ourselves in thought within five minutes of that end. The denial of the possibility of our approaching the boundary of space or time in our thoughts, is the same thing as the denial of the existence of such a boundary; and the notion of infinity becomes a relief from the incongruity of the attempt to conceive existence stripped of its essential conditions. But it might be asked, why not, as to space at least, consider real existing extension, not as the object of our thoughts, but as it would exist if we were not alive to think? Is it, or is it not, physically possible to go on for ever in space? If a person could provide himself with an unlimited supply of motive-power, air, heat, food, &c., must we, or must we not, say that there is anything to hinder his travelling to all eternity? For ourselves, we should say there is clearly nothing to hinder; but of course we cannot appeal to experiment, and it may be only the impossibility of destroying our own conception of space which dictates an answer as to that external reality which, let metaphysicians say what they please, can always be established by a wave of the hand. We should have supposed that, mysterious as the connection may be between the external world and our impressions of it, the possibility of really infinite external space would be admitted by any one, unless he held the metaphysical system of BERKELEY, which denies the necessity of any external substratum of our conceptions, and substitutes the direct agency of the Creator; and we should have thought it impossible to maintain the necessary finitude of *matter*, without also maintaining the same of real external space. Nevertheless, to show how differently these subjects strike different persons, we quote the following from a recent dissertation of an eminent writer: ‘Every *real, existing, material* body must enjoy that indefeasible attribute of body, viz. *definite place*. Now place is defined by *direction* and *distance* from a fixed point. Every body therefore which does exist, exists at a certain definite distance from us, and at no other, either more or less. The distance of every individual body in the universe from us is therefore necessarily admitted to be finite.’ Now it will hardly be denied that the space which a body fills is as real and existent as the body itself, and this whether so occupied or not. Leave out the word *material* in the above, and for ‘body’ read ‘part of space,’ and the argument remains as good as before, ending with a denial of the infinity of space. Every *assignable* body is at a finite distance from us; but this is a truism contained in the meaning of the word assignable. But who is therefore to deny the following? Name any distance, however great; matter exists at still greater distances.

If we estimate the reality of a conception by its necessity, which is what we do when we settle the pre-eminence of space and time among our ideas, then it is certain that the conception of infinity is as real as that of space or time, being essentially united with them. Many mathematicians try to deny this, and substitute various modes of speaking to avoid the introduction of the idea. It is true that the notion of infinite is one which it is difficult to use without falling into error; a very good reason for avoiding it until the understanding has been well practised in mathematical deduction, but none for denying its existence. Why say that the notion of infinity arises from our not being able to assign a limit, when we know that we feel something more positive; when we are as certain as we are of any right to use the words *can* and *cannot*, that there *cannot be* a limit to either space or time? Those who examine the views of different writers on the first principles of science, see a great variety of modes of expression on this point, but a uniform practical use of nothing more than the *denial of finitude*, accompanied by the mere expression of *incapacity to attain infinity;* resolutely coupled, in many cases, with a determination not to allow any words capable of expressing the *absolute notion of infinity* which actually is before the thoughts. Now it should be the object of elementary writing, while guarding the avenues to error which branch in all directions from an improper use of the word infinite, to acknowledge the existence of the idea, and to make a gradual preparation for its correct and legitimate use. Both infinitely small and infinitely great ought to become terms which may be employed without fear; and the student who has been trained to the natural and healthy use of all his notions, will in the end succeed better than the one who has had some of them tied up from the beginning because they are somewhat difficult to use at first.

As soon as an attempt is made to fetter one branch of thought, the effect is sure to be immediately felt in others. The infinite divisibility of space is a truth of the same sort as its infinite extension. *Matter* may not be divisible without end, and the truths of modern chemistry would seem to show that there are ultimate particles inseparable by chemical, and still less by mechanical, means. But there is a solvent which every one has it in his power to apply to space; it is the intuitive conviction that every portion of it, however small, except that ultimate notion which is called a point, is divisible into parts, which are themselves divisible into parts; a process which may be continued without end. Now a person who trifles with the notion of infinite extension, and persuades himself that he has not the idea, will probably end by denying infinite diminution: and as motion, however small it may be, requires the succession of positions answering to an unlimited separation of the time of motion into parts, the next step will be to deny the infinite divisibility of time, and the possibility of motion, as commonly conceived. Change of place will be imagined to be physically impossible, if it be asserted that between the first and last positions there have been an infinite number of others: and the mind will be driven, in order to avoid the notion of infinity, into a sort of opinion that motion is a very large (but finite) number of annihilations and re-creations; annihilation in one spot, and re-creation a little farther on, without anything intermediate. This is no imaginary case; and it seems to us that when this theory of motion is once attained, nature has taken a very proper revenge for the attempt to smother her conceptions.

The errors which arise from the improper use of the notion of infinite lie mostly in the idea that all that is proved of finite space or time must necessarily be true of the infinite. We pass over the error that all infinites must be equal, as being that of the merest beginner; there are enough remaining to claim great caution. The process adopted in the article INFINITE is perhaps the best way of habituating the young mind to the rigorous attainment of results; provided only that the understanding is duly apprised that such a course of proceeding is not pursued because there is not infinity, but because there is, and because the notion, though inevitable, is not easily used. The road need not be carried over any unsafe foundation, but that is no reason why the quicksand and the marsh should be left out of the map.

SPACES, in Music, the intervals between the five lines forming the staff. [STAFF.]

SPA'DA, LIONELLO, a distinguished painter, both in fresco and in oil, of the early part of the seventeenth century, and one of the best colourists of the Bolognese school. He was born in Bologna, of very poor parents of the labouring class, in 1576. He was employed whilst a boy as a colour-grinder by the Caracci; but through an observing mind and an ambitious disposition, he was led himself to attempt design, and incited to an endeavour to emulate the great works by which he was surrounded. He at first copied in the school of the Caracci, but afterwards became the scholar of Baglione, and contracted a friendship with his fellow-scholar Dentone. From Dentone Spada learnt perspective, and most probably acquired that correct taste and true feeling for chiaroscuro for which his works are conspicuous, and which prevented him from being carried away by the hard contrasts of Caravaggio, when he adopted the style of that master.

Stung by a contemptuous remark of Guido's upon a picture that he had painted, Spada determined to avenge himself by opposing a bold and natural style to the delicate and ideal style of Guido. He accordingly went to Rome and became the scholar of Caravaggio, who then, as the rival of Cesari, was at the height of his reputation. Spada accompanied Caravaggio to Malta, and returned to and established himself at Bologna, master of a new style much after the manner of Caravaggio; as bold as Caravaggio's, but less vulgar, and softer and more harmonious. His design is natural, though not choice; his chiaroscuro powerful and rich; his colouring brilliant and true, though rather red in the shadows; but this may be the effect of time, for Malvasia appears to have considered him unsurpassed as a colourist.

Spada's works were much admired by Tiarini, with whom he painted in competition several times; but some of his rivals in Bologna contemptuously styled him 'La Scimia,' or the ape of Caravaggio. He however soon earned the reputation of being one of the best painters of his time, and he received several orders for great works in Reggio, Modena, Parma, and other neighbouring cities; and in consequence of the successful execution of these works, Spada was appointed his court painter by Ranuccio, duke of Parma: his fortune now equalled his reputation, and he spent the remainder of his life, which was however not a long one, at the court of Ranuccio. He appears to have been of a very humorous and satirical disposition (many specimens of his humour are recorded by Malvasia), and presuming upon the great esteem and friendship of the duke for him, he made himself much disliked by the courtiers and nobles of Parma; and upon the sudden death of Ranuccio by apoplexy, Spada found himself deserted. This appears to have had a great effect upon his mind, and although in the prime of life, he shortly followed the duke to the grave. He died in 1622, in the 46th year of his age.

Spada superintended the decorations of the celebrated, and at that time unrivalled, theatre of Parma. The generality of his compositions are half-figures, of the natural size, after the manner of Caravaggio and Guercino. Holy Families by Spada are not rare in the galleries of Bologna and Lombardy; the Execution of John the Baptist was also a favourite subject of his. His masterpiece is generally considered to be the great picture of San Domenico burning the proscribed books of the heretics, in the church of that saint at Bologna. The following works also gained him great reputation:—The Miracle of St. Benedict, at the monastery of S. Michele in Bosco; a picture which so pleased Sacchi when he saw it, that he took a sketch of it. Susannah at the Bath, and the Return of the Prodigal Son, at Modena; a Madonna, at Reggio; and a St. Jerome and a Martyrdom of a Saint, at Parma; the two last pictures are painted more in the style of the Caracci than any of his earlier works. Spada wrote verses, some specimens of which have been preserved by Malvasia. He left several scholars, and has had some imitators; Pietro Desani of Bologna, and Orazio Talami and Sebastiano Vercellesi of Reggio, were the most distinguished. (Malvasia, *Felsina Pittrice;* Lanzi.)

SPADIX, a form of the inflorescence of plants, in which the flowers are closely arranged around a thick fleshy axis and the whole surrounded by a large leaf or bract called a spathe. The flowers of the *Arum maculatum*, cuckoo-pint, or wake-robin, are arranged in this manner. In this plant the central fleshy axis or rachis is much extended beyond the point on which the flowers are situated, forming a soft club-shaped mass, which is variously coloured. This is an instance of the same kind of development as occurs in the production of the spine at the growing point of the branch, only in the one it is soft and blunt, in the other it is hard and sharp-pointed. This form of inflorescence is seen in all the plants belonging to the natural orders Araceæ and Acoraceæ. This term is also applied to the collection of female flowers of the *Zea Mays*, common maize, and to the inflorescence of Palms.

SPAGNOLETTO. [RIBERA.]

SPAHIS (or rather *Sipáhis*, from the Persian *sipáh*, meaning a cavalry soldier), are a body of Turkish cavalry organized by Amurath I. (Múrad), who was also the founder of the Janissaries. Their number varied according to circumstances, but amounted sometimes to 20,000. They enjoyed many privileges in common with the Janissaries. Their pay was twelve aspers a day, unless employed on special service, when they received a higher pay. They were composed of two classes; the *spahaoglari*, who had red, and the *silkhadár*, who had yellow banners. Those who held fiefs from the sultan were called *Timari-siphâhis*. Their usual arms were a sabre, a lance, a jereed or dart about two feet long, which they hurled with great dexterity and strength, and a second sabre, or rather broadsword, attached to the saddle. Some of them had also a carabine and one or two pistols. At one time they were the most formidable body of cavalry in the Turkish army; but being an undisciplined and unruly militia, they were, together with the Janissaries, dissolved by the last sultan Mahmud.

SPAIN (*España*), a country in Europe, occupying the greater part of that peninsula which is divided from France by the mountain-range of the Pyrenees, from which circumstance it is sometimes called the Pyrenean Peninsula, or briefly the Peninsula. It is situated between 36° and 43° 46′ N. lat., and 2° 15′ E. long. and 9° 10′ W. long. The most northern point is Cape Ortegal (43° 46′ N. lat.), and the most southern Tarifa (36° 2′). From its most north-western point, Cape Finisterre, to the most eastern, Cape Creus, is a distance of nearly 600 miles; from Tarifa to Fuentarabia, near the boundary of France, on the Bay of Biscay, nearly 540 miles; and from Cape Ortegal to Cape de Gata, the most south-eastern promontory, about 556 miles. The area of Spain is stated by some authors to be nearly 190,000 square miles; but most probably it does not much exceed 185,000 square miles, being larger than that of the British Islands by about one-half their extent, and not quite one-tenth smaller than that of France.

Spain is washed on the east by the Mediterranean, and on the south by the narrow sea which connects the Mediterranean with the Atlantic and terminates on the west in the Strait of Gibraltar, and partly by the Atlantic. On the west it is bounded by Portugal, and on the north-west by the Atlantic. On the north is the Bay of Biscay and France. Spain is divided from France by the mountain-range of the Pyrenees, whose highest portion, constituting the watershed between the rivers which run south and north, forms the boundary between these two countries, with the exception of the Vale of Arran, which contains the sources of the Garonne, and belongs to Spain, though situated on the northern declivity of the mountain-chain. Towards the Bay of Biscay, where the Pyrenees sink down into hills, a chain of heights which separates the basins of the rivers Nidve and Bidasoa is a boundary, but for a few miles from the sea the boundary is formed by the course of the last-mentioned river. Spain bounds Portugal on the north and on the east. Along the northern line the boundary between Spain and Portugal is not marked by any natural object, except that the river Minho separates both countries for about 30 miles from its mouth. The western boundary of Spain towards Portugal is generally more distinctly marked. North of 41° N. lat it is formed by the south-south-western course of the river Duero. Between the Duero and the Tajo, the two countries are separated by the rivers Turones and Erjas, of which the former joins the Duero, and the second the Tajo; and by the mountains in which these rivers rise, which belong to the Sierra de Gata. The Tajo runs along the boundary for 30 miles as far west as the mouth of the river Sever. The lower course of the Sever, and farther south a range of heights, separate Spain from Portugal between the Tajo and Guadiana. The Guadiana runs along the boundary-line for nearly 30 miles to 38° 30′ N. lat., but farther south, as far as 37° 55′, the dividing-line traverses some ridges and valleys. Near 37° 55′ N. lat. the river Chanza, an affluent of the Guadiana, begins to separate the two countries, and continues to be the boundary to its confluence with the Guadiana, which then separates Andalusia from Algarve.

Coast.—The coast-line of Spain, without taking into account the numerous small inlets, is 1370 miles, of which 602 are washed by the Atlantic and 768 by the Mediterranean. The coast between the boundary of France and the mouth of the river Minho is 478 miles, and that between the Guadiana and the Punta de Europa, the most southern point of the tongue of land on which Gibraltar stands, is 124 miles.

The northern coast of Spain, from the boundary of France to the Punta de los Cairos (7° 15′ W. long.), runs nearly in a continuous line, without any considerable break, if we except the æstuary of the river Nervion and the bay of Santander, neither of which is a spacious harbour. All the other indentations, which are rather numerous, are only narrow inlets of no great length, which are used by small coasters. These inlets go by the name of *rias*, as they generally constitute the mouths of small rivers. The whole line is rocky, and the rocks nearly always approach the sea, where they form a mural line varying in height between 30 and 300 feet. But with the exception of one or two places, the coast is free from rocks and islands, and the water is deep up to the shore. The coast farther west, between Punta de los Cairos and Cape Ortegal, preserves the same character, except that the inlets which occur along this short distance are wider, and the headlands project farther. From Cape Ortegal to Cape Finisterre, and thence to the mouth of the Minho, the coast is less elevated, though it is rocky, and the rocks come up to the beach. It is also very broken, and several headlands advance some miles into the sea, and some of the inlets enter several miles into the land, and form spacious harbours. The most remarkable is the Bay of Betanzos, which divides into three inlets, which form the harbours of Ferrol, Betanzos, and La Coruña. South of Cape Finisterre are four rather large bays, called Ria de Muros y Noya, Ria de Arosa, Ria de Pontevedra, and Ria de Vigo, all of which are deep and have good anchorage. Along this line of coast there occur several small rocky islands.

The coast-line of the Atlantic, between the mouth of the Guadiana and the Punta de Europa, is of a different character. From the hills on which the town of Ayamonte is built, at the mouth of the Guadiana, a low shore begins and extends eastward to the harbour of Huelva, which is formed by the æstuary of the rivers Odiel and Tinto. The coast-line is well defined, but skirted by low and sandy islands. Between the harbour of Huelva and the mouth of the river Guadalquivir the coast is extremely low, swampy, and sandy. Even small vessels cannot approach the beach. South of the mouth of the Guadalquivir the shores are again well defined, though low and occasionally swampy. Approaching Cape Trafalgar, at Torre de Roche, the coast begins to rise, and a moderately high shore runs along the northern side of the Strait of Gibraltar, and into the Bay of Algeciras to the town of that name. The remainder of the bay has a low and sandy shore, with the exception of the rock on which Gibraltar stands.

The coast of the Mediterranean from Punta de Europa to Cabo de Palos is in general elevated and rocky. The western portion, between the Strait and the mouth of the river Guadalfeo near Motril, does not rise to a great height, and occasionally sinks down nearly to the level of the sea. East of Motril the coast is generally very high, sometimes several hundred feet, and there is no flat along the sea. The road, which runs not far from the shore, passes from one mountain to another, and descends only in a few places, where the mouths of the small rivers occur. This elevated coast extends to Cabo de Gata, and north of it to the town of Moxacar. From Moxacar to Cabo de Palos the rocks along the coast are of moderate elevation, and in a few places interrupted by flats. This extensive line of rocky coast has no indentations, and no harbour which vessels of moderate size can enter, with the exception of the excellent harbour of Cartagena and the harbour of Malaga; the latter is partly artificial. The open bay of Almeria, between Punta de Elena and Cabo de Gata, has good anchorage, but it is too much exposed to southern, south-eastern, and south-western winds, and to the violent gales which sometimes blow from the mountains that surround the bay.

At Cabo de Palos a low and sandy coast begins, which extends as far north as Cabo de Santa Pola, a short distance south of Alicante. It has no harbours even for small vessels or large boats, though it is intersected by several creeks, which in some places form small lagoons. Near Cabo de Palos is the large lagoon of Encañizada de Murcia, which is very shallow. From Cabo de Santa Pola to Villajoyosa the coast-line is generally low, but rocky, and in some places the ridges, which traverse the adjacent country, terminate on the sea with steep hills of small extent and moderate elevation. From Villajoyosa to Denia the coast is almost without exception rocky and high, but does not rise to a great elevation. Between Cabo de Palos and Denia there is no harbour, except that of Alicante.

From Denia to the mouth of the Ebro the coast is low and sandy. North of Castellon de la Plana a few low ridges terminate on the sea, forming a moderately high shore. This coast line has no harbours even for vessels of moderate size; and Grao, the port of Valencia, is only a bad roadstead. Along this low coast there are many small lagoons, called *albuferas*. The largest is Albufera de Valencia, noted for the great quantity of salt which is made on its banks. South of the mouth of the Ebro is the Puerto de los Alfaques, which can only be entered by vessels not drawing more than 15 feet.

From the mouth of the Ebro to the boundary of France the coast is alternately high and low, and both the low and the high shores generally continue for many miles. The coast however does not rise to a great elevation, except at Cape Creus, and thence to the boundary-line. In this part there occur several harbours for small vessels; and two are deep enough for large ships, Barcelona and Rosas. The Gulf of Rosas is an excellent harbour, but is very little used, as the neighbouring country is only partially cultivated. The small harbour of Salou, which is the port of Reus, is only fit for small vessels.

Surface and Natural Divisions.—Spain presents greater and more marked differences in the form of its surface than any other country of Europe of equal extent. The interior is an elevated table-land, whose surface is from 2000 to 3000 feet above the sea-level. Though situated at the western extremity of Europe, and near the sea, which surrounds that part of the world, its elevation is higher than that of any other table-land of Europe. The elevated plains which surround the northern base of the Alps are only between 1000 and 1300 feet above the sea-level, and are about 700 feet lower than the lowest part of the table-land of Castile, as that of Spain is called. The table-land comprehends nearly the whole country which lies between 38° and 43° N. lat., and extends from near 1° to near 8° W. long. It does not advance to the sea, but on the north and west it is divided from the Bay of Biscay and the Atlantic by a comparatively narrow tract of mountainous country. Nor does it extend to the base of the Pyrenees, being separated from them by the basin of the river Ebro. Between the table-land and the Mediterranean there is also a lower country, which in some parts is hilly and even mountainous, and in others extends in wide plains. South of the table-land is the basin of the river Guadalquivir, by which the table-land is separated from another more elevated and more mountainous region, that of the Sierra Nevada, which extends over the southern part of Spain along the Mediterranean and the Strait of Gibraltar. Thus Spain contains six great natural divisions—the Table-land, the Northern and Western Maritime region, the Basin of the Ebro, the Eastern Declivity, the Basin of the Guadalquivir, and the Mountain Region of the Sierra Nevada.

I. The *Table-land* comprehends the eastern districts of Galicia, the whole of the kingdom of Leon, that of Old Castile, with the exception of about one-fourth of its area which lies in the basin of the Ebro and along the Bay of Biscay, the whole of New Castile and Estremadura, the south-western districts of Aragon, and the northern districts of Murcia. According to a rough estimate it extends over a surface of about 92,000 square miles, or over nearly one-half of the area of Spain.

The table-land is nearly surrounded by mountains. Along its northern edge rise with a steep ascent the mountains of Asturias, which in elevation nearly rival the Pyrenees, but occupy a smaller extent of country. That part of the Montes de Asturias which is at the source of the Ebro is called Sierra de Sejos, and attains an elevation of 5700 feet above the sea. Farther west the elevation increases. The Sierra d'Alba, situated where the boundaries of Old Castile, Leon, and Asturias meet, rises to 6960 feet, and the Sierra de Pajares, farther west, to 8628 feet. At the mountain-knot which occurs near the sources of the river Sil (near 6° 20′ W. long.) the chain attains its highest elevation, one of the summits, the Sierra de Peñaranda, rising to 11,000 feet, and far above the snow-line. This mountain is only about 600 feet lower than the Pico de Mulhaçen, the highest summit of the Sierra Nevada, and only 300 feet lower than the Pico de Neton, the highest summit of the Pyrenees. West of this large mountain-mass the chain lowers, but apparently not much, for the Sierra de Peñamarela, which lies near 7° W. long., is 9450 feet above the sea-level. So far the direction of the chain is from east to west, or nearly so, but in this part of the range the highest edge of the mountains runs south-west, but soon turns north, enclosing a narrow glen, in which the river Navia descends to the Bay of Biscay. For about 40 miles the range runs northward, until it approaches the Bay of Biscay within about 12 miles, when it again turns westward, and after having run about 20 miles in that direction, turns southward, dividing the basin of the upper Minho from the lower country which lies to the west of it. The elevation of this chain is not known, but from the cold climate of the upper valley of the Minho, it may be inferred to be 6000 feet above the sea-level. Near the town of Orense the mountain-chain terminates, or rather, there is a depression through which the Minho flows; for on the east of the river rises another ridge, the Sierra de S. Mamed, which runs east-south-east, and soon attains a considerable elevation, 7710 feet above the sea-level. This chain continues east-south-east until it approaches the Duero, where it begins to form the boundary between Spain and Portugal. At this point it is connected with the Serra de Roboreda, which lies within Portugal, and extends, parallel to the course of the Duero, to the point where the river turns to the west.

The high grounds which divide the table-land from the basin of the Ebro cannot be considered as a mountain-ridge in all their extent. Towards the western extremity of the river-basin, between the Sierra de Sejos and the great road which leads from France to Madrid, no mountain-range divides it from the table-land. East of the road and of the town of Burgos rises the Sierra de Oca, which attains the elevation of 4980 feet, or about 2000 feet above the adjacent parts of the table-land. It extends from west-north-west to east-south-east, and is followed by the Sierra de Cameros, whose highest summit, the Pico de Urbion, is 7200 feet above the sea-level. Contiguous to it, and in the same direction, is the Sierra de Moncayo, which rises to 9600 feet at its eastern termination near 2° W. long. From this point the edge of the table-land is less marked. It runs to the river Xalon, which it crosses near Calatayud, and afterwards in a south-eastern direction along the high grounds which form the right bank of the river Xiloca, which gradually rise into mountains near the town of Montalban, whence the mountain-chain continues to the boundary between Aragon and Valencia, where the Sierra de Peñagolosa attains 6000 feet. From this summit the edge of the table-land runs southward along the elevated ridge which extends east of the river Turia or Guadalaviar. It crosses this river north of Requena, and afterwards the river Xucar below its confluence with the Cabriel, and then continues southward, leaving the town of Almansa to the west, to the vicinity of Villena. South of the Xucar the edge of the table-land is not marked by a continuous ridge, though some isolated mountains occur along it. Near Villena is the Sierra del Carache, which runs first south-west, and afterwards north-west, to the neighbourhood of Albacete (39° N. lat. and 1° 55′ W. long.). The Sierra del Carache seems to rise only a little above the table-land, but it presents a considerable ascent from the deep valley of the Segura, and that of the Mundo, a tributary of the Segura.

Along the southern border of the table-land extends that range, or rather mountain region, which is called Sierra Morena. It begins on the east, a short distance west of Albacete, with two ridges which run south-west, including the narrow valley of the river Guadarmena, and are called Sierra de Alcaraz. From the western of these ridges the mountain region extends westward to the boundary of Portugal. It consists of a great number of short ridges, running south-west towards the east, and south-east towards the west. These ridges, which enclose very narrow valleys, are connected by other ridges, lying frequently along their northern extremity or close to the extremity of the table-land, but sometimes also in the middle of the mountain region. Towards the east the Sierra Morena does not occupy more than 30 or 40 miles in width; but in proceeding westward it grows wider, and near the boundary of Portugal it is about 80 miles across. Some of the ridges advance a considerable distance into the basin of the Guadalquivir. At its western extremity one of its branches extends southward along the river Chanza and the lower course of the Guadiana, terminating near the sea in the hill on which the town of Ayamonte is built. North-east of that place is a summit called Monte Gordo, which is 2235 feet above the sea. This is the only summit of the Sierra Morena whose elevation has been determined by actual measurement. The difficulty which is encountered in traversing these mountains, and which is chiefly if not entirely to be attributed to their breadth and the steepness of the ridges, led to the opinion that the general level must be at least 6000 feet above the sea-level; but this supposition is not consistent with what we know of the climate, as few parts are covered with snow more than three months.

Other mountain-ranges occur on the table-land itself. One of them constitutes a continuous range, traversing the plain in all its extent from east to west. It begins on the east near the high summit of the Sierra de Moncayo, and runs, under the name of Sierra de Deza, south-west until it approaches 44° N. lat., when it turns to the west north of the town of Siguenza. In this direction it continues to the place where it is crossed by the road leading from France to Madrid. The mountain-pass through which this road runs is 4950 feet above the sea, and this may be considered as the mean elevation of the Somasierra, as the range here is called. From this pass the range runs south-west, and is called the Sierra de Guadarama. The mean elevation of this part of the range does not seem greater than that of the Somasierra, as the mountain-pass from Madrid to Segovia, in its highest point, is only 4657 feet above the sea; but not far from it stands the Sierra de Peñalara, whose summit attains 7756 feet. The continuation of the Sierra de Guadarama is called Sierra de Avila, the branches of which enclose the small plain on which the town of Avila is built, 3485 feet above the sea. West of Avila the range makes a bend to the south, encircling the upper course of the river Tormes, an affluent of the Duero. At the southern extremity of this bend the range attains the greatest elevation, the Sierra de Gredos rising to 10,548 feet, and considerably above the snow-line. After the range has resumed its south-western direction it is called Sierra de Gata, and enters Portugal, where it again attains a considerable elevaton in the Sierra d'Estrella, and continues to the shores of the Atlantic Ocean, where it terminates with the Cabo da Roca, west of Lisbon. The table land is divided by the mountain-range just mentioned into two parts, which do not differ much in extent. That portion which lies north of it is called the table-land of Old Castile and Leon, and contains about 44,000 square miles. The other part south of the range is called the table-land of New Castile and Estremadura, and contains about 48,000 square miles.

Table-land of Old Castile and Leon.—The north-western corner of this region is a mountainous country, which extends over the eastern districts of Galicia. The mountain-range, which separates it from the plain to the east of it, is connected on the north with the mountain-knot of the Sierra de Peñaranda, and on the south joins the Sierra de Segundera, which is part of the Sierra de S. Mamed. This range is called, at least in its greatest extent, Sierra de los Cilleros. Its mean elevation probably does not much fall short of 6000 feet. The country between the Sierra de los Cilleros and the southern prolongation of the Montes de Asturias comprehends the valleys of the rivers Minho and Sil before their confluence. It is a very elevated country. The winters are cold, and the frost usually lasts for three months, sometimes without interruption. These facts lead to the conclusion that the higher districts of the valleys are not less than 4000 feet, and the lower at least 3000 feet above the sea-level. The valleys are, with a few exceptions, rather narrow; but the hills, which are contiguous to the level grounds, have generally a gentle slope, so that they admit of cultivation to a considerable distance up the declivities. They do not rise so high as the mountains which enclose this region. Those parts of the hills which cannot be cultivated are used as pasture-grounds for cattle, sheep, and goats. But many large tracts are covered with forests, and the dockyards of Ferrol are chiefly provided with timber from these mountains. The valleys are not adapted to the cultivation of maize, but wheat, barley, and flax succeed well. Chesnut and walnut trees are very numerous. This region contains about 7600 square miles, and is nearly equal to Wales in extent.

The remainder of the table-land of Old Castile and Leon is a plain which extends over the greater part of these two kingdoms, and contains about 36,400 square miles. The eastern portion of the plain, between the Sierra de Moncayo on the north and the Sierras of Deza and Somasierra on the south, is probably not less than 3000 feet above the sea-level. The surface is rather hilly, and the soil partly stony and partly sandy; its fertility rather indifferent, and large tracts are quite unfit for cultivation. Farther west, where the plain is crossed by the road leading from Burgos to Madrid, the level sinks down to about 2500 feet above the sea; Burgos, which is on a hill, being 2873 feet. On the north of the river Duero the plain is nearly a level, here and there interspersed with small groups of low detached hills. The country is not fertile. The lower tracts are entirely destitute of trees, and generally even of bushes. The hills are partly overgrown with light thin woods and numerous low bushes. The woods consist almost exclusively of evergreen oaks and a kind of cistus. On the hills there are small miserable villages at a great distance from one another; they are surrounded by a few vineyards and cornfields. Farther west, along the road which connects Segovia with Valladolid and Valladolid with Palencia, the soil improves and cultivation increases. The level of the plain does not seem to be lower, but the rivers, having descended deeper, have excavated beds from 2 to 4 miles wide, which are from 100 to 200 feet below the general level, which is as flat as a table, and covered with heath, nor is the view intercepted by any tree. These elevated flats are without cultivation, and only used as pasture-ground for goats and sheep. But the valleys which extend along the beds of the rivers possess a considerable degree of fertility, and produce all kinds of grain; and the slopes of the higher grounds are well stocked with trees and vines. The soil consists of a mixture of clay and sand. Towards the boundary-line of Portugal the higher grounds which divide the valleys along the rivers are not quite level, but extend in gently sloping plains. These plains are likewise destitute of trees; but the soil, being more retentive of moisture, is more fertile; and even the higher grounds are here sown with wheat, rye, barley, and Indian corn. This part of the plain is rather thickly inhabited, and villages occur at short distances from one another.

The Table-land of New Castile and Estremadura comprehends these two kingdoms, with the south-western districts of Aragon and the northern part of Murcia. The surface is much more diversified by hills and mountains than that of the northern plain. The mountain-chains are of considerable extent, but they do not form continuous ranges, being interrupted by several depressions, which sink nearly to the level of the country. In the eastern districts of the table-land is the Sierra Molina, which begins north-west of the town of that name, and south of the confluence of the Xiloca with the Xalon, in 41° N. lat. and 1° 30′ W. long. It does not appear to be connected with the Sierra de Deza by a mountain-ridge, but only by high ground. The Sierra de Molina runs southward, and does not rise much more than 1000 feet above the general level of the country in the northern parts. The road from Molina to Teruel rises on the Sierra de Menara to 4333 feet above the sea-level. Farther south it rises still somewhat higher. Where the rivers Tajo and Turia originate, it is from 4500 to 4600 feet high, and at this place it sends off a branch, the Sierra de Albaracin, which runs south-east between the Turia on the east and the Xucar on the west, and extends to the edge of the table-land, near the town of Requena. This ridge rises to a great height, but its elevation has not been determined. From the sources of the Tajo the Sierra de Molina runs south-west, but near 40° S. lat., west of the town of Cuença, it turns again to the south, and soon subsides into hills, which are slightly elevated above the level of the country. The Sierra de Molina is of very inconsiderable width, but it constitutes the watershed between the rivers which fall into the Mediterranean and those that run to the Atlantic.

West of Cuença a ridge of low mountains branches off from the Sierra de Molina, and runs westward, dividing the upper branches of the Tajo from those of the Guadiana. It terminates probably near Tarrancon, east of Aranjuez. In our maps this range is continued south-west, and afterwards west to the Sierra de Toledo, but this appears to be incorrect. The two great roads from Madrid to Mansanares and from Toledo to Ciudad Real traverse this tract, but travellers who have gone over it do not mention having passed or even seen a range of mountains, though they speak of having crossed some broken ground rising into hills. No mountain-range therefore exists between these two roads or in their vicinity; and the watershed between the Tajo and Guadiana is only formed by high ground broken into steep hills. The Sierra de Toledo seems to rise west of 4° W. long., and to extend to 5° W. long., running east and west; but we are very imperfectly acquainted with this ridge. It does not appear to occupy a great width, nor so rise more than 1000 feet above the plain. It is not traversed by any road. Near 5° W. long. it sinks down to the level of the plain, but another range rises out of it, called the Sierra de Guadalupe, which extends westward to the boundary of Portugal, and enters that kingdom, where it is called Sierra de Portalegre. The Sierra del Guadalupe resembles the Sierra Morena more than the mountains of Toledo. It consists of a number of narrow steep ridges, whose general direction is north-east or north-west, and they are sometimes connected by other ridges running east and west, but frequently unconnected, and separated by flats. These flats or valleys are commonly much wider than in the Sierra Morena, and hence this mountain-tract does not oppose so many obstacles to travelling. The width of this region is considerable, as it fills nearly the whole tract between the rivers Tajo and Guadiana, west of 5° W. long. None of the summits attain a great elevation above the level of the country.

The eastern portion of the table-land of New Castile and Estremadura, comprehending the province of Cuença, the northern districts of Murcia, and the adjacent countries, is the highest part of the table-land, and about 3000 feet above the level of the sea. The surface is very uneven, with the exception of the higher ground between the river-basins, which in some places extends in plains, and in others is diversified by numerous hills or low ridges. A very small portion of this region, which lies in the valleys along the rivers, and in some depressions of the plain, is under cultivation; the remainder has rather a sterile and very dry soil, and is either quite useless or only used as sheep-walks, sheep constituting the principal wealth of the inhabitants. In some places wheat is cultivated, and in others there are tracts planted with vines and olive-trees. Saffron is rather extensively grown. Fruit-trees are abundant in the lower tracts. The higher grounds are quite destitute of wood, and covered with heath and odoriferous plants, on which numerous bees feed. Wax and honey are sent to other parts of Spain, and also wool of an inferior quality.

The central region of the table-land is between 3° and 5° W. long. It consists of two plains, the Plain of Madrid and Toledo, which lies north of the mountains of Toledo, and the high broken ground which forms the watershed between the rivers Tajo and Guadiana; and the Plain of La Mancha, which lies to the south. These two plains are about 2000 feet above the sea-level. According to Bauza, Madrid is 2222 feet and Toledo 1868 feet above it. In the plain of La Mancha the town of Val de Peñas is 2119, and that of Villaria 1947 feet above the sea level. The productive powers and the surface of these two plains are nearly the same. The country consists of extensive levels, intersected by short ridges of low hills and rocks. It is destitute of trees, except some groves of evergreen oak, which are found near the hills, and plantations of olive-trees and vines near the villages. The villages are large and well built, but at great distances from one another. The level tracts between them produce wheat, but as part of these tracts are at a great distance from the villages, in which alone the farms are situated, a large portion of them is badly cultivated, and some tracts are partly overgrown with broom and the flax-leaved daphne (Daphne Gnidium). The crops however are tolerably good. The best cultivated and richest part of the plain is that which lies along the southern base of the Sierra de Guadarama, where the soil is a rich clay, and the country presents a succession of vineyards, olive-plantations, and excellent pastures, with numerous corn-fields. The farmers of this tract are more wealthy than those of other districts in Spain.

The western portion of the table-land of New Castile and Estremadura comprehends the country from 5° W. long. to the boundary of Portugal, or the province of Estremadura. This country has a very mountainous surface. The ridges of the Sierra de Guadalupe cover nearly all the country between the Tajo and the Guadiana. North of the Tajo several offsets of the Sierra de Gata traverse the country in a south-western direction. South of the Guadiana several branches of the Sierra Morena advance within a short distance of the river. Plains of some extent occur only along the banks of the principal rivers. They are small on the banks of the Tajo, but rather extensive on those of the Guadiana. The general level of the country is lower than in the plains farther east, as we may infer from the circumstance that snow and frost are not common in the Sierra de Guadalupe, in which the merino sheep pass the winter without the least injury in the open air. The productive powers of this region differ greatly in different parts. In the districts north of the Tajo there are wide valleys, containing much level ground, between the ridges of the Sierra de Gata; they have a rich soil, are well cultivated, and yield good crops. The hilly tract between the Tajo and Guadiana is nearly a desert. The summits of the ridges are bare; their slopes are clothed with forests of the evergreen oak, but the lower parts are destitute even of bushes. They are never cultivated, but preserved as the pasture-grounds of the merino sheep in winter. The cultivated spots are only found in the narrower valleys, and they are few and of small extent, even in the level country on the banks of the Guadiana, between Merida and Badajoz. To the south of the Guadiana the country improves. At no great distance from the river are plantations of olive-trees, which increase in number as we proceed up the valleys of the Sierra Morena. Some level tracts of considerable extent and great fertility are enclosed by the ridges, as at Llerena, Zafra, and Jerez.

Rain is comparatively scarce on the table-land of Spain. It is stated that the annual quantity on an average does not amount to more than 10 inches, which is partly to be ascribed to the elevation of the more level part of the table-land, and partly to the circumstance that it is in most parts bounded by mountains which rise considerably above the general level of the plain, and prevent the moisture from reaching the flat country. The rain generally falls in the winter, and only a few showers occur in other seasons. The least quantity of rain falls in the mountain region of the Sierra de Guadalupe, and on the high plains of Cuença and Murcia, where sometimes eight or nine months pass without a drop falling. To this scarcity of rain the want of cultivation is chiefly to be attributed which is observed in the two last-mentioned regions. In summer excessive heat, and in winter a great degree of cold, are experienced. Though Madrid is 10° south of London, the mean annual temperature of the winter at Madrid is 43·7°, or only 4° higher than at London. But during every winter a degree of cold is experienced for some days which is very rare in London. In 1830 the thermometer sunk to 9·5° Fahr., and a great quantity of snow fell. Every year for several nights the thermometer falls several degrees below 32° and the rivers are covered with ice, though it generally disappears in the day. The mean temperature of the three summer months is 76·2°, or 15° higher than in London. But during the south-eastern wind, which is called the *solano*, the thermometer frequently rises to 90° and even 100°. With the exception of the injurious effects of such changes in the temperature, the climate of the table-land is very healthy.

II. The *Maritime* region of the Atlantic and Bay of Biscay surrounds the table-land on the north-west and north, and contains the western districts of Galicia, the province of Asturias, and the northern portion of Old Castile. That portion which lies south of Cape Ortegal is hardly more than 40 miles in width, and is traversed by numerous ridges, which have usually gentle slopes, so as to admit of cultivation to a considerable distance from their base. Their summits are crowned with forests. The lower country, which about Santiago de Compostella stretches out in extensive plains, is tolerably fertile and well cultivated. The farmers live in single farms dispersed over the country. The climate is wet. Besides the cultivation of the common kinds of grain, great attention is paid to vines and fruit-trees, among which the chesnut plantations occupy large tracts, and the chesnuts furnish the ordinary food of the poorer classes. The heat of the summer is moderate, and the winters far from being severe, except when the *gallegos*, or north winds, blow, but they are not of long duration.

The country between Cape Ortegal and Cape Ajo is of a different character. The Montañas de Asturias, which descend southward to the plain of Old Castile and Leon with a very rapid slope, decline towards the north in long ridges, which grow lower as they approach the Bay of Biscay. In the vicinity of the principal range these lateral ridges are too steep and too high to be cultivated, and are only used as pasture-ground for cattle and goats: a considerable part of them is covered with forests. Towards the sea the ridges are lower and their declivities less steep, and here cultivation has ascended to some distance from their base. The valleys which lie between these ridges are narrow and elevated near the great chain, but they grow wider towards the sea. They have a tolerably fertile soil, and are well cultivated. Wheat, barley, and maize are grown. Great quantities of cider are annually made and exported. Chesnut-trees are so common, that the chesnuts not only supply the lower classes with food, but also are exported to a great extent. The climate does not differ much from that of the western maritime tract, being also very wet, but the cold is greater, though the *gallegos*, or northern winds, are not experienced in the same degree as in Galicia.

III. *The Basin of the River Ebro* occupies a part of Old Castile, the province of Alava, the kingdom of Navarre, the greater part of Aragon, and a considerable portion of Catalonia. The northern boundary, from the sources of the river Segre on the east to those of the Arga on the west, is formed by the high chain of the Pyrenees. [PYRENEES.] West of the sources of the Arga river a chain of mountains begins, which runs westward until it meets, near the sources of the Ebro, the Sierra de Sejos, or the eastern portion of the Montañas de Asturias. This range, which is called Sierra de Aralar, is about 120 miles in length. It is much less elevated than the two great mountain-systems which it connects. The mean elevation probably does not exceed 3000 feet above the sea-level. The highest summits which have been determined are Mount Adi, which is 4766 feet high, and Mount Arza, which is 4268 feet high, both in Guipuzcoa.

The higher portion of the basin of the Ebro is considerably lower than the plain of Old Castile, which joins it on the south. Espinosa de los Monteros, a small town not far from the source of the river, is 2478 feet above the sea, and 400 feet lower than the town of Burgos; and Miranda, through which town the road from Biscay to Burgos runs, is only 1514 feet above the sea-level. Thus this part of the basin of the Ebro forms a considerable depression between the two adjacent countries. The interior of the basin, in this part, is nearly a plain, which extends north to Vittoria and south to Nagera, and is here and there intersected by detached groups of limestone hills. It has a tolerably fertile soil, and produces good crops of corn. Farther east many offsets branch off from the Sierra de Aralar and the Pyrenees, and west of the river Aragon these ridges cover at least three-fourths of the country north of the Ebro. Near the principal ridges they constitute extensive mountain-masses, which are separated by narrow valleys. The masses themselves are unfit for cultivation, but are used as pasture-grounds, and a great part of them is covered with forests containing many fine timber-trees. The valleys are cultivated, but they are not distinguished by fertility. About 12 miles from the river the mountain masses decrease in size and elevation, and soon sink down to hills, which extend to the banks of the river. Their slopes are partly cultivated, and as the soil is fertile, this tract yield good crops of maize, wheat, and other grain; there are also numerous plantations of vines, olive-trees, and chesnut-trees. Hemp and flax are extensively grown. Grain, oil, and wine are exported to a considerable amount.

East of the river Aragon, more than half of the country north of the Ebro is covered with the branches of the Pyrenees. Near 2° E. long. a range detaches itself from that chain, which runs first south-west and afterwards south, and again south-west until it terminates on the banks of the Ebro about 30′ E. long. This range is called in its southern portion Sierra de Llena, and may be considered as the eastern boundary-line of the basin of the Ebro, as nearly all the rivers which originate on its eastern declivity descend to the south-east and enter the Mediterranean. Between the sources of the rivers Aragon and Segre (that is, between 1° W. long. and 2° E. long.) is the highest portion of the Pyrenean mountains, containing the lofty summits and extensive mountain masses of the Pic du Midi, of Mount Perdido, and the Peña de Maladeta. In this part the northern declivity is extremely steep. But towards the south the range slopes down in a long inclined plain, which terminates about 40 miles from the highest part of the range, north of 42° N. lat. The rocks of which these mountain masses are composed are mostly bare of trees, and have only a scanty vegetation, but they serve as sheep-walks. The irregularly inclined plain is furrowed by deep and narrow valleys. Near the great chain these valleys are almost unfit for cultivation, on account of the severity of the climate; but farther down narrow tracts occur which are cultivated with the grains of Northern Europe and with flax. As the mountains terminate north of 42° N. lat., a considerable tract of country extends between them and the banks of the Ebro. This tract is partly cultivable and partly a desert. The desert is not far from the banks of the river, and extends from the vicinity of Zaragoza on the west, to near Mequinenza on the east, a distance of more than 50 miles in a straight line. It is about 10 or 12 miles in width, and formed by a swell of the ground, which in its highest part may rise 1500 feet above the level of the Ebro. The surface is a succession of slight ascents and descents, and the soil is extremely arid. This tract is called the Sierra de Alcubierre, or the Desert of Fraga, being traversed by the road which leads from Fraga on the Cinca to Zaragoza. It is nearly uninhabited, and almost a useless waste. A cultivated country surrounds it on all sides, though the soil is in general of indifferent quality, and the crops far from being abundant. But the extensive tract which extends at the base of the mountains, from Barbastro on the Cinca to Balaguer on the Segre, and thence eastward to Cervera at the foot of the Sierra de Llena, is an exception. On the south it terminates on the banks of the Ebro between the mouth of the Segre and the southern extremity of the Sierra de Llena. This tract, called the plain of Lerida, is distinguished by fertility. The surface is often undulating and sometimes hilly, especially towards the Sierra de Llena, but the soil being rich, cultivation is general, and the waste lands are of small extent. It produces good crops of maize, wheat, rye, barley, oats, leguminous vegetables, fruit, wine, and oil.

The countries within the basin of the Ebro south of the river contain a much larger proportion of arable land, and are much more populous than those on the north of the river. That part of it which extends between Logroño and the mouth of the Xalon, from the banks of the river southward to the base of the Sierra de Cameros, is probably the most fertile tract in the interior of Spain. West of Calahorra the surface is in general hilly, and the fertility not so great as east of that town, where the district of Rioja and Bureva is almost a plain, which is annually covered with the most abundant crops. In approaching the mouth of the Xalon, the surface of the country is again intersected by hills, and the fertility decreases.

Near the mouth of the river Aragon, and at no great distance from the banks of the Ebro, commences a ridge of high lands, which at first runs south-south-west to the point where the Xiloca falls into the Xalon. Here it attains an elevation of probably more than 2000 feet above the sea, and forms the edge of the table-land from the mouth of the Xiloca as far as the summit of the Peñagolosa. From the last-mentioned height a tolerably elevated range runs eastward until it approaches the Mediterranean within about fifteen miles, when it turns northward, and extending parallel to the sea, terminates on the banks of the Ebro opposite the extremity of the Sierra de Llena. This ridge, which is about six or eight miles across, attains a mean elevation of between 1500 and 2000 feet; and the most elevated summit, Mount Malasima, rises to 2504 feet. The range itself bears the name of Sierra Monsia. The country surrounded by the ridge just mentioned has nearly the form of a semicircle, of which the Ebro forms the diameter, and may be called the plain of Ixa, from the town of that name which is situated in the middle of its northern edge. The surface is generally hilly or undulating, and it contains a much greater portion of arable land than the countries north of the river, but the soil is of moderate fertility and badly cultivated. The average elevation of this plain above the sea-level is probably not more than 300 feet.

The country which extends between the Sierra de Llena and the Mediterranean, and the lower course of the Ebro, may be considered an appendage of the basin of the Ebro. With few exceptions, the surface is very hilly, and in some parts even mountainous, as in the vicinity of Vique. The ridges of hills which traverse it run partly parallel to the Sierra de Llena, and partly in an opposite direction towards the Mediterranean; the fertility is various. Some districts are very fertile and well cultivated, as the valley of the river Fluvia, not far from the boundary of France, which is called El Apurdan; and the fine plain in which the town of Reus is situated, and which is fifteen miles long and six wide. In general the valleys and depressions are rather fertile and well cultivated; but there are also extensive tracts which have a very stony and sterile soil, as the country between Vique, Gerona, and Hostalrich, and Mount Lazamos, which extends from the plain of Reus to the mouth of the Ebro, and whose sandy soil is covered with a forest of stunted furs. Cultivation has attained a high degree of improvement in this tract, and the water of the

Google

numerous perennial rivers is used for irrigating the cultivated grounds. Among the mountains of this region, the Montserrat rises in terraces to the elevation of more than 4000 feet, and the hill of salt near Cardona, which is above two miles in circuit, to nearly 600 feet. Great quantities of salt are annually taken from it.

The countries included in the basin of the Ebro differ greatly in climate, the valleys within the Pyrenees being so cold that the common kinds of grain do not succeed, while along the sea-shore and towards the mouth of the river most of the fruits of Southern Europe attain perfection. In general it may be observed that the part of the basin which is north of the river, with the exception of the tracts immediately situated on the shores of the Mediterranean, has more severe winters and colder summers than the great table-land, whilst the countries south of the river have a mild winter, and a much more temperate summer. The mean annual quantity of rain is between 20 and 26 inches, but it is much more in the elevated valleys of the Pyrenees. In the interior the climate is healthy, but not so on the coast. Barcelona has occasionally suffered from the yellow fever.

IV. The *Eastern Declivity* extends from the mouth of the Ebro to Cabo de Palos, and contains four regions, which differ in their natural features and productive powers. The most northern extends from the Ebro to Murviedro. Along the sea-shore there is a narrow strip of level ground, hardly more than two or three miles wide, which in a few places is interrupted by low hills. It is generally fertile, and in some places highly fertile. The hills which lie at the back of it, and the valleys between them, are also tolerably fertile and well cultivated, but where the country approaches the high table-land of Cuença, the soil is dry and less productive.

South of this hilly country is the plain of Valencia, which extends on the sea-shore from Murviedro to Gandia, a distance of more than 40 miles, and in its widest part, at the back of the town of Valencia, it extends about twenty miles inland. It is abundantly irrigated, and the whole is under cultivation. It is no less noted for the great variety of its fruits, and rich crops of rice, wheat, and other grain, than for the mildness of the climate, which never experiences frost, but yet is not considered healthy.

The country which lies south of the plain of Valencia, and extends along the sea-shore from Gandia to the vicinity of Alicante and Elche, is extremely broken. It may be considered the most eastern offset of the great table-land, for its central districts are at a great elevation above the sea-level, as may be inferred from the severe cold which is experienced in the winter months, and from the circumstance that the most elevated of its ridges, the Sierra de Peñaquila, south of Alcoy, is covered for some months of the year with snow, which is collected and sent to the lower countries lying south and north of it. The valleys are usually narrow, and the level tracts between the mountains of small extent, and their fertility not much above mediocrity; but as this tract has become the seat of an extensive manufacturing industry, all the arable land is cultivated with the greatest industry, and the crops of maize and corn are tolerably abundant.

South of this mountainous region the eastern declivity extends much farther inland. On the west it reaches to the Sierra de Cazorla and the Sierra de Segura, two ridges of considerable elevation, situated near 3° W. long., and on the south it extends to the Sierra de Aguaderas (37° 20′ N. lat.). The western portion of this region (west of 2° W. long.) is almost entirely filled up with mountains which rise to between 4000 and 5000 feet above the sea-level. It is probable that the general elevation of the valleys is not less than 2000 feet, and that this tract unites the great table-land with the mountain region of the Sierra Nevada. The long narrow valleys are not fertile, and they are badly cultivated. East of 2° W. long. the mountains recede and leave wide valleys between them, of which the northern, or that of the river Segura, is distinguished by great fertility, and the southern, or that of the river Sangonara, may also be called fertile. Both are covered with corn-fields and plantations of fruit-trees. These valleys do not extend beyond 1° 25′ W. long., where they pass into two plains separated by a low ridge, which runs north-east, and terminates near the mouth of the river Segura. The northern is called the plain of Orihuela, and the soil is of the finest quality. Though its products are less various than those of the plain of Valencia, no tract of Spain yields such abundant crops of wheat. The southern plain, which is called the plain of Murcia, is divided from the sea, which is to the south of it, by another low but rather steep ridge, which terminates at Cabo de Palos. The soil is less fertile, and impregnated with salt, which renders it fit for the cultivation of the various plants from which barilla is obtained, which forms an important article of export from Spain. This region, more than any other part of Spain, is subject to earthquakes, and it suffered much from them in 1829. This region also suffers from want of moisture; sometimes it does not rain all the year round, but the rivers always yield a plentiful supply of water for irrigation.

V. The *Basin of the River Guadalquivir* lies between the great table-land and the mountain region of the Sierra Nevada. On the north is the Sierra Morena, and on the east the Sierra de Segura and that of Cazorla. The mountains which constitute the southern boundary-line run along 37° 35′ N. lat., east of 4° 30′ W. long., but west of that meridian they decline to the south-west and terminate on the Atlantic in Cape Trafalgar. The lower level of this country is about 1500 feet below the high countries which lie north and south of it. The source of the river Guadalquivir, which is at the base of the Sierra de Cazorla, and three miles south of the town of that name, is only 526 feet above the sea-level. Such a difference in the level of the country must of course be attended by a corresponding difference in vegetation and productions. [ANDALUSIA, vol. i., p. 512.] But the basin of the Guadalquivir is not a complete level. it varies greatly in aspect and productions. The most eastern portion, or that which is east of 4° W. long., is traversed in the northern and also in the southern districts by several ridges which branch off from the Sierra Morena and the Montes de Granada, and these offsets, with the intervening valleys, occupy about two-thirds of the surface. The ridges are not high, and the valleys are open and wide, and rather fertile and well cultivated. The country between the extremities of the mountains, occupying the central districts, is generally an undulating plain interspersed with a few hills. It is of considerable fertility and well cultivated, and produces much wine, oil, and all kinds of grain.

The central part of the basin is only mountainous to the north of the Guadalquivir, where several ridges of the Sierra Morena approach to the banks of the river. The valleys between them are very narrow and difficult of access. They contain very little arable land, and are badly cultivated. The slopes can only be used as sheep-walks, and the grass in general is scanty. Many of them are covered with thin forests of stunted evergreen oaks, and many are quite bare. The level tracts along the river are generally from 100 to 200 feet above it; they are very fertile and well cultivated, especially in the neighbourhood of Cordova. The tracts south of the river can hardly be called hilly, except in a few places; the surface is diversified by long and broad swells, which usually rise with a gentle slope, and have only steep sides where they approach the Montes de Granada. Some of these swells are dry, and of very indifferent fertility, and generally covered with pine-trees, but most of them are planted with olive-trees or vines. The broad level depressions between the swells are tolerably fertile, and usually well cultivated. This region extends to 5° W. long.

The lower basin of the Guadalquivir extends from 5° W. long. to the Atlantic. That portion which lies north and west of the river contains two regions, which differ in their natural features. The northern, or that which is north of the road from Sevilla to the town of Ayamonte, at the mouth of the Guadiana, is hilly, and in its northern districts even mountainous. Though the ranges occupy a considerable portion of it, the valleys between the offsets of the Sierra Morena are much wider than farther east, and contain large tracts of arable land, but the soil is not so fertile as that of the valleys north of the range. It is tolerably well cultivated. South of the road between Sevilla and Ayamonte the country is almost a useless waste: it is a dead level, and hardly elevated above the sea. Though the supply of rain is far from being abundant, the whole region, for want of sufficient draining, is converted into a swamp, which is covered with low bushes. It is only along the road, where it is somewhat higher and drier, that a portion of it is cultivated: the remainder is uninhabited, except by fishermen and persons occupied in making salt from sea-water. South of the Guadalquivir is a plain, which is traversed, in the vicinity of the river, by a few low broad swells, but in approaching the mountain region of the Sierra Nevada and the banks of the river Guadalete it rises into hills. The northern and eastern districts have generally a good clayey soil, and as they are also well watered by numerous small rivers that are used for irrigation, agriculture is in a good condition, and the crops of grain are plentiful. The plantations of olive-trees, vines, and fruit-trees, among which the oranges of Sevilla are noted, occupy large tracts. The southern district, which extends from the small town of Utrera to Xerez de la Frontera, is a desert nearly without inhabitants and without cultivation, though the soil, which is clayey, apparently possesses a considerable degree of fertility. But the most southern corner, which surrounds the bay of Cadiz, is famous for its vineyards and large plantations of olive-trees. The sugar-cane is cultivated, and the cochineal insect is now reared.

VI. The Mountain region of the *Sierra Nevada* extends over the most southern part of Spain, lying along the sea which divides Spain from Africa, and along the Strait of Gibraltar. Its northern boundary on the east is marked by elevated ranges, extending east and west near 37° 25′ N. lat. The most eastern is called Sierra de Aguaderas, then follows the Sierra de Estancias, and farther west the Montes de Granada, which reach to the towns of Cabra and Lucena, near 4° 30′ W. long. From this point to the Atlantic near Cape Trafalgar, or rather Torre de Roche, the boundary runs south-west, and is not formed by a distinct ridge, but by a mountainous tract consisting of the offsets of the Sierra de Cabras and Sierra de Ronda. This mountain-system covers nearly 12,000 square miles, and contains two regions, a more elevated one to the east of 4° 20′ W. long., and a lower one west of that line.

The centre of the more elevated region is occupied by the Sierra Nevada, a lofty range of mountains running east and west, and about 10 miles wide. The highest part lies between 3° and 4° W. long., nearly the whole of which is covered with snow all the year round. On the 15th August, 1804, the lowest line of snow on these mountains was 9064 feet above the sea-level, but many of the summits rise to a much greater elevation. The highest is the Pico de Mulhaçen, which is the highest mountain in Spain, and attains 11,666 feet above the sea-level; west of it stands the Pico de Veleta, which rises to 11,387 feet. But there are many other summits which are nearly as elevated, as the Cerro de los Machos, Cerro de la Caldera, and the Cerro de Fachos Altos. In advancing east of 3° and west of 4° W. long., the chain grows lower, and none of the summits attain the snow line. Between 2° 40′ and 3° 10′ W. long. is a mountain-knot from which several ridges branch off: it lies between the towns of Baza on the east and Guadix on the west, and is called the Sierra de Baza. From its southern edge the Sierra de Gador issues, and running southward terminates on the sea-shore between Punta de Santa Elena and the Castello de Guardias Vejas, with high rocks. This chain rises, at no great distance from the sea, to 7130 feet. Two other chains issue from the eastern side of the mountain-knot of Baza. The southern chain runs east, and is called Sierra de Bucares: it is of considerable elevation, as the eastern extremity, the Sierra de Maria, about two miles from Vera, is 6274 feet above the sea-level. A branch of the Sierra de Bucares, called the Sierra de Ujamilla, or Aljamilla, runs southward, and occupies with its extensive masses the whole space between the Gulf of Almeria and the small plain that surrounds Vera. It does not appear to rise so high as the Sierra de Bucares. The northern chain issuing from the Sierra de Baza also runs eastward, and bears first the name of Sierra de Estancias, and where it approaches the Mediterranean, that of Aguaderas. No part probably rises above 3000 feet. The few valleys of this mountain region are very small, and enclosed by steep declivities. The arable tracts are of inferior quality, and the whole appears to be a very desolate country. But this part of Spain is rarely visited by travellers, and a great portion of it is almost entirely unknown.

South of the Sierra Nevada are the Alpujarras, a name which properly indicates a range of mountains that runs parallel to the great chain and the shores of the sea, nearly half-way between them. They extend from the Sierra de Gador, which is considered a part of them, westward to the river Guadalfeo, where it runs southward. This chain is of a moderate elevation, probably nowhere more than 5000 feet above the sea-level, an elevation which is attained by the Cerro de Murtas. These mountains are characterized by a rich vegetation which clothes their northern declivity. This declivity descends by gentle slopes to the broad valleys which lie between the Alpujarras and the Sierra Nevada. The fine pastures on the mountain slopes and the fertility of the valleys are partly to be attributed to the great quantity of rain, which amounts annually to between 25 and 30 inches. This is owing to the Sierra Nevada, as the southern slope of the Alpujarras is nearly bare of trees and vegetation, and almost uninhabited, except in the valleys formed by the rivers, which intersect the range, and flow to the sea.

The river Guadalfeo is considered the western boundary of the Alpujarras, but the range of mountains continues westward. It is there called Sierra de Jolucar, and is of moderate elevation (2632 feet above the sea level); but at some distance from the river, where it takes the name of Sierra de Lujar, it rises to 6218 feet; and farther west, in the Sierra de Tejada, it attains the height of 7671 feet. This part of the mountain region is similar in fertility to the Alpujarras, and some geographers consider it a part of that region. But the mountains do not generally advance close to the sea: they slope towards it with a long and gentle declivity, and a narrow, level, though not a low tract intervenes between the base of the declivities and the sea-shore. On this level tract and the slopes of the mountains are those extensive vineyards which supply the wine that is exported from Malaga. This is also the only tract in Europe where sugar is raised to any extent and as an object of rural economy. Much cotton is also grown, and among the trees two or three kinds of palms are found. It is the hottest country in Europe.

Along the northern base of the Sierra Nevada extends the plain of Granada, which is famed for its natural richness and picturesque beauties, and its relics of the Moorish times. [Alhambra; Granada.] North of the plain are the southern slopes of the Montes de Granada. On the east this range is connected with the mountain-knot of Baza, and runs westward nearly parallel to the Sierra Nevada. It may extend about 50 miles in length, and is about 10 miles across. It does not rise with a steep ascent, like the Sierra Nevada, but slopes gently to the south and north. These slopes are usually either covered with plantations of olive-trees and vines, or cultivated with grain, though the range rises to a considerable elevation. The town of Alcalá la Real, situated near its western extremity, is 2805 feet above the sea; but the mountains rise much higher to the north-east of Granada, where the Sierra Elvira, or de los Infantes, exceeds 5000 feet. East of the town of Granada, the Xenil river, which divides the declivities of the Sierra Nevada from those of the Montes de Granada, flows in a valley of moderate width, but tolerably well cultivated. Near the town the valley widens to a plain, which extends on both sides of the river as far as Loja, a distance of nearly 20 miles in a straight line, and varies in breadth from eight to ten miles. The whole is covered with fields and gardens, intermixed with houses and villages. In no part of Europe is irrigation better understood. Every kind of grain yields abundant crops. On the slopes of the Sierra Nevada there are excellent pastures.

The mountain region which begins west of the plain of Granada and the Sierra Nevada, extends south-west, occupying the whole of the tract between the Mediterranean and the river Guadalete, which falls into the bay of Cadiz. It terminates on the west between Torre de Roche and Tarifa. Nearly in the middle of it runs an elevated tract about ten miles wide, which however is not immediately connected with the Sierra Nevada, but rather with the Sierra Tejada. East of 5° W. long. it is called Sierra de Cabras; but farther west it takes the shape of two parallel ridges, of which the western is called Sierra de Ronda, and the eastern Sierra de Tolox. The high mountains terminate in the vicinity of Medina Sidonia. The mountains do not attain a great elevation. The Sierra de Cabras may rise to between 4000 and 5000 feet above the sea-level; but farther west it sinks lower, and near Medina Sidonia it hardly exceeds 2000 feet. But the surface of the whole tract is extremely broken, like the Sierra Morena. Steep ridges and high peaks lie close together, and are divided rather by ravines than by valleys. Travellers find it very difficult to cross this tract. On the north-west and south this mountain region is surrounded by a hilly country, which in many places has a very broken surface, but also contains a considerable number of wide valleys and extensive plains. The hills, which are numerous, with few exceptions do not rise more than a thousand feet above the sea; and nearly the whole of the country, where not cultivated, is covered with forests. A great part of it is used as pasture-ground, but other parts are generally cultivated. The soil is moderately fertile Along the Mediterranean, between Malaga and Marbella, are extensive vineyards, plantations of sugar and cotton, date-trees, and other fruit-trees in great abundance.

The region of the Sierra Nevada enjoys the advantages resulting from abundant rains more than any other part of Spain, not even the northern and western coasts of the northern provinces excepted. The annual quantity of rain varies between 25 and 30 inches, being greater near the elevated ridges, and less plentiful near the sea. This, united to the powerful effects of a southern sun, renders it fit for the production of a great number of fruits and plants which do not succeed in any other part of Spain.

Rivers.—Spain is drained by a great number of rivers, and some of them run for several hundred miles; but only a very few are navigable for small boats, and that only towards their mouths. Travellers generally attribute this to want of energy in the government or in the nation; but the rivers have only a very small quantity of water. This is mainly to be ascribed to the small amount of rain which falls on the table-land and the adjacent tracts, in which almost all the rivers rise; and this small quantity is very soon evaporated, as the highest parts of the interior are destitute of trees. Though the number of mountain-ranges is very great, most of them are only for a few months of the year covered with a thin layer of snow, which dissolves very rapidly. It is remarkable that those rivers which are navigable become so only at places where they are joined by tributaries which originate in such mountains as rise above the snow-line. The Ebro becomes navigable at Tudela, after having been joined by the Aragon, which originates with numerous branches in the snow-covered mountains which surround the Pic du Midi. The Tagus is not navigable even for small boats above Alcantara, which town lies near the boundary of Portugal, and where it is joined by the Alagon, which river is supplied during the whole year with water from the snow-covered summit of the Sierra de Gredos. The Guadalquivir can only be navigated by small boats from the town of Palma downwards, for at that place it receives the Xenil, which derives the great supply of water that it brings down from the Sierra Nevada. We do not precisely know where the Duero begins to be navigated, but probably this takes place at the confluence with the Ezla, which originates in the Montañas de Asturias, and derives one of its branches from the high summit of the Peña de Peñaranda. But though the rivers of Spain are nearly useless for the transport of its productions, they are of great importance for fertilising the ground by irrigation. This practice is nearly general in all the countries which extend along the Mediterranean, and in the basin of the Guadalquivir. It cannot be introduced on the table-land, as the rivers which water it generally run in so deep a bed, and so much below the general surface of the country, that their waters cannot be made available for that purpose. In the northern and north-western maritime countries the rains are sufficiently abundant for the growth of corn without such artificial means.

The largest rivers are noticed under their proper heads. [DOURO; EBRO; TAGUS.] We shall here briefly mention a few others.

The Miño, or, as it is called by the Portuguese, Minho, rises with numerous branches in the north-eastern districts of Galicia, where the Montañas de Asturias form nearly a circle, whose circumference is open towards the south. All the waters collected on the inner edge of this circular range unite and form the Miño. Where the river issues from the circle, below the town of Lugo, it has scoped its way through an elevated rocky ridge. It continues to run in a southern direction to Orense, where it again runs between high ridges, after having been joined by the Sil, which in its upper course drains a similar circular region, and also in the middle of its course traverses a narrow cleft between high mountains. Below Orense the Miño runs mostly south-west, and from Melgaço to its mouth it constitutes the boundary-line between Spain and Portugal. The mouth is between Guardia in Spain and Caminha in Portugal. Its course in a straight line is about 115 miles, and along the windings 160 miles. Though abundantly supplied with water, this river is not navigable within Spain, on account of its great rapidity. It is however navigated from Salvatierra to its mouth.

The Guadiana rises with numerous branches on the table-land of Cuença, between 2° and 3° W. long. and 39° and 40° N. lat. That branch which is called Guadiana originates near 39° N. lat., in a series of small lakes called Lagunas de Ruydera; and after having run a few miles, it disappears underground, and it continues to run underground for more than twelve miles: it issues from the earth as a strong stream between Villarta and Daymiel. The place where the river re-appears is called Los Ojos de Guadiana (the eyes of the Guadiana). Soon after it is joined by a large tributary, the Giguela, which runs nearly 100 miles, and drains an extensive country. It then runs for more than 120 miles westward through the plains of La Mancha, without being joined by any considerable affluent. East of 6° W. long. it is joined by the Zujar, which descends from the Sierra Morena, and runs more than 100 miles, but has very little water. Continuing westward without receiving any considerable tributary, it begins to form the boundary between Portugal and Spain near Badajoz; and after running about 30 miles along the boundary in a south-south-western direction, it enters Portugal, where it runs in a very narrow valley near the town of Serpa, separating the western offsets of the Sierra Morena from the Sierra de Caldarão, and forms a cataract, called El Salto del Lobo (the leap of the wolf). Afterwards it turns to the east of south, and from the confluence of the river Chanza to its mouth it again runs along the boundary between Spain and Portugal. Its course exceeds 450 miles; but it has little water, and can only be ascended by flat-bottomed small river-barges to Mertola in Portugal, not much more than 30 miles from its mouth.

The Guadalquivir originates in the Sierra de Cazorla, east of 3° W. long., and near 37° 50′ N. lat.; and after a course of about 30 miles, mostly west, it is met by the Guadiana Menor, which drains the country enclosed by the mountain-knot of Baza, and runs south, west, and north, nearly 100 miles, before it joins the Guadalquivir. The Guadalquivir, after running 30 miles more to the west, is joined from the north by the Guadarmena, which originates on the table-land of Cuença; and, after leaving it, flows south-west in a narrow valley of the Sierra Morena. It flows nearly 150 miles before it joins the Guadalquivir. Below the confluence of the Guadarmena, the Guadalquivir receives only the waters of one considerable affluent, the Xenil or Genil, which brings down the waters from the Sierra Nevada, and runs first west and afterwards north-west. Though its course does not exceed 100 miles, at its confluence with the Guadalquivir it is the larger river, and brings to it such a volume of water, that from this place the Guadalquivir becomes navigable for river-boats. At the town of Sevilla the Guadalquivir changes its south-western course into a nearly southern course; and here the banks, which up to this point were rather high, sink down almost to the level of the river. In the low plain through which it flows it divides into several branches, which enclose two large islands, Isla Menor and Isla Mayor, which are very low and swampy: though fertile, they are nearly uninhabited. Below Isla Mayor, where the river runs in one channel, it forms a small æstuary, which is connected with the sea at S. Lucar de Borrameda. The whole course of the Guadalquivir falls short of 300 miles; but if the Guadarmena is considered as the principal branch, it runs nearly 100 miles more. Sloops may ascend the river to the town of Sevilla.

Among the rivers which fall into the Mediterranean besides the Ebro, the Segura, Xucar, and Guadalaviar require notice. The Segura originates in the Sierra de Segura north of the source of the Guadalquivir, and in its upper course, which nearly forms a semicircle running north, north-east, east, and south, it flows in a narrow valley between high mountains. Afterwards it runs east in the Vale of Murcia, and becomes navigable at that town for river barges, though a great volume of water is drawn from it to irrigate the extensive plain of Orihuela; where it enters that plain it is joined from the south by the Sangonera, which originates on the eastern declivity of the mountain-knot of Baza, and brings down a considerable volume of water. This river runs above 200 miles.

The Xucar rises on the elevated plain of Cuença, at the place where the Sierra de Molina is connected with the Sierra de Albaraçin, and it runs for more than 100 miles, mostly south, in a broad and moderately fertile valley, without receiving any tributary. It then gradually turns to the east, and after descending from the table-land near its confluence with the Cabriel, it flows in a wide and fertile valley until it enters the plain of Valencia about 12 miles from its mouth. It probably would be navigable for the last 30 or 40 miles from its mouth, if the waters were less abundantly applied to the irrigation of the adjacent country. Its course considerably exceeds 200 miles.

The Guadalaviar or Turia rises on the north-eastern edge of the table-land, in the mountain-ridge which runs from Montalban to the Peñagolosa. After having run about 30 miles to the town of Teruel, its surface is still 2887 feet above the sea-level. Its general course is to the south, but after passing 40° N. lat. it gradually declines to the south-east, and the course is nearly east where it enters the plain of Valencia, which is abundantly irrigated by its waters. After flowing more than 20 miles in the plain, it falls into the Mediterranean near Grao, where there is a bad roadstead. Its whole course is about 150 miles.

Productions.—The most common kinds of grain which are cultivated in Spain are wheat, maize, barley, and rice. The largest quantity of wheat is cultivated in Catalonia and in the western portion of the plain of Old Castile and Leon. Rice is only grown in the countries along the Mediterranean, from the boundary of France to Cabo de Palos. Frequently the produce of the crops is not sufficient for home consumption, and grain is imported. Other objects of agriculture are hemp and flax, especially in the basin of the Ebro, and madder and saffron on the table-land of Cuença. In the southern districts the sugar-cane and cotton are cultivated, and the aloe for the thread which is obtained from it. The most common vegetables are onions, pumpkins, cucumbers, melons, water-melons, potatoes, beans, and peas. Many fruit-trees are cultivated, as almonds, figs, pomegranates, lemons, oranges, pistachia nuts, carobas, dates in the southern districts, walnuts, hazel-nuts, and especially chesnut-trees, which in some of the northern districts cover large tracts. Olive-trees occur in all parts, except the northern mountain tracts, and the vineyards are extensive, except on the most elevated regions. Several of the Spanish wines are considerable articles of commerce, as Xeres (Sherry), Malaga, Alicante, Malvasia, Tinto, and Val de Peñas. Brandy and raisins also are articles of export. Among the wild trees are the sweet-acorn oak (*Quercus ballota*), the cork-tree (*Quercus suber*), the kermes oak (*Quercus coccifera*), and the sumach-tree. On the Montañas de Asturias and Aralar, and also on the western offsets of the Pyrenees, there are large forests of fine timber-trees. The plant from which the barilla is obtained grows partly wild and is partly cultivated in the plain of Murcia and some adjacent districts. The liquorice-plant is abundant in the vicinity of Sevilla and near the mouth of the Ebro, and the prepared juice is sent to all parts of Europe. The esparto is used for making ropes, mats, baskets, &c. On the naked rocks of the Montañas of Asturias, lichen Islandicus and orchil are collected. The caper-bush grows wild in the countries along the Mediterranean, in which also manna is collected.

Among the domestic animals the sheep and horses are distinguished. The sheep are noted for their fine wool, which forms an important article of export. They pass the summer on the Sierras de Guadarama, Avila, and Gata, and the winter in the low mountains of Estremadura which lie between the Tajo and Guadiana. Their number amounts to five or six millions. Sheep are also numerous in other parts, but they have generally a coarse wool. The horses of Spain, and especially those of Andalusia, are noted for their beauty; but during the French occupation (1808-1814), nearly all the fine breeds were sent to France, and they are now rare. Cattle are only numerous and of large size near the higher mountain-ranges; in other parts they are small. The asses and mules are distinguished by their size and beauty. Pigs are not very numerous. Goats are more numerous than in any country of Europe, especially on the table-land. There are wild cattle in the mountain region of the Sierra Nevada, chamois in the Pyrenees, and porcupines in many places. The mountains also contain wolves, bears, lynxes, wild cats, and martens, the last especially in Biscay. Chameleons are found near Cadiz, and monkeys on the rock of Gibraltar. The flamingo is sometimes seen near Valencia, and there are also eagles. The care of the silkworm, the cochineal insect, and bees are branches of industry. In no country of Europe, except Italy, is so much silk obtained as in the eastern and southern provinces of Spain. The cochineal insect has been reared in the last twenty years in Andalusia, Granada, and Estremadura, and it is said to thrive well. Bees are very abundant, and much honey and wax are obtained. Only a few kinds of fish are met with in the rivers, but the fishery in the Atlantic is important. On the coast of Galicia great numbers of sardines are taken, and along the coast between Cadiz and Gibraltar the tunny and anchovies.

Spain abounds in minerals. Gold and silver are known to exist in several places, but they were neglected whilst Spain was in possession of the American colonies. The Darro, a small affluent of the Xenil, brings down from the Sierra Nevada particles of gold. Silver-ore is extracted from some mines near Guadalcanal, where platinum also has been found. Some copper-mines are worked, but the produce is small. A rich mine of quicksilver is worked near Almaden. Lead is very abundant, especially in the Sierra de Gador, and the annual produce of the lead-mines is 600,000 cwt. Iron-ore is very abundant in the Sierra de Aralar, in the Sierra Nevada, and in the Alpujarras. That of the Sierra de Aralar is of the best quality, and the mines are worked to a considerable extent. There are also tin, calamine, bismuth, cobalt, alum, vitriol, and sulphur. In some parts large quantities of saltpetre are collected. Coal occurs in the Montañas de Asturias and in the Sierra Morena, but it is not much worked. Many kinds of marble are got in Catalonia. Several precious stones are found, as rubies, topazes, amethysts, turquoises, and garnets. Salt is got near Cardona in Catalonia, from the lagune called the Albufera de Valencia, and from the sea-water along the coast between Cape Trafalgar and the boundary of Portugal.

(Miñano, *Diccionario Geogr. Estadist. de España, &c.*; Antillon's *Geografia de España;* Bourgoing's *Tableau de l'Espagne Moderne;* Laborde's *Itinéraire descriptif de l'Espagne;* Swinburne's *Travels through Spain;* Graham's *Travels through Portugal and Spain;* Temple's *Observations on a Journey to Spain and Italy;* Temple's *Second Journey in Spain;* Link's *Reisen durch Frankreich, Spanien, und Portugal;* Fischer's *Gemählde von Valencia.*)

Political Divisions.—In former times Spain was divided into fourteen large provinces, some of which were called kingdoms, as Granada, Seville, Jaen, Murcia, Valencia, &c.; others principalities, like Asturias; others counties, like Barcelona, Niebla, &c.; and lastly, others were called provinces, like New and Old Castile, Estremadura, &c. Biscay was termed Señorio. It is now divided into the following forty-nine smaller provinces:—Alava, Albacete, Alicante, Almeria, Avila, Badajoz, Baleares, Barcelona, Burgos, Caceres, Cadiz, Canarias, Castellon de la Plana, Ciudad Real, Cordoba, Coruña, Cuença, Gerona, Granada, Guadalajara, Guipuzcoa, Huelva, Huesca, Jaen, Leon, Lerida, Logroño, Lugo, Madrid, Malaga, Murcia, Navarra, Orense, Oviedo, Palencia, Pontevedra, Salamanca, Santander, Segovia, Sevilla, Soria, Tarragona, Teruel, Toledo, Valencia, Valladolid, Vizcaya, Zamora, Zaragoza.

Population.—The present population of Spain is variously estimated: some authors state it only at ten millions; others at twelve; but in the absence of any official documents it is impossible to decide which estimate is nearest the truth. The last census, made in 1803, gave a total of 10,351,000; which cannot have increased much owing to the troubled state of the Peninsula since the commencement of the present century. Don Sebastian Miñano, who, in 1826, published a Geographical and Statistical Dictionary of the Peninsula (*Diccionario Geográfico de España y Portugal,* Mad., 1826-9, art. 'España'), estimates the population of Spain at 13,732,176; which number he says that he has obtained from documents and reports furnished him by the minister of the interior. But as the work of that author abounds in gross inaccuracies, and is well known to have been written under the influence of a faction, and with a view to exaggerate the population and resources of Spain, no faith whatever can be placed in his statements. As a proof of the wilful exaggerations of which that writer has been guilty, we need only point out the fact of his having given Madrid a population of upwards of 200,000; when, by a census taken last year, it has been found to be only 165,000.

Religion.—The established religion is the Roman Catholic, and no other is allowed in the Spanish dominions. The crown presents the archbishops and bishops, who are confirmed by the holy see, but the pope, having of late refused to grant bulls of confirmation to the ecclesiastics nominated by the regent, almost all the sees of Spain are now administered ad interim by bishops appointed by the government. The wealth of the church was at one time immense; in 1780 the revenues of the archbishop of Toledo amounted to about half a million sterling. Since the Revolution the clergy have been deprived of the tithes; and, by a law passed in the last Cortes, and which has since obtained the royal sanction, the whole of the estates belonging to the cathedrals are to be sold for the discharge of the national debt, and the clergy are henceforth to be supported by the nation. The monastic orders have also been suppressed; and the convents, and the lands belonging to them, sold; but the convents of nuns have been suffered to remain until the death of the present occupants.

Education.—Education is not generally diffused; the lower classes have little or no instruction at all. Until lately education was almost entirely in the hands of the regular clergy, or of the Jesuits, who had colleges in the capital and in the principal cities of the Peninsula; but the suppression of that and the other monastic orders has been in this respect severely felt by the public, as no effectual provision has yet been made by government to supply the place of the schools and colleges formerly kept by them. A society however has lately been formed at Madrid for the establishment of infant-schools, which has already produced some good results, and the example is now being followed by Barcelona, Valencia, and other large cities. The universities, which are nine in number, namely, Salamanca, Valladolid, Santiago, Alcalá, Zaragoza, Huesca, Cervera, Sevilla, and Toledo, are in a most deplorable condition, being attended only by students destined for the church, or those who follow the profession of law or of medicine, for which only academical studies are required. The children of the nobility and rich people are educated in France and other parts of the Continent. There are in the capital various academies and literary societies [MADRID], but their labours of late have been unimportant.

Colonies.—The only colonies now remaining to Spain, of her once extensive dominions in America, are the islands of Cuba and Puerto Rico. She possesses the Philippine Islands in Asia, and the fortresses of Ceuta, Melilla, and Peñon de la Gomera, on the northern coast of Africa, which are used as places of transportation for convicts. The islands of Fernando Po and Annabon, on the western coast of Africa, also belong to her.

Revenue, Trade, &c.—The public revenue of Spain, including that of her colonies, amounts to about 13,000,000*l.* sterling; but the expenditure for several years has exceeded the revenue by nearly one-half. The public debt amounts to about 40,000,000*l.* sterling, upon which no dividends have been paid for some time. No country of Europe equals Spain in natural commercial advantages, whether we consider its situation or its products. The coasts are extensive, and the ports numerous and commodious; the inhabitants, inured to a warm climate, visit the tropical regions with comparative safety; yet it is far behind any other country in commercial importance. During the seventeenth century most of the Spanish trade with America was carried on in Dutch or English vessels; and, with the exception of wine, wool, and oil, few if any of the productions of the Peninsula found their way to that market. About the close of the last century, under the enlightened administration of Count Florida Blanca, Spanish commerce revived, and several manufactures were established throughout the country. These however were all destroyed during the Peninsular war, and the subsequent separation of the American colonies from the mother country has completely annihilated the maritime trade of Spain. At present Catalonia is almost the only province of Spain where manufacturing is carried on to any extent, but notwithstanding the enormous duties imposed for their protection, few products of Catalonian industry can enter into competition with the corresponding articles of foreign manufacture; and the most scandalous contraband trade is carried on through Gibraltar, Portugal, and on the coast of the Mediterranean, to the great detriment of the revenue. Were the Spaniards to devote their attention to agriculture, and to establish speedy means of communication between their provinces, by making roads or digging canals, it would prove a greater source of prosperity to their country than the attempt to establish manufactures. The chief exports of Spain consist of wines—of which 4,130,755 gallons were shipped, in 1840, to England alone—dried fruits, corn, oil, wool, quicksilver, lead, and some iron. The silk of Valencia, which is equal to that of Italy, is bought by the French manufacturers.

Government and Constitution.—The government of Spain during the middle ages was absolute, though, from the peculiar position of the country, and the earlier development of popular rights—the Cortes held at Burgos, in 1169, having preceded by nearly a century the celebrated Leicester parliament—the power of the king was more virtually restricted than in any other country of Europe. Ferdinand the Catholic aimed the first blow at Spanish liberty, by avoiding, as much as possible, the convocation of the Cortes. His successor, Charles V., completed the ruin of the Cortez, by entirely disregarding their petitions and defeating the citizens who rose in arms to support the cause of national liberty. Spain continued to be ruled despotically by the kings of the houses of Austria and Bourbon until the French invasion in 1808, when the deputies of the several provinces assembled at Cadiz, and framed a new constitution, which was sworn to and promulgated in 1812. At the close of the war however, Ferdinand, who had recovered his liberty, refused to give it his sanction, and he re-established the old forms of government; but being compelled soon after (1820) by a military insurrection, at the head of which was General Riego, to swear to the constitution of 1812, it again became the law of the land, until it was a second time put down with the assistance of a French army.

On the death of Ferdinand (1832), his widow, Queen Christina, wishing to conciliate the liberal party, gave the nation a new charter (Estatuto Real), and re-established the antient Cortes of the kingdom, with some slight modifications, one of which was the appointment of two chambers, that of the 'Procuradores,' or Deputies, and that of the 'Proceres,' or Peers. This last was composed of all the grandees of Spain, who were declared peers by right of birth, as well as of a certain number of noblemen, high functionaries, bishops, &c., whom the crown reserved to itself the right of creating peers for life. The king alone had the power of convoking, suspending, and dissolving the Cortes: the only occasion which rendered their convocation imperative was the demise of the crown or the occurrence of any arduous affair which the government might consider so important as to require that they should be consulted. In the event of a dissolution another parliament was to be convoked before the lapse of the year. The Cortes had not the power of deliberating on any matter which had not been expressly submitted to them; but they had the right of petition. The concession of these and other political rights not having satisfied the demands of the Liberal party, several attempts were afterwards made to re-establish the Constitution of 1812, though the more enlightened part of the nation had long acknowledged its impracticablity. At last, in 1836, the revision of the Constitution was intrusted to the Chambers by the government; and after a lengthy discussion, which lasted the whole of the session, the new constitution of the Spanish kingdom was sworn to by the queen-regent, in June, 1837. This differs materially from the old one of 1812. Instead of only one chamber, as before, two were instituted—that of the *Diputados* and that of the *Senadores*—the members of which are invested with equal powers, but all bills relating to taxation are to be presented in the first instance to the Lower Chamber. Instead of the indirect election, the direct system is adopted. Both chambers are elected by the people, the crown having the privilege of choosing one out of every three senators presented by the electors of the province. By the Constitution of 1812, the Cortes met annually on a fixed day without being summoned by the king; and the session lasted till another fixed day, two-thirds of the members having the power of adding a month to the session. The *veto* of the crown moreover was only suspensive in the enactment of laws; but in the present constitution it is absolute. Much of the democratic tendency of the former has been done away with, and it has in most points been assimilated to the constitution of other representative states of Europe. It has however not been extended to the colonies.

Laws.—During the period of Roman domination Spain was governed by Roman law. The Northmen introduced the Visigothic code, antiently called Forum Judicum, and *Fuero Juzgo* by the Spaniards. It was first promulgated by Euric (A.D. 466-83), and greatly improved or augmented by his successors, its principal groundwork being the Breviarium, or body of law selected from the Theodosian Code, the Institutions of Gaius, and other sources, by command of Alaric II., king of the Visigoths. Alfonso VI. caused it to be translated into Castilian. Besides this written or statute law, the Visigoths and their successors had their peculiar customs, which might be termed their common or unwritten law, and which, together with the *Fueros*, or immunities granted to the settlers in towns or districts conquered from the Mohammedans, formed the body of national law. The progressive improvement of society in the thirteenth century having rendered most of the provisions of the *Fuero Juzgo* impracticable, Alfonso 'el Sabio' substituted for it the code of *Las Siete Partidas*, so called from the seven parts into which it is divided. It is a compilation from the code of Justinian, the Visigothic and unwritten law, the local *fueros*, the decretals of the councils, &c., and may be considered the most valuable monument of legislation during the middle ages. It is still the basis of the Spanish common law: for although more recent compilations exist (*Novisima Recopilacion*), they are chiefly founded on it; and cases which cannot be decided either by them or the local fueros, must be decided by the *Partidas*. A commission appointed by the Cortes for the purpose of making a civil and criminal code for the Spanish kingdom, has been sitting for some time, but the result of their labours has not yet been made known.

Army and Navy.—Before the breaking out of the civil war, the standing army of Spain amounted to 60,000 men, besides a reserve of *Milicias Provinciales*, which consisted of 30,000 men. These forces were considerably increased in 1832, and, at the close of the war amounted to upwards of 300,000 men, including in this number several regiments of national guards, who performed the same service as the troops of the line. Since the peace this number has been greatly reduced; the royal guard has been abolished, and its regiments have been incorporated with the rest of the army. The navy is in the most deplorable condition, two ships of the line and half a dozen frigates, with a few smaller vessels, being all that remains to Spain of her once magnificent fleet.

History.—The history of the Peninsula may be divided into four periods: 1, Spain before the invasion of the Arabs; 2, Spain divided into kingdoms; 3, Spain under the kings of the house of Austria; 4, Spain under the house of Bourbon.

First Period. Spain before the invasion of the Arabs.—The history of the Peninsula, previous to the settlements of the Carthaginians, is unknown. The earliest inhabitants mentioned by the Greek and Roman historians were the Iberi. The Iberi were disturbed in their possessions by the Celtae, who invaded the Peninsula from Gaul, or, as others would have it (Masdeu, *Hist. crit. de España*, vol. ii., p. 116, *et seq.*), from Africa, and subsequently settled in the northern districts. In many places however, but chiefly in the central districts of the Peninsula, the two races seem to have been amalgamated, and to have formed only one nation, known as the Celtiberians. [CELTIBERI.] The rich corn-lands, the mines, and seaports of the Peninsula, attracted the attention of the early Phœnician navigators. The time when the Phœnicians first had commercial intercourse with the inhabitants of the southern coast of Spain is not ascertained; but it was doubtless before the foundation of either Rome or Carthage. For some time their settlements, of which Ghadir (now Cadiz) was the principal, were limited to the coasts of Bætica, whence they supplied the natives with the products of Asia, in exchange for the gold, silver, iron, and other valuable productions of the Peninsula. But as they became better acquainted with the country, they penetrated into the interior, where they founded the city of Kartabah (now Cordova), and explored the mountainous districts of Navarre in search of iron. The Phœnicians however were not the only maritime nation which had settlements on the coast of Spain. The Rhodians visited the shores of Catalonia, and founded a town, which they called Rhode (now Rosas). [ROSAS.] They were followed by the Phocæans, who founded the town which is now Denia, and probably also that of Chersoneus (now Peñiscola), on the same coast, and who, having in time dispossessed the Rhodians, extended their settlements along the shores of Valencia. There were other Greek settlements, the names of which may still be recognised in their modern appellations, as Emporion, now Ampurias. The Carthaginians also directed their views towards Spain. Having insidiously possessed themselves of Cadiz, which they took from the Phœnicians, they proceeded into the interior with a view to the subjugation of the country, an attempt however in which they completely failed; for although the Carthaginian generals, Hamilcar, his brother Hasdrubal, and his far more celebrated nephew Hannibal, completely reduced the southern part of the Peninsula, they were unable to subdue the warlike tribes of the interior. This attempt led to the second Punic war. The Romans, either alarmed at the progress of Hannibal, who had taken Saguntum, B.C. 218, or wishing to have a footing in the Peninsula, sent the two brothers Publius and Cneius Scipio to the assistance of the Spanish tribes, with whom they had previously formed an offensive and defensive alliance. After several sanguinary encounters, Publius was routed and slain by Mago, and his brother Cneius met with the same fate near Tarragona, B.C 211; but Publius Cornelius Scipio, afterwards surnamed Africanus, who succeeded in command of the armies of the republic, soon turned the scale in favour of the Romans. After taking Carthago Nova (Carthagena), a town founded by Hasdrubal, defeating Hanno, whom he took prisoner, and gaining a decisive victory over Hasdrubal, the son of Gisco, he invested and took Cadiz, and for ever freed Spain from the Punic yoke. [SCIPIO.] But the Spaniards only changed masters; and Spain was made a Roman province, and divided into Citerior and Ulterior, the Iberus or Ebro being a boundary between them. The subjugation of Spain however was not easily or speedily accomplished. Numantia, when besieged by Scipio Æmilianus, emulated the heroism of Saguntum. [NUMANTIA.]

Until the time of Augustus, the Cantabri, the Gallaici, and the Astures, who inhabited the north western parts of the Peninsula, were not even nominally subjected to the republic; and the other portions of Spain—Celtiberia in the north, Bætica in the south, and Lusitania in the west—became the scene of constant warfare and rebellion. The most remarkable of the native insurrections was that organized in Lusitania by Viriatus, who, during more than eleven years, defeated the ablest generals of the republic and was only put down by the treachery of Cœpio, B.C. 14 [VIRIATUS.] Spain was soon afterwards the theatre of th civil war between Marius and Sulla. Sertorius, a leader of the defeated party, fled thither, and carried on the war for some time. Spain having espoused the cause of Pompey, Julius Cæsar repaired thither in person, and by his military skill triumphed over his enemies. Cneius, the son of Pompey, was defeated at Munda, and peace was restored to the country.

It was only under Augustus that Spain was completely subdued; even the Cantabri and the Astures were reduced to submission. Augustus himself visited Spain, and he divided the country into three great provinces, Bætica, Lusitania, and Tarraconensis, a division which subsisted until the reign of Constantine the Great. During this period Spain was considered one of the most valuable and flourishing provinces of the empire. According to Pliny, it contained three hundred and sixty large cities. The organization of the Spanish provinces is fully stated by Pliny (iii., 1, &c.). Spain gave birth to the poets Lucan and Martial, to the philosopher Seneca, and to the emperors Hadrian and Trajan.

About the beginning of the fifth century, the Suevi under their king Hermeric, the Alans under Atace, and the Vandals or Silingi under Gunderic, after overrunning the provinces of Gaul and crossing the Pyrenees, settled in the Peninsula. They were speedily followed (A.D. 411) by a host of Visigoths led by their king Athaulf, who established himself in Catalonia, though nominally dependent upon his brother-in-law Honorius, the Roman emperor. Wallia, one of Athaulf's successors, obliged the Vandals and the Alans to quit Spain for Africa, and the Suevi, after being defeated in many battles, acknowledged his superiority (416-8). It was not however until the time of Euric (466-83) that the Goths became complete masters of the Peninsula. Euric must be considered as the first Gothic sovereign of Spain, as the six kings, his predecessors, ruled over Gaul, and occasionally only over Spain. He was also the first legislator of his nation, and the laws which he collected or promulgated became in after time the foundation of the 'Forum Judicum' or *Fuero Juzgo*. After the death of Amalric, who fell in battle against Clovis, king of the Franks (531), the Gothic kings appear to have been either elective or hereditary according to circumstances The first king chosen was Theudis. His reign was troubled with wars, and terminated by his assassination in 548. One private individual then followed another upon the throne, none of whom occupied it long or died a natural death. In 554, Athanagild, a noble Goth, having usurped the royal power, purchased the assistance of Justinian, the Eastern emperor, by surrendering to him some fortresses along the south-eastern coast, and promising to hold the rest of his dominions as a fief of the empire. Under the reign of this monarch, the Suevi, who still held some districts of Galicia, following the example of their king Theodomir, abjured Arianism, and were admitted into the bosom of the church. Spain was not entirely emancipated from her dependence upon the empire until the reign of Leovigild, one of the greatest Gothic kings, who subdued the Suevi, and incorporated that vassal state with his own kingdom. He was just and brave. His first wife Theodosia had three brothers, who were canonized by the Catholic church for their piety, namely, St. Isidore, St. Fulgentius, and St. Leander. His son Hermengild, who revolted against him, has been canonized by the papal see, and represented as an humble and persecuted martyr, instead of a rebellious and ungrateful son, merely because he abjured Arianism and embraced the Catholic faith. In 672 the throne of Gothic Spain was occupied by Wamba, a monarch distinguished by his virtues and abilities. The Saracens of Africa having attempted to land at Gibraltar, Wamba fitted out a fleet and defeated them in the first naval action recorded in the annals of Spain. He was succeeded by Ervigius, and Ervigius by Egica, who repulsed the attacks of the Saracens, but is best known for his legislative labours. Egica associated his son Witiza in the empire, whose depravity and misgovernment reduced the country to the most deplorable condition. He was dethroned by Roderic, under whose reign (A.D. 711) the Arabs of Africa, commanded by Tárik Ibn Zeyád, crossed the straits, and, after defeating the whole force of the Gothic monarchy on the banks of the Guadalete [MOORS], took the capital, Toledo.

Second Period.—Spain divided into Kingdoms (from A.D. 711 to A.D. 1518).—Músa Ibn Nosseyr, who followed in the steps of Tarik, prosecuted his conquests, and reduced the whole of Spain to the sway of Islám, with the exception of the mountainous districts of the Asturias, where the prelates and chiefs of the Goths fled for refuge. [MUSA.] It was from those mountains, the cradle of Spanish liberty, that a Gothic nobleman, named Pelayo, attempted to rescue his country from the yoke of the infidel. Profiting by the divisions among the Moslems, he seized on some towns among the mountains, defeated the forces sent against him, and, having successively enlarged his dominions, founded the small kingdom of Asturias, which he transmitted to his son and successor Favila, in 737. [PELAYO.] Alfonso, surnamed the Catholic, who succeeded Favila (in 739), made ample additions to his territories. He was succeeded by his eldest son Fruela (757), and Fruela by Aurelio (768), under whose rule no important accessions were made to the territory of the Christian kingdom. Pressed on every side by the victorious Abdu-r-rahmán I., who occupied the throne of Cordova, the little state of Asturias, with its possessions in Leon, seems only to have had a precarious existence. Indeed Mauregato, a natural son of Alfonso the Catholic by a Mohammedan slave, who, with the aid of Abdu-r-rahmán, ascended the throne of Asturias in 783, is said to have insured peace only by payment of an annual tribute of 100 virgins, half of noble and half of ignoble birth. While these events were passing in the north-western parts of the Peninsula, another Christian kingdom was rising into existence in the recesses of the Pyrenees. In 758, according to the best native historians, Garcia Ximenez, a wealthy noble of Cantabrian origin, was proclaimed king by the inhabitants of the country of Sobrarbe, which became in time the foundation of the two kingdoms of Navarre and Aragon; but the early history of this little kingdom is involved in such obscurity, that the successive labours of critics and historians have hitherto failed in attempting to separate historical truth from romance.

About the beginning of the ninth century, Wifrid, a governor of the Spanish March for the French, assumed the title of count of Barcelona. Nearly two centuries after (A.D. 1005), the ancient province of Bardulia, which, from the numerous forts erected by Alfonso I. for its defence, took the name of *Castella*, after being long governed by counts, the first of whom was Ferran Gonzalez, was formed into a kingdom by Sancho el Mayor, who was likewise king of Navarre.

In 1137 Catalonia was annexed to Aragon by the marriage of Petronila, daughter of Ramiro II., with Raymond V., count of Barcelona.

The crowns of Castile and Leon were also united at times on the same head, either by marriage or by conquest. In 1072, after the assassination of Sancho II., king of Castile, before the walls of Zamora, his brother, Alfonso VI. of Leon, became king of Asturias, Leon, Galicia, and Castile. About the same time (A.D. 1095) the kingdom of Portugal was founded by Henry de Besançon, to whom Alonso gave in marriage his natural daughter Theresa, together with the right of conquest over the Moors. [PORTUGAL.] To relate the particular history of these states falls not within the limits of this article. Their rulers were frequently at war with each other, instead of uniting their arms against the common foe, and thus the deliverance of the Peninsula from the infidel was retarded. It was not until the end of the eleventh century that these states began to extend their frontiers at the expense of the Mohammedans; and this was owing more to the dissensions and civil wars which broke out among their enemies, than to the wise policy or vigorous attacks of their Christian leaders. In 1085, Toledo and the neighbouring districts were reduced by Alonso III. of Castile, under whose reign Rodrigo de Vivar, surnamed *El Cid*, achieved most of his exploits. [ALONSO VI.] His grandson and successor, Alonso VIII., usually styled the Emperor, advanced the frontiers of Castile from the Tagus to the Sierra Morena. Ferdinand III. took Badajoz and Merida in 1230, Cordova in 1236, and Jaen, Seville, and Murcia in 1243. To his brilliant successes over the Mohammedans he owed the surname of 'El Santo' (the saint), which the Spaniards gave him, and which was afterwards confirmed by a bull of canonization from Clement X. in 1671. His son and successor, Alsonso X., surnamed *el Sabio*, or the learned, is better known for the 'Astronomical Tables' which pass under his name, and for the compilation of the laws of the 'Siete Partidas,' than for his conquests. During this time the kings of Aragon were not inactive. As early as the beginning of the eleventh century (1035-63) Ramiro I. had extended the frontiers of his little kingdom, and made the Moorish kings of Tudela, Saragossa, and Lerida his tributaries. His successor (1063-94) Sancho I. reduced all the Mohammedan fortresses between the Pyrenees and the Cinca. Alonso I. took Saragossa in 1118, and made it the capital of his kingdom. He also conquered all the country south of the Ebro, and from his warlike habits was surnamed *el Batallador* (the warlike). Jayme I., the most celebrated king in the antient annals of Aragon, prosecuted the conquests of his predecessors. In 1229 he took the Balearic Islands, which, though reduced in 1115 by Raymond III., count of Barcelona, had again fallen into the hands of the Mohammedan pirates. The important city of Valencia, the capital of a Moorish kingdom of that name, submitted to him in 1238. Owing to these and other conquests of the kings of Castile and Aragon, the Spanish Moslems were driven to the mountains of Granada, where, in 1248, Mohammed Ibnu-l-ahmar founded a new kingdom. [MOORS.]

After this several unsuccessful attempts were made by the Africans to re-establish the rule of Islám in Spain. In 1273 Abú Yúsuf Ya'kub Ibn 'Abdi-l-hakk, fourth sultan of Marocco of the dynasty of the Benu Merin, crossed the strait with a formidable host; but after some slight advantages, he returned to his dominions without making any important conquest. In 1339 Abú-l-hasan, king of Fez, having landed at Gibraltar with considerable forces, was defeated on the banks of the river Salado, near Tarifa, by the kings of Castile and Portugal united (October, 1340). During the reign of Pedro IV. of Castile, England for the first time interfered in the internal affairs of Spain. That prince, who from his tyrannical rule and cruelties, was surnamed 'el Cruel,' began his reign with the murder of his father's mistress, Eleonora de Guzman; his nobles and high vassals fell the victims of his cruelty, or, as it has been qualified by his apologist Zuñiga, of his unflinching severity and love of justice. In 1358 he treacherously murdered his natural brother Don Fadrique, who was grand-master of Santiago. His next victim was his cousin Juan, prince of Aragon. He divorced his queen, Blanche of Bourbon, threw her into a dungeon, and afterwards had her poisoned. Henry, count of Trastamara, Pedro's natural brother, alarmed at the fate of his family, took shelter in France. Having, with the consent of Charles V., raised a strong body of mercenary adventurers commanded by Bertrand du Guesclin, he invaded Castile. Pedro was easily overpowered, and while his successful rival was proclaimed king at Burgos (1366), he hastily fled to Bordeaux, at that time the capital of the English dominions in France. He there implored the assistance of Edward, Prince of Wales, who, having obtained his father's consent, levied an army, and entered Spain. Henry encountered him at the head of 100,000 men, and, against the advice of Du Guesclin, gave him battle near Naxera. The English were victorious; Du Guesclin was made prisoner; Henry fled to France, and Pedro was again king of Leon and Castile. The Black Prince however had soon reason to repent of the aid he had given to Pedro, who not only refused the sums that he had agreed to pay for the English forces, but, disregarding the advice of his humane ally, again stained the throne with the blood of his relatives and courtiers. [Pedro.] Accordingly, when Henry attacked him a second time, the Black Prince left him to his fate, and Pedro lost his throne and his life (1369). These events led to the connexion of the houses of Lancaster and Trastamara, by the marriage of Enrique III. of Castile with Catherine, daughter of John of Gaunt, duke of Lancaster, by Constanza, daughter of Pedro IV. Henry IV., surnamed 'the Impotent,' who succeeded John II. in 1455, was one of the weakest kings, both in mind and in body, that ever ascended a throne. The nobility, with the archbishop of Toledo at their head, combining against him, arrogated the right of trying and passing sentence on their king, whom they publicly deposed in 1465.

All the malcontent nobility were summoned to a plain not far from the city of Avila, where a scaffold was erected of sufficient elevation to be easily seen from the surrounding country. An image representing the king was seated on a chair of state, clad in sable robes and adorned with all the insignia of royalty; a sword at its side, a sceptre in its hand, and a crown upon its head. A manifesto was then read, and sentence of deposition pronounced, after which the archbishop of Toledo ascended the platform, and tore the crown from the head of the image; the marquis of Villena removed the sceptre, the count of Placencia the sword, the grand-master of Alcantara and the counts of Benavente and Paredes the rest of the regal insignia; the image, thus deprived of its honours, was precipitated from the scaffold amidst the mingled groans and clamours of the spectators. The young prince Alfonso, at that time only eleven years of age, was seated on the vacant throne, and the assembled nobility kissed his hand in token of obedience. This extraordinary transaction was followed by a civil war, which did not cease till after the death of the young prince, on whom the nobles had bestowed the kingdom. On the death of Alfonso (July 5, 1468), his sister Isabella was immediately proclaimed, but on her refusal to assume the government whilst her father was still living, the malcontents were compelled to come to terms with the dethroned king, who was suffered to resume his power on condition that he would divorce his queen, whose dissolute conduct was the cause of general detestation, and acknowledge Isabella, the only lawful heiress of the kingdom, to the prejudice of his daughter Joanna, who was reputed to be the daughter of his favourite, Don Beltran de la Cueva, duke of Albuquerque, whence she was called 'La Beltraneja.' The next step taken by the insurgents was to secure the marriage of the princess, who, after several months spent in negotiation, was betrothed to prince Ferdinand of Aragon in 1469. On the death of Henry (December 11th, 1474), his daughter Isabella was raised to the throne, though not without opposition. A considerable number of the Castilian nobility espoused the cause of Joanna, whom they caused to be proclaimed queen of Castile at Placencia, and betrothed to her uncle Alfonzo V., king of Portugal, who prepared to assert her rights to the throne at the head of a powerful army. But the superior talents of Ferdinand prevailed; the Portuguese king was defeated at Toro (May, 1476), and after several years of desultory warfare was obliged to retreat into his dominions, and to give up the cause of his niece and intended bride, who retired into a convent. By the death of John II., Ferdinand's father, which happened about this ime (January 20, 1479), the kingdoms of Aragon and Sicily were annexed to the crown of Castile. No sooner were Ferdinand and Isabella delivered from their internal enemies, than they turned their arms against the Mohammedans, who in the late civil dissensions had been seldom disturbed. In 1481, the important city of Alhama, one of the bulwarks of the Moorish kingdom, was reduced by the marquis of Cadiz; Loja, Velez, Malaga, Baza, and other strong places surrendered between 1483 and 1492; and the capital itself fell into the hands of Ferdinand after an obstinate and long protracted defence. [Granada; Moors.]

The conquest of Granada was followed by the expulsion, or rather the pillage of the Jews, who had engrossed nearly all the wealth and commerce of Spain. The next important event was the discovery of a new world by Columbus [Columbus], the credit of which was entirely due to Isabella. The counties of Rousillon and Cerdagne, which the French had retained since 1462, were restored by Charles VIII., who wished to conciliate Ferdinand previous to his expedition into Italy, but Ferdinand could not overlook the wild ambition of the French king, who laid claim to the kingdom of Naples, whose sovereign, Ferdinand I., was closely related to the house of Aragon. Accordingly Ferdinand sent an army to his assistance, under the command of Gonsalvo de Cordova, who in less than one year expelled the French from their conquests and reseated the king of Naples on his throne. Seeing however that Lewis XII., who succeeded Charles on the throne of France, was intent upon the subjugation of Naples, the wary Ferdinand proposed to him to divide that kingdom, on the plea that Frederic had refused his consent to the marriage of his son and heir the duke of Calabria with his aunt Joanna, daughter of Ferdinand II. of Naples, and had by ill treatment obliged that princess to quit Naples for Spain. Louis accepted the offer, and in 1501 Naples was conquered and divided between the allies. This infamous transaction turned entirely to the advantage of the Spanish king, who in 1506 caused his general Gonsalvo to attack the French, who were ultimately dispossessed of all their dominions in Italy. [Gonsalvo; Italy.] The establishment of the Inquisition in 1480 [Office, Holy], the compulsory baptism of the Moriscos, and the conquest of Navarre, which in 1512 was finally annexed to Spain, are among the important events of this reign. On the death of Isabella (1506), the crown of Castile devolved on her daughter Joanna, wife of Philip, archduke of Austria, and on the death of the latter, upon his son Charles V., afterwards emperor of Germany. Ferdinand died on the 23rd of January, 1516, after appointing Cardinal Ximenez regent of Castile until the arrival of his grandson Charles, who was only sixteen years old. Ximenez maintained order in the kingdom, and repressed the ambition of the haughty Castilian nobles, who disdained submission to one whom they considered their inferior. [Cisneros.]

The history of Spain during this period is very rich in materials. Besides the Chronicles of Isidorus Pacensis, who lived in the eighth century; of Sebastian of Salamanca, of the anonymous monk of Abelda, who wrote in the ninth; of Sampiro, bishop of Astorga, whose narrative comes down to 982; of the monk of Silos, who brought down t national history to the reign of Alfonso VI.; and of Pelayo, bishop of Oviedo, who lived in the twelfth century—all of which are in the collection of Florez, entitled 'España Sagrada,' Mad., 1754-84—the history of Spain at this period is mostly indebted to Don Lucas, bishop of Tuy, whose 'Chronicon Mundi' apud Schottum, *Hisp. Illust.*, vol. ii. and iv., Francf., 1663-8), and to Don Rodrigo Ximenez, archbishop of Toledo, whose 'Rerum in Hispania Gestarum Chronicon (Gran., 1545), and 'Historia Arabum (Lugd. Bat., 1625), are most valuable. The reader may also consult Rodericus Sanctius, *Historia Hispanica*; Alfonsus à Carthagena, *Anacephalæosis* (apud Schottum, vol. i.); Zurita, *Anales de Aragon* (Sarag., 1610); Moret, *Anales de Navarra* (Pamp., 1665); Lopez Cortejano, *Chronica de Fernando III.* (Vallad., 1555); Villasan, *Chronica de Don Alfonso XI.* (Vallad., 1551); Ayala, *Chronica de los Reyes de Castilla*; Fernan Perez de Guzman, *Chronica de Don Juan II.*; and those of Ferdinand and Isabella by Valera, Palencia, and Nebrixa. A 'History of the Reign of Ferdinand and Isabella,' by Mr. Prescott (Boston, 1839), is highly praised.

III. *Establishment of the House of Austria* (1518-16).—Soon after his accession to the throne of Spain, Charles became one of the candidates for the vacant Imperial crown, and although Francis I. of France proved a dangerous competitor, he was chosen by the Diet in 1519. Thus originated the rivalry of the two kings, which gave birth to a series of wars, in which almost all Europe was involved. Whilst Charles was hastening to Aix-la-Chapelle to take possession of the empire, a formidable insurrection broke out in

Castile, which spread to other provinces of Spain. The avarice of the Flemings, to whom the administration of affairs had been almost entirely committed since the death of Ximenez, and the utter disregard shown by Charles himself of all constitutional forms, so incensed the people that they rose in arms for the defence of their rights. Toledo took the lead; the citizens expelled the king's officers, elected municipal governors and councils, to whom they gave the name of comunidades, and raised a body of troops, the command of which they entrusted to John of Padilla. The attempts made by Adrian, the regent of the kingdom during Charles's absence, to quell the insurrection proved unsuccessful. The royal troops were defeated near Segovia, and the rebellion spread through Leon, Galicia, and Estremadura. This seemed to Francis I. a favourable opportunity for reinstating Jean D'Albret in the kingdom of Navarre. A French army, under Andrew de Foix, speedily conquered that kingdom, the garrisons of which were then employed against the comuneros of Castile, but that young and inexperienced general having ventured to penetrate into Castile, the Spaniards, though divided, united their forces, routed his army, took him prisoner, and recovered Navarre in a shorter time than he had subdued it. The Count of Haro, who had succeeded Ronquillo in the command of the royal forces against the comuneros, retook Tordesillas, defeated the insurgents in several actions, and at length took Padilla prisoner, and had him executed. [PADILLA.] His widow Donna Maria, a woman of high spirit, induced the citizens of Toledo still to defend the cause for which her husband had fallen, but all her efforts were in vain. Toledo was taken by the royalists, and she fled to Portugal. The consequence of this unsuccessful rebellion was a material accession of power to the triumphant party, and a proportionate reduction of those rights for the extension of which the vanquished had fought. A league was about this time concluded by the intrigues of Cardinal Wolsey, between the Pope, Henry VIII., and Charles, against France. By granting him the revenues of two sees in Spain, and pledging his word that he would assist him in obtaining the papacy, Charles won over to his interests the ambitious cardinal. Strengthened by this alliance, the emperor proceeded to expel the French from the duchy of Milan, where the insolence and exactions of Marshal de Lautrec had made them extremely odious. The papal army, commanded by Prospero Colonna, an experienced general, being joined by Spanish troops from Germany and Naples, attacked and defeated them, and after an unsuccessful campaign the French evacuated the duchy, retaining only the town of Cremona and the castle of Milan. The election of Cardinal Adrian, Charles's preceptor, who in 1521 was raised to the papal see, to the astonishment of all Europe, and to the great disappointment of Wolsey, roused the anger of his rival Francis, and war broke out again in Lombardy; but the advantage remained entirely with the Imperialists and Spaniards. At last, after a series of campaigns, during which the duchy of Milan, for which they chiefly contended, was alternately gained and lost by both parties, the year 1524 ended with the defeat and capture of the French king before Pavia on the 24th of February. [FRANCIS.] On his arrival in Madrid, where he was removed under the escort of Don Antonio de Leyva, Francis asked to see his rival, who refused him an interview, and kept him in rigorous confinement until the terms for his liberation should be agreed upon. After a great deal of negociating, a treaty was at length concluded (1526), by which Francis was to cede Burgundy; to give up all claims on Italy, as well as on the sovereignty of Flanders and Artois; to restore Charles de Bourbon to his dignities and states; to marry Eleanor, queen-dowager of Portugal, sister of the emperor, and finally to deliver his eldest and second son as hostages for the fulfilment of these agreements. Should the states-general of his kingdom prevent the execution of this treaty, Francis solemnly swore to return to his prison. But while he pledged his oath and honour for the fulfilment of these conditions, Francis is said to have signed a secret protest against the validity of his promise, a subterfuge ill suiting a king whom the writers of his nation have represented as a model of chivalry and honour, in opposition to his imperial rival, whom they describe as equally perfidious and unfeeling. Long wars, acrimonious negociations, and a formal challenge to single combat from Francis to Charles ensued, ending in the taking and sack of Rome by the Constable of Bourbon (May, 1527) [BOURBON], the capture of Pope Clement, who was sent a prisoner to Spain, and the treaty of Cambray, by which Francis agreed to pay two millions of crowns as the ransom of his two sons; to resign the sovereignty of Flanders and Artois; and to forego all his Italian claims, while Charles was not to demand the restitution of Burgundy.

During these transactions, war had been carried on with various success against the Turks, who in 1522 took the island of Rhodes, and against the piratical states on the northern coast of Africa. No sooner was the peace consolidated, than Charles determined to turn his arms against the African pirates. In 1535 an expedition, conducted by the emperor in person, sailed for the port of Tunis, which had lately fallen into the hands of the corsair Barbarossa; Muley Hasan, the dethroned king of Tunis, promising to assist Charles with his forces. Goletta, a seaport town, fortified with 300 pieces of cannon, was taken, with all the Turkish fleet within; the corsair himself was defeated in a pitched battle; and 10,000 Christian slaves, having knocked off their fetters, made themselves masters of the citadel, whilst Charles was engaging the enemy outside the town. The sceptre was restored to Muley Hasan on condition that he should acknowledge himself the vassal of the emperor, deliver up all his fortresses on the coast of Tunis, and pay an annual tribute of 12,000 crowns for the support of the Spanish garrisons. An attempt made some years after (1541) upon Algiers was not equally successful. A storm drove the fleet from its moorings; the army, being deprived of provisions and ammunition, was cut off by disease or the sword of the Arabs, and Charles was compelled to raise the siege of that city, leaving his artillery and baggage behind. The remainder of his reign was spent in war with France or with the Protestant princes of Germany, who, in August, 1552, obtained the free exercise of their religion in their dominions. [CHARLES V. OF GERMANY.] Soon after the decease of his mother Joanna (1555), Charles assembled the states of the Low Countries at Brussels on the 25th of October, and resigned the sovereignty of his paternal dominions to his son Philip, to whom he had already given his Italian possessions on the occasion of his marriage with Mary of England in 1554. Two weeks after he made over to him, before a large assembly of German princes and Spanish grandees, the rest of his European and American dominions; and in the following year (1556) he likewise resigned the Imperial crown to his brother Ferdinand, who had already been elected King of the Romans and his successor. In February, 1557, he retired to the monastery of St. Just, near Plasencia in Extremadura, where he passed the remainder of his days. During the reign of this able monarch, the empire of Mexico was conquered by Hernando Cortés (1318-21); Magalhaens, a Portuguese officer, discovered the westward passage to the East Indies, through the 'Strait of Magalhaens,' and opened to Spain the rich trade of India and China; in 1531 Pizarro, following in Balboa's steps, made his way to Peru, and overthrew the empire of the Incas. [CORTES; MAGALHAENS; PIZARRO.] The following are the best histories of this reign:—Sandoval, 'Historia de Carlos V.' (Pamplona, 1618, fol.); Vera, 'Epitome de la Vida,' &c. (Mad., 1613, 4to.); Ulloa, 'Vita del Imperatore Carlo V.' (Venetia, 1559, 4to.); and Robertson's invaluable work.

Philip II. had neither the inclination nor the talents for war of his father; accordingly his first step upon his accession was to negociate a peace with France, through the mediation of his wife Mary of England. This however was of short duration. Henry II., having been induced by the pope to re-assert the rights of France to the sovereignty of Naples, sent the duke of Guise into Italy at the head of a powerful army; but the superior talents of the duke of Alba, who commanded the Spanish forces, prevailed, and the French were expelled from the Neapolitan territory. In 1557 the united forces of Spain and England, commanded by the duke of Savoy, gained the battle of St. Quentin, in commemoration of which a monastery, sacred to St. Laurence, was built at considerable expense. [ESCURIAL.] The death of Mary, 1558, and the accession of Elizabeth to the throne of England, changed the state of affairs. Philip's return to Spain was followed by a most sanguinary persecution, by which he succeeded in crushing the germ of the Reformation in the Peninsula. The Moriscos, who, whatever might be their attachment to the habits and faith of their ancestors, had proved loyal subjects to his father, were so exasperated by his measures, that they revolted in several provinces of the kingdom; and after a furious and long-protracted contest, were reduced to submission, or compelled to seek refuge in Africa (1571). The Inquisition was armed with new and extraordinary power, and the flames of the *autos da fé* blazed in every corner of the Peninsula: that institution was extended by Philip to his Italian dominions. [AUTO DA FE.] The attempt to establish the Holy Office in the Netherlands first provoked a spirit of insurrection in that country (1566), which, soon growing into a formidable rebellion, exhausted the immense resources of Spain, baffled the talents of Alba and Don John of Austria, and ended in the separation of those provinces from the Spanish monarchy (1648). The death of the adventurous Don Sebastian, who fell in battle with the Moors of Africa near Alcaçarquivir [SEBASTIAN], united Portugal to Spain in 1580. The remainder of Philip's life was passed in designs for subjugating France and England. In the former country he at one time had some hopes of success by secretly allying himself with the queen's mother, Catherine of Medici, and the Romish party, for the destruction of the Huguenots; and afterwards by supporting the Roman Catholic league, under the Guises, against Henry IV. His project for the conquest of England completely failed, and the fleet which he had equipped for the reduction of this island was utterly destroyed. [ARMADA; ELIZABETH.] The execution of his eldest son, Don Carlos, in 1568; the murder of Escovedo; and the subsequent transactions with his private secretary Antonio Perez, have cast a dark shade over the character of this king, who was not deficient either in application to business or talents for administration; but his good qualities were overshaded by bigotry, his ruling passion. He was frequently heard to say that 'he had rather not be a king, than rule over heretics and infidels.' His Spanish admirers ascribe to him a degree of political wisdom equal to that of his great-grandfather Ferdinand; but as he failed in most of his enterprises, we must suppose his political prudence, if he possessed it, to have been in most instances overruled by his bigotry. (Watson's *Philip II.*; Vanderhamen, *Hist. de Don Felipe el Prudente* (Mad., 1625, 4to.); Cabrera, *Hist. de Felipe II.* (Mad., 1609.)

Under Philip III., who reigned from 1598 to 1621, the decline of the Spanish monarchy began. His extreme indolence led him to entrust the management of affairs entirely to his favourite the duke of Lerma. A peace with England was concluded in 1604, and an armistice with the Netherlands in 1609, and Spain once more traded freely with her colonies; but the benefits attending on these two measures were more than counterbalanced by the total expulsion of the Moriscos, which deprived Spain of a considerable part of her population, in whose hands all the wealth and trade were concentrated (1610).

Philip IV. was only sixteen years of age when he ascended the throne. He entrusted the sole management of affairs to his favourite Gaspar de Guzman, count-duke of Olivares, who, though not entirely destitute of talents, was unfit to govern a vast monarchy like Spain. In 1640 Portugal, severely oppressed by the Spanish governors, shook off its bonds by a successful insurrection, which placed John of Braganza on the throne. The war with the Netherlands was renewed, and though the abilities of Spinola, who commanded the armies of Spain, long maintained the Spanish ascendency in those provinces, the Dutch fleets were directed against the New World, and were everywhere victorious. Philip was at last obliged to recognise the independence of the Provinces by the peace of Westphalia in 1648. The war in which France had taken part against Spain and Austria, still continued for eleven years more, until the peace of the Pyrenees (November 7, 1659), by which Roussillon and Perpignan were finally ceded to France, and the marriage of Louis XIV. with a princess of Spain was concerted. A dangerous insurrection in Catalonia, provoked by the imprudent measures of Olivares, was only put down after several years war with the rebels. Philip died in 1665, after appointing his widow queen-regent during the minority of his son Charles II., who was only three years old. Charles II. reigned from 1665 to 1700, during which time Spain was reduced to the most miserable condition at home by bad administration, and abroad by the reverses sustained by her arms. Three successive wars with France ended only in the treaties of Aix-la-Chapelle (1668), Nimeguen (1679), and Ryswick (1697), all of which were extremely humiliating to Spain.

As Charles had no issue, numerous intrigues were formed to prevail on him to name his successor among the various claimants of the crown. After long hesitation, the French party prevailed, and Charles appointed Philip d'Anjou his successor. Louis XIV. instantly recognised his grandson as king of Spain; but the house of Austria advanced claims, and William III. of England and Stadtholder of the Netherlands urged a partition. This led to the war of the Succession, which lasted thirteen years, until Philip, having defeated the allies at Almansa in 1707, became undisturbed master of the Peninsula. (Marqués de San Felipe, *Commentarios de la Guerra de España*, Genova, 1719, 4to.; Lord Mahon, *Hist. of the War of Succession*, Lond., 1832; Coxe, *Historical Memoirs of the House of Bourbon*, Lond., 1813.)

Fourth Period.—House of Bourbon (1700-1841).—The peace of Utrecht stripped Spain of her European dominions; Belgium, Naples, Sicily, and Milan were given to Austria; Sardinia to Savoy; Minorca and Gibraltar to England; and though Alberoni afterwards conceived the bold design of restoring Spain to her former rank among European nations, the quadruple alliance of England, France, the Empire, and Holland defeated all his plans. In 1724 Philip abdicated the crown in favour of his son Louis; but this prince having died a few months after of the small-pox, he was compelled to resume the government. Philip died in 1746, and was succeeded by his son Fernando.

The reign of Fernando VI. exhibits little more than a contest between the British and French agents in support of the policy of their respective nations. However, as the king contrived to observe a strict neutrality in the European wars occasioned by the rivalry of England and France, Spain began to recover from her late wounds. His wise policy was at first pursued by his brother Charles III., king of the two Sicilies, who succeeded him in 1759: and under the administration of men like Olavide, Campomanes, and Floridablanca, Spain was once more respected and feared. The utmost efforts were made by these enlightened men to promote trade and agriculture; canals were dug and roads opened. Nor was their administrative zeal confined to such measures as these; reform was carried by them even into the church; the power of the Inquisition was restricted, and the Jesuits annihilated at one blow, by the Pragmatic Sanction of April 2, 1767, which banished them from all the Spanish dominions and confiscated their property. Unluckily for Spain, the Bourbon family compact involved her in the war between this country and France (1779-83). The expedition to Algiers miscarried, as well as the attack upon Gibraltar. The impulse given to the various branches of the administration during the reign of Charles III. continued through the early part of that of his son and successor Charles IV.; but Godoy, the queen's favourite, having succeeded Count Aranda in the administration, Spain entered on a new career of ruin and misfortune. On the 4th of March, 1793, the French convention declared war against Spain upon the ground of Charles's improper interference with her internal affairs. Spain at first entered with zeal into the crusade against the French republic, and a voluntary contribution, amounting to seventy-three millions of francs, was voted towards the expenses of the war, but Godoy, the favourite, who wished to conduct the operations from his palace, ruined all. Though, early in June, the forces of Spain and Portugal united invaded Roussillon, where they occupied Bellegarde and other places of less importance, and though on the 22nd September they defeated the French troops sent to oppose their progress, no advantage was derived from their victory. In 1794 General Dugommier invaded Catalonia, and Godoy was obliged to conclude the discreditable peace of Basle, by which half of St. Domingo was resigned to France. The next step of Godoy, who, on the cessation of hostilities, had received the title of 'Principe de la Paz' (Prince of Peace), was to conclude with the republic, the leaders of which deluded him with the prospect of placing a Spanish prince on the throne of France, a treaty of alliance offensive and defensive. By this treaty, which was signed and ratified on the 19th of August, 1796, at St. Ildefonso, it was stipulated that either power should, in case of war, be entitled to claim from the other fifteen ships of the line and an army of 24,000 men. It was further stated in the treaty that these stipulations referred especially to England, which was represented as the sworn enemy of Spain on account of her American dominions. War was accordingly declared against England; but Spain had soon reason to repent of her alliance with France. Her fleet under Don José de Cordova was defeated and dispersed by Sir John Jarvis, who was created Lord St. Vincent for his victory. Sir Ralph Abercromby attacked and took the island of Trinidad (February, 1797); and, after a short resistance, Minorca surrendered to General Stuart (November, 1797). In consequence of the entire interruption of the colonial trade, taxes and debts increased, whilst the credit of the nation sunk. Portugal having refused to comply with Bonaparte's demands to admit French and Spanish garrisons into her sea-ports and fortresses until peace with England should be concluded, the invasion of that kingdom was determined on. Forty thousand Spaniards, commanded by Godoy in person, drove the Portuguese beyond the Tagus, and Portugal, seeing her northern provinces also threatened by the French, consented to cede Olivenza to the Spaniards, and to shut her ports against England (1801). By the peace of Amiens, which ensued (27th March, 1801), England restored to Spain all her conquests except the island of Trinidad.

In the war between England and France in 1803, Spain did not join at first, having, it is said, purchased permission to remain neutral by a monthly tribute of five millions of francs to Napoleon; but the British ministry, having conceived the suspicion that the cabinet of Madrid only waited for the safe arrival of the American treasure-ships to declare openly against England, without any previous declaration of war, ordered the seizure of four Spanish frigates which were freighted with the precious metals. This measure, which no principle of international law could warrant, and which afforded a fair pretext to French declamation against England's naval tyranny, roused the indignation of the Spaniards, and on the 12th of December the cabinet of Madrid issued a manifesto 'calling upon every individual Spaniard to assist in avenging the insults of the tyrant of the sea,' and war was instantly declared against England. The reverses which Spain sustained in the maritime war of 1805 are well known; the battle of Trafalgar inflicted upon her navy a blow from which she has never recovered. In 1807 the secret treaty of Fontainebleau was concluded between France and Spain, by which Charles surrendered to Napoleon his infant grandson's kingdom of Etruria, on condition that he should receive for him the two provinces of Entre Minho e Douro and Tras os Montes, under the name of the kingdom of Northern Lusitania. The more important provinces of Alemtejo and Algarve were to constitute a principality for Godoy, who was the principal negociator of this treaty. Accordingly a French army under General Junot invaded Portugal and took possession of Lisbon, but when called upon to fulfil the conditions of the treaty of Fontainebleau and to instal the Prince of Peace in his dominions, the French emperor refused to admit any partners in his new acquisition, and gave orders to his ambassador Beauharnais to foment the dissensions then existing in the Spanish royal family. The Prince of Asturias (Ferdinand) had refused to marry the sister-in-law of Godoy, and, in order to secure himself against the vengeance of the offended favourite, had written to the French emperor for protection, and requested the hand of one of his nieces. He also addressed a letter to his father, exposing the mistakes and abuses of the administration, and requesting to be allowed some participation in the government. This was enough for Godoy. On the 29th Charles was informed that a conspiracy against his life was on foot, and having immediately proceeded to his son's apartments, he disarmed him, seized his papers, and made him a close prisoner. Escoiquiz and the Duke of Infantado were also arrested, and on the following day a proclamation was issued announcing to the nation the atrocious design imputed to the Prince of Asturias, and a solemn thanksgiving was ordered throughout the kingdom for the king's deliverance. The Junta however which was convened for his trial, unanimously acquitted the prince, who was released, and apparently reconciled to his parents. The other prisoners were banished. Thus ended, in November, 1807, the celebrated Process of the Escurial. In the meantime French troops had entered Spain, apparently on their way to Portugal, but in reality to achieve one of the most iniquitous acts of spoliation on record. Through stratagem they gained admittance into Barcelona, Figueras, St. Sebastian, and Pamplona, and Murat entered Madrid at the head of a strong division. Charles IV. still received them as allies, but the people of Madrid, driven to desperation, flocked to Aranjuez, where the court was then residing, and having attacked the house of Godoy, plundered it of its valuable contents and set it on fire. The favourite could only escape the popular fury by hiding himself in one of the cellars of his palace. On the morning of the 20th, Charles, wearied with the struggles of the last few days, publicly abdicated, and declared the Prince of Asturias king of Spain.

With a French army in his capital, Ferdinand saw that the stability of his throne depended upon his recognition by the French emperor. He therefore addressed him a note in justification of the late events, and renewed his solicitations for the hand of an imperial princess. In the meantime Charles also wrote to Bonaparte, protesting against his abdication as a forced measure; while the queen importuned Murat to save the life of her minion, who had been discovered and imprisoned. Ferdinand, having been persuaded by the French ambassador Savary to leave Madrid and meet the emperor, who was said to be already in Spain, was conveyed a prisoner to Bayonne with all his family, on the 15th of April. Here he had an interview with the emperor, who threw off the mask, and required him to make a formal cession of the Spanish crown; the kingdom of Etruria, lately taken from his nephew, and the hand of one of Bonaparte's nieces, were promised him in return. Ferdinand's conduct on this occasion raised expectations which were afterwards grievously disappointed; he refused to comply with the emperor's wishes, and declared that he would never consent to part with his father's inheritance. Shortly after Charles IV., his queen, and Godoy arrived at Bayonne, and Bonaparte had no difficulty in obtaining from the former an edict addressed to the council of Castile nominating Prince Murat lieutenant-general of the kingdom, and directing his orders to be obeyed as emanating from the king. On the 5th of May, Godoy and Duroc concluded and signed a convention by which Charles ceded Spain and the Indies to Bonaparte. Ferdinand was next applied to in order to sign an act of renunciation of all his rights in favour of the French emperor, which he did on the 10th of the same month. Whilst this scene of unexampled perfidy and violence was being acted at Bayonne, the French had so exasperated the Spaniards that the feelings of the nation were roused against them. An attempt to prevent the departure of the regent Don Antonio, and the Infante Don Francisco, Ferdinand's younger brother, from Madrid, brought about the first collision between the French and the Spaniards. The 2nd of May, 1808, will ever be memorable in Spanish annals for the sanguinary conflict between the unarmed inhabitants of the capital and 25,000 well appointed soldiers, and for the slaughter which Murat afterwards caused to be made of the defenceless inhabitants. That day too was like the spark of fire to the mine. No sooner were the events in the capital made known in the provinces, than the gathering tempest of Spanish indignation broke forth, and the people took up arms against the invaders, although the most enlightened part of the nation espoused the cause of Joseph Bonaparte, whom the French emperor had nominated king of Spain. The Asturians were the first to take up arms in the cause of national independence, the people of Aragon followed, and the rising soon spread to Seville, Badajoz, and Barcelona. Everywhere Juntas were instituted to act against the invaders. A French squadron under Admiral Rosilly was compelled to surrender within the harbour of Cadiz. Moncey was repulsed with considerable loss from before Valencia, and Duhesme failed in an attempt upon Gerona. The Spaniards under Cuesta and Blake having been defeated by Bessières at Rio Seco, the road to the capital was opened, and Joseph made his triumphant entry into Madrid on the 20th July, 1808, though, hearing of the defeat of Dupont by General Castaños at Baylen, he left it a few days after, and retreated to Vitoria. About the same time an insurrection broke out in Portugal, and the alliance of Great Britain with the Spanish nation was proclaimed. A struggle now commenced, which, it is generally admitted, led to the ruin of the French emperor. Sir Arthur Wellesley, having been sent from England to the assistance of the Spaniards, landed at Coruña on the 20th of August, and having subsequently defeated the French under Junot at Vimeira, Portugal was evacuated by the convention of Cintra. In the meantime discussions were going on in Spain as to the form of government to be adopted. Soon after the outbreak of Madrid, several Juntas had started up, simultaneously and without concert, in the provinces, to repel foreign aggression. At first a sense of common danger made them act in union with zeal and patriotism; but when the intrusive king and his foreign troops had been driven almost to the foot of the Pyrenees, provincial ambition, local and even individual interests, jealousy and intrigues, took the place of patriotism, and each province, with its own governing Junta, stood alone, jealous of every other province, and the necessity of some central executive power began to be felt. Accordingly a Central Junta was installed at Aranjuez on the 26th of September, and the count of Floridablanca was chosen president. Its first measure was a solemn proclamation of Ferdinand VII.

On the 8th of November Bonaparte himself entered Spain, and the influence of his superior military talent was immediately apparent. Soult attacked and defeated the centre of the great Spanish army (10th October, 1808). Victor's and Lefebvre's victories at Espinosa and Reynosa on the 11th, opened the way to Asturias and the northern coast. On the 23rd Lannes attacked Castaños and Palafox near Tudela, and defeated them. The mountain-pass of Somo-Sierra was taken by assault by the French and Poles under Bonaparte, and on the 4th of December the French army appeared before Madrid, which immediately surrendered. During this time, Sir John Moore, who was at Salamanca, found himself opposed to the victorious French armies which were rapidly advancing to cut off his retreat. Giving up all hope of the defence of Portugal, he commenced a rapid and precipitate retreat on Coruña. He was attacked on the 16th January, 1809, by Soult and Ney, at the head of superior forces, and he fell at the very moment when his army had gained the victory. [MOORE, SIR JOHN.]

The war continued with unabated fury in every corner of the Peninsula. The Spaniards, being much inferior in discipline to the French, were invariably defeated in the open field; but the French remained masters only of the places which they occupied, and the guerrillas continually surrounded and harassed them. No line of communication was safe for the French, and their means of support frequently failed. The obstinate defence made by the people of Saragossa [SARAGOSSA] and other towns, considerably thinned their numbers. Two objects chiefly occupied the French generals during the campaigns of 1809 and 1810—the reconquest of Portugal and the march over the Sierra Morena to Cadiz. The former was prevented by the tactics of Sir Arthur Wellesley, who advanced into Castile, and defeated Joseph, Victor, and Jourdan at Talavera (27th and 28th July, 1809); but after the defeat of the Spanish general Arizaga, Ocaña was carried by the French. In January, 1810, Desolles and Gazan took the pass of Despeñaperros; Sebastiani stormed the defile of St. Estevan and took the bridges over the Guadalquivir; Andalusia was overrun, and the cities of Jaen, Cordova, and Seville were taken. In Catalonia, Aragon, Navarre, and Castile, the guerrilla chiefs were not inactive. The Empezinado advanced to the gates of Madrid; and in Navarre the two Minas, uncle and nephew, were the terror of the enemy; and Porlier, Longa, Cuevillas, Rodriguez, and others scoured Old and New Castile. Masters of the country, these undisciplined bands performed great service. They harassed the enemy's communications, cut off his convoys and supplies, and by intercepting couriers, both procured intelligence and defeated the schemes of the French; and though it would be idle to assert that the guerrillas alone could have expelled the enemy from Spain, there can be no doubt that they gave great assistance to the English regular troops. In February, 1810, the French, under Victor, besieged Cadiz, where the Central Junta had retreated on the capture of Seville, but all their efforts to reduce that place were unsuccessful. The taking of Ciudad Rodrigo and Badajoz, and the victory of Salamanca [SALAMANCA], obliged the French to abandon Madrid, and to concentrate their forces in the eastern and northern provinces of the Peninsula. Lord Wellington, after having occupied Madrid, followed the enemy to Burgos, and after several engagements transferred his head-quarters to Fresneda, on the frontier of Portugal. Thus ended the campaign of 1812. Meanwhile the Central Junta had convoked the Cortes of the kingdom, and these deputies, assembled at Cadiz, were occupied in framing a constitution for Spain, which was signed on the 20th of March by the regents, and acknowledged by the allies of Spain. The Inquisition was abolished, ecclesiastical reforms were accomplished, monastic orders were suppressed, and their property taken by the state. At length Bonaparte's disasters in Russia decided the fate of the Peninsula. Soult was recalled, in the beginning of July, with 30,000 men from Spain. Suchet abandoned Valencia. King Joseph and Jourdan retreated to Vitoria, where Wellington overtook them, and gained a splendid victory. The French, pursued by Graham and Hill, retreated in disorder over the Pyrenees, and lost all their baggage (June 21, 1813). The conquerors immediately invested Pamplona. The Spaniards, under Count D'Abisbal, occupied the pass of Pancorbo, and Graham besieged St. Sebastian, which was afterwards taken. [SEBASTIAN, SAN.] Shortly after Suchet was compelled to evacuate Catalonia. Thus ended, after six years of continual struggle, one of the most sanguinary wars on record, in which one is at a loss what to admire most, the courage and perseverance of the Spanish nation, or the steady discipline of the British troops and the high military talents of their commander. (Those readers who may wish for more ample information on this interesting period of Spanish history, may consult Ibieca, 'Historia de los dos Sitios de Zaragoza,' Burgos, 8vo. 1830-1; 'Memoirs of Ferdinand VII. of Spain,' Lond., 1824; Toreno, 'Historia del Levantamiento Guerra, y Revolucion de España,' Paris, 1838, 5 vols.; 'Mémoires du Maréchal Suchet, Duc d'Albufera,' Paris, 1828; and the well known Histories of the Peninsular War, by Southey and Napier.)

Whilst Ferdinand's allies were triumphing over his oppressor, the captive prince had regained his liberty, and entered his kingdom amidst the acclamations of thousands of his subjects who went out to meet him. No sooner however had he set his foot in Spain than he began to show his ingratitude to those to whom he was mostly indebted for his throne. His kinsman the cardinal of Bourbon, one of the late regents, was immediately deprived of the archbishopric of Toledo, which was bestowed on one of the fiercest of the anti-constitutional clergy. Ferdinand refused to take the prescribed oath to observe the constitution of the state, and on the 4th of May, 1814, he issued a decree declaring that the Cortes had been illegally convoked, or rather illegally constituted, and the Cortes were accordingly dissolved, and their constitution abrogated. The Inquisition was re-established, though not with the power of capital punishment; the conventual estates were restored, and the Jesuits recalled; the prisons moreover were crowded with those patriots who had fought for the cause of national independence, and to whom he owed his throne. For six years (1814-20) Ferdinand reigned with absolute power, during which time several unsuccessful attempts were made for the restoration of the constitution, and Porlier, Lacy, and Vidal, who rose in various parts of the kingdom, ended their days on the scaffold. Mina, more fortunate than his companions, escaped. On the 1st of January, 1820, four battalions—making part of an expedition destined to suppress the American insurrection—proclaimed the constitution of 1812 at the Isla de Leon, and, with Riego at their head, marched against Cadiz. After some slight skirmishing with O'Donnel, the captain-general of Andalusia, Riego occupied Algesiras, entered Malaga, and proceeded through Ezija and Cordova to the centre of the Peninsula. Risings now took place in every quarter; the royal troops sent against the insurgents made common cause with them, and Ferdinand was compelled to yield to the general cry by accepting the constitution, proclaiming a general amnesty, and summoning the Cortes of 1812. The Inquisition was abolished, and obnoxious ministers were succeeded by others favourable to constitutional principles. The monastic orders were abolished, and their lands sold; the laws of entail were abrogated; and several liberal measures were passed by the house of representatives during the first session. But the clergy, thus stripped of their wealth and influence, again excited the lower classes to deliver their king from the fangs of freemasons and heretics, as the liberal party were termed by the hot partizans of absolutism. An Apostolical Junta established itself on the frontiers of Portugal, and bands of peasants, commanded by monks, took up arms for the purpose of restoring the privileges of the crown and the clergy. At the same time Mexico declared itself independent; Lima was occupied by the Chilians under San Martin; and the Spanish part of the island of Santo Domingo was lost by its union with Hayti. The guerrillas, though beaten by the troops, could not be entirely disarmed. In the third session of the Cortes, which began March 1, 1822, the moderate liberal party prevailed over the *Exaltados*, and tranquillity was in some measure restored; but the intrigues of the Spanish exiles, supported by the French court, kept discord alive. An attempt made on the 7th of July, 1822, by some battalions of the royal guards, to put down the constitution, was defeated through the energy and patriotism of the national militia of Madrid. A regency of the friends of absolute monarchy, under the marquis of Mataflorida, was established at Urgel, near the French frontier; but the troops raised by them were beaten by Mina and Milans, and the members of the regency fled to France in November, 1822 At last the French government aided the equipment of apostolical soldiers on the French territory, and acceded, at the congress of Verona, to the principle of armed intervention, pronounced by Austria, Russia, and Prussia, with relation to Spain. The duke of Angoulême, having previously issued a proclamation to the Spaniards declaring that France desired nothing but their deliverance from the evils of the revolution, crossed the Bidassoa, whilst Moncey entered Catalonia. The Cortes decreed a general arming of the people, and Madrid being deemed insecure, the seat of government was tranferred to Cadiz. An army of 120,000 men, in four divisions, commanded by Ballesteros, Murillo, Mina, and D'Abisbal, was sent to arrest the progress of the enemy, who had taken Santoña, Santander, St. Sebastian, and Pamplona. D'Abisbal, being suspected by the Cortes, fled to France. The duke of Angoulême entered Madrid on the 24th of May, and nominated a regency composed of the duke of Infantado, the duke of Montemar, the bishop of Osma, the baron D'Eroles, and Gomez Calderon. On the 26th of June Murillo declared himself against the Cortes, and surrendered to the French. In vain did Quiroga, in Coruña, where Sir Robert Wilson also was, collect troops to defend the place. General de Bourck, after a bloody contest, made himself master of the heights, and the city itself surrendered on the 13th of August. Mina, with only 6000 men, carried on a partizan war in Catalonia, but with no better success. The duke of Angoulême now besieged Cadiz, which, after the fall of the Trocadero, surrendered to him on the 4th of October. The members of the government, and most of the deputies of the Cortes, took refuge in England, where they were received with the respect due to their rank and misfortunes. The war still lingered in Catalonia, but was soon brought to a close by the capture of Riego, who, in violation of the terms of the military capitulation concluded with the French generals, was tried and executed at Madrid. Peace, if not order, was now re-established; but the apostolical party, being displeased with Ferdinand, some of whose measures were deemed too conciliatory and liberal, determined to raise his brother Carlos to the throne. A formidable insurrection in Catalonia (1825) was only put down by the severity of the count d'España and Ferdinand's presence. The fort of St. Juan de Ullóa, near Vera Cruz, surrendered in November, 1825, and the fortress of Callao, near Lima, the last place held by the Spaniards on the American continent, fell also into the hands of the insurgents on the 22nd of January, 1826. The foolish and ill-concerted expedition against Mexico terminated in the surrender of Barradas to Santana in 1829. In the following year Spain was evacuated by the French auxiliary troops. The French revolution of 1830 stirred the Spanish patriots in exile to cross the frontier with a view to recover their liberties; but the country did not rise at their approach, and the undertaking miscarried.

Ferdinand married Christina, daughter of the king of Naples, who, in 1830, bore him a female child named Isabella. By the antient laws of Spain, females could inherit the crown in default of male issue; but the Salic law of France had been introduced with the princes of the house of Bourbon, and females continued to be excluded from the throne until 1789, when Charles IV., by means of a secret sanction of the Cortes, abrogated the restriction, and restored the antient rule of succession. In 1812, however, the Cortes re-established the Salic law; and as Ferdinand had no male children, his brother Don Carlos was heir presumptive.

In 1830 Ferdinand issued a decree placing the right of uccession on the same footing as before, and his daughter was thereby capacitated to ascend the throne; but in 1833 the approaching death of Ferdinand seemed to threaten a change in the Spanish succession. On the 17th of September his life was despaired of. His daughter was an infant, and Don Carlos, at the head of a powerful and bigoted party, began publicly to assert his rights. Ferdinand's ministers, eager to secure the favour of Don Carlos, surrounded the death bed of the king, and made him sign a decree by which he restored the operation of the Salic law. However the very next day, after Ferdinand had been announced as already dead, and his body had been exposed in one of the halls of the palace, the disease unexpectedly took a favourable turn, and the king, being made aware of the designs of Carlos, dismissed his minister Calomarde, called Zea Bermudez to the ministry, and annulled the act wrung from him in the agonies of anticipated death. Queen Christina having regained the ascendency over the mind of her husband, several good measures were determined and carried into execution. The universities were reopened, and a general amnesty for all past political offences proclaimed. The death of Ferdinand, which happened on the 29th of September, 1833, was the signal for a general rising of the adherents of Don Carlos, in opposition to Queen Isabella, who succeeded Ferdinand. The insurrection broke out in the northern provinces, where apostolical principles had always been strong, and soon spread to Catalonia and other provinces.

On the 24th of July, 1834, Christina, who had been appointed queen-regent, opened in person the session of the Cortes, in compliance with the 'Estatuto Real,' a sort of constitution which she had granted to the nation in the preceding month of April, Martinez de la Rosa being prime-minister at the time. Among other measures of importance proposed by the government for the consideration of the Cortes, one was a bill for excluding Don Carlos from the throne, which passed both houses without opposition. Shortly after, Martinez de la Rosa, being unable to command a majority in the Cortes, tendered his resignation, which was accepted, and the count of Toreno was appointed to succeed him. In the meantime the rebel prince, who, after a short stay in England, had lately arrived in Navarre, maintained the contest with the same varying fortunes and indecisive results which had characterized the struggle from its commencement. But about the close of the year the enterprising general Zumalacarregui gained some advantages over the queen's forces, and Mina was sent against him. The campaign of 1835 proved unfavourable to the queen's cause; the advances of the Carlists towards Castile became more frequent and bolder; Zumalacarregui beat in succession the divisions sent against him, and all the resources and skill of Mina were insufficient to check the progress of the enemy. General Valdés, who succeeded him in the command of the army, was not more fortunate; and the aspect of affairs grew daily worse, when the death of Zumalacarregui, who was killed before Bilbao (June 25th, 1835), turned the scale in favour of the queen.

Some time before, and at the instigation of England, a convention had been signed between the generals of the two belligerent parties, purporting that prisoners should be treated according to the laws of war among civilized nations, instead of being butchered as before. The ill success of the war carried on against the Carlist insurgents, and the weakness and vacillation manifested by the government of Madrid, occasioned tumultuary risings in various parts of the Peninsula, which were only quieted by the dismissal of the Toreno administration and the appointment of Mendizabal. The new ministry began its career with great vigour and zeal. A levy of 100,000 men was decreed and raised. General Cordova, a young officer of talents, was raised to the command of the army in the north; an auxiliary legion, 8000 strong, recruited in England, and commanded by De Lacy Evans, was added to the army of operations in Biscay. A new electoral law, the liberty of the press, and the abolition of the monastic orders, were among the measures of the new administration. Everything promised fair for Spain; but as the minister, Mendizabal, who relied for support on England in preference to France, was about to conclude a treaty of commerce with Great Britain, France, alarmed at the consequences which the contemplated measure might have on her trade, protested through her ambassador, count de Rayneval, and every intrigue was set on foot to overthrow the Mendizabal administration. General Cordova joined in the plot, and leaving his army under the command of Espartero, proceeded to the capital to hasten the fall of the obnoxious administration. On the 14th of May, 1836, Mendizabal tendered his resignation, and was succeeded by Isturiz, who did not remain long in office.

On the evening of the 12th of August, a battalion commanded by Serjeant Garcia, broke out into rebellion at San Ildefonso, and obliged the queen to sign a decree for the dis missal of the ministry, and to swear to the constitution of 1812. Meanwhile Espartero, who had succeeded Cordova in the command, had obtained some successes over the Carlists, and he had relieved Bilbao, which the enemy had blockaded. In Catalonia and Lower Aragon however the Carlist chief Cabrera had the advantage. In the year 1837 the Cortes terminated their debates on the constitution of 1812, which the government had submitted to their revision, and on Sunday, the 18th of June, 1837, the new constitution was publicly sworn to by the queen-regent.

In 1839 the cause of Carlos began visibly to lose ground. General Leon pressed Elio in Navarre: a great portion of Biscay and Alava were in the hands of Espartero, and the Basques began to be weary of the civil war, which was at last terminated by the convention of Bergara, on the 31st of August. It was not until September, 1840, that the Peninsula was completely pacified by the breaking up of Cabrera's army in Valencia and the taking of Morella by Espartero.

The war being at an end, the two parties, namely, the *Moderados* and *Progresistas*, courted the friendship of Espartero and the army, with a view to strengthen themselves in power. The former having obtained a considerable majority in both chambers, an administration was formed under the presidency of Perez de Castro, which immediately proceeded to annul some of the measures carried by the preceding liberal administrations. Having succeeded in carrying through both chambers a most unpopular bill respecting the municipal corporations, whose rights were annihilated at one blow, and having obtained the royal sanction for the same, an insurrection broke out at Barcelona, and the municipality of Madrid refused to give publicity to the obnoxious law. The queen-regent was obliged to change her administration, and shortly after, of her own accord, she resigned the regency, and sailed from Valencia to Marseille, where, on her arrival, she issued a manifesto (November, 1840), declaring her abdication to have been voluntary. A regency was then appointed in Madrid to govern the country until the meeting of the Cortes, which, after a most interesting discussion, which lasted several days, chose General Espartero, Duke de la Vitoria, sole regent of the kingdom. At the moment we are now writing, the partisans of the queen-regent have made an attempt to rekindle civil war, and re-establish despotism, by a marriage between the Duke of Aumale and Queen Isabella; but the firmness and vigour of Espartero have defeated all their plans, and after the execution of General Leon and the principal leaders of the insurrection, the country again enjoys the blessings of peace. The following are the best general histories of Spain:—'La Cronica General de España,' Zamora, 1541, fol., generally attributed to Alfonso X. of Castile; 'La Cronica de España,' by Florian de Ocampo, historiographer of Charles V. (Alcalá, 1578, fol.), with the continuation by Ambrosio Morales (ib., 1574); Mariana, 'Historia General de España,' written first in Latin (Toledo, 1591), and then translated into Spanish (Mad., 1608). The best edition is that of Valencia, 1783, in nine volumes, folio, being enriched with critical notes by a society of literary men: Garibay, 'Compendio Historial,' Barcelona, 1648, 4 vols. fol.; Ferreras, 'Synopsis Historica Chronologica de España,' Mad., 1775-91, 17 vols. 4to.; Ortiz y Sanz, 'Compendio Cronologico,' &c., Mad., 1795, 7 vols. 8vo.; Masdeu, 'Historia Critica de España y de la Cultura Española,' (Mad., 1783-1800, 20 vols. 4to.), an invaluable work, which appeared at the same time in Italian and Spanish; Ascargota, 'Compendio de la Historia de España' (Paris, 1840), and the continuation of Mariana by Sabau (Mad., 1817-21), and Miñana (Mad., 1794-5). Of those written in this country, the best is that by Dr. Dunham, in Lardner's 'Cabinet Cyclopædia.'

Language.—Of the languages or dialects spoken in the Peninsula before it became a Roman province very little is known. Strabo (lib. iii., p. 139, Casaub.) says that various dialects were in use in his time among the inhabitants of the Peninsula, and that the Turditani had a written code of laws in verse. The Phœnicians and Greeks who settled in Spain must also have introduced their own languages, whilst the Celts, who occupied the north-western districts, spoke their own tongue. During the long period of Roman domination, all these languages seem to have made room for the Latin, except in the north and west of the Peninsula, where the Basque [BASQUE LANGUAGE] was always, and is still, generally spoken. The northern nations who invaded Spain in the fifth century of our æra made no effort to introduce their own tongue, but adopted that of the natives, and spoke Latin, which they corrupted by making the nouns indeclinable, as in their own rude dialects, and increasing the use of prepositions. They nevertheless introduced several words relating principally to their warlike habits, such as *hielmo* (helmet), *rico* (rich), *harpa* (harp), *jardin* (garden), *daga* (dagger), *bosque* (forest), *guantes* (gloves), *guarda* (guard), *guerra* (war), *garras* (claws), &c. A provincial dialect of the Asturias, called 'La Lengua Bable,' contains a still greater number of words which have not passed into the written Spanish. Then came the Arabs, whose language at one time must have been very generally spoken in the Peninsula. Alvarus Cordubensis, a writer of the tenth century, in his 'Indiculus Luminosus,' informs us that 'out of one thousand Christians scarcely one could be found capable of repeating the Latin forms of prayer, whilst many could express themselves in Arabic with rhetorical elegance, and even compose verses in that language. Nearly two centuries after the taking of Toledo by Alfonso VI., Arabic was still spoken there in preference to the Castilian, and most legal writings, even between Christian parties, were made in Arabic. Up to the end of the thirteenth century, the kings of Aragon were in the habit of signing their names with the letters of the Arabic alphabet. On the taking of Seville by Ferdinand III., it was deemed necessary to translate the Gospels into Arabic, in order to instruct the Christian population of that city in the duties of religion, which, as well as their native language, they had completely forgotten during their long captivity.

Of these heterogeneous elements the modern Spanish language is formed, although it would be difficult to say at what time it began to assume its present shape. Bouterwek is of opinion that the Castilian tongue had its origin before the Saracen invasion; whilst Dr. Puighlanch has gone so far as to assert that 'it was the sister of the Latin, and existed as early at least as the times of the Roman republic.' (*Opúsculos grammático-satíricos*, Lond., 1828, vol. i., App., p. 4.) But the earliest document written in *Romance* hitherto discovered bears the date of 1173, and although it might be inferred from the style that the language had existed in a similar form for upwards of a century, we are nowise justified in concluding that the *Romance* was formed before the tenth century, that is to say, two hundred years after the Mohammedan conquest.

About the beginning of the thirteenth century, three principal languages were spoken in the Peninsula. The Castilian prevailed exclusively in the two Castiles and Leon; the Catalonian, a dialect resembling the Provençal or Limosin of the south of France, was spoken in Catalonia, Aragon, part of Valencia, and the Balearic Islands; and, lastly, the Cantabrian or Basque, notwithstanding the intercourse of trade and civilization, still maintained its ground, though greatly corrupted, along the western side of the Pyrenees. [BASQUE PROVINCES.] About the same time the Portuguese, which originated in a mixture of the Galician dialect and the language spoken by the French knights who served under Henry of Besançon, became more distinct from the Castilian. [PORTUGAL.] How far the Arabic has contributed to the formation of the modern Spanish is a contested point among Spanish critics, some, like Mayans (*Orígenes de la Lengua Castellana*, vol. i., p. 27), asserting that it has only borrowed a few words from the language of the conquerors, whilst Conde (*Hist. de la Dom.*, vol. i., prol. pretends that the Castilian is so much indebted to the Arabic, not only in its vocabulary, but in its idioms and phraseology, that it ought to be regarded as a dialect of the Arabic. Both opinions however are extreme. The former is that of a man well versed in the classical writers, but totally unacquainted with the Eastern languages, and who, like other learned men of his age, thought that no advantage whatever could result to his native tongue from an avowed connection with the language of the conquerors; whilst the latter is that of a scholar passionately fond of everything relating to the East, and who spent the best years of his life among the Arabic MSS. which he translated into Spanish, adopting, rather more than was either necessary or useful, the words and style of the Arabic. That the Castilian language has borrowed a considerable number of its words from the Arabic is a fact beyond all doubt. If any one opens the *Diccionario de la Lengua Castellana*, published by the Royal Academy in 1726, he will find that most words beginning with *al*, or with the letters *j*, *x*, *z*, are of Arabic origin. The names of plants, flowers, drugs, minerals, furniture, dresses, weights and measures, &c., are, with a few exceptions, all Arabic, although they have also corresponding names derived from the Latin. All words relating to the different branches of the mechanical arts which were introduced by the Moors into Spain are likewise borrowed from their language. In general nouns of Arabic origin abound more than either adverbs or prepositions, and these in proportion are more numerous than the verbs. The connection of both languages would still be greater, if the writers of the golden age of Spanish literature had not formed their style on the Latin, and avoided, as much as possible, words of Arabic origin; to which may be added, that when the Academicians compiled the abovementioned dictionary, they left out many words authorised by use, which are found in the oldest Spanish works. It was not until the beginning of the sixteenth century, and during the reigns of Ferdinand and Charles V., that the Castilian became the language of the Peninsula, although works in Valencian, Catalonian, and Basque continued to be published from time to time, and although the above-mentioned languages were, and are still, spoken by the inhabitants of a great part of Spain. Even during the period when the Castilian was the general language of literature, it was far from having attained perfection. Juan del Enzina, a popular writer of the sixteenth century, complained that he was obliged, in his version of Virgil's 'Eclogues,' to invent a new vocabulary from the want of terms corresponding to those in the original. Half a century afterwards Ambrosio Morales (*Obras*, tom. xiv., p. 147-8) made a similar complaint. The Spanish language abounds in full sounding words which render it suitable for all poetical purposes. The Spaniards use two rhymes: the *asonante* and the *consonante*. The *consonante*, or full rhyme, is nearly the same as the Italian. The *asonante* is one which the ear of a foreigner would not immediately distinguish from the termination of a blank verse. An *asonante* is a word that resembles another in the vowel on which the last accent falls, as well as the vowel or vowels that follow. Thus *cabállo*, *armádo*, *pálo*; *guérra*, *riéga*, *halagüéña*; *traidór*, *nació*, *vós*, are all asonantes. Hence the great facility of writing Spanish verses, instances being well known of poets who could converse in rhyme. There is a strong guttural sign in Spanish (that of the *j*) which, some people suppose, may be traced to the Arabic; but which was doubtless introduced by the German courtiers of Charles V., since before that time the letter *j* was universally pronounced soft, as the *g* in the Italian words *gioia*, *giardino*, *frigido*, *gioco*. The only guttural sound borrowed from the Arabs is that of *h* at the commencement of a word, such as *haca*, *harapo*, *huso*. The letter *x*, which is now pronounced with a harsh aspiration, was in former times used to express the *ch* of the French, *Marexal*, *xabon*, *xibia*, *xarabe*, &c. The Spanish is peculiarly fitted for the elevated and the pathetic, but not unfrequently its solemn dignity seduces the Spaniard into bombast. Poetry, having always been more cultivated than prose, there is a certain redundancy of expression in the best prose writings of the Spaniards. Further information on the origin of the Spanish language may be found in the following works:—Alderete, *Origen y Principio de la Lengua Castellana*, Roma, 1606, 4to.; Covarrubias, *Tesoro de la Lengua Castellana*, Mad., 1638, fol.; Mayans, *Origines de la Lengua Castellana*, Mad., 1737, 8vo.; Hermosilla, *Arte de Hablar en Prosa y en Verso*, Mad., 1830, 4to.; Garcé, *Fundamento del Vigor y Elegancia de la Lengua Castellana*, Mad., 1791; Cabrera, *Diccionario Etymológico de, &c.*, Mad. 1834, 4to, An English and Spanish Dictionary published in 1591, by Richard Percyvall (*Bibl. Hisp.*, 4to.) and the 'Spanish Schoolmaster,' by W. Stepney (Lond., 1591, 8vo.), are no more than two bibliographical curiosities. Pineda, Stevens, and Barretti also made dictionaries of both languages. The best is that of Seoane, London, 1832, 8vo. A Spanish grammar for the use of English students, lately published by Alcalá, is an inferior performance.

Literature.—In attempting a rapid sketch of the literature of Spain, the *romances*, or popular ballads, first demand our attention. As their name sufficiently implies, they must have been coeval with or subsequent to the formation of the *Romance* or Castilian language, but as to the origin and antiquity of this language critics are greatly divided. Some, as Mr. Southey ('Chronicle of the Cid,' Introd.), are of opinion that few if any are older than the fourteenth century; Bouterwek ('Geschichte der Poesie und Beredsamkeit,' p. 20) conjectures that all those which relate to the Cid are the produce of the eleventh century, while some Spanish writers give them a still greater antiquity. The question however is one of difficult solution; for how can we determine the age to which ballads belong whose authors are in most cases unknown, and whose style in the progressive improvement of language has been first altered by minstrels, and then modernised by collectors? The peculiar character of some of the earliest ballads, those of the Cid for instance, leads us to suppose that they were composed in the lifetime or shortly after the death of those heroes whose exploits they commemorate. How far these effusions of the Spanish muse are indebted to Arabian poetry for their metrical forms and spirit is another contested point. Those who happen to be acquainted with the poetry of the Spanish Arabs, can have no doubt that the *redondilla*, a verse consisting of eight syllables (the last foot and some or all of the preceding, as the case may be, being trochees), is borrowed from the Arabs, as were also the double hemistich, the intermixture of assonances and consonances, the repetition of the same rhyme, and other peculiarities of early Castilian poetry. After these ballads the rhymed chronicle of the Cid ('Poema del Cid Campeador') is the oldest monument of Spanish literature hitherto discovered. It is written in a kind of rude Alexandrine, and bears evident traces of being much posterior to most of the ballads which record the exploits of that warrior, and of being made up out of them, for the octosyllabic verse of the *redondillas* is frequently found incorporated with the Alexandrine. The supposed author of this poem lived about the end of the twelfth century. Nearly to the same age belongs a fabulous chronicle of Alexander ('Poema de Alexandro Magno'), written in the same metre. Gonzalo de Bercéo, a Benedictine monk, who lived about the middle of the thirteenth century, was the author of some Lives of Saints, in rhyme, and other poems on sacred subjects. About the beginning of the fourteenth century Juan Ruiz, archpriest of Hita, wrote an allegorical satire, not without some merit, which, together with the works of the above-mentioned poets, is in Sanchez, 'Coleccion de Poesias Castellanas anteriores al Siglo XV.,' Mad., 1779-90, 4 vols. 8vo.

About the same time Castilian poetry received a great impulse from the encouragement as well as the labours of Alfonso X., surnamed 'El Sabio' (the learned), who, besides 'El Libro de las Querellas' (the book of complaints), which has been lost, wrote a short poem, entitled 'Las Cantigas de Nuestra Señora,' and a few dactylic stanzas on the secrets of alchemy, his favourite pursuit.

Alfonso, who was the first king of Castile who ordered all public documents to be written in the *romance*, or popular language of the time, caused translations of the Bible, and of the work of William of Tyre on the Holy Land, to be made into Castilian. He was the author or editor of a general history of Spain, 'Cronica General de España.' The history of Spanish poetry continues barren of names until the middle of the fourteenth century, when the example of Alfonso XI. of Castile, and of his relative Don Juan Manuel, the celebrated author of 'El Conde Lucanor,' a book of moral and political maxims, operated powerfully on the Castilian nobility. Alfonso Gonzalez de Castro; Pero Lopez de Ayala, 'el Viejo,' author of the 'Rimado de Palacio;' Alvarez de Villasandino, the Jew; Don Santos Carrion, a favourite of Peter the Cruel, and others whose works are contained in the old Cancioneros, are among the poets of that time. It was not until the age of John II. (1407-54) that a spirit of improvement was discernible in the antient national poetry of Spain. Among the noblemen who composed the 'poetical court' of John II.—for so it has been termed by Spanish writers—Don Enrique, Marquis de Villena, was one of the most distinguished by his classical learning and his talents. Besides a translation of the '*Æneid*' in verse, which has been lost, he wrote a mythological and moral work, entitled 'Los Trabajos de Hercules (the labours of Hercules), which was printed for the first time at Zamora, in 1483, fol., and an Art of Poetry, entitled 'La Gaya Ciencia,' extracts from which are contained in Mayans ('Origenes de la Lang. Cast.,' vol. ii., p. 321). It is to be regretted that the marquis did not confine his labours to literature, instead of travelling into the paths of natural science, which he learned in the writings of the Arabs; for as long as he lived he was regarded as a magician, and at his death, in 1434, a search was made in his library, and upwards of one hundred volumes, including his own poetical labours, were consigned to the flames, as savouring too strongly of the black art. (Cibdadreal, 'Cent. Epist.,' fol. 29.) His pupil, the Marquis de Santillana, was another of the poets who adorned the court of John II. He was the first who naturalized the Italian sonnet in Castile; and his epistle to Don Pedro, constable of Portugal, on the origin of Castilian poetry, is invaluable. His 'Doctrinal de Privados,' the earliest didactic poem in the Spanish language, consists of a series of moral reflections occasioned by the unfortunate fate of Don Alvaro de Luna, the favourite of John II. He also wrote an elegy on the death of his friend and master the Marquis of Villena, a short poem, entitled 'Los Gozos de Nuestra Señora' (the Joys of Our Lady), and other poems to be found in the old Cancioneros. A list of this nobleman's writings, among which there is a collection of Spanish proverbs ('Los Proverbios de Don Iñigo Lopez de Mendoza, con su Glosa,' Sevilla, 1494, fol.), of which an English translation, by Barnaby Googe, appeared in 1579 (Lond., 16mo.) may be seen in Sanchez (vol. i., p. 34).

John of Mena, whom Spanish writers call their Ennius, lived about this time. [Mena.] A host of other poets and rhymers, such as Fernan Perez de Guzman, Rodriguez del Padron, Alfonso bishop of Cartagena, who is better known as the author of the 'Doctrinal de Caballeros' (Burgos, 1483, fol.), Garci Sanchez de Badajos, and others, whose works are printed either in the 'Cancionero General,' by Hernando del Castillo (Valencia, 1511, fol.), or in the still inedited* collection made by the Jew Alfonso de Baena, for John II., of the works of Castilian poets in his time, cultivated lyric poetry with success. The Chronicles of Don Alvaro de Luna (Milan, 1546), that of Don Pedro Niño, by Gutierrez Dias de Games; that of John II. himself, by Fernan Perez del Pulgar, the 'Centon Epistolario,' by the Bachiller Cibdadreal, Burgos, 1499, and other works still inedited, are remarkable instances of the cultivation of letters under this reign. Of the state of Spanish poetry under Ferdinand and Isabella, a correct notion may be formed from the perusal of the 'Cancionero General,' where no less than fifty Castilian noblemen figure as authors. Don Jorge Manrique wrote his beautiful moral couplets ('Coplas de Don Jorge Manrique,' Sev., 1494), which have lately been admirably translated into English, by Professor Longfellow, of Boston, in the United States ('Voices of the Night,' Cambridge, 1841). Padilla, a Carthusian monk, was the author of two poems in octaves: 'Retablo de la Vida de Christo' (Alcalá, 1529); 'Triumfos de los Apostoles,' (Sev., 1504). Traces of the origin of Spanish dramatic poetry are first visible in this reign. During the fifteenth century the Spaniards possessed their religious dramas and their farces, like the rest of Europe. In 1414 the Marquis of Villena composed an allegorical drama ('Comedia Alegorica') which was performed at the court of Aragon at the coronation of Ferdinand. In 1440 Don Pedro de Velasco wrote the 'Comedietta de Ponza.' An anonymous writer, who lived under the reign of John II., wrote a satirical work in form of dialogue between two shepherds, which was intended for acting ('Coplas de Mingo Revulgo,' Toledo, 1565). Rodrigo Cota is supposed to have been the author of the dramatic romance of 'Calistus and Melibœa' (Celestina, Salam., 1500), which Fernando de Rojas continued, and which was soon afterwards translated into Italian, French, and English ('The Spanish Bawde,' London, 1631). These rude essays were first converted into real dramas by Juan del Ensina, a chapel-master, or musical director, to Pope Leo, who gave great encouragement to dramatic amusements. He wrote several sacred and profane eclogues, in the form of dialogues, which were represented before distinguished audiences on Christmas-eve, during the Carnival, and on other festivals. With the exception of a few, they are all lost. ('Cancionero de todas las Obras de Juan del Enzina,' Sev., 1501; Moratin, 'Origenes del Teatro Español,' edic. Paris, p. 142.) In the reign of Ferdinand and Isabella considerable progress was made in historical writing. Alonso de Palencia [Palencia]; Bernaldez, whose valuable chronicle is still unpublished; Pedro Martyr de Angheria, or Anghiera, the author of the 'Opus Epistolarum,' Alcalá, 1530; Antonio de Valera, who, besides his chronicle of 'Ferdinand and Isabella' (still unpublished), wrote a general history of Spain (Saragossa, 1492), which was reprinted five times before 1500; Lucio Marinéo Siculo ('Obras Historicas,' Alcalá, 1530); Antonius Nebrissensis, or de Nebrija (Granada, 1550), who was also the author of a Latin and Spanish Dictionary (Sev., 1506), and several grammatical and philological works; and lastly Pulgar ('Reyes Catolicos,' Vallad., 1565) flourished under this reign. The conquest of Granada (1492) gave a new turn to the ballad poetry of Spain. It then became the fashion among the Spanish romance writers to select from the events of Moorish history materials for their songs. Such is the origin of the 'Romances Moriscos,' or Moorish ballads, with which the Spanish romanceros are filled, and which have erroneously been considered as the work of converted Moors, or as translations from Arabic songs. (Lockhart, 'Ancient Spanish Ballads,' Introd.)

Hitherto Spanish literature had developed itself without losing any of its antient forms, and a true national spirit prevailed in all the works, whether verse or prose; but the Italian wars having suddenly brought the Spaniards into contact with Italy, a change was slowly effected in the national taste. The introduction of the style and forms of Italian poetry was chiefly due to Juan Boscan Almogávar, who, by imitating the classical models of antiquity, and judiciously incorporating into Castilian poetry the excellencies of the Italian poets, gave a new direction to the literary taste of his countrymen. [Boscan.] He was greatly assisted by his friend Garcilaso de la Vega, whose beautiful eclogues, in the style of the 'Arcadia' of Sannazaro, are still unequalled, and of which an excellent English translation in verse has lately appeared, by Mr. Wiffen (Lond., 1823). The next Spanish poet who followed in the path of Boscan was Don Diego Hurtado de Mendoza, the minister of Charles V., equally well known for his classical learning and his fine collection of Greek MSS., as for his labours in almost every branch of literature. [Mendoza.] Saa de Miranda and Jorge de Montemayor, both natives of Portugal, though they wrote chiefly in Spanish, followed the example of Boscan, and succeeded in giving to pastoral poetry a more elevated character. The latter was the author of a pastoral romance, entitled 'Diana,' which was soon translated into almost every European language. A second and third part to his work, the former by Alonso Perez (Venet., 1585), the latter by Gil Polo (Mad., 1778), were published after his death. Pedro Padilla was another successful writer of pastoral poetry ('Eglogas Pastoriles,' Sev., 1582), into which he introduced the Italian and antient Spanish metres. Fernando de Herrera, surnamed El Divino, among other works, published a commentary on the poetical writings of his friend Garcilaso. Fray Luis de Leon imitated the classics, and principally Horace, more successfully than any of his predecessors; and his metrical versions of the Psalms and part of the Book of Job are inimitable. As might be expected, the introduction of the Italian style met with violent opposition from those who asserted that the old Castilian metres and forms of rhyme were alone suited to the Spanish language. No one maintained the cause of the old Castilian poetry against the importations of the Italian school with more talent than Christoval de Castillejo, the secretary of the emperor Ferdinand I. of Austria, to whom Velazquez ('Origenes de la Poesia Española,' p. 25) and other Spanish critics assign the first rank among the poets of their nation. (Castillejo, 'Obras,' Mad., 1573.) During the whole of the sixteenth century several poets, encouraged by the example of Castillejo, continued to write in the old Castilian style, though they occasionally composed a few sonnets and *canciones* after the Italian. In this number are included Gregorio Sylvestre ('Obras,' Gran., 1591); Romero de Cepeda (Sev., 1582); Antonio de Villegas ('Inventario,' Medina del Campo, 1555). Fernando de Acuña, one of Boscan's disciples, was one of the first poets who, by writing in short strophes, endeavoured to form an intermediate style between the Italian *canzone* and the old Spanish *cancion*.

But if Spanish literature was rich in lyric and pastoral poetry, all attempts to imitate the romantic epic of the Italians completely failed; nor were their attempts in the serious epic more successful. Neither the 'Carlos Famoso' of Luis de Zapata, nor the 'Carlos Victorioso' of Geronimo de Urrea, who was likewise the translator of Ariosto's 'Orlando Furioso;' nor the 'Austriada' of Juan Rufo (Mad., 1584); nor 'La Parthenopéa,' a poem in honour of Gonsalvo de Cordova, are worthy of mention. The 'Araucana,' by Ercilla; 'Las Navas de Tolosa' by Christoval de Mesa;

---

* An edition of this invaluable manuscript, which during the Peninsular war was stolen from the Escurial library and brought to this country for sale is now, we understand, in progress of printing at Paris.

'El Bernardo,' by Balbuena, though written more in accordance with the forms of the true epic, are still far beneath the 'Gerusalemme Liberata' of Tasso or 'As Lusiadas' of Camoens. But dramatic poetry during this period, and principally during the first half of the seventeenth century, seems to have acquired its perfection. In 1570 Torres Naharro, an actor himself, wrote several comedies, which were mostly represented at Naples. Lope de Rueda followed with pieces in prose. Cervantes, who calls him 'the great Lope de Rueda,' says that he so far improved the Spanish stage, by adding to the decorations, &c., 'that the wardrobe of a theatre's company could no longer be packed in a bag, as before.' Juan de Malara, Juan de la Cueva, Geronimo Bermudez, and Christoval Virués, contributed to the improvement of the Spanish stage. In the meantime a contest was going on between the 'national party,' to which these dramatic writers more or less belonged, and the 'erudite party,' who wished to give the Spanish drama the form of the antique. To the latter belong—Simon Abril, who published a complete translation of Terence (Cord., 1586); Villalobos, a physician of Charles V., who translated the 'Amphitryon' of Plautus; Perez de Oliva, who made a prose version of the 'Electra' of Sophocles; and others. But the Spanish public preferred the former. Cervantes did nothing to improve the national drama. [SAAVEDRA.] The task was reserved for Lope de Vega, an author whose fertility of invention is unparalleled in the history of poetry [VEGA], who, according to his own statement, required no more than twenty-four hours to write a versified drama of three acts, interspersed with sonnets, tercets, and octaves, and abounding in interesting situations. He sometimes wrote a play in three or four hours. This astonishing facility enabled him to supply the Spanish theatre with upwards of two thousand original dramas, all in verse, of which only about four hundred have been printed. Lope was soon surrounded by a crowd of disciples and admirers, among whom were Mira de Amescua, Guillen de Castro, Guevara, and Matos Fragoso, who completed the triumph of the national drama over the classical but dull importations of the erudite party. Calderon followed, and the Spanish theatre became the inexhaustible source whence the best French dramatists drew the subjects of their plays. [CALDERON.] Until the latter end of the eighteenth century the plays of Lope de Vega, Calderon, and the writers of their respective schools, were universally acted throughout Spain; even now some of the best are still brought on the Spanish stage, though they have been recast or modernised.

About this time (1615-35) a new, irregular, and fantastical style was introduced into Spanish poetry, and the Italian school of the Marinists began to exercise an influence on the Spanish poets. Manoel de Faria e Sousa, a Portuguese by birth, was one of the first to adopt in his writings that turgidity and affectation which marked the Italian school. ('Fuente de Aganipe,' Mad., 1656; 'Divinas y Humanas Flores,' Mad., 1624.) Luis de Gongora carried this bombastic and forced style to the highest pitch; and as he was not without talent, he soon found a host of admirers, who were called *Gongoristas*, from the name of their leader, but who gave themselves the more honourable appellation of '*cultoristas*' (or writers in cultivated style), in opposition to the simple but irregular effusions of the national school, at the head of which was Lope de Vega. [GONGORA.] This innovation however was not without opponents: the two brothers Argensola, Manuel de Villegas, Jauregui, Espinel, and others, whilst censuring the style of their antagonists, upheld the national school; and Quevedo assailed them most bitterly in his 'Culta Latiniparla.' [QUEVEDO.] But Gongora's admirers were not easily defeated. A new school, called the *Conceptistas*, in imitation of the Italian term *Concettisti*, applied to the followers of Marino, started up, who, without the vigorous mind and superior talents of that poet, carried to excess the empty pomp and verbose obscurity of his artifical language, revelling in the wildest regions of fancy, and indulging in the most preposterous and extravagant ideas.

The cultivation of prose style during the above period was far from keeping pace with poetry. Indeed the literary men of Spain seem always to have paid little attention to the cultivation of historic and didactic prose, and, with very few exceptions, the best prose writers of the Peninsula were also poets. In the sixteenth century the most eminent writers of the Peninsula were of opinion that the Spanish language was incapable of expressing grave and noble ideas in prose, and hence the imitation of the antient classics was considered as the only means of improving the prose style. The learned theologian Fernan Perez de Oliva was the author of a dialogue on the dignity of man (*Dialogo de la Dignidad del Hombre* (Mad., 1772, 4to.), written in the manner of Cicero, which is perhaps the best fragment of didactic prose in Spanish literature. He was followed by his pupil and nephew the learned Ambrosio Morales, historiographer to Philip II., whose works on the history and antiquities of the Peninsula are greatly esteemed. Diego de Mendoza wrote his admirable history of the war of Granada (*Guerras de Granada*, Lisboa, 1627, 4to.), in which he imitated Sallust. Mariana, Solis, and Melo, who wrote the history of the wars of Catalonia (*Historia de los Movimientos y Separacion de Cataluña*, Lisboa, 1645, 4to.), are considered by the Spaniards as models of prose style. But the cultivation of the historical style received a severe check from the Inquisition. Even the Jesuit Mariana, who introduced into his history every tradition and idle legend which could gratify the pride of his countrymen, was arraigned before that dreaded tribunal, and accused of favouring wicked and rebellious principles; he was tried, and it was with the greatest difficulty that he escaped destruction.

In romantic prose the Spaniards were more successful than they had been in history. After imitating for some time the Italian novelists, the Spaniards invented a kind of novel, which, by way of distinguishing it from the pastoral romances in prose, and the numerous romances of chivalry, received the name of *Novelas del Gusto picaresco* (or novels in the roguish style). The 'Lazarillo de Tormes,' by Diego de Mendoza, which appeared for the first time at Antwerp in 1653, and was speedily translated into French, Italian, and English ('The Spaniardes Life,' by David Rouland Danglesey, Lond., 1586, 12mo.); 'Gusman de Alfarache,' by Mateo Aleman; 'El Escudero Marcos Obregon,' by Espinel; 'La Picara Justina, by Ubeda; 'La Garduña de Sevilla,' by Salas Barbadillo (Mad., 1642); 'El Bachiller Trapaza,' by Castillo Solorzano, are fair specimens of this style of writing, which is peculiar to Spain. Nor can we pass over the 'Novelas Exemplares' of the inimitable Cervantes, whose 'Don Quixote' is, independently of its other merits, the best written work in the Spanish language. About the end of the seventeenth century Gracian introduced Gongorism into Spanish prose, and the national taste was corrupted.

About the beginning of the eighteenth century the establishment of the house of Bourbon, and the introduction of French manners, prepared the way for a reform. At that time the literature of France began to exercise an influence over the whole of Europe, and it was natural that Spain, where Philip V had instituted academies on the model of the French, should look up to France. Ignazio de Luzàn must be regarded as the founder of this new school, which soon found in Spain numerous advocates. With a view to the radical reform of the literary taste of his countrymen, Luzàn wrote his celebrated 'Arte Poetica' (Art of Poetry), which was first published at Saragossa in 1737; and the most eminent literary men of his time showed their readiness to conform to his precepts. Unaccustomed to the long neglected forms of Spanish poetry, the new party sought to improve it as well as the drama, by translations of French works and imitations of the French style. Luyando undertook to introduce regular tragedy on the Spanish stage, and with this view wrote two tragedies, entitled 'Virginia' and 'Athaulfo.' Velasquez, Nassarre, and Mayans endeavoured to introduce the French style into other branches of literature. The change however which they tried to accomplish was neither radical nor complete; the mass of the nation still clung to the old forms of Spanish poetry; romances were still written and sung, resembling the productions of earlier ages, and Vances Candamo, Zamora, and Cañizares, continued to supply the stage with dramas in the style of Lope de Vega and Calderon, though they wanted the dramatic talents and invention of those two celebrated writers. Garcia de la Huerta, an academician and librarian to the king, attempted to revive the taste for antient national literature, by publishing a collection of the best Spanish dramas ('Theatro Escogido,' Mad., 1785), and writing a tragedy entitled 'La Raquel,' which was intended to combine the old Spanish forms with the dignity of the French tragic style, without however being subject to the rules of French dramatic art. Though this production—one of uncommon merit—was very well received even by the *Gal-*

licista, or partisans of the French school, it did not produce the intended effect. In the second half of the last century, under the enlightened rule of Charles III., Spanish literature was in some manner revived by the labours of the two academies at Madrid, but chiefly through the encouragement given by the 'Academia de la Lengua,' which distributed prizes among the best poets. Some epic essays by Vargas Ponze and the elder Moratin show that the poetic genius of the Spaniards was not yet altogether extinct. Don Thomas Yriarte wrote a didactic poem entitled 'La Musica.' Juan Melendez Valdez wrote some Anacreontic odes not inferior in merit to those of Villegas. Cienfuegos, Salas, Quintana, Arriaza, Santos Pelegrin, Lista, Noroña, Gorostiza, Mora, Cadalso, the author of the 'Cartas Marrueras,' some of whom are still living, distinguished themselves in the various kinds of lyric or dramatic poetry. To Moratin the younger, whose translation of 'Hamlet' was a complete failure, the Spanish stage was greatly indebted, as he was the first who introduced the true comedy (Comedia de Costumbres) after Molière and the best French comic writers. He also wrote 'Origenes del Teatro Español,' a work of vast and rare erudition and research. [MORATIN.]

Among the present writers of Spain, Martinez de la Rosa is one of the most successful. As a comic writer he is considered equal to Moratin. He has moreover gained great reputation as the author of several tragedies, of which 'La Viuda de Padilla' and 'Edipo' are the most esteemed. An epic poem on the siege of Saragossa; a drama in prose, entitled 'La Conjuracion de Venecia' (the Conspiracy of Venice), an art of poetry in imitation of that of Boileau, a political work entitled 'El Espiritu del Siglo' (the spirit of the age), and several lyric poems, show his powers for all branches of literature. A new school of dramatic writers is now being formed in Spain, whose object seems to be to combine the French drama of the school of Victor Hugo and Dumas with the old national style. 'Los Amantes de Teruel,' by Hartzenbusch; 'El Trobador,' by Gutierrez; 'Felipe Segundo,' by Gil; 'Don Julian,' by Principe, are successful attempts in this line. Breton de los Herreros is considered the best writer of comedies. Zorrilla, Espronceda, Calderon, Quiroga, Garcia Tassara, are also popular poets. But among the numerous poets of Modern Spain there is scarcely one who can be said to cultivate prose with success, and with the exception of the satirical writings of Larra and Mesonero, of Clemencin's learned 'Commentary on Don Quixote,' of Toreno's 'History of the Peninsular War,' and a few essays printed in the Transactions of the Royal Academy of History, scarcely a work of ordinary merit has been published since the beginning of this century.

SPA'LATRO, or SPA'LATO, a town of Dalmatia, situated on a promontory in a bay of the Adriatic, formed by the islands of Brazza and Bua and the mainland. It is about midway between Zara and Ragusa, in 43° 30′ N. lat. and 16° 33′ E. long. Spalatro has a harbour, sufficiently extensive, but not very safe. The town is walled and fortified, but the principal defence on the land side consists of the fort of Clissa, which commands a defile in the mountains towards the Turkish borders. Spalatro stands principally on the site of the extensive palace which the emperor Diocletian built for himself near the antient town of Salona. [DIOCLETIAN.] Salona is now completely ruined, having been destroyed by the Slavonians in the seventh century, but many remains of antiquity are found by digging among the vineyards which occupy its former area, about three miles from Spalatro, and halfway between it and Clissa. The emperor Francis of Austria visited the ruins in 1815, and assigned a fund for carrying on the excavations and the formation of a museum at Spalatro.

The outer walls of the residence of Diocletian, which formed a square of nearly one mile, are in great measure still existing, as well as some of the gates. It is said that the name of Spalato, or Spalatum, is a corruption of Palatium. The cathedral of Spalato is made out of a temple built by Diocletian in the middle of the area of his residence; it contains some fine columns and is adorned with a handsome frieze. Other considerable remains of the Imperial buildings are seen within the precincts of Spalatro.

Spalatro is one of the most commercial towns of Dalmatia; the population is about 8000.

SPALAX. [MURIDÆ, vol. xv., p. 515, et seq.]

SPALDING. [LINCOLNSHIRE.]

SPALDING, JOHANN JOACHIM, was born on the 1st of November, 1714, at Triebsees, in Swedish Pomerania, where his father had a school, and was afterwards appointed preacher. Young Spalding studied at the universities of Rostock and Greifswalde; and although theology was the department to which he chiefly devoted himself, he paid great attention to other branches of learning. In 1745 he was appointed secretary to the Swedish embassy at Berlin; but he remained in this post only for two years, as he preferred the office of preacher at Lassahn, in Swedish Pomerania, which was offered to him. In 1757 he was appointed to the office of præpositus and first preacher at Barth; and it was about the same time that he began his numerous theological works, which are no less distinguished for clearness of style than of thought, and were received with general approbation. Owing to the reputation which he gained as an author and an orator, he was in 1764 appointed first pastor and provost to the Nicolaikirche at Berlin, where some time afterwards he was also elected a member of the chief consistory. In this new and extensive sphere of action, he showed so much mildness of character combined with dignity, that he won the affection and veneration of all who came in contact with him. Through his sermons however he exercised the greatest influence: they were full of deep feeling and profound thought; and in point of style they ranked, and still rank, among the best specimens of German pulpit oratory. There is little in them that will remind a reader that Spalding lived at a time when the German language was just entering upon its new career of development. In 1788, when the king Frederic William II., instigated by Wöllner and others of the mystic and pietistic party, issued an edict (Religions-edict) condemning all freedom of thought in religious matters, Spalding, who belonged to the opposite party, was in some degree obliged to resign his offices. This firm adherence to his principles raised Spalding still higher in public estimation: he spent the last years of his life in retirement. He died on the 2nd of March, 1804, at the age of ninety.

The works of Spalding are very numerous: they are partly on philosophical and ethical subjects, and partly on theology. The principal, which have all gone through several editions, are:—'Ueber die Bestimmung des Menschen,' Greifswalde, 1748; 'Gedanken über den Werth der Gefühle in dem Christenthum,' Berlin, 1761; 'Ueber die Nutzbarkeit des Predigtamtes,' Berlin, 1772; and 'Religion eine Angelegenheit des Menschen,' Berlin, 1797. His sermons were published in various collections at several times. The Life of Spalding was written by himself, and edited with notes by his son Georg Ludwig, at Halle, in 1804, 8vo.

SPALDING, GEORG LUDWIG, son of the former, was born in 1762, at Barth. He was educated at one of the gymnasia of Berlin, under Büsching. From 1779 to 1781 he studied philology and theology at the universities of Göttingen and Halle. He continued his studies in private after he had left the universities; and in order to improve his knowledge, he undertook a journey through Germany, Switzerland, France, England, and Holland. On his return to Berlin he was appointed tutor to the children of Prince Ferdinand of Prussia, and in 1787 he obtained a professorship at the gymnasium Zum grauen Kloster in Berlin. The Religions-edict, on account of which his father had given up his offices, induced the son, who held the same opinions, to abandon the study of theology altogether, and to devote himself entirely to philology. In 1792 he obtained from the university of Halle the degree of master of arts; and on this occasion he wrote a dissertation, 'Vindiciæ Philosophorum Megaricorum,' &c. A short time after, a Leipzig publisher requested him to revise the text of Quinctilian, and to prepare a new edition of this writer. Spalding agreed, thinking that the work could be accomplished in a short time. But when he had once entered upon his task, he found much more to do than he had anticipated; and that it was necessary, if the work was to be done well, to devote all his time to it. This was indeed henceforth the great object of his life. In order that he might not be disturbed in his work, he even refused the directorship of his gymnasium, which had become vacant, and was offered to him. In 1803 he was elected a member of the Berlin Academy. In 1805 he made a journey to Italy in order to collate a Florentine manuscript of Quinctilian. During the latter part of his life he held the high office of counsellor in the ministry for public instruction. He died in 1811, after he had spent the greater part of the last nineteen years of his life upon the critical study of Quinctilian; and yet the work was not finished at his death, for only the first three volumes had been published at Leipzig, in the years 1798, 1803, and 1808; the remaining two volumes were edited by Buttmann and Zumpt, 1816 and 1829.

Spalding has not written much, but what he has done is masterly. He was a man of very mild though lively temperament, and beloved and esteemed by men like Buttmann and Niebuhr.

See the memoir, or rather eulogium, on Spalding by Buttmann, in the *Transactions of the Berlin Academy of* 1814 *and* 1815.

SPALLANZA'NI, LA'ZARO, was born at Scandiano, a small town near Reggio, in the duchy of Modena, on January 12th, 1729. His early education was directed by his father, J. N. Spallanzani, who had considerable reputation as a lawyer; and when he had reached the age of fifteen, he was sent to the Jesuits' College at Reggio, where he remained during several years. He then repaired to the university of Bologna; and while there his studies were directed by his kinswoman the celebrated Laura Bassi. He had early imbibed a fondness for the natural sciences; but his family insisted on his embracing his father's profession, and he had completed the studies necessary for obtaining the degree of doctor of laws before he could obtain permission to abandon a pursuit which was extremely distasteful to him. Immediately on quitting the profession of the law he embraced the ecclesiastical habit, and applied himself to the study of languages so diligently, that in the year 1754 he was chosen to fill the vacant chair of logic, metaphysics, and Greek literature in the university of Reggio. He held the appointment for six years, during which time he published his first and only philological work, a critique upon a translation of Homer into Italian verse by A. M. Salviani, in which there are many important errors.

During his stay at Reggio Spallanzani's name had become known in many parts of Europe; and he received invitations from the universities of Coimbra, Parma, and Césène, all of which he declined from his desire not to be separated from his family. In 1761 however he accepted a professorship at Modena, which was only a few miles distant from his native town, and from this time dates the commencement of the high reputation which he acquired by his investigations into different branches of natural science. In 1766 he published a sketch of a work on the reproduction of animals; and though during his subsequent life he completed only a part of the researches which he had planned, yet his labours are most valuable. In opposition to the opinion of Buffon, which had been eagerly embraced by our countryman Needham, he maintained and proved that the Infusoria are really endowed with animal life, not mere organic molecules, as those authors had supposed. In 1768 he published the result of his investigations into the action of the heart and the circulation of the blood, a subject which had engaged his attention for many years. A translation of Bonnet's 'Contemplations de la Nature,' which appeared in 1769, was the last work published during his stay at Modena; and in the ensuing year he was chosen professor of natural history at Pavia, which appointment he continued to hold till his death.

His treatise on the circulation of the blood had led to his being invited to Pavia; and on entering on his new duties, to which those of director of the museum were soon added, he entirely gave up literary pursuits. The labours in which he now engaged are too extensive, and of a character too purely scientific, to admit of an analysis here. They were principally directed to elucidating the subject of the circulation of the blood, and the functions of respiration, digestion, and generation, on all of which he published treatises after his removal to Pavia. The number and ingenuity of his experiments are not more striking than his close and logical reasoning—excellencies which procured for him one of the greatest honours that a scientific man of that day could receive, in the dedication to him, by the illustrious Haller, of the second volume of his physiology. Besides his larger works, Spallanzani contributed numerous papers on natural history to the Transactions of various learned societies. Nor did he rest content with that knowledge only which could be acquired by books, or which the museum of Pavia or the surrounding country might afford, but he undertook journeys to different parts of Europe. In 1779 he travelled through the greater part of Switzerland. In 1781 he visited the coasts of the Mediterranean from Leghorn to Marseille, and remained in the latter city for six weeks. In the year 1782 and 1783 he visited Istria, traversed the shores of the Adriatic and Ægean seas, and explored the Euganean Mountains. All these journeys yielded some fruit to the scientific traveller; but in 1785 he undertook a longer voyage than any he had before made, and visited Constantinople. In his route thither he visited Corfu and Cerigo; and to him, and his companion Zuliani, the Venetian ambassador, we owe a description of the geology of these islands. Various objects of interest engaged his attention during a stay of eleven months at Constantinople; after which he quitted that city, and returned through Germany to his own country, from which he had been absent one and twenty months.

During his absence, the envy of some of his colleagues at Pavia had been at work, defaming his character and accusing him of having stolen various specimens from the museum. Spallanzani heard of this while at Vienna, from which place he sent an answer to the charges against him. His defence overwhelmed his enemies with shame, and the return of Spallanzani to Pavia was a sort of triumphal entry; the students met their professor outside the walls, and conducted him with acclamations to his own house.

Three years afterwards he visited Sicily and Naples, and various parts of the Apennines, in order to obtain geological specimens, in which the museum at Pavia was very deficient. On his return he devoted himself to lecturing, to arranging his numerous notes, and to cultivating his style, which he endeavoured to form on that of Buffon. The French republic offered him the professorship of natural history in the Jardin des Plantes at Paris, but he declined to accept it, and passed his latter years at Pavia, in the enjoyment of every honour which a man of science could desire. The comfort of his declining age was interrupted by severe bodily suffering, and after having experienced frequent attacks of apoplexy, he died from the effects of a fresh seizure, on February 12, 1799, aged 70 years.

A catalogue of Spallanzani's numerous works, many of which have been translated into English, is given at the end of his Life, in vol. vii. of the *Biographie Médicale;* and a lengthened analysis of his labours will be found in the *Eloge*, by M. Alibert, which is contained in vol. iii. of the *Mémoires de la Société Médicale d'Emulation.*

SPANDAU, or **SPANDOW**, a very antient town and fortress in the kingdom of Prussia, in the province of Brandenburg, is situated in 52° 30′ N. lat. and 13° 10 E. long., at the conflux of the rivers Havel and Spree. It was formerly the residence of the electors of Brandenburg, whose palace is now converted into a house of correction for 500 criminals. It has three suburbs, in one of which, called the Plan, there is a government manufactory of arms, which are sent to Potsdam to be finished. There are four principal and five small gates. The citadel, commenced by the elector Joachim II., is built on an island in the Havel; it is a regular quadrangle, surrounded on the north and west by a double fosse, which can be laid under water; and on the other two sides by the Havel. The walls, casemates, and outworks are of stone. The public edifices are—three Protestant churches, of which that of St. Nicholas contains several curiosities; and one Roman Catholic church, an hospital, the above mentioned house of correction, and the manufactory of arms. There is also an asylum for destitute orphans and the children of criminals. The inhabitants, about 7000 in number, manufacture woollens, linens, silks, hats, and earthenware, and have considerable breweries, distilleries, and tanneries. They have also a good trade on the rivers, the fisheries in which are likewise a source of profit.

Spandau was taken, in 1631, by the Swedes, but restored in 1634. In 1806, soon after the fatal battle of Jena, it surrendered on the first summons to the French, by which 1500 prisoners and 60 pieces of cannon fell into their hands. On the retreat of the French from Berlin, on the 4th of March, 1813, the suburbs were burnt, and in the bombardment on the 20th of April, seventy houses were burned, and thirty others much damaged. On the 26th of April, 1813, the French surrendered to the Prussian genera Thumen. (Müller, *Wörterbuch*, &c.; Stein; Hassel; *Conversations Lexicon.*)

SPA'NHEIM, EZECHIEL, the son of Frederic Spanheim, a theologian of some note, was born at Geneva, on the 7th of December, 1629. Respecting his early education nothing is known; but from the knowledge which he displayed when yet a young man, we must infer that it was well regulated, and supported by considerable talents on the part of the youth. When he was thirteen years old his father was appointed professor of theology in the university of Leyden, whither he removed with his whole family. Ezechiel here devoted himself first to the study of antiquity, and afterwards to that of theology, and attracted the attention of D. Heinsius and Salmasius, who guided and encouraged him in his studies. He also studied the Oriental languages, especially Hebrew and Arabic; and the first time that he appeared before the public as an author was in a controversy respecting the original characters of the Hebrew alphabet, which he denied to have been preserved by the Samaritans, as L. Capell had maintained. The work he wrote on this occasion bears the title of 'Theses contra L. Capellum pro Antiquitate Literarum Hebraicarum,' Leyden, 1645, 4to.

In 1649 his father died, after having shortly before written a work on Universal Grace, which was now severely attacked by Amyrauld. Spanheim fulfilled his filial duties towards his father by replying to this unseemly assault; but shortly after this event he returned to Geneva, where the chair of professor of eloquence was offered to him, which he accepted in 1651. This title of professor was however merely an honorary distinction conferred upon him by his native city, and he is not known ever to have undertaken the functions of a professor in the university of Geneva. He only delivered two occasional discourses in Latin, which however he published in French, under the title, 'Discours sur la Crèche et sur la Croix de Not. Sauv. Jesus Christ,' Geneva, 1655, 8vo., a new and corrected edition of which was published by the author at Berlin in 1695. In the meanwhile however the fame of his great acquirements was spreading and had reached the ear of the elector-palatine Louis Charles, who appointed him tutor to his son Charles. He discharged his duties to the perfect satisfaction of the elector, and devoted all his leisure hours to the study of the antients, and of the German law, on which he published a dissertation during this time. He also translated from the Greek into French the Cæsars of Julian, illustrated by coins and other antient documents. (Heidelberg, 1660, 8vo.; reprinted at Paris in 1683, and at Amsterdam in 1728.) As a translation, this work is of little value. The great prudence which Spanheim had shown during the time he stayed at the court of Heidelberg, induced the elector to send him to Italy to renew his connection with the princes and states of that country. In 1659 Spanheim thus set out for Italy, where he visited Florence, Mantua, Parma, Modena, and Rome, and was everywhere received with great distinction. The chief study which he pursued in his leisure hours was that of numismatics; and in 1664 he published his first work on this subject at Rome. For the purpose of prosecuting his antiquarian studies still further, he also visited Naples, Sicily, and Malta. In 1665 he returned to Heidelberg, and was henceforth employed by the elector in the most important political and diplomatical affairs. He was successively sent by the elector to the conferences of Oppenheim and Spire, and to the congress of Breda. Afterwards he was appointed minister resident of the elector in Holland, and then in England, at the court of Charles II. During his stay in England the ambassador of the elector of Brandenburg was recalled, and Spanheim was requested and undertook, with the consent of the prince-palatine, to manage also the affairs of the elector of Brandenburg. He discharged the duties of his twofold office so well, that the elector of Brandenburg desired him to enter his service exclusively. This Spanheim did, with the consent of his former master, though not without his regret. Shortly after, in 1680, the elector of Brandenburg sent him as his extraordinary ambassador to Paris, at the court of Louis XIV., which post he held for nearly nine years. In 1689 he went to Berlin, where for some time he gave himself entirely up to his favourite studies, which he had never abandoned during his public life. At Berlin he wrote his celebrated Letters to Beger and Morel, on some numismatical subjects, and some of the Commentaries on antient writers, which we shall mention hereafter.

After the peace of Ryswick, in 1697, Spanheim returned as ambassador to Paris, where he remained till the year 1701.

After the elector of Brandenburg had assumed the title of king, and was recognised as such by the other powers, Spanheim was raised to the rank of a baron, and was sent, in 1702, as ambassador of the new king of Prussia, Frederic I., to England. Here he remained until his death, on the 7th of November, 1710.

The principal works of Spanheim, besides those already mentioned, are—1, 'Dissertationes de Præstantia et Usu Numismatum Antiquorum,' which was first published in one volume, 4to., at Rome, in 1664, and reprinted at Paris in 1671. The last and best edition is that published at London, in 1706, fol., to which Verburg, in 1717, added a second volume from the papers of Spanheim. The whole work consists of thirteen dissertations, addressed to his friend Falconieri. It contains a store of information, though very inconveniently arranged.

2. 'De Nummo Smyrnaeorum inscripto Σμυρναίων πρυτάνεις, scilicet de Vesta et Prytanibus Græcorum Diatriba,' Paris, 1672. This work is reprinted in Grævius's 'Thesaurus,' v., p. 660.

3. 'Lettre sur l'Histoire Critique du Vieux Testament,' par Richard Simon, Paris, 1678.

4. 'Orbis Romanus, seu ad Constitutionem Imperatoris Antonini, de qua Ulpianus leg. xvii. Dig. de Statu Hominum Exercitationes Duæ,' the best edition of which is that published in London, 1704. This work is still of great value; it is also contained in the eleventh volume of Grævius's 'Thesaurus.'

Besides these works Spanheim wrote a number of Commentaries upon antient authors, some of which may still be consulted with great advantage. Among them we shall mention his Commentaries on Callimachus, in the edition of Grævius, and reprinted in that of Ernesti, Lugd. Bat., 1761; on Strabo, Amsterdam, 1707; on the first three comedies of Aristophanes, in Küster's edition of 1707-9; on 'Ael. Aristides,' in Jebb's edition, Oxford, 1722; on Josephus, Leyden, 1726; on Thucydides, in Duker's edition, Amsterd., 1731, and others.

Compare the 'Acta Eruditor.' of the year 1711; and the Memoir of Spanheim, by Verburg, prefixed to the second volume of his 'Dissert. de Præst. et Usu Num. Ant.,' p. viii.-xix.

SPANIEL, a variety of Dog, in which article a figure of the skull is given. [Vol. ix., p. 61.]

It is not at all improbable that dogs of this race were known to the Romans, as is observed by Lieut.-Col. Hamilton Smith, who remarks that the Spaniel, *Canis extrarius ?*, is clearly figured on some of the later monuments, and seems to be identical with the *Canis Tuscus* praised by Nemesianus; and indeed the lines in the *Cynegeticon*, beginning—

> 'Quin et Thuscorum non est extrema voluptas
> Sæpe canum, forma est illis licet obsita villo.'

with the allusion to their hunting qualities—

> 'Moresque simul naresque sagaces'—

strongly favour that opinion. It may also be noted that Nemesianus in another part of the poem speaks of dogs—

> 'Quorum proles de sanguine manat Ibero;'

or, as the Aldine edition (8vo., Venet., 1534) has it, 'hibero.'

The Spaniel appears to have been the companion of the Falconer at a very early period. In *The Booke of Falconrie or Hawking* (1611), 'Heretofore published by George Turbervile, Gentleman,' we find among 'The Contents of this Booke,' 'A little treatise translated out of the Italian tongue, touching the diseases happening to Spanyels, with their Cures;' and on turning to the page we come to 'A Treatise and discourse of the cure of Spaniels when they be any way over-heat; devised and written by M. Francesco Sforzino Vicentino, the Italian Gentleman-Falconer,' and beneath the title a cut, where stands the falconer, hawk on fist, hat on head, staff in hand, and pouch on side, in trunk-hose, and with bare-headed attendants, accompanied by two couple of Spaniels.

'How necessary a thing,' begins the treatise, 'a Spaniell is to Falconrie, and for those that use that pastime, keeping hawks for their pleasure and recreation, I deem no man doubteth as wel to spring and retrive a fowle being flowen to the marke, as also divers other ways to assist and ayde Falcons and Goshawkes. Wherefore, seeing that hitherto in my collection I have spoken altogether of Hawkes both for the river and field, and in my conceite have left few needfull poynts for a good Falconer untoucht or treated of: now I shall not doe amisse, nor wander over wide from my purpose, if I say somewhat of Spaniels, without the which a Falconer (specially using to flee the field) cannot be without mayme of his pastime, and impayre of his gallant glee. And againe for that they are subject to many dis-cases and plagues (as wee commonly tearme them), for dogges, and longer than they are without infection wee may expect from them no pleasure, assistance, or recreation. I will onely in this treatise describe you their harmes with cures due to the same. Among all which I place the Mangie first, as the capitall enemy to the quiet and beauty of a brave Spaniell, wherewith the poor dogges are oftentimes greatly plagued, both to the infection of their fellowes, and the no slender griefe of theyr masters.'—Whereupon follow three prescriptions for 'The cure of the Mangie,' each more potent than its antecedent, as well as 'A way to cure the Mangie without any unguent—if a Spaniell bee not very much infected.' Then come cures for other ills that spaniels are heirs to, and the whole is wound up with the following conclusion:—'Thus much I thought good to write of Spanels, and their diseases and cures, for that they are superintendants, and necessarie servants, both for the Hawke and the Falconer, without whome the sport would bee but colde; and the toyle far more than it is to the man. Wherefore it shall not be amisse for a good Falconer always to breede and keepe of the best kinde of Spanels that he may come by, and so to respect them, as they heate not at any time; or if they doe by misfortune or neglygence of your lackey boye, then to regard their cure, which may be done in manner as I have heere set downe; and withall to use due correction to the boy. For a good Spanell is a great jewel: and a good Spanell maketh a good Hawke, and a curst maister a careful footeman. Farewell.'

In the sporting prints engraved by Hollar after Barlow, a whole team of spaniels are introduced giving tongue in 'Partridge Hawking,' with the following lines at the bottom of the plate:—

'The fearfull Partridge being sprung by quest
Of Spaniells from their pleasing-foode and rest,
The keene and bloody Hawke pursues, the Knight
Hath then his sport, and feasts on them at night.'

And again in 'Feasant Hawking,' with the following quatrain:—

'The Feasant Cocke the woods doth most frequent,
Where Spaniells spring and pearche him by the sent.
And when in flight, the Hawk with quickened speed
With 's beake and savage talens makes him bleed.'

Spaniels, apparently of a stouter breed, are also introduced in 'Hern Hawking' by the same hands, a circumstance worthy of remark, inasmuch as in the cut in *The Booke of Falconrie*, with the superscription 'How to flee a Hearon,' the mounted gentleman-falconer, who is covered, is attended by bare-headed domestics, and accompanied by a couple of greyhounds.

The author of the *Sportsman's Cabinet* states that the race of dogs passing under the denomination of spaniels are of two kinds, one of which is considerably larger than the other, and known by the appellation of the *Springing Spaniel*, as applicable to every kind of game in any country, whilst the smaller is called the *Cocker* or *Cocking Spaniel*, as being more adapted to covert and woodcock shooting. This appears to be a correct definition, and most authors notice the two kinds, but some confusion has been introduced by the application of a name equivalent to that of *Springing Spaniel* to the *Cocking Spaniel*. Thus Bewick, who gives cuts both of the *Large Water Spaniel* and the *Small Water Spaniel* (both apparently modifications of the old *Old Springing Spaniel*), as well as one of the *Large Rough Water-dog* (*Canis aviarius aquaticus*, 'a Water-spagnelle,' of Gesner, probably the *Canis sagax ad aquas* of Aldrovandus, and *Grand Barbet* of Buffon, *Water-Dog* of Pennant), represents the small breed under the name of *The Springer or Cocker*. Bell also calls this last the *Springer*. Lieut.-Col. Hamilton Smith enumerates 'The Spaniel (*Canis extrarius ?*), commonly called Water Spaniel;' 'The Springer;' 'King Charles's Spaniel;' and the 'Cocker,' as well as the 'Water-dog. *Canis acquaticus*.'

Dr. Caius, in his systematic table of British Dogs, makes the *Fowlers* consist of the Spaniel (*Hispaniolus*), Setter (*Index*), and Water Spaniel or Fynder (*Aquaticus*); whilst under the title Lap-dogs, the Spaniel gentle or comforter (*Melitæus* or *Fotor*—the Maltese Lap-dog), stands alone.

Aldrovandi has two cuts of Spaniels: one is described as 'Canis Hispanicus auribus demissis, pectore, ventre, pedibus albis maculis nigris distinctis, reliquo corpore nigro;' the other, which is much coarser and altogether larger, is merely noticed as 'Canis Hispanicus alter auribus demissis.' The first, making allowances for the rudeness of the drawing and engraving, might pass for a not ill-bred Spaniel of the present day.

Pennant, in following out the tract of Caius, says, 'The third division of the more generous dogs comprehends those which were used in fowling; first, the *Hispaniolus*, or Spaniel: from the name it may be supposed that we were indebted to Spain for this breed. There were two varieties of this kind, the first used in hawking, to spring the game, which are the same with our Starters. The other variety was used only for the net, and was called *Index*, or the Setter; a kind well known at present. [SETTER.] This kingdom has long been remarkable for producing dogs of this sort, particular care having been taken to preserve the breed in the utmost purity. They are still distinguished by the name of *English* Spaniels; so that, notwithstanding the derivation of the name, it is probable that they are natives of Great Britain. We may strengthen our suspicion by saying that the first who broke a dog to the net was an English nobleman of a most distinguished character, the great Robert Dudley, duke of Northumberland.'

The probability appears to be that all the varieties of the Spaniel, the small Water-Spaniel, the Cocking Spaniel, King Charles's Spaniel, and the Blenheim Spaniel, if that breed be not the true spaniel of King Charles I., are all the result of careful breeding from the large Water-Spaniel (not the Rough Water-Dog which some call a water-spaniel), which seems to have been the old Springing Spaniel.

The author of the *Sportsman's Cabinet* describes the true English-bred springing spaniel as differing but little in figure from the setter, except in size; varying only in a small degree, if any, from a red, yellow, or liver-colour, and white, which seems to be the invariable external standard of this breed. They are, he observes, nearly two-fifths less in height and strength than the setter, delicately formed, ears long, soft, and pliable, coat waving and silky, eyes and nose red or black, the tail somewhat bushy and pendulous, and always in motion when actively employed.

This appears to have been the setting-dog used by our forefathers for taking partridges and other birds with a net. We find in *An addition to the first book of the Ornithology of Francis Willughby, Esq., being an Epitome of the Art of Fowling collected out of Markham, Olina, and others* (1678), instructions 'how to take partridges and other birds with a setting-dog,' commencing thus:—'A setting-dog should be a lusty land-spaniel that will range well, and yet at such absolute command, that when he is in full career one hem of his master shall make him stand still, gaze about him, and look in his master's face, as it were expecting directions from him, whether to proceed, stand still, or retire; but the main thing he is to be traught is, when he sees and is near his prey, of a sudden to stand still, or fall down flat on his belly, without making any noise or motion till his master come to him'—'when you see him make a sudden stop or stand still, be sure he hath set the fowl; therefore presently make in to him and bid him go nearer; if he refuses, but either lies still or stands shaking of his tail, and withal now and then locks back upon you, he is near enough.' The dropping of our present breed of setters, which, as has been observed in the article SETTER, probably owe their origin to the old English spaniel and the pointer, which last does not seem to have been known to our ancestors, confirms the spaniel parentage; and this may be traced in another habit observable in many of the setters now in use, especially those whose markings and appearance approach most closely to the spaniel, namely, the slow lateral motion of the stiffened stern gently fanning horizontally when the dog is pointing, till it becomes quite steady and motionless, and in which we may perceive the chastened action of the tail so vigorously moved from side to side when the spaniel hits upon the foot of game. Setters so marked frequently exhibit an inclination to drop or set instead of pointing, especially when close upon their game.

We have above given the *Veteran Sportsman's* description of the springing spaniel. 'From this description,' says he, 'the cocker differs, having a shorter, more compact form, a rounder head, shorter nose, ears long (and the longer the more admired), the limbs short and strong; the coat more inclined to curl than the springer's, is longer, particularly on the tail, which is generally truncated; colour, liver and white, red, red and white, black and white, all liver colour, and not unfrequently black, with tanned legs and muzzle. From the great similitude between some of these cockers and the small water-dog, both in figure and disposition, there is little doubt but they may have been originally produced by a cross between the springing spaniel and the latter. Some of the largest and strongest of this description are very common in most parts of Sussex, and are called Sussex spaniels. The smallest spaniels passing under the denomination of cockers is that peculiar breed in the possession and preservation of the Duke of Marlborough and his friends; these are invariably red and white, with very long ears, short noses, and black eyes; they are excellent and indefatigable, being in great estimation with those sportsmen who can become possessed of the breed. It is upon record how much that unfortunate monarch Charles I. was attached to spaniels, of which he had always favourites about him; and although they were supposed to be of the small, black, curly sort which bear his name, they were much more likely to have been of the distinct breed of cockers, if judgment may be consistently formed from the pictures of Vandyke, in which they are introduced.'

It may be that the black and black and tan variety found favour in the eyes of Charles II., who generally had some choice spaniels about him.

It is no small proof of the merit of the spaniel that it has kept its ground amid all the revolutions of sporting. 'A good spaniel is *still* a great jewel.' The companion of the hawk and net now attends the greyhounds; and is indispensable in woodcock shooting; apart from its excellent services in cover, there is no more lively field-shooting than that with a team of thoroughly well bred spaniels broken never to give tongue, to range well, but not at a greater distance than fifteen or twenty yards from the gun, and never to chace either feather or fur. The sportsman's attention is always kept on the alert, and he who has accustomed himself to this style of shooting will generally be found to be a quick and sure shot.

Spaniels have a great share of intelligence and affection; these qualities, being combined with much beauty, make them highly prized as companions, and we have, in our day, the

'Spaniel, bred with all the care
That waits upon a fav'rite heir.'

Seventy pounds have been refused for one of these dogs.

Our space will not permit us to indulge in anecdotes of the sagacity and attachment of the spaniel; but we may mention the feat of Colonel Hardy's favourite spaniel-bitch. The Colonel, who had been sent for express to Bath, took the spaniel with him in his chaise, which he never quitted till his arrival there. After remaining at Bath four days, he accidentally left her behind, and returned to his residence at Springfield in Essex with equal expedition. In three days after, his faithful spaniel arrived. The distance between that place and Bath is 140 miles, and it is stated that she had to explore her way through London, to which she had never been but in her journey to Bath, when she was in a close carriage. It is also on record that in 1792 a gentleman who lived in Vere Street, Clare Market, went with his family to Drury Lane theatre, at about half-past five in the evening, leaving a small spaniel of King Charles's breed locked up in the dining-room, to prevent the chance of the loss of the dog in his absence. At eight o'clock his son opened the door: the dog, unperceived, watched his opportunity, passed the street-door, and immediately made his way to the playhouse, where he found out his master, who was seated nearly in the centre of an unusually thronged pit. Indeed it seems that they can have neither peace nor rest if they are not with their master or mistress. No one can have kept one of these affectionate creatures without observing this, and we could fill pages with the stratagems of these dogs to prevent their being separated from their kind owners. If excluded from a room, they will lie at the door, so that no one can go out without their knowledge; and when in the room with their mistress, some will not go to sleep when wearied, except upon a portion of her dress, so that she cannot rise from her chair without giving them notice. Nor does this strong attachment cease with life. We will not weary our readers with the well-known melancholy stories: that of the unfortunate sufferer during the French Revolution, a few days before the overthrow of Robespierre, and his faithful spaniel that clung to him during his mock trial, was with him at the guillotine, and died exhausted on his grave, is familiar to most; but we must mention a recent and well-authenticated instance of enduring attachment:—'While revising the letter-press of this article (14th April, 1840),' says Lieut.-Col. Hamilton Smith, in his elaborate and interesting work on *Dogs*,[*] under the title *Spaniel*, 'there was a dog allied to the spaniel race lying on the grave of his mistress, already the third day, in the churchyard of Charles Church, Plymouth, refusing all food; it is just now forcibly removed.'

The docility of the spaniel is equal to its intelligence and feeling of attachment. A spaniel has been taught to wait at table, take away plates and fetch others, carry wine in a glass without spilling, and to hold the stirrup in his mouth for his master while he was mounting his horse. The spaniel given by Mr. Daniel, author of *Rural Sports*, to the Hon. Mr. Greville, would, we are told, in addition to the common tricks which dogs trained to fetch and carry exhibit, bring bottles of wine from the corner of the room to the table by the neck, with such care as never to break one, and was the *Boots* of the mess-room.

But of all the stories that ever have been told of canine scholarship, the story of *Leibnitz's Dog*, as the four-footed orator was called, though he did not belong to that celebrated man, is the most marvellous. This dog, which was rather above the middle size, had the appearance of a large cross-bred spaniel. He belonged to a Saxon peasant, whose son fancied that he perceived in the dog's voice an indistinct resemblance to certain words, and so set to work, when the dog was about three years old, to teach him to speak. It is gravely asserted that the dog was able to articulate thirty words, and that he would call for tea, coffee, chocolate, &c. Leibnitz attested that he heard this extraordinary dog speak. In the fifth volume of Leibnitz's Works (*Gothofredi Guillelmi Leibnitii Opera Omnia studio Ludovici Dutens*, 4to., *Genevæ*, 1768) the following passage occurs in one of Leibnitz's letters:—'VII. Voici une nouvelle d'une autre espèce. Je viens de recevoir une lettre d'un Prince régnant de l'Empire, où S. A. me marque avoir vu deux fois ce printems, à la dernière foire de Leipzig, et examiné avec soin, un chien qui parle. Ce chien a prononcé distinctement plus de trente mots, répondant même assez à propos à son maître; il a aussi prononcé tout l'alphabet, excepté les lettres m, n, x.' (Lettre v., p. 72.)

This note is appended to the marvellous communication: 'Voyez le détail de cette singularité dans l'extrait d'une lettre de Mr. Leibniz à l'Abbé de St. Pierre, rapportée au tom. ii. de ce Recueil.'

When Leibnitz wrote the above, he does not appear to have seen the dog; but, on turning to the 'détail' referred to in the note, it is clear that he afterwards did see it. Here is the passage:—

'Exposé d'une lettre de Mr. Leibniz à l'Abbé de St. Pierre, sur un chien qui parle.'[†]

'Sans un garant tel que M. Leibniz, témoin oculaire, nous n'aurions la hardiesse de rapporter qu'auprès de Zeits dans la Misnie il y a un chien qui parle. C'est un chien de paysan, d'une figure des plus communes, et de grandeur médiocre. Un jeune enfant lui entendit pousser quelques sons qu'il crut ressembler à des mots Allemands, et sur cela se mit en tête de lui apprendre à parler. Le maître, qui n'avoit rien de mieux à faire, n'y épargna pas le tems, ni ses peines; et heureusement le disciple avoit des dispositions qu'il eût été difficile de trouver dans un autre. Enfin au bout de quelques années le chien sçut prononcer environ une trentaine de mots; de ce nombre sont *thé*, *caffé*, *chocolat*, *assemblée*, mots François qui ont passé dans l'Allemand tels qu'ils sont. Il est à remarquer que le chien avoit bien trois ans quand il fut mis à l'école. Il ne parle que par l'écho, c'est à dire, après que son maître a prononcé un mot, et il semble qu'il ne repète que par force, et malgré lui, quoiqu'on le ne maltraite point. Encore une fois, Mr. Leibniz l'a vû et entendu."

That there was some foundation for this story cannot be doubted. No person familiar with domesticated dogs can have omitted to notice the variety of vocal intonations and modulations with which they endeavour to express their feelings. A careful observation of these, and an education founded upon such observation, *may* teach the dog to produce a given sound on a given occasion; and a lively imagination may perceive something like words in the sounds so produced, as it did when the visitors, aided by the proprietor, detected 'pretty queen,' &c. in the whistlings of the talking canary bird: but 'articulation' is a strong and an abused term when applied to such cases; though it is justifiable in the case of those anthropoglotts the parrots, and even in that of starlings, or ravens, or magpies, which *do* talk. Sir John Sebright performed wonders with dogs in the way of tuition, but we never heard that he made them speak.

---

[*] 'Naturalist's Library—Mammalia,' vols. ix. and x.

[†] 'Cet exposé de la lettre de Mr. de Leibnis se trouve dans l'Histoire de l'Académie des Sciences, année 1706. Ce sont les auteurs de l'Hist de l'Académie qui parlent."

SPANISH TOWN. [JAMAICA.]

SPAR, a word from the German *Spath*, employed, combined with specific terms, in mineralogy, to include a great number of crystallized earthy and some metallic substances, but chiefly the former. Thus callareous spar is crystallized carbonate of lime; fluor-spar, fluoride of calcium; heavy spar, sulphate of barytes, &c. By miners the term is frequently used alone to express any bright crystalline substance; but in mineralogy, strictly speaking, it is never so employed.

SPARGA'NIUM (from *σπάργανον*, a 'bandage'), a genus of plants which with the genus Typha constitute the natural order Typhaceæ. The species are monœcious. The flowers are arranged in dense spherical heads. Both the barren and fertile flowers are composed of a single perianth with three leaves. The stamens are longer than the calyx, and the fruit consists of a dry drupe with one seed. The species are found commonly in ditches and marshes of the northern hemisphere. Three of these are common in Great Britain. The *Sparganium ramosum* (branched bur-reed) is known by its branched flower-stalk, triangular leaves, and linear stigma. This species was the only one of the genus found by Dr. Sibthorp in Greece, and appears to be the *σπαργάνιον* of Dioscorides. It is an inhabitant of ditches, lakes, and stagnant waters, forming a handsome addition to their vegetation. The *S. simplex* (unbranched bur-reed) is known by its simple stem, and the *S. natans* (floating bur-reed) by its long, linear, floating leaves. They are both found in the same situations as the first.

SPA'RIDÆ, or **SPAROI'DES**, a family of fishes belonging to the section Acanthopterygii, which are distinguished by the following characters combined, viz. the possession of a single dorsal fin, the anterior half of which is supported by spinous rays, and which is not divided, nor is it protected by scales; the operculum is spinous, the palate destitute of teeth, the branchiostegous membrane has five or six rays, and the pyloric appendages are few in number. The body is usually of an ovate form, and covered with large scales. The mouth is not protractile.

The species of this family feed chiefly upon the animals of small shells, crustacea, &c., for crushing which their strong teeth are admirably adapted.

Guided by the structure of the teeth, Cuvier divides the family into four tribes. In the first the jaws are provided with teeth, which are rounded like paving-stones; in the second the teeth are conical and pointed; in the third the teeth minute and thickly crowded; and the fourth tribe have a series of trenchant teeth.

To the first of these tribes belongs the genus *Sargus*, where the incisors, or foremost teeth, are compressed, and have sharp cutting edges; the molars are rounded, and form several rows.

Of this genus numerous species are described in the 'Histoire des Poissons' of MM. Cuvier and Valenciennes; several are from the Mediterranean, and the others are chiefly from the coast of America, north and south.

The next genus, *Charanx*, is founded upon a single species, an inhabitant of the Mediterranean, which has sharp cutting incisors, like the species of *Sargus*, but the molars are extremely minute, and form only a single row.

The third genus of the first tribe is *Chrysophrys*, which is distinguished from *Sargus* by the incisors being conical, and usually four or six in number in front of each jaw; the molars, for the most part, are rounded, and form at least three rows on each side of each jaw, a character which serves to distinguish the present genus from *Pagrus*.

This genus is numerous in species, and these are almost entirely confined to the seas of the warmer and tropical parts of the Old World.

The *Chrysophrys aurata*, a species which is very common in the Mediterranean, is also occasionally met with on our coast, as well as that of France, and the same remark applies to the *Pagrus vulgaris*, which is an example of the next genus, *Pagrus*, which differs from *Chrysophrys* in having only two rows of molar teeth on each side of the jaw. Several species of this genus are found in the Mediterranean, others inhabit the Indian seas, some again are found on the coasts of New Holland and New Zealand and the *Pagrus argyrops* is found on the North American coast.

The last genus of the first division is *Pagellus*, the species of which are easily distinguished by the foremost teeth in each jaw being all of them small, curved, pointed, and dense.

Numerous examples of this genus occur in the Mediterranean; and two species, the *Pagellus erythrinus* and *P. centrodontus*, have been found on our own coast. The former appears to be of very rare occurrence on the British coast; the latter, known by the name of the Sea Bream and Gilt-head, is by no means an uncommon fish on the southern shore of England, and is not unfrequently found on the coast of Ireland

To the second section belong the genera *Lethirinus*, *Dentex*, and *Pentapus*. The first of these genera is at once distinguished from all other genera of the first section by there being no scales on the cheeks; the mouth is but little cleft; and the teeth are, some of them, strong, pointed, and curved; others very small and dense, and the molars form only a single row.

In the genus *Dentex* the teeth are conical, and generally confined to a single row; some of the foremost of them are elongated, curved, and sharply pointed.

The species of this genus, which are very numerous, appear to be almost entirely confined to the temperate and tropical portions of the Old World. But one species is found on the British coast, the Four-toothed Sparus of Mr. Yarrell's work, *Dentex vulgaris*, Cuv. and Val.

The genus *Pentapus* is founded upon certain Sparoïd fishes found in the Indian Seas and off the coast of Australia, which approach the genus *Dentex*, but have two strong canine teeth in front of each jaw, between which sometimes are two or four much smaller teeth; the other teeth are minute, prickly, close together, and arranged in a single row in each jaw.

Close to the ventral fins on each side is a spine, and a third spine is situated between these fins. Similar spines are found in other species, but they are usually less developed than in the present genus. The name of *Pentapus* is applied to these fishes from these spines giving to them the appearance of having five ventrals.

The third section, in which all the teeth are minute and dense as the pile on velvet, contains but one genus, *Cantharus*. Of this genus an example is found on the British coast, and is known by the name of the Black Bream (*Cantharus griseus*, Cuv. and Val.). This fish, though more rare than the Sea Bream, is not uncommon on various parts of our coast.

In the fourth section Cuvier arranges the genera *Box*, *Oblata*, *Scatharus*, and *Crenidens*. All these genera have the foremost range of teeth compressed, placed close together, and with a cutting edge which is more or less notched. In the genus *Box* there is but one series of teeth in each jaw. The *Box vulgaris* (*Sparus boops*, Linn.) is a common species in the Mediterranean, and lives upon vegetable substances.

The genus *Oblata* is founded upon a fish from the Mediterranean, the *Sparus melanurus*, Linn., in which, in addition to the compressed front teeth, which are emarginated at the apex, there is an inner series of minute teeth.

The genus *Scatharus* is also founded upon a Mediterranean fish; here there is but one series of compressed teeth, and these are pointed or lancet-shaped.

Lastly, the genus *Crenidens* is distinguishable by the foremost row of compressed teeth being dilated at the apex and notched; behind these are numerous small globular teeth. There is but one species, the *Crenidens Forskalii* Cuv. and Val., an inhabitant of the Red Sea.

SPARRMANN, ANDREW, the pupil and friend of the elder Linnæus, and the companion of the Forsters in their voyage round the world, was born in the province of Upland in Sweden, about the year 1747. He appears to have entertained from childhood a great fondness for the study of natural history, which was increased by a voyage which he made to China in the year 1765, in a vessel commanded by Captain Ekeberg, one of his kinsmen.

On his return to Sweden he repaired to the university of Upsal, and there applied himself to the study of medicine, but more especially of botany, in which science he had the advantage of the instruction of the celebrated Linnæus. Under the auspices of that distinguished man, he now published his 'Amœnitates Academicæ,' which gave ample proof that his voyage to China had not been made in vain. His scanty means presented an insurmountable obstacle to the accomplishment of his wishes, which would have led him to investigate the natural productions of foreign countries.

The kindness of his friend and relation Ekeberg at length procured for him an appointment which afforded him some prospect of being able to accomplish his favourite project, and he left Gottenburg on January 10, 1772, in order to become tutor to the children of M. Kerste, then resident at False Bay, near the Cape of Good Hope. He reached the Cape on April 30th, and soon after his arrival met his countryman Thunberg, whose zeal for botany had led him to visit those southern regions. Although Sparrmann's time was much occupied by duties in which he took no interest, he made some researches, which he was planning to extend, when Captain Cook touched at the Cape with the ships Resolution and Adventure. Messrs. Forster, naturalists to the expedition, being desirous of obtaining an assistant, gave him the offer of accompanying them, of which he gladly availed himself, and having with them sailed round the world, he returned to Africa, in March, 1775, after an absence of 28 months.

He now practised his profession at Cape Town for a few months, in order to obtain the means for his projected journey into the interior of Africa. During his voyage he obtained sixty ducats by translating a Swedish medical work into English, and with that money and the fruits of a four months' practice, he started for the interior on July 25, 1775, in company with a young man named Immelman, who was born in Africa. He first visited Mossel Bay; then striking more into the heart of the country, he penetrated as far as the banks of the Great Fish River; and afterwards taking a direct northerly course he advanced as far as 28° 30′ S. lat., and 350 leagues from the Cape. On February 6, 1776, he turned southward, and occasionally varying a little from his former track, reached Cape Town on the 15th of April, laden with specimens of plants and animals.

In the course of the same year he returned home, and found that the degree of doctor of medicine had been conferred upon him during his absence. He was next elected a member of the Academy of Sciences at Stockholm; and on the death of Baron Geer, the entomologist, was appointed his successor in the office of conservator of the museum. His love of enterprise tempted him from his retreat to join Wadstroem's projected expedition to the interior of Africa [WADSTROEM]; but on its failure he returned from Senegal, and continued at Stockholm till his death, on July 20th, 1820.

Sparrmann's reputation is founded chiefly on his travels, which have been translated into English and several other European languages. In them he appears as a persevering traveller, an able naturalist, and a truth-telling narrator; and it is no small merit that the map attached to his book is the first in which the coast from the Cape to the Great Fish River is laid down with any degree of accuracy.

The younger Linnæus gave the name of Sparrmannia to species of plants belonging to the order Tiliaceæ of Jussieu.

SPARRMANNIA, the name of a genus of plants belonging to the natural order Tiliaceæ; it was named by the younger Linnæus in honour of his countryman, and the friend of his father, Andrew Sparrmann, who was companion of the Forsters in their voyage round the world. The genus is known by its calyx of 4 sepals, 4 roundish petals, numerous stamens, intermixed with tomentose threads; echinated, 5-angled, 5-celled, 6-valved capsules, with 2-seeded cells. There is only one species, the *Sparrmannia Africana*, which is a native of the Cape of Good Hope. It is a beautiful shrub, much cultivated, flowering in the beginning of the spring. It is found to grow best in a soil composed of loam and peat. The cuttings will root freely when placed under a hand-glass.

SPARROW, *Fringilla domestica*, Linn.; *Pyrgita domestica*, Cuv.

This well known bird, the constant attendant on civilized man wherever it is found, is the *Moineau* and *Passereau* of the French, *Passara* of the Italians, *Haus-Sperling* of the Germans, *Huis-Musch* of the Netherlanders, *Gruspärf* of the Swedes, *Graase-Spurre* of the Danes, *Huus-Kuld* of the Norwegians, *Common Sparrow* and *House-Sparrow* of the modern British, and *Aderyn y to* and *Golfan* of the Welsh.

Belon makes it the Στρουθός (*Struthus*) of the Greeks and *Passer* of the ancient Italians, but it is by no means clear that this was the species meant. The Cisalpine Sparrow (*Pyrgita Italica*, Vieill., *Fringilla Cisalpina*, Temm., *Passero*, *Passera*, *Passero Commune*, and *Passero Tettujuolo* of the modern Italians) is much more abundant at the present day in Italy, where the common Sparrow is comparatively scarce; and there are two other European species.

Geographical Distribution.—Denmark, Norway, Sweden, in which last country it is more numerous if possible than with us, the whole of the British Islands, France, Spain, Portugal, Italy (rare), Liguria, and Dalmatia, in small numbers, and a stranger, as it were, in the midst of the numerous flocks of the Cisalpine Sparrow, according to Temminck; North Africa; the Levant, according to Mr. H. E. Strickland; Trebizond; the Nubian Mountains; the Deccan, according to Colonel Sykes, the Himalaya Mountains, and other parts of India.

The bird is everywhere before our eyes, even in our most populous cities, and cannot need description; but a London sparrow requires to be well cleaned before the true colours of his plumage appear. If one of these begrimed soot-collectors be placed near a bright trim sparrow from a barn-door, it is difficult to conclude that the rustic and the citizen are birds of the same feather.

There are many accidental varieties—pure white; yellowish white, with the colours hardly indicated; rusty yellow variegated with white; some part of the body white, ash-colour or black-brown more or less deep. The *Fringilla candida* of Sparrmann, *Passer flavus* of Brisson, and *Black Sparrow* of Latham, are founded on some of these variegated individuals.

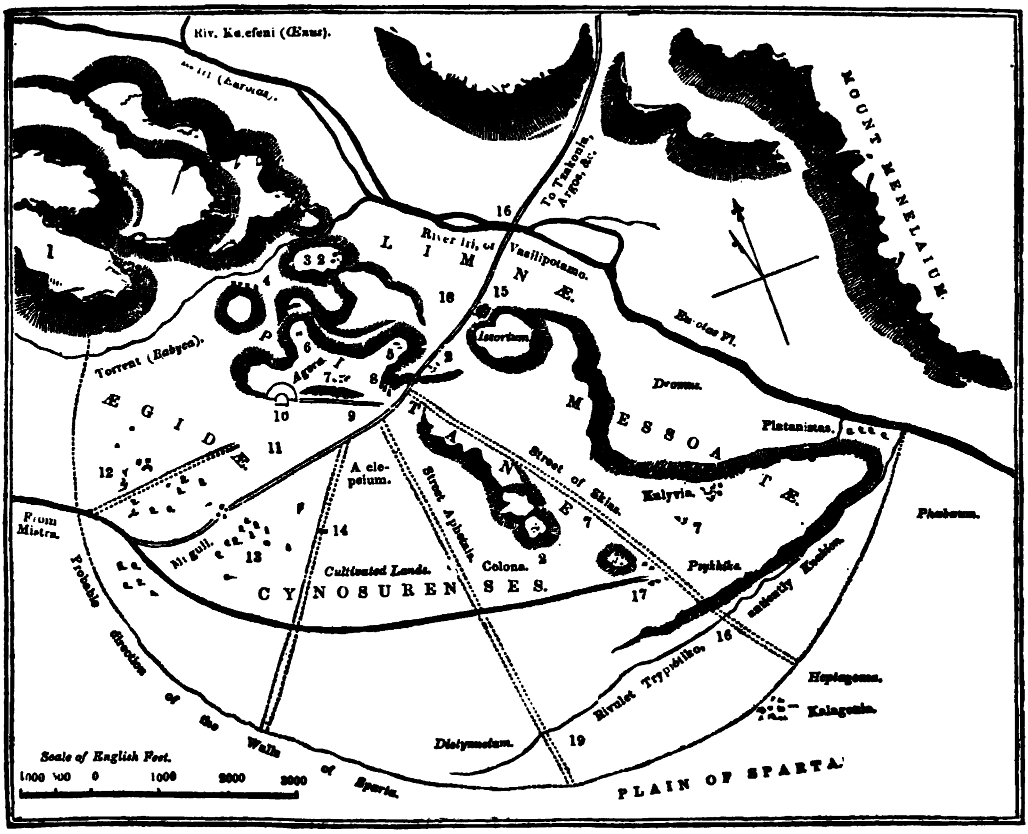
The habits of the Common Sparrow, its amazing fecundity, its strong attachment to its young, the truculent battle-royal in which they will occasionally engage in troops, when excited upon some difference of opinion arising out of questions of love or nest-property, their familiarity, not to say impudence, and their voracity, are familiar to all; but few pause to inquire what service the sparrows do for the unlimited tolls they take. Mr. Knapp, in his highly interesting *Journal of a Naturalist*, has painted the best and truest sparrow-picture known to us:—

'We have no bird, I believe, more generally known, thought of, or mentioned with greater indifference, perhaps contempt, than the common sparrow (fringilla domestica), "that sitteth alone on the house-top;" yet it is an animal that nature seems to have endowed with peculiar characteristics, having ordained for it a very marked provision, manifested in its increase and maintenance, notwithstanding the hostile attacks to which it is exposed. A dispensation that exists throughout creation is brought more immediately to our notice by the domestic habits of this kind. The natural tendency that the sparrow has to increase will often enable one pair of birds to bring up fourteen or more young ones in the season. They build in places of perfect security from the plunder of larger birds and vermin. Their art and ingenuity in commonly attaching their nests beneath that of the rook, high in the elm, a bird whose habits are perfectly dissimilar, and with which they have no association whatever, making use of their structure only for a defence, to which no other bird resorts, manifest their anxiety and contrivance for the safety of their broods. With peculiar perseverance and boldness, they forage and provide for themselves and their offspring; will filch grain from the trough of the pig, or contend for its food with the gigantic turkey; and, if scared away, their fears are those of a moment, as they quickly return to their plunder; and they roost protected from all injuries of weather. These circumstances tend greatly to increase the race, and in some seasons their numbers in our corn-fields towards autumn are prodigious; and did not events counteract the increase of this army of plunderers, the larger portion of our bread-corn would be consumed by them; but their reduction is as rapidly accomplished as their increase, their love of association bringing upon them a destruction which a contrary habit would not tempt. They roost in troops in our ricks, in the ivy on the wall, &c., and are captured by the net: they cluster on the bush, or crowd on the chaff by the barn-door, and are shot by dozens at a time, or will rush in numbers, one following another, into the trap.

These and various other engines of destruction so reduce them in the winter season, that the swarms of autumn gradually diminish, till their numbers in spring are in no way remarkable. I have called them plunderers, and they are so; they are benefactors likewise, seeming to be appointed by nature as one of the agents for keeping from undue increase another race of creatures, and by their prolificacy they accomplish it. In spring and the early part of the summer, before the corn becomes ripe, they are insectivorous, and their constantly increasing families require an increasing supply of food. We see them every minute of the day in continual progress, flying from the nest for a supply, and returning, on rapid wing, with a grub, a caterpillar, or some reptile; and the numbers captured by them in the course of these travels are incredibly numerous, keeping under the increase of these races, and making ample restitution for their plunderings and thefts. When the insect race becomes scarce, the corn and seeds of various kinds are ready; their appetite changes, and they feed on these with undiminished enjoyment.'

This species must not be confounded with another British species, the Tree-Sparrow.

SPARTA, or, as it was sometimes called, Lacedæmon, the capital of Laconia, and the chief city of Peloponnesus, was situated on the right or western bank of the Eurotas (the modern Iri), about 20 miles from the sea, in 37° 4′ N. lat. and 22° 26′ E. long. It was built in a plain of some extent, and was bounded on the east by the Eurotas, and on the south by a smaller stream running into it, now called Trypiótiko, and supposed by Colonel Leake (vol. i., p. 151) to be the antient Knakion. Polybius (lib. v., 22), thus describes its general features: 'It is of a circular form, and though it is situated in a plain, contains within it several rising grounds and hills. On the east is the Eurotas, which during the greater part of the year is so large as not to be fordable; on the south-east, but on the other side of the Eurotas, is a range of hills, on which stands the suburb called Menelaium. These are rough and difficult of approach, and they command the space between the town and the Eurotas, for the river runs close by the bottom of the heights, and the whole space, including the river, between them and Sparta, is not more than a stadium and a half (about 940 feet) in breadth.' These hills of the Menelaïum form a part only of a steep bank which rises on the eastern side of the Eurotas to the height of 500 or 600 feet, and is surmounted by a table-land, beyond which, again, lies an uneven country, intersected with ravines and rivers, gradually rising to Mount Parnon and the other summits of the range of mountains which bounds the view from the plain of Sparta on the east. (Leake, i. 137.) A corresponding boundary on the west is formed by the more elevated range of Mount Taygetus; hence Homer applies the term 'hollow Lacedæmon' to the plain of Sparta, and to the city itself, which Strabo (vol. viii., p. 367) also speaks of as being in a hollow. In most parts there is a level space between the eastern bank and the Eurotas, but the hills on which the Menelaïum stands are washed by the river. The only villages on the antient site of Sparta are **Magúla** (Μαγοῦλα), and Psykhikó (Ψυχικόν), the former of which names is often applied to a height with ruins, especially when they are in a plain. The principal modern town in the neighbourhood is Mistra, which lies about two miles to the west, on the slopes of Mount Taygetus.



[Topographical Sketch of the Site of Sparta.]

1 Termination of a branch of Mount *Taygetus*.
2 Ancient vestiges.
3 Acropolis.
4 Antient Aqueduct.
5 Antient foundations.
6 Church
7 Hellenic ruins.
8 Remains of Temple. 9 Roman remains.
10 Theatre.
11 Tombs of *Leonidas* and *Pausanias*.
12 Remains of Roman Baths and other buildings.
13 A scattered Village, with Gardens.
14 Ruins of an Hellenic building.
15 Circular building.
16 Remains of Bridge.
17 Site of the Temple of *Juno Argeus*.
18 Tombs of the *Agidæ*.
19 Tombs of the *Eurypontidæ*.

The only considerable remains of Hellenic workmanship are the theatre, from which Mistra and the surrounding neighbourhood have been supplied with stone for building. Colonel Leake could perceive only a few fragments of seats in the cavea, and thought that the exterior masonry and brickwork which still subsist are not older than the time of the Roman empire. Nevertheless the theatre itself may have existed from an early period, though not originally used for dramatic purposes, but for gymnastic and choral exercises and public meetings. (Herod., vi., 67.) The centre of the building was excavated in a hill, but the ground does not afford much advantage compared with the situations of other Greek theatres. The largest diameter, says Sir W. Gell, was 418 feet in length; the orchestra is 140 feet wide, and adjoining are two parallel walls about the length of a furlong. According to Colonel Leake, 'it is impossible to determine the interior diameter or length of the orchestra without excavation: the breadth of each wing appears to have been about 115 feet, and the total diameter about 450 feet, so that this theatre must have been one of the largest in Greece.' In front of it there is a sepulchal chamber carefully built of large quadrangular stones.

'Not far from the theatre,' observes Colonel Leake, 'I found two opposite doors, each formed of three stones, and buried almost to the soffit. On one side of these doors is some appearance of seats, as if the building had been a place of public assembly.' In another place he found two other similar doors buried in the ground to nearly the same height.

Another relic is an antient bridge over the Trypiótiko, which is still in use, constructed of large single blocks of stone, reaching from side to side. There is also part of an old causeway of similar construction at each end of the bridge.

Every part of the site of antient Sparta is covered with fragments of wrought stones; and here and there are scattered pieces of Doric columns of white marble, and other relics of antient buildings. The materials of the Roman walls, now nearly ruined, which once surrounded the principal heights of the city, are formed of similar fragments.

Of Sparta, Thucydides (i. 10) observes, that if 'it were evacuated, and only the temples and foundations of its buildings left, posterity would be very incredulous about the extent of its former power, which was so great that it possessed two of the five divisions of Peloponnesus, and had the command of the whole country, and many allies out of the Peloponnesus. Of this however no adequate idea would be afforded by the city itself, as it was not embellished with temples and splendid edifices, nor built in contiguity, but in separate quarters.' Such was the state of Sparta about 400 B.C.; but architecture and the arts in general had not then reached their greatest development, nor had Sparta so entirely relaxed from the severity of its antient manners as it did afterwards, when, with the increase of riches, public monuments also multiplied with more rapidity than in earlier ages. These monuments, it appears from Pausanias, were still remaining about A.D. 200, in a more perfect and uninjured state than those of any other Grecian city except Athens. From this fact, and the indications afforded by the present accumulations on the old site of Sparta, Col. Leake has inferred that it would not be a more unpromising field for research than at least the second-rate cities of Greece.

We proceed to give a summary of the antient topography of the city, as described by Pausanias, and illustrated by the annexed sketch from Colonel Leake's work, which is copied with his permission (vol. i., pl. 2):—

1. He begins with the Agora, or public square, which contained the council-house of the senate and the offices of the principal magistrates. The most remarkable building in this part of the city was the Persian stŏa or portico, originally built of the spoils taken in the Persian war, but subsequently repaired and augmented. It was ornamented with statues, in white marble, of some of the Persian generals, including that of Mardonius; and also with one of Artemisia, the queen of Halicarnassus, an ally of Xerxes. The Agora also contained shrines of Julius Cæsar and the emperor Augustus. A part of it was known by the name of the chorus, or dancing-place, in which young men danced at the games in honour of the Dorian god Apollo. In its immediate neighbourhood were various statues and temples.

2. Pausanias next describes the street called Aphetæ (Ἀφέται) or Aphetaïs, leading from the Agora, along the line of which was a number of public monuments, including a temple of Minerva Keleutheia, with a statue said to have been dedicated by Ulysses. At the end of the street, close to the city walls, was a temple of Dictynna, or Diana, and the royal tombs of the Eurypontidæ.

3. The street in which the Skias was situated led out of the Agora to the walls. This was an antient place of assembly, said to have been built by Theodorus of Samos, of a circular form, and with a roof shaped like an umbrella (skiadeion). (Pausan., 12, 8; Etymolog. in Σκιάς.) Along this street also, or in its immediate neighbourhood, were various monuments, such as temples, statues, chapels, and altars, erected in honour of the tutelary divinities of Sparta (such as Apollo Carneius) and its heroes. In connection with these, Pausanias also mentions a kind of quadrangular Change, surrounded with porticoes in which second-hand goods were sold.

4. Pausanias describes the district to the west of the Agora. Here was a cenotaph of Brasidas, and near it a splendid theatre of white marble; opposite to which were the monuments of Pausanias and of Leonidas; near the latter was a pillar inscribed with the names of those who fell at Thermopylæ, with those of their fathers.

5. There was a place called Theomelida at Sparta, in which were the tombs of the royal house of the Agidæ. In the same quarter was the temple of Diana Issôra, or Pitanatis, and those of other divinities. Not far off, and on the banks of the Eurotas, was the Dromus, or racecourse, which contained two gymnasia, and in which, observes Pausanias, young men are exercised in running till this day. The Dromus was also embellished with various statues and temples, among which was a temple of Æsculapius, surnamed Agnitas, from his statue being made of the wood of the agnus, which is still called Agneia (ἁγνειά). At the beginning of the Dromus were statues of Castor and Pollux, surnamed Apheterii, because they stood at the starting-post. A little outside of the Dromus, Pausanias was shown the site of the house of Meneläus, one of the Grecian leaders at Troy. At the south-east of the Dromus was the Platanistes, which was an island, or nearly so, surrounded by running water, and so called from the plane-trees (platani) growing there. Two bridges formed the approaches to it, on one of which was a statue of Lycurgus, and of Hercules on the other.

The Platanistes and its neighbourhood, like other parts of the city, contained several architectural remains in the time of Pausanias. Close to the city walls, in this quarter, temples were raised to Helen and Hercules, and to the east of the Dromus was a temple of Minerva Axiopoenus, *i.e.* who requites according to desert.

Pausanias appears to form a sixth division of Sparta, in which he places the public hall (λεσχή), called the decorated (or ποικίλη), with various heroa, or chapels dedicated to heroes, about it. Not far from the theatre, he adds, was a temple of Neptune Genethlius; and, after advancing a little, there was a small height, on which was an antient temple, with a wooden statue of Venus in armour, and having an upper story sacred to Venus Morpho—the only building of this description which Pausanias had ever seen. A similar specimen of two perfect churches, one built above the other, is still existing at a village nearly opposite Bonn on the right side of the Rhine, called Schwarz-Rheindorf. (Petit, 'Church Archit.,' i., p. 86.)

Lastly, there were temples of Diana Orthia and Latona in the place called Limnæum, or 'marsh land,' not far from which the Acropolis was probably situated. On this subject Pausanias remarks, that the Lacedæmonians had not a citadel of conspicuous elevation, like the Cadmeia at Thebes and the Larissa at Argos; but as there were several hills within the city, the highest of these was called the Acropolis. It contained, amongst a great number of other buildings, the temple of Minerva Chalcioecus (*i.e* of the bronze house), begun by Tyndareus, and afterwards made of bronze, on which the actions of Hercules and of Castor and Pollux were worked in relief, together with other representations, of which the largest and most admirable were the Birth of Minerva and the figures of Neptune and Amphitrite. Of the other monuments in the same locality we shall only mention a bronze statue of Jupiter, which Pausanias says was the oldest extant of that material; it was formed of several separate pieces hammered together with nails. Col. Leake observes that the only point in Pausanias's description which can be determined with certainty is the theatre, the position of which was such that the Agora was in the hollow of the great height behind it, with its eastern extremity not far distant from an opening, still observable towards the middle of the bank of hills which overlooks the valley of the Eurotas, and forms the front of Sparta on the north-east. This opening is itself nearly opposite an old bridge over the Eurotas, so that it would seem that all the roads from the east of Laconia crossed the river into the city, and then proceeded to the Agora.

Of the remaining parts of Sparta the most important to determine is the Acropolis. From the description of Pausanias it seems to have been situated on the hill at the extreme north of the city, which was detached from the others, and better suited for an Acropolis than any of them.

From the antient authorities it appears that Sparta was divided into five local tribes, viz. the Pitanatæ, the Limnatæ or Marshmen, the Messoatæ, the Ægidæ, and Cynosurenses. Col. Leake has determined their position, as laid down in the annexed sketch, with considerable probability.

The general form of the city was circular, or rather semicircular, and, according to Polybius, its circumference was forty-eight stades, or about six Roman miles.

It was not regularly fortified till the time of the Roman interference in Greece, though fortifications had been hastily thrown up against the attacks of Demetrius Poliorcetes (B.C. 280) and Pyrrhus (B.C. 272): it was at last completely surrounded with walls by order of Appius, the Roman legate. (Pausan., vii., 9, 3.) Two hundred and fifty years afterwards, when Pausanias visited Sparta, both walls and gates were in existence: no traces of them are visible now. The soil of the plain in which Sparta is situated is in general a poor mixture of white clay and stones, difficult to plough, and better adapted for olives than corn; exactly agreeing in this respect with the words of Euripides (Strab., viii., p. 366), who contrasts Messenia with Laconia, and describes the latter as a poor land, in which there is plenty of arable soil, but hard to work. The women of Mistra and the plain, says Colonel Leake, are 'taller and more robust than the other Greeks, have more colour in general, and look healthier;' a statement agreeing with Homer's expression, Λακεδαίμονα καλλιγύναικα (Lacedæmon with handsome women).

The chief modern authorities on the topography of Sparta are: Dodwell; Sir W. Gell, *Itinerary of the Morea;* and Leake's *Travels in the Morea.*

The Constitution and Government of Sparta.—This was of a very mixed nature, consisting of three or even four distinct elements, viz. royalty, a council of elders or senate, a general assembly, and, in later times, the Ephoralty.

The kingly authority existed at Sparta from the time of the conquest of the Peloponnesus by the Spartans, and was always shared by two persons at the same time, so that it was, properly speaking, a diarchy, or divided royalty. The two kings were the successive representatives of the two royal families descended from Eurysthenes and Procles, the twin sons of Aristodemus, under whom the conquest of Laconia was achieved. According to the national legend, the establishment of the diarchy arose from the circumstance of Aristodemus having twins born to him, but as the sanction of the Pythian oracle was said to have been procured for the arrangement, it may not have been purely accidental, but rather a work of design and contrivance. (Herod., vi. 52.) The constitutional powers of the kings were very limited. They presided over the council of elders as 'principes senatus,' and though it seems probable that the kings of the older house had a casting vote (Herod., vi. 57; Thucyd., i. 20), still the vote of each counted for no more than that of a private senator. Nevertheless the kings had some important prerogatives. In common with other magistrates they had the right of addressing the public assembly; they sat as judges in a separate court of their own, where they decided upon private matters of importance, as in the case of heiresses claimed by different parties. But it was in foreign affairs that their prerogatives and powers were greatest. They were the commanders of the Spartan forces, and had the power of choosing from among the citizens persons to act as Proxeni, or protectors of foreigners visiting Sparta. When they had once crossed the borders of Laconia at the head of their forces, their authority became unlimited. Some of the Ephors indeed sometimes accompanied the kings on their expeditions, but the operations of the latter were not under the control of those magistrates; they merely watched over the proceedings of the army. However, there can be little doubt (and especially after the increase of the Ephoral authority) that the kings on their return home were accountable for their conduct as generals. In fact in some instances the kings were dethroned or punished for misconduct and mismanagement as generals. Nor were their military powers connected with any political or diplomatic functions; they were not allowed to conclude treaties, or to determine the fate of cities, without communicating with the authorities at home. In the most antient times the two kings had a joint command, but this led to inconvenience, and a law was consequently passed, that in future one only of the two kings should have the command of the army on foreign service. The honours and privileges of the Spartan kings were greater than their prerogatives and powers. They united the characters of priest and king (Herod., vi. 50), and officiated as high priest of the nation at all the public sacrifices offered for the state. They were well provided by the community with the means of exercising the heroic virtue of hospitality. Whenever any citizen made a public sacrifice to the gods, the kings were invited, and treated with especial honour: a double portion of food was given them, and they made the first libation to the gods. (Herod., vi. 57.) These, and other distinctions of a like kind, were however of a simple and old-fashioned nature, and prove that to a certain extent the Spartan royalty was of the same character as that which Homer describes as existing in what are called the Heroic times.

The accession and demise of the Spartan kings were marked by observances of an Oriental character. Whenever the former event occurred, all debts due, from private individuals, to the state or the king, were remitted: and on the death of one of the kings, his funeral solemnities were celebrated by the whole community. There was a general mourning and suspension of all public business for ten days. (Herod., vi. 58.)

A second element in the Spartan polity was the Gerusia (γερουσία), or assembly of elders. This was the aristocratical element of the constitution, and not peculiar to Sparta alone, but also found in other Dorian states. It included the two kings, who sat as presidents (ἀρχαγέται), and consisted of thirty members, ten from each of the three tribes, and one from each of the divisions called obæ (ὠβαί). It was confined to men of distinguished character and station: no one was eligible to it till he was sixty years of age (Plut., *Lycur.*, 26), and the additional qualifications were also of an aristocratic nature. (Arist., *Pol.*, ii. 6, 15.) The election was determined by vote, and the office was holden for life, and irresponsible as if a person's previous character and the near approach of death formed a sufficient security for uprightness and moderation. The duties of the counsellors were deliberative, judicial, and executive. In the first capacity they prepared measures and passed preliminary laws, which were laid before the popular assembly; so that they had the important privilege of initiating changes in the government or laws. As a criminal court they could punish with death or degradation (ἀτιμία), and that too without being restrained by a code of written laws. (Arist., *Pol.*, ii. 6.)

They also appear to have exercised a judicial superintendence and censorship over the lives and manners of the citizens (Aul. Gell., xviii. 3), and probably were allowed a kind of patriarchal authority to enforce the observance of antient usage and discipline. (Thirl., *Hist. of Greece*, i., p. 318.) It is not however easy to ascertain accurately what was the original extent of their functions; especially in the last-mentioned capacity, since the Ephors not only encroached from time to time upon the prerogative of the kings and the council, but also possessed in very early times a censorial power which they were more likely to extend than suffer to be diminished.

The third element was the Ecclesia (ἐκκλησία), or general assembly of the Spartan citizens. From various authorities quoted by Müller (*Dorians*, iii., c. 5, 8), it appears that the general assembly was not competent to originate any measure, but only to adopt or reject without alteration the laws and measures submitted to it by the proper authorities, a limitation which almost fixed the character of the Spartan constitution, and justifies an observation of Demosthenes (*c. Lept.*, p. 489), that the γερουσία at Sparta was in many respects supreme. All citizens above the age of thirty, not labouring under any disabilities, were admissible to the ἐκκλησία, or ἀπέλλα, as it was called in the old Dorian dialect; but except magistrates, and especially the ephors and kings, no one addressed the people without being called upon. The same public officers also put the question to the vote; and as the magistrates only were the speakers and leaders of the assembly, the resolutions of the whole people are (particularl in foreign matters) spoken of as the decrees of those autho ties alone. The close connection of the ephors with assembly is shown by a phrase of frequent occurrence the decrees of the assembly: 'Resolved by the ephors a assembly,' &c. The voting was by acclamation, and th place of meeting to the west of the city between the bro Knakiôn and the bridge Babyca. The regular meetin were holden every full moon, and in cases of emergency extraordinary assemblies were called.

The functions and powers of the Spartan ἐκκλησία are thus described by Müller, in his 'Treatise on the Dorians' (iii.; iv. 9). The popular assembly alone had the power to 'proclaim a war, conclude a peace, enter into an armistice for any length of time, and all negotiations with foreign powers, though conducted by the kings and ephors, could be ratified by the same authority only.' And with regard to domestic affairs, the highest officers of the state, such as magistracies and priesthoods, were filled up 'by the votes of the people; cases of disputed succession to the throne were decided by them; changes in the constitution were proposed before them, and all new laws, after a previous resolution of the senate, were ratified by them.' So that the general assembly, according to the theory of the constitution, possessed the supreme political and legislative authority at Sparta, but subject to so many checks and limitations, that the government of the state is often spoken of as an aristocracy. One of these limitations was the Ephoralty, a power apparently foreign to the constitution as established by Lycurgus, and which appears in the first instance to have owed its aggrandisement to the connection established between itself and the assembly. In after-times it encroached upon and overpowered the royal authority, and became the supporter of oligarchical principles and privileges.

The free citizens of the community were divided into two classes: one composed of the Spartans, or descendants of the Dorian conquerors of Laconia, and other individuals from time to time, but sparingly, associated with them; the other, of a subject population, living not in the city, but in the country, and called Periœci, or 'dwellers round,' who, though personally free, were denied all political privileges, the government and administration of the state being confined to the Spartans exclusively.

The various elements we have mentioned have given rise to the question—'What was the nature of the Spartan constitution?' By antient authors it is generally spoken of as an aristocracy; but it has been maintained (Arnold, Thucyd., vol. i., Appen. II.) that this aristocracy was one of conquest, in which the Spartan conquerors and their descendants stood to the Periœci in the relation of nobility to vassals, and that it is in this respect principally that the Spartan constitution was of an oligarchic or anti-popular character. But this is not altogether true. For the fact is that, in theory and name, the constitution as settled by Lycurgus was a democracy, with two hereditary magistrates at its head; but in practice (at least before the encroachments of the ephoralty) it worked as if the supreme authority had been placed in the hands of a minority, and therefore was in reality a limited aristocracy, independent and irrespective of the relation between the subject and the ruling classes. The chief circumstances which justify this conclusion are the restraints imposed upon the assembly, the extensive powers of the councillors, their election for 'life, their irresponsibility, the absence of written laws, of paid offices, of appointments determined by lot,' and of other peculiarities which the Greeks considered characteristic of a democracy. Aristotle (*Politica*, ii. 6) gives the following account of the Spartan constitution, and the opinions which prevailed about it: 'Some affirm that the best form of government is one mixed of all the forms, wherefore they praise the Spartan constitution; for some say that it is composed of an oligarchy, and a monarchy, and a democracy—a monarchy, on account of the kings; an oligarchy, on account of the councillors; and a democracy, on account of the ephors; but others say that the ephoralty is a tyranny, whereas, on the other hand, the public tables and the regulations of daily life are of a democratic tendency.'

Many of these regulations however, and the social institution of Sparta, were suggested, and almost rendered necessary, by the position in which her citizens stood with respect to their subjects and serfs. They were in fact 'like an army of occupation, or a beleaguered garrison,' surrounded by a number of enemies ready to overpower and crush them on every opportunity. Hence all the regulations and usages of daily life at Sparta were subservient to the development of a martial spirit, and contributed to maintain the superiority of the dominant classes over the inferior population; with a view to which results, individual interests and comforts were always made subordinate to the real or supposed interest of the state. The spirit indeed of Spartan legislation and Spartan feeling established and recognised the principle that the citizen was born only for the state; that his powers and energies were to be devoted to its service; and that any sacrifice, however painful or costly, was to be made by him for its welfare. Now it is almost evident that no legislator could so far have acted upon the minds of a nation as to have created the spirit implied in such a principle. It must either have been natural to the people actuated by it, or the result of the circumstances in which they were placed, an isolated handful of men, in an unwalled town, surrounded by an unfriendly population, superior to themselves in number, and yet ruled by them as their subjects and serfs. We cannot therefore, it would seem, assert that the peculiar features both of public and private life at Sparta, and the principles which in the best days of her history pervaded and modified her social institutions and regulated the conduct of her citizens, *were* the *creation* of her lawgiver Lycurgus. Still there can be no doubt that in legislating for his country he both availed himself of a disposition which he found already existing, and gave a greater and more systematic development to the principle of which we have been speaking, than it had received before his time. The influence and bearing of this principle were strongly marked in the distribution of private property as settled by Lycurgus, who assigned an equal portion of land to every one of 9000 Spartan citizens. But we may illustrate its force more fully in all the various regulations by which a Spartan citizen was trained for the service of the state, and which affected the arrangements even of families and private houses. From his very birth every Spartan boy was treated as the child of the state, and as such was liable to be exposed to die at the discretion of his father's kin, if he was a deformed or sickly infant. In his earliest years he was not left entirely to the management of his parents, though under their care, and at the age of seven he entered upon a course of public discipline, increasing in severity as he approached manhood. The education of the young indeed, and to a certain extent the care of all the elder citizens, was under the especial superintendence of a public officer appointed for this purpose (the παιδονόμος), and he again selected a number of the best qualified young men, just above twenty years of age, to act as captains of the companies (ἀγέλαι) into which the boys were divided; and as this education had only one end in view, that of training citizens to serve and defend their country, the discipline was in every respect subservient to this object. No accomplishments or arts, except of a military character, were taught, while every effort was made to ensure military skill, activity, fortitude, and bravery. The Spartan was to be taught both to dare and to bear with fortitude; and for this purpose he was inured from his youth to a coarse and scanty fare, to insufficient clothing, to self-denial, and the severest trials of pain and hardship. One of these is said to have been instituted by Lycurgus, in which noble youths standing by the altar of Artemis vied with each other in submitting to the lash, and sometimes died in the contest without uttering a groan. (Cicero, *Tus. Quaest.*, v. 27.)

By another custom, the Spartan youths were compelled, sometimes from hunger, sometimes at the command of their captains, to get provisions or anything else by foraging in the fields or plundering houses: if successful, they retained their spoil, and were honoured with praise; if detected, they were punished, not for the attempt, but for their want of ingenuity. We scarcely need observe that this practice must not be considered as a violation of the rights of property; the community agreed to submit to it, for the sake of the advantages which they conceived to be derived from it. Even what might be considered the accomplishments of a Spartan youth were cultivated in the same spirit. He was taught music, to sing, and to play on the flute and the harp; but only with the view of forming his moral tastes; and therefore the airs and the songs that he learnt were of a sacred or martial character. Hence the poetry of Homer, with its lively description of the Heroic age, was in very early times introduced and welcomed at Sparta; and Tyrtæus, the lame schoolmaster of Attica, but martial poet, was held in especial honour, as animating and encouraging their youth. Gymnastic dancing also formed a part of Spartan education; and the Pyrrhic dance was taught to boys as a warlike exercise, imitative of the movements and actions of a combatant in battle. But the lessons most strongly impressed upon the young Spartan, and the duties most carefully inculcated, were those of modesty, obedience, and respect to rank and age; qualities and habits of vital importance to the permanence of the constitution, as securing a ready compliance with the commands of the magistrates, and inconsistent with innovations in the laws and form of government. Together with all this, the young Spartan was impressed, both by precept and example, with a sense of shame; and taught to consider dishonour and disgrace as more terrible than death, when met either for the honour or at the command of his country. At the expiration of eighteen years, the Spartan youths passed from boyhood; and from this period to thirty they were considered to be in a state of transition to manhood. At twenty they served in the ranks, but were perhaps chiefly employed in such duties as the Crypteia, and other service within the frontiers, like the Athenian youth called Peripoli (Περίπολοι). (Müller, *Dorians*, iv. 5, 3.) But even after maturity, the Spartans, though not under a course of training, were still expected to employ themselves in gymnastic exercises and amusements, such as the chase, which served as a preparation for war. (Xenop., *De Rep. Lacon.*, v. 7.) Nor were they exempt from military service till sixty. The last years of their life were spent in the service of the community, in the council of the Gerusia, or in superintending the education of the young; and nowhere, it has been remarked by Cicero, had old age a more agreeable or more honourable position than at Sparta. When advancing years disabled them from active service, they still had the resource of the Lesche (λέσχη), a place of resort for public conversation, where they might enjoy the society of their equals, and live over again their past lives. Another important feature of the Spartan institutions was the Syssitia, or public meals, in which all the citizens of a suitable age joined. The guests were divided into societies, or clubs, generally of fifteen men; any vacancy was filled by ballot, and unanimous consent was requisite for the admission of new members. The repast of each club was of a frugal and temperate character, but enlivened by social and cheerful conversation, and the entertainment was provided by the contributions of the individual members. It is evident that an institution of this sort was calculated to unite the citizens in the closest relations of intimacy and friendship, and to increase the power of public opinion; every individual of the state being thus brought under the inspection of his fellows, and made dependent for his happiness and honour upon their esteem. Moreover the Syssitia served important purposes in a military point of view, as each company formed a small band in itself, the members of which were bound by every tie to assist and protect each other in the field, after living together as brethren at home.

The care and attention which the Spartans bestowed upon military exercises, and the military spirit which pervaded all their institutions, illustrate the fact 'that no nation considered war as an art in the same sense and to the same degree as they did.' War seemed to be their element and delight, and all pains were taken to make it attractive. The life in the city was, to a certain extent, like that of a camp; but the life of the camp was comparatively more easy, being freed from many of the restraints and duties of the city. On the eve of a battle they combed their long hair and crowned it with chaplets as if for a festival, and entered upon it rather as a contest for glory than as a struggle for life or death; but still even in battle and in war the Spartans did not forget the caution which was in general their characteristic, for we are told of a maxim of Lycurgus which forbade them to make war too often on the same enemy, lest they should teach others their own tactics, and convert a weak adversary into a bold and formidable one. This maxim indeed was not always observed. Agesilaus in particular was charged with violating it. But there was another rule dictated by the same spirit, and which we are told by Thucydides (v. 73) was really enforced, that of pursuing a foe only so far as was necessary to secure a victory. Müller indeed observes that in these rules we may recognise the antient principles of Greek humanity; but they seem rather to have been the dictates of policy and prudence.

The tactics of the Spartan army were distinguished for simplicity, though apparently of a very complicated character, and are praised by Xenophon for this quality. The point of their superiority thought worthy of notice was the rapidity with which the general's orders were passed through a whole army, by means of a well-regulated subordination and connection of the various officers. The chief strength of the Spartan forces was in the heavy-armed infantry, which was superior to that of any other state in Greece. Cavalry service was not thought highly of amongst them, the country being not fitted for the production of horses. The horsemen of Sparta, in the Peloponnesian war, were at first only 400, and afterwards rose to 600 men (Müller, iii. 12, 6), a very small force for so powerful and warlike a state. The naval service was chiefly confined to the Periœci.

From what has been stated it is evident that the Spartan institutions were almost entirely of a military spirit and tendency; but they also incidentally served other important ends, such as the invigoration and health of the body, and the production of physical beauty. (Müller, iv. 5, 8.) That these results were produced by them appears from the fact that about 540 B.C. the Spartans were the most healthy of the Greeks (Xenop., *Rep. Lacon.*, v. 9), and that the handsomest men and women were found amongst them. But the systematic training which we have described was not coupled with excellence in the arts and sciences which embellish and ameliorate man's condition. Nor indeed could it be expected that Sparta should produce among her citizens the painter, the sculptor, the poet, or the historian. They were all warriors; and therefore the cultivation of the arts and sciences, and even of agriculture, was left almost entirely to the Periœci and the Helots. Lyrical and choral poetry indeed, for which the Dorian communities were famous, were cultivated and encouraged, but chiefly for religious purposes; several foreign lyric poets were naturalized among them, even in spite of their jealousy of foreigners, and the names of some native writers of lyric odes have come down to us. Still we have no remains of Spartan lyric poetry, with the exception of some of a poet called *Alcman*. Nor do we read of any distinguished epic poets, or dramatists, or historians, or philosophic writers among the Spartans. The arts of rhetoric and eloquence too were studiously discouraged among them, as being instruments of deceit and misrepresentation, and inconsistent with the concise and sententious method of expression on which the Spartans prided themselves, and which they enforced on their youth by a regular training. With respect to architecture and sculpture our information is scanty and of a negative character; but we have every reason for supposing that these arts were confined to a few, especially in their higher departments, as there was little room for the employment of either, except in the building and decoration of the national temples. At any rate, history has not transmitted to us the names of any Spartans eminent as painters, sculptors, or architects. Trade and commerce also were alien to their character. They were thought beneath their dignity, and inconsistent with the enjoyment of leisure; hence they were left entirely to their provincial subjects. Any extensive trade indeed was rendered almost impossible by the want of a gold and silver coinage, iron being till the latest time their only legal currency; a regulation ascribed to Lycurgus, but probably of later origin, if, as is generally supposed, the use of silver money was not known to the Greeks for more than a century after his time. The very possession of gold or silver money was prohibited by their laws: an interdiction which would of course contribute to preserve a simplicity of manners, though, from the tendency of human nature to long for what is forbidden, it probably increased, if it did not cause, the venality and avarice of which many instances are mentioned among the Spartans. 'Avarice appears to have been the vice to which the Spartan was most prone: money, for which he scarcely had any use, was a bait which even the purest patriotism could not resist.' (Thirl., *Hist. of Greece*, i. 326.) The law however was evaded by the money being deposited in foreign countries; and after the time of Lysander, (B.C. 400) the possession of the precious metals must have been allowed to individuals under certain restrictions. (Müller, iii. 10.)

We have already described the education of the Spartan young men; the female sex, at least the unmarried portion, were in many respects brought up similarly and with similar views. The Spartan women had their own gymnasia, and practised themselves in running, wrestling, and other exercises, which contributed to their health and vigour of constitution, in order that they might prove the mothers of a healthy progeny. Their costume too was different from that of the rest of Greece. The Spartan virgins, even in the company of men, generally wore but a single robe, without an upper garment; in which respect they were distinguished from married women. But the most remarkable feature in the social position of the Spartan women was the indulgence and respect universally shown to them, presenting a strong contrast with the treatment of the female sex among the Athenians and other nations of the Ionian race. The domestic relation of the wife to the husband was for the most part the same as that described by Homer as prevailing among the antient Greeks, and common among the old nations of the West. She was honoured by him with the title of lady or mistress (δέσποινα), an appellation not used unmeaningly, but expressive of the esteem and regard in which she was held; and so great was the influence of the women at Sparta, that the Spartans were often censured by other nations for submitting to their yoke.

The Spartans, and the Dorians generally, also differed from the rest of the Greeks in the freedom of intercourse which they allowed in public between the youth of both sexes, who were especially brought into contact at religious festivals and choruses. The young men in fact were constantly in the presence of the unmarried women, whose praise and admiration were considered as the highest reward of merit, as their derision and contempt were an object of dread. Hence at Sparta it was very possible for marriage to be the result of affection and love, which was seldom the case in the Ionian states of Greece: it has been remarked that 'at Athens we have not a single instance of a man having loved a free born woman, and marrying her from any strong affection, whilst a single narrative of Herodotus (vi. 61, 65) contains two love-stories at Sparta.' But still in this, as in everything else, private feelings and wishes were made subordinate to the interests of the community; and marriage was not considered merely as a private relation, in which the state had little or no concern, but as a public institution, the chief end of which was to supply the state with a strong and healthy progeny, and consequently it was to a certain degree looked on with a primitive simplicity, repugnant to the more refined feelings of later times. Intermarriage with foreign women was forbidden to all the Spartans, and to the Heracleids, or royal family, by a particular rhetra, or constitutional ordinance.

The Spartan national character, as exhibited in its greatest purity, was distinguished by a love of fixedness and an aversion to change; by simplicity and sobriety of taste; by steadiness and composure under exciting circumstances; and a patriotism in which all selfish and personal considerations were forgotten. Other elements of this character were, a calm and steady courage, perseverance in the pursuit of desired ends, a strict regard and ready submission to the laws, a comparative indifference to personal independence and individual freedom, a constant striving after uniformity and unity, and a strong attachment to the usages and manners of their ancestors, and to existing institutions. Hence it has been said that the Spartans were better as members of a state than as members of a society; and as they were accustomed to follow implicitly national custom without consulting the dictates of their own conscience, whenever this guide failed they wandered wholly and entirely from the path of rectitude.

The exclusiveness and independence to which the Spartans were naturally inclined, were perhaps increased by their geographical position, which, with the exception of the Arcadians, was more retired and isolated than that of any other people in Peloponnesus. It produced however a stiffness and haughtiness in their dealings with foreigners, which, as contrasted with the more conciliating and courteous manners of the Athenians, excited a disgust which was the main cause of their losing their supremacy over the confederated forces of Greece at the close of the Persian war. Connected with this exclusiveness was the reserve which formed so striking a point in the Spartan character, and the concise and sententious mode of expression, which sometimes served as a cloak for the concealment of real opinions and intentions. To such an extent was this carried, that the Lacedæmonians, after the Persian war, appear to have gained an unenviable character for artfulness and duplicity in their dealings with strangers. It would be easy to prove this from various passages of Aristophanes, in one of which (*Acharn.*, v. 308) they are said to have regard neither for altars nor pledges nor oaths; and also from Euripides, who in one place (*Androm.*, 452) calls them 'deceitful flatterers, masters of lies.' But we have more unexceptionable testimony to this point in the historians Herodotus and Thucydides, the former of whom (ix. 54) describes the Lacedæmonians as being in the habit of saying one thing and meaning another; while the latter (v. 105) affirms, or rather makes the Athenians affirm of them, that as far as respects themselves and their native institutions they were virtuous and well principled; but that in their dealings with foreign states they undisguisedly made expediency and their own interest their only rule of action. We must however remember that the character of the Spartans suffered much in its better qualities from their intercourse with foreigners after the close of the Persian war, and that in the later times of Spartan history the institutions of Lycurgus had lost much of their power over and their adaptation to the minds of the people.

History of Sparta.—The occupation of Laconia by the Spartans dates, according to the received chronology, from the year 1104 B.C., the 80th after the Trojan war: but some writers place that event in B.C. 1048. About one of those periods the Dorians migrated from Doris, a district lying between the chains of Mount Œta on the north and Parnassus on the south, and, under the command of three leaders, Aristodemus, Temenus, and Cresphontes, reputed descendants of Hercules, invaded the Peloponnesus; they were accompanied and guided in their expedition by Oxylus, an Ætolian chief, and soon succeeded, according to the poetical legend, in making themselves masters of the country. In the division which took place, Laconia was assigned to Aristodemus, Argos to Temenus, Messenia to Cresphontes, while Elis was given to Oxylus as a reward for his assistance. According to the historian Ephorus, quoted by Strabo, the subjugation of Laconia was effected in a very short time. The capital of the old inhabitants was Amyclæ, where their chief strength was collected; but the city was betrayed, or the people induced to capitulate, by the treachery of Philonomus, one of their countrymen. Eurysthenes and Procles, the twin sons and heirs of Aristodemus, then divided Laconia into six districts: one of these, that of Amyclæ, they gave to Philonomus; Sparta they appropriated to themselves; whilst over the other four they set four governors, with the title of kings. During the sovereignty of the twin brothers, the Achæans, the old inhabitants, enjoyed the same political privileges and franchises as their conquerors; but the next king, Agis, deprived them of their rights, and reduced them to a state of vassalage or dependence on the Spartans. The story adds that all the Achæans submitted at once, with the exception of the inhabitants of Helos, a town on the seacoast, who endeavoured to shake off the yoke, but failing in their revolt, lost both their political independence and personal freedom, and were afterwards distinguished, they and their posterity, by the name of Helots. The account which we have briefly stated would lead us to suppose that the Spartans achieved the conquest of Laconia without difficulty, and that after the death of Philonomus, Amyclæ and its district fell into their possession. There are however indications which would lead us to infer that the conquest was not so soon completed; for it is certain that the capture of Amyclæ was not effected till the end of the ninth century B.C., and the manner in which the capture is described as the result of stratagem and other circumstances, justifies the conclusion that it had never before submitted to Sparta. (Paus., iii. 2, 6.) And if it be true that the subjugation of Amyclæ, so near to Sparta, was thus long in being accomplished, it is natural to suppose that the conquest of the more distant provinces was the work of equal or longer time. According to one account indeed, even Helos itself, from which the Laconian slaves are commonly supposed to have derived their name, preserved its independence till the reign of Alcamenes, the son of the conqueror of Amyclæ. Till the conquest of Laconia was thoroughly effected, the Spartans were probably too much occupied at home to engage in foreign wars. Their earliest expeditions were into Arcadia and Argos. Against Tegea, the capital of the former country, they continued to wage war, and always unsuccessfully, for many generations. Herodotus tells us that he himself saw at that city the fetters which the Spartan army had brought with them on an expedition to Tegea under their king Charilaus, and in which they themselves were compelled to till the land of their enemies. The prosecution of this war however was interrupted by the prospect of a more important and tempting conquest, that of Messenia. The first of the Messenian wars commenced about B.C. 743, and terminated in the defeat and subjection of Messenia. The struggle was renewed in B.C. 685, but ended in a like result, B.C. 668.

The conquest of this country was attended with the most important consequences to the fortunes of Sparta. The greater part of the conquered territory was shared amongst her citizens; and it is recorded that Polydorus, one of the kings who achieved the conquest, doubled the number of plots of land possessed by them; a story which, taken in connection with other circumstances, leads to the conclusion that he at the same time doubled or considerably augmented the number of the citizens themselves. It seems to have been connected also with some change in the Spartan constitution, and perhaps with the introduction or enlargement of the powers of the ephoralty, as some writers ascribe its origin to Theopompus, the colleague of Polydorus.

From B.C. 668, the close of the second Messenian war, Sparta continued in a course of uninterrupted success, till she became supreme in Peloponnesus, and pre-eminent in all Greece. The old contest with Tegea was at last decided in her favour, about the year 545 B.C. (Herod., i. 68.) Nearly at the same time the contest with Argos, for the possession of the tract of land called Thyreæ, of which the Spartans had made themselves masters in the third generation after the conquest, was decided by a battle of 300 champions on each side, in which Argos lost the day, and Thyreæ was won by the Spartans. (Herod., i. 82.) Herodotus observes that by this time the greater part of the Peloponnesus was under the power of Sparta; and so widely had her fame spread, that Croesus, the king of Lydia, when directed to ally himself with the most powerful of the Greeks, solicited her aid against Cyrus and the Persians. Some time after this, about B.C. 525, we find the Spartans again in hostilities with Argos, and victorious over them in a decisive battle. The next occasion of their prominently appearing in history was at the instigation of the Delphian oracle, when they invaded Attica, under their king Cleomenes, for the purpose of expelling the usurper Hippias, an object which they effected in B.C. 510. Five years afterwards they again appeared in Attica, but in a more appropriate character, as the supporters of the aristocratic party headed by Isagoras: they were led by Cleomenes; but the result of the expedition was not only fruitless, but ignominious; the Spartan king, who had occupied the citadel, being at last obliged to capitulate, and submit to the terms dictated by the popular party at Athens. He afterwards endeavoured to avenge the disgrace, and, with the other king, Demaratus, advanced as far as Eleusis; but their Corinthian allies deserted them, the two kings quarrelled, and the Spartan forces retreated without effecting anything. Shortly after this occurred an incident as disgraceful as any in Spartan history. The Spartans saw reason to regret the expulsion of Hippias from Athens: they discovered that the Pythian priestess had been tampered with by Cleisthenes, the opponent of his family: they saw that Athens was growing powerful, and likely to become a formidable rival if left to herself, and uncontrolled by a 'tyranny.' Accordingly they summoned Hippias from Sigeum on the Hellespont, whither he had retired; called a congress of the allies, the Corinthians amongst the rest; and pretending a regard for the welfare of Greece, endeavoured to persuade them to join in his restoration. But the allies saw through the Spartan hypocrisy, and repudiated the design: the scheme failed, and the Spartans were obliged to submit to the development of the Athenian resources under a democracy. Hippias retired again to Sigeum, and thence to the court of Darius, king of Persia. The expulsion of the Pisistratidæ from Athens, and the aid furnished by the Athenians to some of the revolted subjects of Persia, gave occasion to the Persian war. This was preceded by a formal demand of earth and water as tokens of submission, made by the heralds of Darius to the different states of Greece. The Æginetans complied with it, and the supremacy of Sparta was recognised by the Athenians, who sent thither to accuse them of betraying the cause of Greece. The battle of Marathon followed (B.C. 490), the honour of sharing in which the Spartans lost, though solicited by the Athenians to help them, from a superstitious regard to an antient custom which forbade them to set out on an expedition before the moon was at the full. (Herod., vi. 106.) But ten years afterwards, when Xerxes invaded Greece, they fought against him, first at Thermopylæ, then at Salamis, and lastly at Platæa. At Thermopylæ, Leonidas, the Spartan king, with a handful of troops, long defied the hosts of the enemy; and at last, after dismissing his allies, fell, with his 300 Spartan citizens, in obedience, as their epitaph recorded of them, to the laws of their country. No achievement recorded of the Spartans was more brilliant and glorious than this; and but for it, they would have been little distinguished in the great national struggle of Greece. At Salamis, the chief command on the Greek side was entrusted to the Spartan Eurybiades, though the Lacedæmonians furnished only sixteen ships, and the Athenians one hundred and eighty; and had not Themistocles interposed, Greece would have been ruined by his irresolute and narrow-minded policy. At the battle of Platæa, B.C. 479, the Spartans were present with a force of 5000 citizens, 5000 provincials, and 35,000 Helots· the chief command was in the hands of Pausanias, their general, and the valour and firmness of his troops mainly contributed to the success of the Grecian arms. But the previous behaviour of the Spartans was in every respect dishonourable and contemptible. On hearing that the Persian general Mardonius was endeavouring to persuade the Athenians to detach themselves from the Grecian cause, they sent a pressing embassy to dissuade them. The Athenians answered, that so long as one Athenian survived, never would they unite with Xerxes. A few weeks passed, and the Athenians in their turn sent to Sparta to solicit aid against Mardonius: the Spartans were then celebrating the festival of the Hyacinthia, and paid no heed to the request of the ambassadors, repeated from day to day for a period of ten days, but continued in the mean time to fortify the Isthmus with a wall; nor did they send assistance till they were reminded that, if the Athenians joined the Persians, their wall, however strong, would prove no security against the stranger. Herodotus simply observes on this subject:— 'I cannot tell why, when Mardonius was negociating with the Athenians, the Spartans were so anxious that they should not join the Persians, and afterwards showed no concern about it, except that *then* the Isthmus was walled, and they found that they had no further need of the Athenians, whereas *before* it was not.'

Immediately after the battle the Athenians set about rebuilding their city walls, which had been razed by the Persians. But Sparta, instead of generously assisting them, was mean enough to show her jealousy of Athens, and hypocritical enough to do so under the pretence of a regard for the general weal of Greece. She represented to the Athenians that a walled town outside the Isthmus would only serve, as heretofore, for a shelter to the barbarians, and that therefore they had better assist themselves in dismantling the walls of all towns north of the Isthmus. The pretence was too flimsy not to be seen through, and the intention of the Spartans was frustrated by Themistocles.

In the year 477 B.C. commenced what is called the Athenian ascendency, under the following circumstances. The war was still carried on against Persia, in the Hellespont, and off the coast of Asia Minor, by the confederates, under the command of the Spartan Pausanias; the Athenian admirals being Aristides and Cimon. Pausanias, elated by past success, and the prospect of future aggrandizement, assumed a haughtiness and arrogance in his command which disgusted the allies, particularly the Ionians, who had just asserted their independence, more especially when contrasted with the courtesy of the Athenian commanders. Accordingly all the confederates, except Ægina and the Peloponnesian states, called upon the Athenians to accept the supremacy in the alliance, which had formerly been held by Sparta. (Thucyd., i. 95.) In the mean time Pausanias was recalled, and another commander was sent out in his stead; but it was too late; the confederates refused to submit to his command, and as himself and colleagues would not brook a subordinate station, they retired altogether from the conduct of the war, and left it to the Athenians. The immediate result of this determination was that the supremacy of Sparta was henceforward confined to her Peloponnesian allies, whom the increasing power of Athens attached to her more closely than ever. The position in which Athens was thus placed was not calculated to allay the rivalry and jealousy of Sparta; and accordingly, when the Thasians, who were involved in a war with Athens, B.C. 465, solicited her aid, it was readily but secretly promised, and the Spartans were on the eve of fulfilling their engagement by invading Attica, when a domestic disaster occurred to prevent them. This was caused by a shock of an earthquake (B.C. 464), so violent that the whole of Laconia was shaken by it, and, according to one account, only five houses were left standing in Sparta.

(Ædian, *Var. Hist.*, vi. 7; Plin., ii. 79.) The Helots, the descendants of the conquered Messenians, took advantage of this occurrence to rise against their oppressors, and, in conjunction with some of the Periœci, occupied their former stronghold of Ithome. The Spartans, not being very skilful as besiegers, were unable to take it, but they did not scruple to solicit the assistance of the Athenians. It was generously granted at the instance of Cimon, and he was sent with a force to help them.

Their assistance however not proving so efficacious as was expected, the Spartans doubted their good faith, and dismissed them, retaining at the same time their other allies. The Athenians resented the affront by allying themselves with the Argives, the old enemies of the Spartans, and shortly afterwards met them at Tanagra in Bœotia, as they were returning from an expedition into Doris, their mother country. A pitched battle was the consequence, in which the Athenians were defeated with great loss (B.C. 457). In B.C. 455 the third Messenian war was concluded by the surrender of Ithome; but the Peloponnesians suffered considerably from an armament of the Athenians, which sailed round the coasts, and burnt the Spartan arsenal at Gythium In 450 a truce for five years was concluded through the intercession of Cimon; at the expiration of which the Spartans took advantage of the revolt of the various dependencies of Athens to invade Attica, and advanced as far as Eleusis, but were then prevailed upon to retire, their commanders being, as it was said, bribed by Pericles. A second truce for 30 years was then agreed upon (B.C. 445), by which the Athenians gave up the towns they had acquired in the Peloponnesus, and which was in other respects very favourable to the Spartans. But the jealousy and distrust between the two states were too great to admit of its observance; and circumstances occurred in various parts of Greece which occasioned a renewal of hostilities in its fifteenth year, B.C. 431, and ended in the Peloponnesian war of 27 years. The history of this war is given in vol. xi., pp. 390, 391; it ended in the overthrow of Athens and the restoration of Sparta to the undisputed supremacy over the rest of Greece, after Athens had divided it with her for 73 years. One of Sparta's most valuable allies in the latter part of the war was the Persian Cyrus, and the Spartans were soon called upon to show their gratitude to him. This they did by furnishing him with auxiliaries in his attempt to dethrone his brother Artaxerxes, the king of Persia, an event intimately connected with the destinies of Greece and some of the most important revolutions of the antient civilized world. (Thirlwall, *Hist. of Greece*, iv. 281.) Cyrus failed; and the Ionian cities which had favoured him refused to submit to the satrap Tissaphernes, the successor of Cyrus in his province. Being too weak to resist him, they applied to Sparta, who gladly availed herself of such an opportunity of aggrandizement, and sent a considerable force to aid them in asserting their independence, though when in want of money, during the Peloponnesian war, she had acknowledged the title of the king of Persia to the whole of Asia. Her forces were commanded by Thimbron (B.C. 399), and afterwards by Dercyllidas, who carried on the war successfully against the Persian satraps Pharnabazus and Tissaphernes. A reinforcement was afterwards (B.C. 396) sent out under the king Agesilaus, with a view of anticipating a threatened invasion of Greece by the Persians. His successes against the Persians are detailed in his life. [AGESILAUS.] They were so great as to encourage him to form the design of overthrowing the Persian empire. But he was unexpectedly stopped in his preparations for this design, of which everything promised a glorious result.

His antagonist the satrap Tithraustes, on finding himself unable to cope with him in the field, had recourse to the expedient of sending a sum of money into Greece, for distribution among the leading individuals of the different states, with a view of inducing them to stir up a war against Sparta at home. The supremacy which Sparta had so long enjoyed had not been exercised with moderation or discretion, and consequently the Persian agents soon succeeded in raising a confederacy against her, which included amongst its members Thebes, Argos, Corinth, and Athens. War first broke out between Thebes and Sparta; and the Lacedæmonians, having invaded Bœotia, were defeated at Haliartus, B.C. 395, with the loss of their general Lysander, who was slain under the walls. Pausanias, the Spartan king, had hastened to their relief, but he arrived too late, and was obliged to submit to an ignominious truce. Agesilaus was therefore summoned home by the ephors, and had the patriotism and fortitude to obey their call. But before he arrived another engagement was fought, 'the great battle,' that of Corinth (B.C. 394), in which the Lacedæmonians gained the victory with a very trifling loss. But the Athenians had by this time re-established their navy under Conon, and the victory of Corinth was counterbalanced by a naval defeat off Cnidus. An army of the confederates was again assembled on the plain of Coronea, where Agesilaus met them on his march homewards, and completely defeated them. This however did not finish the Corinthian war as it was called; it continued to be waged for several years by incursions and irregular expeditions, in one of which a Lacedæmonian brigade of heavy-armed infantry, the mora, was defeated by the light-armed targeteers of Iphicrates, an Athenian general. This, which was an unheard-of event in Greece, produced the greatest alarm at Sparta, and corresponding exultation among her enemies, although her loss amounted to only 250 men. Insignificant as this loss may seem, the moral effect of it was very great; it broke the charm of the Spartan name, and taught the confederates that the Spartan heavy-armed troops were not invincible. Reverses of this kind, coupled with the successes of the Athenians in the Ægean, and the descents on the Laconian coasts by Conon and Pharnabazus, disposed the Spartans to peace, which was at last negotiated in the eighth year of the war, under the mediation of the Persian king, whose interference the Lacedæmonians had the address to secure in their favour. The convention was known by the name of the peace of Antalcidas (B.C. 387) and was highly favourable to Sparta.

To avoid a break in the narrative we have hitherto omitted giving any account of a conspiracy, the first known at Sparta, which was formed and detected in the first year of the reign of Agesilaus. The author of it was a Spartan citizen called Cinadon: his design was to overthrow the constitution as it then existed, and he calculated upon the aid of the Helots and unprivileged classes for carrying his schemes into effect. To understand the motives which seem to have prompted Cinadon to this step, we must observe that the Spartan citizens were divided into two classes; the members of one of which were called 'equals' or peers. They constituted the smaller division, and enjoyed considerable privileges in the administration of the state. Cinadon was a man of spirit, unable to brook his exclusion from the higher class, and therefore dissatisfied with his position. Hence the conspiracy which he planned; and which, though crushed in its germ by the promptitude of the ephors, was nigh involving the state in a bloody war, and showed the unsoundness of its whole system.

The peace of Antalcidas was, as we have observed, highly favourable to Sparta. All the Greek states were declared to be independent, a provision which detached the Bœotian towns from Thebes, but did not oblige Sparta to surrender her control over her Laconian and Messenian dependencies, as she was constituted interpreter of the treaty, and was backed by the power of Persia in her exposition of it.

An Argive garrison was withdrawn from Corinth, and Spartan influence restored there; and, on the whole, the power of Sparta was more completely established by the peace than by the arrangements which terminated the Peloponnesian war. The first use Sparta made of the advantages she had gained was to make an unprovoked attack upon the people of Mantinea, a truce of thirty years with that city having just expired. The charge laid against them was that they had failed in their duty as allies in the late war; but one powerful motive which actuated Sparta was the dislike of their democratic form of government. The city was taken, and the inhabitants distributed into four country towns, so as to be under the influence of the aristocratic party, which was powerful and supported by Sparta (385 B.C.). Three years after this she was engaged in more distant operations. The cities of Acanthus and Apollonia in Chalcidice solicited her aid against the growing power of Olynthus, representing that the latter city was likely to become a formidable rival, and was already preparing to ally itself with Thebes and Athens. The fears and jealousy of Sparta were roused, and she determined to send troops against Olynthus. One division of the forces marched by Thebes (under Phœbidas) and encamped near the walls, under the pretext of obtaining a reinforcement, but probably with a different motive. At any rate, an offer was made by the oligarchic party in the city to put them in possession of the Cadmeia, or citadel, and thus make Thebes entirely dependent on Sparta. The offer was accepted, and the design carried into execution, nor did Sparta hesitate to profit by the unauthorised act of her general, although he was fined 10,000 drachmæ; an incident which shows that the old regulation about money had fallen into desuetude. Still she did not restore the Cadmeia, but defended its retention, a defence in which Agesilaus joined on the ground of expediency; thus confirming the assertion in Thucydides, that 'of all states Sparta most glaringly showed by her conduct, that in her political transactions she measured honour by inclination and justice by expediency.'

The war against Olynthus lasted four years, and ended in the capture of the city, B.C. 379. The Spartans were now at their highest point of power. Olynthus was overthrown, Bœotia was dependent, Corinth friendly, Argos reduced, and Athens without allies. But a change came upon them; and they suffered a deserved retribution for their flagrant violation of the treaty which provided for the independence of the states of Greece. So great in fact was the degradation of the reverses by which she was afterwards humbled, that Xenophon recognised in them the hand of a retributive Providence, exacting vengeance for her iniquity at Thebes. The Cadmeia was soon recovered by a band of exiles of the democratical party, and the Lacedæmonians were entirely expelled from the city; and shortly afterwards, by an intrigue of the Theban Pelopidas, and through an indiscreet aggression of the Spartan general Sphodrias, Athens was prevailed upon to ally herself with Thebes against Sparta (B.C. 379). Hostilities were carried on for six or seven years, during which Sparta made several expeditions into Bœotia, and greatly distressed Thebes by ravaging and plundering its territory. In the meantime, the Athenians were victorious at sea under Chabrias, off Naxos (B.C. 376); but they soon became tired of their alliance with a new friend, and concluded a separate treaty with Sparta (B.C. 374), and by virtue of which their fleet, then under Timotheus, was called home. This general however, as he was returning, restored to their country some Zacynthian exiles, an act which the Spartans precipitately voted to be a wrong, and that it should be redressed by arms; a vote the more unjust, as Sparta had been relieved from the pressure of the war, and Athens had broken up her fleet, not conscious of any intentional wrong. The result was what was called 'the second or after war;' but friendly relations were soon re-established (B.C. 371), and a treaty made from which Thebes was excluded, as she would not consent to one of its stipulations, according to which every state of Greece was to be independent; to which Sparta agreed, relying on the antient connection between herself and the other states of Peloponnesus for the continuance of her supremacy over them. Thebes however refused to surrender her sovereignty over the cities of Bœotia, and Sparta gladly availed herself of the refusal, as a sufficient reason for ordering an army, then in Phocis, under Cleombrotus, to invade Bœotia; in direct contravention of the treaty, which provided that all armies should be forthwith disbanded. The Spartans met the Theban forces, commanded by Pelopidas and Epaminondas, on the plain of Leuctra. To their astonishment and surprise, they were utterly defeated in a regular pitched battle, by inferior numbers, a circumstance unparalleled in the previous history of Sparta (B.C. 371). The battle was most decisive, and from it we may date the decline of the Spartan power: but it is interesting to observe how the news of the defeat was received at Sparta, as it gives us some insight into their national character, and shows the still continuing power of the institutions of Lycurgus. The Spartans were then solemnising a great festival in their theatre, and a chorus was exhibiting. Still the ephors did not allow any interruption of it; they only communicated the names of the slain to their kinsfolk, and ordered the women to abstain from the usual mourning. The next day, the friends of the slain went about with cheerful countenances, and the only signs of sorrow and shame were shown by the relatives of the survivors. Still with all this show of unconcern, deep despondency was really caused by the defeat. The influence of Sparta over her dependencies was shaken; the people of Mantinea again assembled, against her wishes, in one fortified city, which they called Megalopolis, and established a democratic government. The Thebans invaded Laconia, under Epaminondas, to help them and advanced into the immediate neighbourhood of the unwalled capital, burning and pillaging, till it was filled with the utmost consternation, which was increased by the disaffection prevalent amongst the subject classes. For the first time, the women of Sparta saw fires kindled by an enemy; and but for the vigilance and energy of Agesilaus, the city would have been taken. The whole plain of the Eurotas, as far as the sea-coast, was devastated; but this was not the greatest injury inflicted upon the Spartans. The Theban general collected together the expatriated Messenians, and restored them to their fatherland, thus establishing a permanent enemy close to Sparta (B.C. 367), and depriving many of her citizens of the greatest part of their property. But this was not his last expedition into Peloponnesus; he undertook no less than four; in the last of which he nearly surprised and took Sparta in the absence of Agesilaus. He then resolved on a general engagement, and met the Spartans and their allies, amongst whom were the Athenians, at Mantinea. His army was victorious, but he himself was slain; the supremacy of Thebes fell with him (B.C. 362); and Xenophon observes that greater confusion prevailed in Greece after the battle than before. Still one result flowed from it, the recognition of the independence of Messenia by the allies of Sparta, in which she refused to acquiesce, and was consequently excluded from a treaty to which the other belligerent parties agreed (B.C. 361).

From this time Sparta ceases to appear in history as one of the leading states of Greece; but although she lost all chance of recovering her former position, she had the satisfaction of seeing neither Thebes nor any other city able to take her place. Another power soon assumed the control in Grecian affairs, and when the Spartans attempted to enforce their claim to Messenia, we find Philip of Macedon opposing their pretensions, and supporting the independence of that country. After the battle of Chaeronea (B.C. 338), he invaded Laconia, and, according to Polybius (ix., 28), obliged her to surrender several small districts to the Argives, Arcadians, and Messenians. In the reign of Alexander, and while he was engaged in his Eastern conquests, the Spartans made an attempt to overthrow the Macedonian empire, but they were defeated by Antipater, Alexander's lieutenant, and Agis, their king and commander, was slain, B.C. 331. (Diod. Sicul., xvii.; Thirlwall, *Hist. of Greece*, vol. vi., p. 257.) In the contests which divided Greece after the death of Alexander, Demetrius, the son of Antigonus, was at war with the Spartans, and victorious over them in two engagements. Their next assailant was Pyrrhus (B.C. 268), against whom they made a gallant defence, assisted and animated by the women, whose spirit saved the city from capture. At that time it was walled. After that event we hear little of Sparta till the reigns of Agis III. and Cleomenes (B.C. 240). The institutions of Lycurgus, though existing in name, were then no longer of any force at Sparta. The regulation by which every head of a family was ensured the possession of a plot of land had been repealed. The number of Spartan citizens was considerably reduced, and a great accumulation of property was vested in the hands of a few people, many of whom were females. Agis and his friends wished to return to the original constitution, and the mode of life of former times. He perished in the attempt to carry out his views (B.C. 240), being murdered in prison at the instigation of the ephors, who had now monopolised almost all authority in the state. In B.C. 236, Cleomenes III. ascended the throne, and by stratagem and force succeeded in the attempt in which Agis had failed; a general division and re-distribution of property took place: some of the Periœci were adopted amongst the Spartan citizens; the old mode of education and the public meals were resumed; the ephors put to death, and their office abolished. Cleomenes also defeated the troops of the Achæan league in several engagements, and had conquered a great part of the Peloponnesus, when Aratus, the strategus or general of the Achæans, summoned Antigonus Doson from Macedonia to oppose his progress. The Macedonians and Spartans met at Sellasia, on the borders of Laconia, and after a hard-fought and decisive battle Antigonus was victorious. He then marched to Sparta, and restored the former state of things. Cleomenes fled to Egypt.

Pausanias (iii., 6, 5) observes of him, that he was the last of the Agidæ, and shortly afterwards the sovereignty was sold by the ephors to Lycurgus, who was not even a Hera cleid. He sided with the Aetolians in the confederate or social war between them and the Achæans. (Polyb., iv., 2.) He was succeeded by Machanidas, who is called a tyrant, and was conquered and slain by Philopœmen, the general of the Achæans. (Livy, xxviii., 5.) Nabis, the last of these usurpers, resisted the Achæans and Romans, who had now appeared in Greece, but was eventually assassinated, B.C. 192. Shortly afterwards Laconia was invaded by the Achæans, and as they were superior in force, the Spartans were compelled to submit to their orders to destroy their walls, to abolish the institutions of Lycurgus, and to join the Achæan league. The Roman senate however afterwards decreed that the walls should be rebuilt, and that the Lacedæmonians should no longer be included in the Achæan confederacy (B.C. 148).

After the capture of Corinth (B.C. 146) all Greece was reduced to a Roman province, but the inhabitants of Laconia, we are told by Strabo (viii., p. 366), enjoyed more freedom than the other states, being treated not so much like subjects as allies.

Some of the old provincial towns around Sparta were honoured by Augustus with the title of Eleuthero-Lacones, or free Laconians, and released from all dependence upon Sparta.

The colonies of Sparta were but few. The principal were —the island of Calliste or Thera, Cnidos, and Tarentum. (Herod., i. 65; vi., 52-59; Xenophon, *De Repub. Lacon.*; Pausanias, *Laconica;* Thirlwall, *Hist. of Greece*, caps. viii. and ix.; Cramer's *Ancient Greece*, vol. iii., *Laconia*.

SPA'RTACUS. [GLADIATORS.]

SPARTALITE. [ZINC.]

SPARTIA'NUS, ÆLIUS. [AUGUSTA HISTORIA.]

SPARTUM, a name applied by the Romans to the plant much used by them for cordage. It is fully described by Pliny (*N. H.*, xix. 2), who says that it had not been noticed by Theophrastus, and that it is a herb growing of itself without setting or sowing, and that it might be called the rush of a dry and lean ground. That it is common about Carthago Nova (Carthagena), and that whole mountains are overspread with it. When pulled, which it is with some difficulty, it is made into bundles, afterwards dried, and then steeped in water, a process which is repeated two or three times; also that no cordage was considered better than that of this plant when exposed to wet. Authors have differed much respecting the plant intended; some conceiving that some of the brooms are intended, as *Spartium junceum*, or Spanish broom, which produces a fibrous thread of which cloth is made; and *S. monospermum*, which is found on the coasts of Spain as far as the moving sands reach; its twigs are used for tying bundles, and herbs are brought to market tied together with them. The leaves of both afford food for sheep and goats. Others are of opinion that some of the grasses are intended, which grow in the same places and are used for the same purposes, as, for instance, *Lygeum Spartum* and *Stipa tenacissima*, both of which are called *esparto* by the Spaniards, and both are used for making ropes, baskets, nets, and for filling paillasses. Both have also been employed in making a kind of cloth, and the manufacture of this, as well as the various purposes to which these grasses are applied in Spain, was introduced some years since into the neighbourhood of Paris, and a considerable commerce of exports exists from Spain to the south of France and to Italy, where *esparto* is employed for making baskets, sacks, cordage, and even cables.

SPASM (from the Greek σπασμός) is an unhealthy, involuntary, and forcible contraction of muscular tissue. The term is almost synonymous with *convulsion*, but is more generally applied than that word is to the unhealthy painful contractions of the heart, intestines, and other involuntary muscles.

Nosologists have distinguished spasms into clonic, in which the muscular contractions alternate rapidly with relaxations (as in epilepsy), and tonic, in which the contracted fibres remain for a long time rigid, as in tetanus; but in nature the distinction is not well marked. Spasm has also often been regarded as occurring in many tissues, in which it is perhaps not possible, such as the small blood-vessels. In the present day its occurrence is believed to be limited to the muscles. What their condition is when affected by spasm is not precisely known. Very generally the contraction is unnatural, not only in its origin and its continuance, but in its extent; for it does not take place simultaneously, or in a regular succession, in each part of the muscle, but, as one may often see in common cramp, it affects a single portion of the muscle, drawing it up into a hard mass, while the fibres above and below it are much less contracted, or are even elongated.

The greater number of spasms seem to depend on an irritation of the nervous centres. Sometimes they are produced by primary disease in those parts, but much more commonly they are the results of irritation propagated from some disordered organ to the brain or spinal chord, and thence reflected through the motor nerves of the muscles in which the spasm occurs. Hence probably the frequency and the aggravation of cramps, and other more important spasmodic affections, when the digestive organs are disordered, the dependence of a variety of spasms or convulsions on the irritation of teething, &c. Much less however is known of the nature of spasm in general than of the best methods of treating it, and of the effects which it produces in the several organs which it affects. These are treated of in the articles ANGINA PECTORIS, ANTISPASMODICS, ASTHMA, COLIC, CONVULSIONS, EPILEPSY, HYDROPHOBIA, TETANUS, &c.

SPATHE (the Greek σπάθη). This term is applied to the sheathing involucrum of many plants. It is seen in the greatest perfection in the flowers of Palmaceæ and Araceæ, where, during the flowering of the plants, it embraces the entire inflorescence. This organ is considered by most botanists to be a modification of the bract, and as the plants in the above orders have no corolla, it probably performs the function of the ordinary floral envelopes. Link considers the spathe a modification of the petiole. The flowers of the Narcissus, the Snowdrop, and the Iris are invested, in the early periods of their growth, with a spathe which only encloses a single flower.

SPAVIN. [HORSE.]

SPAWN is a term frequently used in gardening to indicate the buds or branches which are produced from underground stems. These, from the facility with which they form roots when separated from the parent stem, are capable of maintaining an independent existence, and on this account are employed as a means of propagating many plants.

Spawn is also applied to the white fibrous matter which, shooting through earth, dung, decaying vegetable matter, &c., is the matrix from which mushrooms and other fungi are produced. It is generally composed of small white thready fibres, which produce, at various distances, little white knobs, from which the stem and cap of the mushroom proceed. This matrix or spawn, called mycelium, is in fact the real stem of the mushroom, and the stipes and pileus, with their appendages, are the inflorescence. This spawn is made use of for the purpose of procuring from it the growth of the edible mushroom (*Agaricus campestris*). It is introduced into beds consisting of dung and earth, which are called spawning mushroom-beds. [MUSHROOM.]

Mushroom-spawn for the purpose of sowing may be procured at all seasons of the year, but in most abundance at the end of summer and commencement of autumn. The positions in which spawn may be looked for in greatest quantity are in places where horse-dung has been collected in any quantity and remained for some time, as in dunghills, compost-heaps, old melon or cucumber hot-beds, horse-mill tracks, stable-yards, &c. In these situations, the spawn is found adhering to lumps of dung and earth, which should be placed entire in the beds for the growth of the mushroom. It may also be obtained from meadows and pastures. from spots where the mushroom is found growing.

SPEAKING-TRUMPET. The occasional use of instruments for enabling the human voice to be heard at a great distance may be traced back to a period long prior to the æra of their general adoption; but it is often difficult to ascertain how far such contrivances bear the character of speaking-trumpets, for strengthening and conducting the sound to a distance; or that of hearing-trumpets, by which the sound is collected and conveyed to the ear. In some cases also, in which the relations of early writers have been supposed to indicate the use of something like speaking-trumpets, it is doubtful whether the instruments referred to were used for transmitting articulate sounds, or whether they were merely wind-instruments of extraordinary power.

Beckmann (*Hist. of Inventions, &c.*, vol. i.) alludes to the monstrous trumpets of the antient Chinese, as referred to in a French work published by Renaudot in 1718, entitled

Anciennes Relations des Indes et de la Chine, de deux voyageurs Mahometans, qui y allèrent dans le neuvième siècle,' as if they were used for the communication of articulate sounds; but we find nothing in the passage referred to (p. 25 of the French work) to justify such a supposition. Even Beckmann himself, while he describes them as 'instruments by which words could not only be heard at the greatest distance possible, but could also be understood,' observes, in a note, that they are 'improperly called speaking-trumpets' by Haller, in his 'Elementa Physiologiæ,' vol. v. Some have considered the great horn described in an old manuscript in the Vatican library as having been used by Alexander the Great to assemble his army, to be the oldest speaking-trumpet on record; but Beckmann conceives that it has received that name without sufficient evidence, since the description does not expressly say that Alexander *spoke* through the horn; and the book itself, which is entitled 'Aristotelis Secretum Secretorum ad Alexandrum Magnum,' is certainly not the production of Aristotle, though probably very old.

The credit of the invention of the modern speaking-trumpet has been warmly contested by the partisans of Sir Samuel Morland and Athanasius Kircher. The claim of the former is supported by a pamphlet which he published in 1671, of which some account has been given under MORLAND, SIR SAMUEL, vol. xv., p. 408. The title of the copy which is preserved in the library of the British Museum differs from that given as above, being 'Tuba Stentoro-Phonica, an instrument of excellent use, as well at sea as at land, invented and variously experimented in the year 1670.' The title-page also says, 'The instruments (or speaking-trumpets) of all sizes and dimensions are made and sold by Mr. Simon Beal, one of his Majesties Trump^{s}., in Suffolk Street.' As stated in the article above referred to, Morland's first speaking-trumpet was of glass, and only two feet eight inches long; it was two inches and a half in diameter at the small end, and increased very gradually in size to near the other end, where it suddenly enlarged, like the mouth of an ordinary trumpet, to eleven inches diameter. The next he made was of brass, about four feet and a half long, twelve inches in diameter at the large end, and only two inches at the small end, to which was affixed a mouth-piece, 'made somewhat after the manner of bellows,' to move with the mouth, and thereby to prevent the escape of the breath. This was tried in St. James's Park, and rendered the voice audible at a distance of near half a mile. The third instrument was of copper, recurved in the form of a common trumpet. Its total length was sixteen feet eight inches, the large end nineteen, and the small end two inches in diameter. With this the voice was heard about a mile and a half. Morland made another of the same form, still larger, and two others of the straight form, and five feet and a half long. With the latter a man could make himself heard a mile and a half; and with one of the largest trumpets, tried at Deal Castle, the voice was conducted a distance of between two and three miles over the sea.

In 1673, when Morland's invention had attracted much attention on the Continent as well as in England, Kircher, in the preface to his 'Phonurgia,' claimed the invention for himself, and intimated that he had published a description of the speaking-trumpet several years before the appearance of Morland's pamphlet. His claim does not however appear to be very well supported, since, according to Beckmann, the 'Ars Magna Lucis et Umbræ' of Kircher, which seems to have been first published about 1643, contains only an account of Alexander's horn, and of a tube, of which one end was to be applied to the mouth of the speaker, and the other to the ear of the listener. His 'Musurgia,' printed in 1650, affords little more evidence in his favour, being only a description of a kind of funnel by which the voice of persons near the large end might be conducted to the small end. Such a funnel, which seems rather like a large hearing-trumpet than a speaking-trumpet, he had, according to his 'Phonurgia,' constructed as early as 1649, in the Jesuits' college at Rome. Whatever may have been the justice of his claim as its inventor, Kircher tried a proper speaking-trumpet in or about 1673. For further information on this question, the reader is referred to Beckmann.

The action of the speaking-trumpet has been variously explained by different writers; but its efficiency has been most commonly attributed to the repeated reflection of the sound from side to side in passing through it, and its ultimate reflection from the mouth of the trumpet, in such a way as either to collect the rays of sound into a focus at a distance, or to project them forward in parallel lines, instead of allowing them to diverge in all directions. The annexed diagram, *Fig.* 1, illustrates this theory, of which there are many modifications, some of them founded on the supposition of a very close analogy between the motion of sound and that of light. These have given rise to many suggestions respecting the best form and degree of curvature of the sides of the trumpet. Some writers recommend a simple cone, the mouth-piece being at the apex: these explain the motion of the rays of sound on the principle shown in *Fig.* 2, in which, as in the former diagram, the dotted lines represent the rays. In Professor Leslie's 'Experimental Inquiry into the Nature and Propagation of Heat,' and in the article 'Acoustics,' in the Supplement to the 'Encyclopædia Britannica,' written, we believe, by the same author, the action of the speaking-trumpet is explained in a different way. 'Its performance,' observes the Professor, 'does certainly not depend upon any supposed repercussion of sound; repeated echoes might divide, but could not augment the quantity of impulse.' He further conceives that the instrument has no peculiar power of transmitting sound in any particular direction, and accounts for its effect as follows:—'The tube, by its length and narrowness, detains the efflux of air, and has the same effect as if it diminished the volubility of that fluid, or increased its density.' 'The organs of articulation,' he continues, 'strike with concentrated force; and the pulses, so vigorously thus excited, are, from the reflected form of the aperture, finally enabled to escape, and to spread themselves along the atmosphere.' The experiments of Hassenfratz, a French philosopher, are cited in support of this theory. He tried the power of a speaking-trumpet by measuring the distance at which the ticking of a watch could be heard through it, and found the effect the same, whether the metal tube were used simply, or wrapped round in such a way as to prevent vibration. It was also heard at the same distance when the inner surface was lined with linen or woollen cloth to diminish reflection, and the range of a cylindrical trumpet was the same as that of a conical one.

Fig. 1.

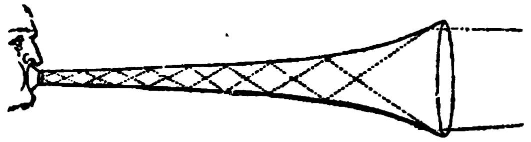
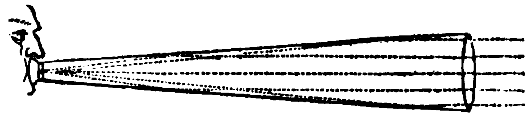


Fig. 2.



SPEARMINT. [MENTHA VIRIDIS.]

SPE'CIES. [GENUS.]

SPECIES. This word is used in mathematics, or rather has been used, in two different senses. In the first place, by Euclid, who means by figures of the same species those which have the same form, whatever may be their size. Thus, in the Data, when the form of a figure is given, he designates it as given in species (τῷ εἴδει δεδομένον). The word species is here used in its primitive sense of *appearance*.

But the term was again used by Vieta in its logical sense, as opposed to individual, in designating the algebraical notation which he first distinctly proposed. Lawyers were in the habit of describing general cases by using individual names, as Caius or Julius, to signify any person concerned, which they termed description by species. Vieta borrowed the word to signify the use of letters to stand for numbers, when such letters were used to designate members generally, without reference to any one in particular. The logistics (a common term for the science of calculation) thus introduced he called *specious*, and his first tract on the simple operations of algebra is headed 'De Logisticâ Speciosâ.' Hence, for some time, the language of algebra was called the specious notation.

SPECIES OF PLANTS. All the individual forms of plants, as well as animals, that occur on the globe, may be collected into groups resembling each other, and these groups are called *species*. A species has been defined to be 'a combination of individuals alike in all their parts;' 'a systematic combination of homogeneous individuals;' 'a collection of individuals which will breed together and produce fertile offspring.' De Candolle says, a species is 'a collection of all the individuals which resemble each other more than they resemble anything else, which can by mutual fecundation produce fertile individuals; and which reproduce themselves, by generation, in such a manner that we may from analogy suppose them all sprung from one single individual.' However clear such a definition may be, it would assist a botanist only in a very limited degree in determining whether a new plant should be looked upon as a new species. If there were perfect structural identity between two individuals of the same species, or if we could ascertain, on the physiological ground, that the individuals after fecundation reproduced similar individuals, it would then be a more easy task. But perfect structural identity does not exist, and the physiological test cannot be always applied, and hence the difficulty of determining what is really a species. From this some have gone so far as to deny the existence of species altogether, and assert that the supposed distinctions between plants are altogether arbitrary and imaginary. This notion is however altogether upset by the well-known fact of plants maintaining for centuries the same structural characters.

However much it may be regretted on account of the vexatious multiplication of species, that some fixed rules cannot be laid down for their formation, it does not appear at present that anything more than general rules can be given, and that much must depend on the judgment and experience of the observer.

As a general rule species are not distinguished by differences in the internal organization, such differences being left for the higher divisions into genera, orders, and classes; but upon those superficial and external differences which are independent of internal structure. Of these may be named duration, dimension, surface, form, division, numerical proportion, colour. The value of each of these points varies according to circumstances, and in proportion to the knowledge of the observer will be the skill with which he selects them for distinguishing species. The *duration* of a plant is a point of great importance, as in no instance do we find, unless from change of climate, plants of the same species differing in being annual, biennial, &c. *Dimension* is rarely of any importance, and should only be taken into consideration in extreme cases. Differences of *surface*, depending on structural peculiarities, are of importance; smoothness, roughness from tubercles, and the existence of stinging hairs and prickles, are points of value. The presence or absence of lymphatic hairs on the surface of leaves is a point that may mostly be disregarded; they are of more importance on other parts. The *form* of parts is only of importance when it is the consequence of anatomical differences, that is to say, the arrangement of the veins, &c. The *division* of organs is not of much importance where it depends on the degree of the laceration of the parenchyma. The union or non-union of contiguous organs, as the parts of the calyx, corolla, &c., is of the greatest value, being mostly uniform in all the individuals of the same species. The *numerical proportion* of the parts of a plant is of value in proportion to the small number of parts or organs; the greater the number, the more subject it is to variation. Differences in *colour* are little to be relied on; the same may be said of odour and taste; as all these properties are liable to undergo change by a slight alteration of the circumstances of the plant.

Those departures from identity of structure, which are considered insufficient to constitute a species, are called *varieties*, and the points of structure that should constitute a species or variety is frequently a matter of difference, and it is no unfrequent thing for one author to reduce the species of another to mere varieties. Thus Borrer has made 71 species of Salix, but Koch has reduced them to 29, and numerous examples could be cited. A careful attention to the influence of climate, soil, elevation, &c. on species, would save much trouble and vexation on this point. De Candolle has elegantly summed up the influence of these agents on plants. 'Let us suppose,' he says, 'what really happens, that the seeds of plants are scattered at hazard over the surface of the earth; or, to speak more correctly, by causes that have no necessary connection with the existence of those plants; such seeds will find themselves in an infinite variety of situations; some which have fallen in soil that is too tenacious or too loose, too dry or too wet, too hot or too cold, do not grow, and are soon destroyed. But between these extremes some will succeed, although it may be under very different circumstances. Thus, for instance, if the place has not light enough, the plant will be half blanched, which will be indicated by its paleness and feebleness, or by being spotted, or by the diminution or even loss of its hairs; if the light is too bright, the plant will be stronger, smaller, more deeply coloured, harder, and more velvety than usual. Temperature also exercises some influence, though in a less degree; in a cold climate the same plants are smaller and weaker than ordinary; the colour of the flowers and fruits is paler, the wood worse ripened, their leaves more deciduous, their fruit often abortive, and the sap destined to nourish it, throwing itself into the neighbouring parts, sometimes changes their appearance. In a hot climate plants become larger, produce more wood, and their leaves have brighter colours and a higher flavour. In the same climate humidity causes the appearance of differences without end; plants that grow in water lose all their hairs, their leaves become divided into capillary segments so as to look like hairy roots, their stems and flower-stalks lengthen to reach the surface of the water, and these different effects are further variable as the water is still or agitated, clear or turbid, pure or mixed with heterogeneous substances; the varieties of *Ranunculus aquatilis* offer a remarkable example of this. If on the other hand a plant accustomed to water is found to live in a drier soil, it becomes covered with hairs, remains smaller than usual, and acquires greater hardness. In air rarified like that of mountains, plants are generally found smaller and more stunted than usual, while their flowers are larger than upon the plains. The influence of soil is not less manifest: if it is tenacious, the roots, which penetrate it with difficulty, are small, hard, and clustered; if it is very sandy, the roots become large, fleshy, and fully formed; if it contains a great quantity of carbon, the colours of the flower are often altered, as those of the Hydrangia into blue, and of the Pink into violet; if it is charged with salt, or if the plant is within the reach of salt, even brought through the atmosphere, we usually find the leaves more fleshy and more glaucous, as in *Lotus corniculatus*. All these different circumstances, combined with each other in nature, are fertile causes of varieties, which are still further multiplied by cultivation.'

SPECIFIC GRAVITY, or, more properly, specific weight, is a term used to express the weight of any gas, liquid, or solid, under some given volume; but the unit of weight and unit of volume are usually such, that for some one particular substance the weight of the unit of volume shall be expressed by the unit of weight, or by 10 times, 100 times, or 1000 times that unit. Thus the numbers expressing the specific gravities of different substances denote the actual weights of those substances under the unit of volume; and hence the ratio between the numbers expressing the specific gravities of any two substances is the same as the ratio between the weights of those substances under any two equal volumes, the density of the atmosphere and also the states of those substances with respect to temperature being the same.

Distilled water is the substance usually employed for the purpose of comparing together the weights of all substances except the gases; and because the volume of any substance varies with its temperature, in determining from experiment the specific gravity of any substance, the weight under a given volume is reduced to that which it would become at one constant temperature. The constant temperature adopted in this country is, in general, that which is expressed by 60 degrees of Fahrenheit's thermometer.

From the experiments of Sir George Shuckburgh Evelyn it was found that at the temperature expressed by 39° Fahrenheit, the height of the column of mercury in the barometer being 29·79 inches, the weight of a cubic foot of distilled water was 999·8066 ounces avoirdupois; and reducing this weight conformably to the table of the densities of water at different temperatures which has been given by Biot, it will be found that at a temperature expressed by 60° Fahrenheit, and when the height of the mercurial column is 30 inches, the weight of the cubic foot of water is 999·54 ounces. But in the Parliamentary regulations, which were made in 1825, a cubic inch of water is stated to weigh 252·458 troy grains, the temperature being 62° Fahrenheit, and the height of the barometrical column, 30 inches; and 7000 troy grains are made equivalent to one pound avoirdupois: hence it follows that a cubic foot of water should weigh 997·136 ounces. Either of these numbers is sufficiently near 1000 to make it very proper that this last should be adopted for the specific gravity of water, since a change in the value of the avoirdupois ounce, which would be scarcely appreciable in the ordinary transactions of commerce, would render the ounce an accurate and convenient unit of weight, while the cubic foot constitutes the unit of volume.

On the Continent, since the employment of the decimal scale of weights and measures has become general, the cubic centimetre (·061028 cubic inches English) is the unit of volume, and the gramme (15·407 troy grains) is the unit of weight. The gramme having been determined by the weight of a cubic centimetre of distilled water of the temperature at which its density is a maximum (38·25° Fahr.). Thus the weight of a cubic centimetre of any substance being expressed by any number n of grammes, n is the specific gravity of that substance.

The numbers expressing the specific weights of substances are also taken to represent their densities. Density, properly speaking, denotes the degree of closeness of the particles of a substance to one another; but this is evidently proportional to the number of particles within a given volume of that substance; and since the weight of a body is only the sum of the actions of gravity upon all its particles, it follows that the densities of two substances under equal volumes will be proportional to their specific gravities. It follows also that if two substances have equal densities or specific gravities, their weights will vary with their volumes; and that the weights of bodies are to one another in a ratio compounded of their specific gravities and volumes.

Previously to describing the methods of finding the specific gravities of substances, it will be proper to explain the construction of the hydrostatical balance, which is the instrument employed for the purpose. The beam of this balance rests, as usual, on the lower circumference of a circular perforation in both sides of the fork which holds it, by a pin which is fixed in it perpendicularly to its length and depth, at a small distance above the common centre of gravity of the beam, scales, and weight. The fork is suspended from the middle of a horizontal bar, and this last is suspended from a spring at the top of the pillar which supports the machine. Care is taken that the two arms of the beam are symmetrical, and that the points from whence the scales are suspended are at equal distances from its centre of gravity. Now let the substance which is to be weighed be put in one of the scale dishes, and the number of grains necessary to keep it in equilibrio be put in the other. If the weight of the substance should be an exact number of grains, that weight is determined, but if not, and it were required to ascertain the weight within one-hundredth part of a grain (for example), the following contrivance may be adopted. Suspend in a vertical position, from the lower part of the scale containing the substance to be weighed, a brass wire, whose volume and weight have been previously determined, and let part of the length of this wire enter into water which is contained in a vessel underneath the scale. The scales with this wire thus attached to one of them being previously put in equilibrio when the surface of the water is at a certain mark on the wire, let the substance to be weighed be introduced into the scale above the wire, and let weights be placed in the opposite scale till one grain more would be found too great: then gently raising the whole balance till, by the increase of the weight on the side of the scale containing the substance, in consequence of a greater portion of the wire being out of the water, an equilibrium takes place. The wire being graduated so that 100 divisions correspond to a weight equal to one grain, the number of graduations on it between the surface of the water and the fixed mark before mentioned will enable the experimenter to determine the number of hundredths of a grain by which the weight of the substance in the scale exceeds the number of grains already placed in the opposite scale.

If it be required to weigh a substance in water, or in any other liquid, that substance may be suspended in a vessel containing the liquid by a horse-hair attached below the scale opposite to that from whence the wire before mentioned was suspended; and its weight while immersed in the liquid may be found to the hundredth part of a grain, as in the former case. The reason why horse-hair is employed to suspend the substance in water is, that it has very nearly the same specific gravity as that fluid.

A solid body having greater specific gravity than water being thus weighed both in air and water, may have its specific gravity determined, that of the water being supposed to be known or assumed, by the following proportion:

The weight lost by immersion in water (that is, the weight of water equal in volume to the volume of the solid [HYDROSTATICS],
Is to the weight of the body in air,
As the specific gravity of the water is to that of the body.

The specific gravity of a fluid is found by weighing any one and the same solid body in air, in water, and also in the fluid, and observing the two differences of weight These differences are the weights of quantities of the two fluids which are equal in volume to the solid body; and they are to one another as the specific gravities of the two fluids: hence that specific gravity which was required may be found. [See also HYDROSTATICS, p. 403, col. 2.] It should be observed that the specific gravity of the solid must be greater than that of either of the fluids, in order that the solid may sink when immersed in them.

If the body whose specific gravity is to be found be a solid lighter than water, there must be annexed to it, before it is weighed, a mass of some material of known specific gravity, and such that the two bodies may together sink in the water. The compound mass, and the heavier body alone, must be weighed both in air and water; also the lighter body must be weighed in air. Let W be the weight of the compound mass in air, and W′ the weight of the same mass in water; also let w be the weight of the heavier body in air, and w' the weight of the same body in water: then W − W′ is the weight of water equal in volume to the compound body, and $w-w'$ is the weight of water equal in volume to the heavier body. The difference between W − W and $w-w'$ is the weight of water equal in volume to the lighter body; therefore, by hydrostatics, that difference is to the specific gravity of water as the weight of the lighter body is to its specific gravity.

When the body is soluble in water, it may be weighed in air, and also in some fluid whose specific gravity is known, and which is not capable of dissolving it; then its specific gravity may be found by the first of the above-mentioned rules, substituting the weight lost in the fluid for the weight lost in water.

If the solid body imbibes water without being dissolved in it, let it be weighed when perfectly dry, and call that weight W: again, find the weight of water displaced by the body when dry, and call it D; then D is to W as the specific gravity of water is to the specific gravity of the body in its actual state. But D − W is the weight of the water displaced by the solid part only of the body; therefore D − W is to W as the specific gravity of water is to the specific gravity of the solid part only of the body.

It must be observed that the true weight of any body, or that which the body would appear to have if weighed in vacuo, is greater than the weight which it is observed to have when weighed in air, by the weight of a volume of air equal to the difference between the volume of the body and that of the object by which the weight is determined. It should also be observed that the numbers expressing the specific gravities of substances are strictly correct only on the parallel of latitude passing through the place where the weight of the water under the unit of volume is determined; for the force of gravity, and consequently the weight of any substance under a given volume, increases in proceeding from the equator towards either pole of the earth.

In order to determine the specific gravity of the atmosphere, or of any gas whatever, the air or gas must be weighed in a globular vessel of glass, of sufficient magnitude to prevent the unavoidable errors of the operation from sensibly affecting the results.

By means of a good air-pump let the air be drawn from the vessel as much as possible, and suppose, for simplicity, that the exhaustion is complete: then let the orifice be closed, and the vessel weighed in air, suspending it for this purpose below one of the scales of the hydrostatical balance Afterwards, by opening the valve, let the atmospherical air fill the vessel, and let the latter be weighed when thus filled. If W and W′ be the weights thus determined, then $W'-W$ is the weight of a volume of air equal to the interior capacity of the vessel. This capacity being supposed to be known, the specific gravity of the air at the time of the experiment may be found by proportion. In like manner having weighed the vessel after the atmospherical air has been removed from it by the air-pump, let the vessel be filled with any gas whose specific gravity is to be determined, and, in this state, let it be again weighed. Let W and w be the two weights thus determined; then $w-W$ will be the weight of the gas.

It is usual, for the sake of greater accuracy, to find the specific gravity of any gas from the ratio that the weight of any volume of it bears to that of an equal volume of atmospherical air; and the latter being the same in all parts of the earth, when the atmosphere is in the same state with respect to density and temperature, the weight of a cubic foot of it becomes a convenient unit for the specific gravities of the gases. Therefore, $W'-W$ is to $w-W$ as unity (the assumed specific gravity of air) is to the specific gravity of the other gas.

But the atmosphere in which the operations are performed varies at different times, even during the same day, with respect to its temperature and to the weight of the column which presses on the earth, that is, it varies with the state of the thermometer and barometer: it also varies with respect to the quantity of aqueous vapour which it contains. The vessel in which the air to be weighed is contained varies moreover in volume with a change of temperature, from the expansion or contraction of the glass; and, on all these accounts, corrections must be made before the specific gravity of a gas can be completely determined. Corrections should also be made for the small quantity of atmospherical air which remains in the vessel after the exhaustion has been carried as far as the air-pump will permit.

For the formulæ by which the corrections should be made see Biot's 'Traité de Physique;' the following rules being however of frequent application, their insertion in this place may be advantageous. First, the temperature of any gas being constant, the density varies inversely as the volume, and the volume varies inversely as the pressure under which it exists (the latter is usually expressed by the number of inches in the height of the column of mercury, whose weight is equal to the pressure). Secondly, the temperature and the volume being constant, the weight varies as the pressure; and hence the density of a gas varies as its weight or as the pressure. Thirdly, when the temperature of a gas is not constant: let V represent the volume of a gas at a temperature expressed by 32° (Fahr.), and let E be the cubic expansion $\left(=\frac{1}{480}\right)$ of the volume produced by an increment of temperature expressed by one degree of the same scale. Then if t and t' express increments of heat in degrees above 32°, and V′, V″ be the required volumes of the gas at the temperatures $32° + t$ and $32° + t'$ respectively, we shall have $V' = V(1 + Et)$ and $V'' = V(1 + Et')$; consequently, by division, $V'' = V'\frac{1+Et'}{1+Et}$. Again, since the weights vary as the densities, or inversely as the volumes, if W′, W″ represent the weights under the volumes V′, V″: then $W'' = W'\frac{1+Et}{1+Et'}$.

Tables of Specific Gravities.

Gases.

Barometer 30 in. Fahrenheit's thermometer 60°.
The specific gravity of atmospherical air is represented by unity.

Hydrogen . .	0·0694	Thomson.
	0·074	Davy, Sir H.
Carbon, vapour of .	0·4166	Gay-Lussac.
Carburetted hydrogen .	0·5555	Thomson.
	0·491	Davy, Sir H.
Ammoniacal gas . .	0·5902	Thomson.
Aqueous vapour . .	0·625	Gay-Lussac.
Do. (in contact with water at 212° Fahr.) . .	0·484	Dalton.
Phosphorus, vapour of .	0·8333	Thomson.
Phosphuretted hydrogen .	0·9027	Do.
Hydrocyanic acid gas .	0·9375	Do.
Azote . . .	0·9691	Biot and Arago
Nitrogen . .	0·9722	Thomson
Olefiant . . .	0·9722	Do.
Carbonic oxide gas .	0·9722	Do.
Atmospherical air .	1·	
Nitric oxide gas . .	1·0416	Thomson.
Nitrous gas (deutoxide of azote)	1·094	Davy, Sir H.
Oxygen . . .	1·1111	Thomson.
Sulphur, vapour of .	1·1111	Do.
Sulphuretted hydrogen .	1·1805	Do.
Muriatic acid gas .	1·2847	Do.
Carbonic acid gas .	1·5196	Biot and Arago.
Nitrous oxide gas (laughing gas) . .	1·5277	Thomson.
	1·614	Davy, Sir H.
Alcohol, vapour of .	1·6004	Berzelius and Dulong.
Quadro-carburetted hydrogen, vapour of . .	1·9065	Thomson.
Chlorocyanic vapour .	2·1520	Do.
Sulphurous acid gas .	2·193	Davy, Sir H.
Æther (muriatic) vapour of	2·219	Thomson.
Euchlorine gas . .	2·409	Davy, Sir H.
Nitrous acid gas . .	2·427	Do.
Chlorine . . .	2·5082	Do.
Æther (chloric) vapour of	3·475	Thomson.
Nitric acid gas . .	3·75	Davy, Sir H.
Hydriodic acid gas .	4·34	Thomson.
Turpentine (oil of), vapour	5·013	Do.
Iodine, vapour of . .	8·678	Gay-Lussac.

The following tables are compiled from the works of Muschenbroek, Haüy, Kirwan, Lavoisier, Biot and Arago, Drs. Thomson, Young, and Ure; from the 'Philosophical Transactions,' and from other authentic sources. The table for the different kinds of wood is from the experiments of Muschenbroek, and from those of Mr. Couch of Plymouth, as quoted by Mr. P. Barlow.

Liquids.

Barometer 30 in. Fahrenheit's thermometer 60°.
The specific gravity of water is represented by 1000.

Quadro-carburetted hydrogen .	627
Hydrocyanic acid . . .	706
Naphtha	708
Æther, muriatic . . .	730
Do., sulphuric . . .	734
Do., ascetic . . .	866
Do., nitric . . .	909
Bicarburet of hydrogen . .	850
Alcohol, pure . . .	796
Do., 10 parts in 100 being water .	822
Do., 20 do. .	848
Do., 30 do. .	871
Do., 40 do. .	896
Do., 50 do. .	917
Do., 60 do. .	936
Do., 70 do. .	956
Do., 80 do. .	973
Do., 90 do. .	987
Water, at 212° Fahr. (distilled) .	956·2
Do., at 100° do. .	994
Do., at 60° do. .	1000
Do., at do. do. .	999·2
Do., at 50° do. .	1000·7
Do., at 35° (maximum of density)	1000·9
Sea-water	1026
Cyder	1018
Beer, pale	1023
Do., brown . . .	1034
Wine, Burgundy . . .	992
Do., Bordeaux . . .	994
Do., Port . . .	997
Do., Canary . . .	1033
Do., Madeira . . .	1038
Oil of turpentine (essential) .	870
Do. of lavender do. .	894
Do. of olives do. .	915
Do. of almonds do. .	917
Do. of whale do. .	923
Do. of poppies do. .	924
Do. of anise-seed do. .	987
Do. of cloves do. .	1036
Do. of cinnamon do. .	1044
Acid, muriatic . . .	1194

Acid, nitric	1217
Do., hyposulphuric	1347
Do.. boraeic	1479
Do., sulphuric (pure)	1848·5
Do., do. (10 parts in 100 being water)	1811·5
Do., do. (20 do.)	1712
Do., do. (30 do.)	1486
Do., do. (50 do.)	1388·4
Do., do. (highly concentrated)	2125

Gums, Animal Substances, &c.

The specific gravity of water being 1000

Indigo	769
Shoemakers' wax	897
Fat, beef	923
Do. mutton	924
Do. veal	934
Do. pork	937
Butter	942
Tallow	942
Spermaceti	943
Lard	948
Bees'-wax, yellow	965
Do., white	969
Camphor	989
Urine	1011
Blood, human (serum)	1028
Do.	1054
Do. (crassamentum)	1126
Milk, woman's	1020·3
Do., cow's	1032·4
Do., goat's	1034·1
Do., mare's	1034·6
Do., ass's	1035·5
Do., ewe's	1040·9
Elemi	1018
Copal, from Madagascar	1060
Do. from China	1063
Mastic	1074
Storax	1110
Gum, euphorbia	1124
Copal, opake	1149
Labdanum	1186
Gum, seraphic	1201
Dragon's-blood	1205
Gum, ammoniac	1207
Gamboge	1222
Guiacum	1229
Gum from Aleppo	1235
Calculus humanus	240 to 1700
Gum, scammony, from Smyrna	1274
Gum, tragacanth	1316
Assafœtida	1328
Opium	1336
Aloes, hepatic	1359
Myrrh	1360
Gum, bdellium	1372
Aloes, Socotrine	1380
Terra Japonica	1398
Honey	1450
Gum, arabic	1452
Juice of Acacia	1515
White sugar	1606
Bone of an ox	1656
Juice of liquorice	1723
Ivory	1826

Woods.

The specific gravity of water being 1000.

Cork		240
Poplar, common		383
White Pine, from New Brunswick	(mean)	402
Do., from the United States	(do.)	426
Yellow Pine, from Canada	(do.)	440
Riga Fir, an inferior kind	(do.)	479
Northern Pine, from New York	(do.)	482
Sassafras		482
Spruce Fir, from Canada		518
Poplar, White Spanish		529
Larch, from Scotland		530
Red Pine, from Canada		538
Juniper		556
Pitch Pine, from Virginia	(mean)	563
Spruce Fir, from Halifax	(do.)	567
Cedar, from Spanish America	(do.)	567
Willow		585
Elm, English		588 to 800
Riga Fir, superior kind	(mean)	598
Lime or Linden-tree		604
Cedar, from Palestine		613
Pitch Pine, from Baltimore	(mean)	632
Poon Wood, from the East Indies		635
Mahogany		637 to 1063
Yellow Wood, from the Cape of Good Hope		643
Cypress		644
Pear-tree		646
Teak		666
Walnut-tree		671
Elder		695
Fir, from Scotland		696
Orange-tree		705
Cherry-tree		715
Oak, English		743 to 760
Cedar, from Canada		753
Apple-tree		793
Alder		800
Beech		852
Box, French		912
Olive		927
Logwood		931
Coco		1040
Bog Oak, from Ireland		1046
Heart of Oak, 60 years old		1170
Ebony		1177
Do., Indian		1209
Letter Wood, from Surinam		1286
Cedar, Indian		1315
Vine		1327
Box, Dutch		1328
Lignum Vitæ		1333
Pomegranate-tree		1354

Earths, Stones, &c.

The specific gravity of water being 1000.

Gunpowder (loose)	836
Amianthus (long)	909
Pumice-stone	915
Ambergris	780 to 926
Gunpowder (closely shaken)	932
Amber, yellow (transparent)	1078
Do. (opaque)	1085
Do. (green)	1083
Bitumen from Judæa	1104
Cannel coal	1270
Carbon (of compact earth)	1329
Slate coal (English)	1250 to 1370
Phosphorus	1714
Nitre	1900
Opal (common)	1958
Rotten-stone	1981
Sulphur (fused)	1990
Brick	2000
Sulphur (native)	2033
Stone (from Burford)	2049
Opal (precious)	2114
Stone (silicious, for grinding)	2143
Porcelain (Sèvres)	2146
Gypsum (opaque)	2168
Slate (black stone)	2186
Stone (from St. Cloud)	2201
Talc (black German)	2246
Nitre (quadrangular)	2246
Gypsum (transparent)	2274
Gypsum (cuneiform crystallised)	2306
Amianthus (short)	2313
Stalactite (transparent)	2324
Obsidian	2348
Jasper (green)	2359
Porcelain (china)	2385
Stone (paving)	2416 to 2460
Serpentine (opaque Italian)	2430
Stone (rag)	2470
Stalactite (opaque)	2478
Stone (mill)	2484
Do. (from Portland)	2496
Stone (from Bristol)	2510
Spar (transparent)	2564

Flint (Egyptian)	2565
Asbestos (ripe)	2578
Flint (black)	2582
Serpentine (semi-transparent)	2586
Pebble (stained)	2587
Calcedony (blue)	2587
Agate (oriental)	2590
Carnelian (stalactite)	2591
Serpentine (veined black and olive)	2594
Flint (white)	2594
Sardonyx (veined)	2595
Spar (white sparkling)	2595
Do. (pure)	2603
Calcedony (veined)	2606
Agate (speckled)	2607
Pebble (English)	2609
Flint (veined)	2612
Calcedony (common)	2616
Carnelian (veined)	2623
Agate (cloudy)	2625
Serpentine (opaque, red and black)	2627
Carnelian (pale)	2630
Agate (stained)	2632
Talc (earthy)	2632
Crystal (European, pure rock)	2637
Quartz (fragile)	2640
Glass (green)	2642
Quartz (brown, crystallized)	2647
Marble (French)	2649
Do. (Brocatelle)	2650
Quartz (milky)	2652
Crystal (from Madagascar)	2653
Do. (from Brazil)	2653
Do. (yellow)	2654
Do. (violet)	2654
Granite (red Egyptian)	2654
Quartz (crystallized)	2655
Talc (yellow)	2655
Jasper (red)	2661
Calcedony (transparent)	2664
Agate (veined)	2667
Marble (green Egyptian)	2668
Crystal (rose-coloured rock	2670
Slate (common)	2672
Porphyry (green, common)	2676
Marble (from Siena)	2678
Argillite (or slate clay)	2600 to 2688
Jasper (brown)	2691
Alabaster (veined)	2691
Chrysolite (from Brazil)	2692
Spar (blue sparkling)	2693
Alabaster (from Piedmont)	2693
Marble (from Biscay)	2695
Alabaster (yellow)	2699
Marble (Castilian)	2700
Talc (white)	2704
Spar (green)	2704
Marble (African)	2708
Do. (Valencian)	2710
Jasper (yellow)	2710
Marble (Carrara, white)	2717
Talc (slaty)	2718
Stones (basaltes)	2722
Beryl (occidental)	2723
Gypsum (foliated)	2725
Porphyry (green, from Cordova)	2728
Alabaster (oriental, white)	2730
Glass (bottle)	2733
Jasper (cloudy)	2735
Marble (green, from Campania)	2742
Do. (Roman, violet)	2755
Alabaster (oriental, semi-transparent)	2762
Porphyry (red)	2765
Emerald (from Peru)	2775
Chalk (British)	2657 to 2784
Do. (Spanish)	2790
Talc (Muscovy)	2792
Marble (white Parian)	2838
Slate (new)	2854
Marble (violet, Italian)	2858
Basalts (from the Giant's Causeway)	2864
Alabaster (from Malaga)	2876
Hone (white, razor)	2876
Crystal (white rock, from Marmerosch)	2888
Glass (white)	2892
Talc (black)	2900
Arragonite	2946
Serpentine (fibrous)	3000
Lapis-lazuli	2767 to 3054
Schorl (tourmalin, from Ceylon)	3054
Asbestos (starry)	3073
Schorl (common)	3092 to 3212
Spar (green and white sparkling)	3105
Sapphire (Brazilian)	3131
Schorl (Brazilian emerald)	3156
Limestone (white fluor)	3156
Do. (green)	3182
Glass (Leith crystal)	3189
Do. (fluid)	3329
Schorl (black, hexahedral)	3364
Diamond (Brazilian)	3444
Do. (yellow)	3519
Do. (white oriental)	3521
Do. (green)	3524
Do. (blue)	3525
Do. (rose-coloured, oriental)	3531
Ruby (Brazilian)	3531
Topaz (Brazilian)	3536
Beryl (oriental)	3549
Diamond (orange-coloured)	3550
Topaz (white)	3554
Do. (Saxon)	3564
Hornblende (common)	3600 to 3830
Hyacinth (common)	3687
Spar (adamantine)	3873
Pyrites (ferruginous, cubic)	3900
Sapphire (oriental)	3994
Hyacinth	4000 to 4620
Garnet (from Syria)	4000
Girasol	4000
Topaz (oriental)	4011
Sapphire (from Puys)	4077
Pyrites (ferruginous, round)	4101
Garnet (from Bohemia)	4189
Vermillian	4230
Ruby (oriental)	4283
Lapis Hœmatites	4360
Barytes, Sulphate of	4481
Pyrites (coppery)	4954
Lapis Calaminaris	5000

Metals.

The specific gravity of water being 1000.

Sodium	865
Potassium	972
Plumbago	1987 to 2267
Cobalt (blue, glass of)	2441
Copper (ore, soft)	3572
Iron-stone (from Lancashire)	3573 to 3863
Arsenic (glass of)	3594
White-lead	4059
Antimony (crude)	4064
Bismuth (ore in plumes)	4371
Copper (ore, white)	4500
Molybdena	4738
Manganese (striated)	4756
Loadstone	4800
Antimony (glass of)	4946
Iron (ore, lenticular)	5012
Copper (from Cornwall)	5452
Silver (ore, dark-red)	5684
Arsenic (molten)	5763
Lead (ore, saturnite)	5925
Tin (ore, white)	6008
Lead (ore, red)	6027
Tungsten	6066
Litharge	6300
Uranium	6440
Lead (ore, vitreous)	6558
Lead (ore, black)	6745
Zinc (in its common state)	6862
Tin (ore, black)	6901
Tin (ore, red)	6935
Wolfram	7119
Iron (cast at Rotherham)	7157
Zinc (compressed)	7191

Iron (cast at Carron)	7248
Tin (pure, Cornish, not hardened)	7291
Tin (do., hardened)	7299
Iron (ore, prismatic)	7355
Lead (ore, cubic)	7587
Iron (forged into bars)	7600 to 7788
Copper (native)	7600 to 7800
Nickel (molten)	7807
Cobalt (molten)	7812
Steel (tempered, not hardened)	7816
Steel (tempered and hardened)	7818
Brass (cast, common)	7824
Steel (neither tempered nor hardened)	7833
Brass (cast, not hammered)	8396
Mercury (precipitate, red)	8399
Brass (cast, wire-drawn)	8544
Copper (wire-drawn)	8878
Bismuth (native)	9020
Bismuth (molten)	9823
Silver (native, common)	10,000
Silver (Paris standard)	10,175
Mercury (brown cinnabar)	10,218
Silver (virgin, fine and not hammered)	10,474
Silver (do. hammered)	10,511
Mercury (precipitate per se)	10,871
Lead (molten)	11,352
Mercury (fluent)	13,568
Mercury (congealed)	15,632
Gold (not hammered)	15,709
Do. (hammered)	15,775
Do. (Parisian standard, 22 carats, not hammered)	17,486
Do. (hammered)	17,589
Do. (English standard, 22 carats, not hammered)	18,888
Do. (fine, 24 carats, not hammered)	19,259
Do. (hammered)	19,362
Platinum (purified, not hammered)	19,500
Do. (hammered)	20,336
Do. (wire drawn)	21,041
Do. (compressed by being rolled)	22,069

SPECIFICATION. [Patent.]

SPECTACLES are lenses so mounted in frames as to be conveniently held before the eyes to assist defective vision. Where side-pieces are added to the frame, to hold it in its proper position by pressing against the sides of the wearer's head, the instrument is denominated simply a pair of spectacles; but when no side-pieces are used, and the frame is held with the hand, the name hand-spectacles is applied.

It has been conceived, though with very little foundation, that spectacles were in use among the antients; but most authorities give the latter part of the thirteenth century as the period of their invention. Some writers attribute the invention to Alexander Spina, a monk of Pisa, and suppose its date to have been about 1299 or 1300; but the mention of magnifying-glasses by Roger Bacon, who died some years before that time, justifies the supposition that something like what are now called spectacles were in use at least several years earlier. [Bacon, Roger, vol. iii., p. 244.]

The defects of sight, which it is the object of spectacles to counteract, and the manner in which they effect that object, have been explained under Sight, vol. xxi., p. 507. In addition to what is there stated, some remarks on the construction and choice of spectacles may be useful. In few cases, perhaps, are the effects of ignorance and prejudice productive of more serious consequences than in the injudicious selection of spectacles, or in the reluctance which sometimes defers their use until the eyes become, for the want of their necessary assistance, irreparably injured; and it is difficult to say whether the most harm is occasioned by the absurd empiricism of some pretending opticians, or by the ignorance which renders the purchaser liable to be imposed upon by the grossest fallacies, or prevents him from detecting the unfitness of the spectacles offered to him for his own particular case. Extensively as these useful instruments are employed, there can be no doubt that, were the subject more generally understood, the amount of advantage obtained from them would be greatly augmented and far more widely diffused. The eyes of an individual whose sight is much tried often receive the most serious injury from improper delay in the use of spectacles; while the sight of many persons is prematurely worn out by the use of glasses of too high a power. It is stated under Sight that, whether the glasses used be concave or convex, the lowest power that is available should be used; but in the case of convex or magnifying lenses this principle is too often lost sight of, and the temporary pleasure occasioned by the use of strong magnifiers is indulged at the expense of the visual organs, which will adapt themselves to circumstances of undue excitement, but will not so readily return to their natural state. The use of a single reading-glass instead of spectacles is also very injurious; since, by occasioning one eye to be more used than the other, the power and focal length of the two are rendered unequal. The unsteadiness of the glass is also a disadvantage. The defects of the single hand-glass are not removed by increasing its size so much that both eyes may see through it, because in that case the axis of each pencil of rays will be distorted by passing through the lens at points beside its centre. Hand-spectacles, which are made to fold up into nearly as small a space as a single glass, are better than reading-glasses; but, although steadied in some degree by resting upon the nose, they are by no means equal to spectacles well fitted to and supported by the head.

Varieties in the conformation of the eyes, and in the manner and degree in which they are affected by use, render it impossible to lay down any rule for the focal length of convex glasses for persons of a given age; yet a general idea of the necessary power may be obtained from an average of a great number of cases. The following table, extracted from Dr. Kitchener's 'Economy of the Eyes,' gives the average results of fifty years' experience of an eminent optician, and may prove useful, though it cannot be depended upon as an invariable rule, because, as the author remarks, 'no general rule has more exceptions.'

Years of age.	Inches of focus.	Years of age.	Inches of focus.
40	36	70	12
45	30	75	10
50	24	80	9
55	20	85	8
58	18	90	7
60	16	100	6
65	14		

How little dependence is to be placed upon such deductions, in practice, may be perceived from facts recorded in the same volume, in which instances are given of very young persons who required magnifiers of six or eight inches focus, which are very rarely used except for couched eyes, while in other cases individuals of great age required no glasses at all, or glasses of very low power. The Rev. Mr. Romaine, for instance, was able, at the age of eighty-one, to read a very small print, and never used glasses. In some cases it is advisable to use different spectacles for night and day, to suit different degrees of light; and it is, generally speaking, well to increase the power of the glasses used as the sight becomes weaker from age. Even in this however caution must be exercised, lest, by over-stimulating the eye, its powers be too rapidly exhausted. It should always be borne in mind, both by young and old persons, and in changing spectacles as well as in first taking to them, that the legitimate object of convex spectacles is to restore the natural power (or rather the natural *focus*) of the eye, and not to enable the wearer to see objects larger or more distinctly than with the eye in a strong and healthy condition. Short-sightedness being still less dependent upon age, cannot be met by any rule even so well as the opposite defect.

The power or focus of the lenses is but one of many particulars to be attended to in the selection of spectacles; and even this must occasionally be different in the same pair of spectacles, because of one eye being, either from peculiar conformation, from accidental injury, or, which is very common, from the use of a single eye-glass, of different focus to the other. It is very essential that the frame shall fit comfortably to the head, and be of such form as to bring the centre of each lens exactly opposite to the centre of the eye it is intended to serve. The endless variations met with in the width between the eyes, the total width of the head, and the form of the nose, render it frequently difficult to suit an individual out of even a very large stock of ready-made spectacles. Errors in width, especially, are very common. In a case recently mentioned to the writer, a gentleman had purchased expensive spectacles from the shop of a first-rate optician, with which he was unable to see comfortably. The fact was, that though his head was very large, his eyes were unusually near together; but the spectacles with which he was supplied were adapted to a head of ordinary proportions, and had a bridge of considerable width, as shown in *Fig.* 1, which threw the centres of the lenses farther apart than the pupils of his eyes. His case was completely met by spectacles of the form of *Fig.* 2, with a narrow bridge, but having the side-pieces so formed as to fit a wide head. The proper elevation of the glasses must be regulated by the form of the bridge, adjusted according to that of the nose. Convex spectacles, being used for viewing near objects, may generally be placed lower down upon the wearer's nose than those used by short-sighted persons, who are compelled to hold up their heads in an awkward manner, unless the glasses rest naturally in such a position as to enable him to see distant objects with an erect position of the head. Thus the bridge of concave spectacles must often be nearly straight, as in *Fig.* 3, or made in the form shown in *Fig.* 4, in which case the spectacles may be put on either way, provided the glasses be of equal power. Some opticians recommend the use of large glasses, while others prefer small ones, on the principle that, as a very small portion only of the lens is available for perfect vision, it is useless and injurious to increase the size and weight, and at the same time to impede the access of air to the eyes. Small lenses may be inconvenient in some cases; but when spectacles are used for examining minute objects only, they are to be preferred, if not so small as to render the frames visible to the wearer. The oval form is usually preferred, because it allows most room for the motion of the eye in a lateral direction, without giving unnecessary weight, but semi-ellipses are sometimes used, when the wearer desires to look over or under, as well as through the lenses. Whatever may be the shape of the glass, the convexity or concavity is mostly spherical; but, to meet peculiar cases, lenses may be ground of unusual forms. An instance of this, in the spectacles of Professor Airy, has been mentioned under SIGHT, p. 508. Besides the circumstances that have been enumerated, it is important to attend carefully to the position of the lenses, as regards the angles they form with the axes of the eyes; because any irregularity in this particular must produce distortion, and prove injurious to the eyes. In some cases it may be necessary, in consequence of defects in the eyes, to place the two lenses not precisely in the same plane. Much has been written respecting the various qualities of glass used in spectacles, but it may be taken as a general rule that, except in cases where it is necessary to protect the eyes from an injurious glare of light, the most colourless material is to be preferred. The accurate figure of the lenses cannot be too strongly insisted on, and may be tested by holding the spectacles near to a printed book, and gradually moving them nearer to the eye; by doing which, if the glasses be not well-shaped, the letters will appear distorted. Veins or blebs in the glass are very injurious to the eye, and may be detected by holding the glass between the eye and the flame of a candle, and moving it backwards and forwards, until it appears full of light; when every such defect will be distinctly seen. Scratches are not quite so injurious, inasmuch as they do not produce distortion; yet they too should be carefully avoided. Their diminished liability to injury by scratching forms the principal recommendation of spectacle lenses formed of rock crystal; but some opticians consider their use injurious, owing to their tendency to irregular refraction of the rays of light. Respecting the material of the frames little need be said. If tortoise-shell frames be used, the front should be black, as the variegated colour might be hurtful to the eyes. Very light steel frames have been brought much into use of late years; but some persons prefer silver, although considerably heavier. Dr. Kitchener states that though the superior lightness and elasticity of a steel frame may for a time render it pleassanter than one of silver, the latter 'soon adapts itself exactly and comfortably to the head, and becomes infinitely easier and pleasanter than the springy steel.' It is almost needless to add, that spectacle-frames with double-jointed sides are far preferable to those with a single joint, though the latter are often used by females, to avoid interference with their head-dress.

Fig. 1.

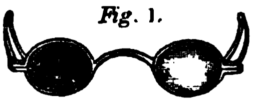


Fig. 2.

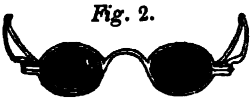


Fig. 3.

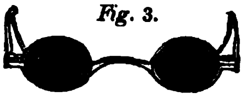
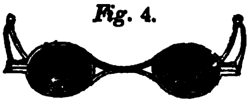


Fig. 4.



Several deviations from the ordinary mode of constructing spectacles may be alluded to. The *periscopic* spectacles of Dr. Wollaston were contrived in order to allow considerable latitude of motion to the eyes without fatigue, by conforming the shape of the glasses to that of the eyes. This is effected by the use of lenses either of a meniscus or concavo-convex form; the concave side being in both cases turned towards the eye. *Fig.* 5 represents, in section, the form of the lens used in convex or magnifying spectacles of the periscopic construction; and *Fig.* 6 shows that of a concave lens, suitable for short-sighted persons. In the former case the curve of least radius is that of the anterior, and in the latter, that of the posterior surface of the lens. Divided spectacles, each glass consisting of two half-lenses, are sometimes used; the upper half of each glass being occupied by a concave lens, or one of very slight convexity, for seeing distant objects, while the lower half has a strong magnifier, for examining things near the eye. Such spectacles have an awkward appearance, on account of the joint along the middle, and require some practice to avoid inconvenience to the wearer; but they have been used with advantage by artists and others requiring to look alternately at near and distant objects. The late Benjamin West, president of the Royal Academy, for many years used such divided glasses, the upper half being of thirty, and the lower of twelve inches focus; and in the latter years of his life used lenses of only eight inches focus in the lower part of his spectacles. Other plans have been tried for obtaining a similar advantage; such as having a second pair of glasses hinged to the frame, and capable of either turning up out of the way, or being placed immediately before the ordinary lenses, to modify their power; or having two distinct pairs of spectacles, capable of being used either separately or together. Spectacles with glazed wings are sometimes used for travelling in; the glasses, which may be plain, unless otherwise required, being of such a form as to shield the eyes from dust. A patent was obtained in 1826 by Mr. A. A. de la Court, for spectacles with a small mirror or reflector so attached to the sides of the frame as to enable the wearer to see objects either beside or behind him; in some cases the reflectors were to be used without ordinary glasses in front, their sole object being to enable an individual to see what is passing around him without turning his head.

Fig. 5.

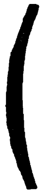
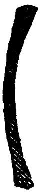


Fig. 6.

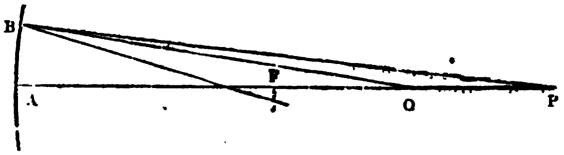


From what has been stated above it is evident that much care and judgment are required in the choice of spectacles, and that it is a task which should not, where it is possible to avoid it, be delegated to another. Cheap as the best glasses now are, an ill-judged economy, or rather parsimony, in the purchase of articles of such importance, should be carefully guarded against; and, while so much ignorance and quackery is often met with, it is especially desirable that every one who stands in need of optical assistance should form a clear conception of the requisite qualities of a good pair of spectacles. It is advisable to try a pair of spectacles for some time before concluding the purchase, because the eyes become so excited by trying a number of glasses as to be unable, immediately, to select those best adapted for ordinary use. The use of the specious name *preservers* should be adverted to, since many are deluded into the notion that the spectacles sold under that name possess some peculiar property which enables them to arrest the progress of that natural change by which most individuals become presbyopic, or long-sighted, as they grow older; a notion which is utterly without foundation. The name is usually applied to convex glasses of thirty-six inches focus, or the *first sight;* but might with equal accuracy be given to any other sort; as the only spectacles to which the wearer can with propriety apply the name are these which, of whatever power they may be, are exactly suited to his particular case. Such spectacles, although they cannot stop the natural changes of the eye, may greatly diminish their inconvenience, and even retard their progress; and therefore may not unfitly be termed preservers; but few things can be more injurious than the use of spectacles of any kind before they are actually wanted, under the fallacious idea that they will maintain the sight unimpaired, notwithstanding the organic changes which accompany increasing years.

SPECTRUM. [Dispersion, vol. ix., p. 20.]

SPE'CULUM, a name frequently given to a mirror used for any scientific purpose, as in a reflecting telescope. For all that is general on this subject we refer to Telescope, intending here only to give the simpler mathematical description of a pencil of rays incident upon a mirror, so as to make this article a counterpart to Lens.

The convex mirror is comparatively of no importance, and the formulæ for it may be easily derived from those for the concave mirror, to which we proceed, referring, as in Lens, to Mr. Coddington's work 'On Reflexion and Refraction' for further information. Let a pencil of rays fall on the spherical mirror AB from the point P, of which rays PB is one. Let PB be reflected into Bp. It is supposed that P is in the radius OA, which is the axis of the mirror; O being the centre of the sphere. Let AO $= r$, AP $= u$, Ap $= v$. The nearer B is taken to A, the more nearly does the point p approach to a certain point F, at which the image of P is said to be formed: not that any rays are actually reflected to F, but because all the rays which are reflected from points near to A fall exceedingly near to F, which is the cusp, and brightest point of the Caustic. If AF $= w$, the position of F is determined by the equation—



$$\frac{1}{w} = \frac{2}{r} - \frac{1}{u} \ldots . (1)$$

The point p however is always nearer to A, or lies between F and A, and pF, or the longitudinal aberration, is thus found: let the length of the arc AB be y; then

$$p\,\mathrm{F} = \frac{w^2}{r}\left(\frac{1}{r} - \frac{1}{u}\right)^2 y^2 \;\ldots . \;(2)$$

very nearly, if y be not very great. And for the lateral aberration Ft, we have

$$\mathrm{F}\,t = \frac{w}{r}\left(\frac{1}{r} - \frac{1}{u}\right)^2 y^3 \;\ldots . \;(3).$$

Again, there is for all the rays proceeding from P, after reflection, a circle through which they all pass, as in Lens (page 422). The distance of this circle of least aberration from the focus F towards A, is the following expression:—

$$\frac{3}{4}\,\frac{w^2\,\mathrm{Y}^2}{r}\left(\frac{1}{r} - \frac{1}{u}\right)^2 \ldots . \;(4),$$

if Y be the whole semi-arc of the mirror: it is therefore three-fourths of the longitudinal aberration of the extreme ray. The diameter of this circle of least aberration is

$$\frac{1}{2}\,\frac{w\,\mathrm{Y}^3}{r}\left(\frac{1}{r} - \frac{1}{u}\right)^2 \;\ldots . \;(5),$$

or one-half the lateral aberration of the extreme ray.

When the rays fall parallel to each other on the mirror, u is infinite, and we have $\frac{1}{2}r$ for the value of w, $\frac{y^2}{4r}$ for the longitudinal aberration, $\frac{y^3}{2r^2}$ for the lateral aberration, $\frac{3\mathrm{Y}^2}{16r}$ for the distance of the circle of least aberration from the focus, and $\frac{\mathrm{Y}^3}{4r}$ for its diameter.

When $u = r$, or the incident pencil is thrown from the centre, it is returned again to the centre, and there are no aberrations.

When u is less than r, or P is between O and A, F then falls beyond O, and, as P approaches to the middle point of OA, recedes without limit. When $u = \frac{1}{2}r$, or P is at the middle point of OA, all the reflected rays are parallel to one another and to the axis of the mirror. And when u is less than $\frac{1}{2}r$, w becomes negative, or the focus is on the other side of the mirror, and the reflected rays diverge: but only the latitudinal aberration alters its sign.

The formulæ for a convex mirror may be found by making r negative in those for a concave mirror. Hence w is always negative, or the focus of every pencil is behind the mirror: the longitudinal aberrations change sign, but not the latitudinal ones: and as w has also changed sign, the effect is that p is always nearer to the mirror than F, as before.

The image in a convex mirror is always upright; and in a concave one always inverted, except when the object falls between the principal focus (or middle point of the radius) and the mirror.

SPECULUM METAL. The best composition for the metals of reflecting telescopes is a subject which has been much investigated; about 70 different mixtures were tried by the Rev. John Edwards, the particulars of which are stated in the 'Nautical Almanac' for the year 1787; he found copper 32, tin 15, brass 1, silver 1, arsenic 1, meaning of course, arsenious acid or white oxide, to form an alloy which was the whitest, hardest, most reflective, and took the highest polish.

The following composition is stated by the Rev. James Little (*Trans. Irish Academ.*, vol. x.) as being in every respect sufficient for the purpose, and inferior to none in whiteness, lustre, and exemption from tarnish: 32 parts of best bar-copper, 16½ parts of tin, 4 parts brass pin-wire, and 1¼ arsenic. He first added to the fused brass about an equal quantity of the tin, and put the mass cold into the melted copper, supplying afterwards the remainder of the tin, and then the arsenic; the copper, he states, was fluxed with black flux of two parts tartar and one of nitre.

Mr. Little states that he found silver, which enters into the composition of Mr. Edwards's metal, when used even in very small quantity, had an extraordinary property of rendering the metal so soft that he was deterred from employing it.

The following appearances are stated by Mr. Little to have served him as rules for determining the goodness of the compound metal:—'When the metal was melted, and before I poured it into the flask, I always took about the quantity of an ounce of it, with a small ladle, out of the crucible, and poured it on a cold flag; and observed the following appearances:—First, if the metal assumed, in cooling, a lively blue or purple colour, commonly intermixed with clouds or shades of green or yellow; and if, when broken, the face of the fracture exhibited a silvery whiteness, as bright and glistening as quicksilver, without any appearance of grain or inequality of texture, then the degree of saturation of the metal with the tin was complete and perfect.' Secondly, if the surface of the metal became of a dun or mouse colour, and especially if of a brown or red, and when broken, the fracture exhibited a more yellow or tawny hue than that of quicksilver, then the quantity of tin in the composition was deficient, and it was necessary to add more. Thirdly, if the colour was a uniform dull blue, like lead, and, when broken, discovered a dull colour, with a coarse grain, like facets, the due saturation was exceeded, and there was an over-proportion of tin in the metal.'

From what is afterwards stated, it appears that Mr. Little on many occasions employed a glass flask, smoked with a candle made of resin mixed with tallow, as a mould for casting. He states that he supposes, with others, that if the speculum metal be granulated by pouring it, when first melted, into water, and then fused a second time, it will be less porous than at first.

SPEED, JOHN, born 1542, died 1629, an English historical writer of the reigns of Elizabeth and James I., was born at Farrington in Cheshire, but came early in life to London, where the rest of his days were spent. He was brought up to the business of a tailor, and seems to have supported himself by it during the greater part of his life;

for he does not appear as an author before the year 1608, when he was in the sixty-sixth year of his age. He was however, during that time, amassing treasures of curious historical knowledge, the possession of which brought him into the acquaintance of Sir Fulk Grevile, who drew him forth from his obscurity, and, it is supposed, afforded him the means of publishing the large works of which he is the author or editor. The first of these is a collection of maps of the English and Welsh counties, with plans of cities, and engravings of various antiquities, said to have been first published in 1608; but when formed into the work entitled 'The Theatre of the Empire of Great Britain,' bearing the date of 1611. In this work he owed much to the labours of Christopher Saxton and John Norden. There have been several editions of it. The other work of Speed's is a history or chronicle of England, entitled 'The History of Great Britain under the Conquests of the Romans, Saxons, Danes, and Normans,' originally published in 1611. In this work are engravings of coins, and also of the great seals of England, then for the first time published; but on the whole it is a compilation of no great merit. He was also the compiler of a set of Tables of Scripture Genealogy, comprising much of the genealogical information contained in the sacred books, exhibited in the form of pedigrees. A few other writings of small value are ascribed to him. He was buried in the church of St. Giles, Cripplegate, where a monument was raised to his memory.

SPELMAN, SIR HENRY, born 1562, died 1641, one of the most distinguished of the band of English antiquaries who lived in the reigns of James I. and his successor; the friend of Camden, Cotton, Selden, Dodsworth, Dewes, Dugdale, and others. He was a gentleman of antient family at Congham in Norfolk; educated at Walsingham in that county; from thence he removed to Trinity College, Cambridge, and at the age of eighteen was entered of Lincoln's Inn, with the design of studying the law. Instead however of proceeding to the practice of the law as a profession, he determined early in life to devote himself to historical and antiquarian research, the study of antient manuscripts and records, with a particular view to two objects, the elucidation of the history and antiquities of the county of Norfolk, and the investigation of the origin of the laws and institutions of the country. He did not keep himself wholly unconnected with public affairs, serving the office of sheriff of his county, and acting as a commissioner for determining disputed claims to lands and manors in Ireland. But in 1612 he withdrew from all public employment, and settled in London as the most favourable field in which to pursue his researches; and it was not till this time, when he was fifty years of age, that he began to bring before the public any of those works, the result of his long studies, which are the secure basis of his fame. The earliest of them is his treatise 'De non Temerandis Ecclesiis,' the object of which is to inculcate respect for the property belonging to the church. This involved him in controversies, in which he appears as the author of two tracts in defence of the principles of his work. In 1626 appeared the first part, which is all that he himself published, of a most valuable glossary of terms which occur in records and other antient historical writings. This work he entitled 'Glossarium Archaiologicum:' but it contains only as far as the letter L. The work was however completed from his manuscript after his death, partly by his son, but principally by Sir William Dugdale, under whose superintendence it was published. His other great work he left in like manner incomplete. This is his 'Concilia, Decreta, Leges, Constitutiones in Re Ecclesiastica Orbis Britannici,' of which the first volume was printed in 1639, and the second in 1664. Another posthumous work is his 'Villare Anglicanum,' 1656, a work of no great value. In 1698 there was printed at Oxford a folio volume entitled 'Reliquiæ Spelmannianæ,' or his posthumous work relating to the laws and antiquities of England. Among his manuscripts he left one which he entitled 'Archaismus Graphicus,' being a collection of the contrasts which he had observed in the old writings, with the explanation of them. This manuscript has been often transcribed, and is useful to those who have occasion to read early writings. He died at the house of his son-in-law Sir Ralph Whitfield, in the Barbican; and his body was interred, by the special order of Charles I., in Westminster Abbey, near the monument of Camden.

His son, Sir John Spelman, inherited the taste and a portion of the learning of his father. He is the author of a 'Critical Life of King Alfred,' Oxford, fol., 1678.

SPELTER. [ZINC.]

SPENCE, JOSEPH, was born at Kingsclere, Hampshire, April 25, 1699. His father was rector of Winnal, near Winchester, at which school Spence was educated, and became fellow of New College, Oxford, in the year 1722. In 1728, having entered into orders, he was chosen professor of poetry, and presented to the rectory of Birchanger, in Essex. At the close of the year 1730, he accompanied Charles, earl of Middlesex, afterwards duke of Dorset, on a tour through France and Italy, and returned in July, 1733, having been in his absence re-elected professor of poetry. His essay on Pope's translation of 'The Odyssey,' published some years before, had introduced him to the notice of that poet, with whom he became very intimate, and published at his request, in 1736, Sackville's tragedy of 'Gorboduc,' with a prefatory account of the author. In 1739 he made another tour to the Continent, with Henry, earl of Lincoln, afterwards duke of Newcastle, and returned to England in 1742. In the same year he was presented by his college to the rectory of Great Horwood, Bucks, and succeeded to the vacant professorship of modern history. In 1747 he published his 'Polymetis; or an Enquiry concerning the Agreement between the Works of the Roman Poets and the Remains of the Antient Artists, being an attempt to illustrate them mutually from each other:' the sale of which work was very profitable to him. In 1754 he was made a prebendary of Durham cathedral.

The latter years of Spence were passed in retirement in the country, where he indulged his favourite taste for gardening. He died August 20, 1768. Johnson ('Life of Pope') has observed of him with truth, that he was 'a man whose learning was not very great, and whose mind was not very powerful. His criticism however was commonly just; what he thought he thought rightly; and his remarks were recommended by his coolness and candour.' The 'Polymetis' has been considered worthy of some discussion by Lessing in his 'Laocoon,' who shows that the author has not distinguished with sufficient accuracy the boundaries of the several provinces of art, and has consequently attempted to make the range and power of the sculptor exactly commensurate with that of the poet in treatment and choice of subject. The design however of such a work is valuable, and, with the more exact knowledge and extensive views of modern archæology, might be successfully carried out.

Spence also collected an interesting volume of anecdotes, to which the biographers of Pope are much indebted for records of his conversations. It was published by Malone, and also by Singer in 1820, with a Life of the author, and many letters from distinguished contemporaries and friends. This correspondence exhibits Spence's private character in a very favourable light, and shows him to have been of an affectionate and benevolent disposition, and of simple manners. A few smaller publications are noticed in the above-mentioned biography. See also Nichols's 'Literary Anecdotes of the Eighteenth Century,' ii. 373-7.

SPENSER, EDMUND, the 'prince of poets,' as the inscription on his monument terms him, is usually ranked with Chaucer, Shakspere, and Milton. Like them, very little seems to be known of his personal history, and that little is extremely contradictory and obscure.

He was born in the year 1553, in East Smithfield, London. He appears to have been well connected, but as to this there is no certainty. The circumstance of some of his minor poems being addressed to Anne, daughter of Sir John Spenser, who married Lord Mounteagle, and at his decease Henry, lord Compton, and also her sister Elizabeth, wife of George Cary, who was created Lord Hunsdon in 1596, furnish some foundation for this opinion. Nothing is known of Spenser's parents. We find him entered as a sizar at Pembroke Hall, Cambridge, on the 20th May, 1569, in his sixteenth year. In 1572 he took the degree of A.B., and in 1576 that of A.M. He soon afterwards left Pembroke Hall, in consequence, it is stated, of an unsuccessful competition for a vacant fellowship with Launcelot Andrewes, bishop of Winchester. But some of his biographers state that no such competition ever occurred; others, that he left college immediately after taking his degree. On quitting Pembroke Hall, he went to reside with some friends in the north. During this retirement he wrote his first work, the 'Shephearde's Calendar,' and fell in love with his 'Rosalind,' who is by some supposed to have been a real personage. This work was first published in quarto in 1579, and dedicated to the 'ever-memorable' Sir Philip Sidney.

Dr. Birch, in his 'Life of Spenser,' asserts that the dedication of the 'Shephearde's Calendar' was Spenser's first and only introduction to Sir Philip Sidney. The common story of Sir Philip's ordering five pounds to be given to the author, who waited without, and gradually increasing the sum in proportion as his admiration was awakened, is treated with discredit by all Spenser's later biographers. Sidney appears to have warmly patronised the poet, for Spenser dates the letters to Gabriel Harvey from Leicester House, Sir Philip's ordinary residence, and many expressions indicative of warm attachment on the part of Spenser and friendship on that of Sidney, are contained in them. It is remarkable that some of Spenser's contemporaries seem to have believed, and the belief seems to have been general, that Sir Philip Sidney himself was the author of the 'Shephearde's Calendar.' The subject is briefly discussed in Mr. J. P. Collier's 'Poetical Decameron,' to which the reader is referred. The fact of the work being published anonymously, no doubt greatly aided the general belief in this report.

In 1580 the 'Foure Epistles' which passed between Spenser and Gabriel Harvey appeared. The subjects of these letters were an earthquake which happened at that time in London, and satirical poetry. Spenser is addressed under the name of 'Immerito.' Nash, in his 'Have with you to Saffron Walden,' 1596, speaks of these letters as 'ragged remnants.' This and other satirical cuts produced a tract from Harvey in the ensuing year, called 'The Trimming of Thomas Nash;' but Spenser's fame being by this time well established, Nash's satire may be considered as confining itself to Harvey's share in the letters.

In the latter part of the year 1580, Spenser was sent to Ireland as secretary to Lord Grey of Wilton, by the earl of Leicester, Sir Philip Sidney's uncle. His services in that capacity procured him, in 1586, a grant from the crown of 3028 acres of land forfeited by the earl of Desmond. Kilcolman, in the county of Cork, was the name of this estate.

In the same year (1586) he lost his kind friend and patron Sir Philip Sidney, a mournful event which produced 'Astrophel,' a pastoral elegy on Sir Philip. This work was not published until the year 1595.

During his residence at Kilcolman, the 'Faerie Queen' was most probably begun. In 1590 the first three books appeared. In 1591 'Colin Clout's come home again,' was published. This poem is dedicated to Sir Walter Raleigh, who appears to have become, after Sir Philip Sidney's death, Spenser's principal friend and patron, and who is generally believed to have introduced him to Queen Elizabeth. The well-known story of the queen rebuking Lord Burleigh for his parsimony, and desiring that Spenser should have 'reason for his rhyme,' has often been contradicted, and as often asserted. Mr. Collier, in his 'Annals of the Stage,' gives the following curious extract from Henslowe's 'Diary' in corroboration of it:—'May 4, 1602. When her majestie had given order that Mr. Spenser should have a reward for his poems, but Spenser could have nothing, he presented her with these verses:—

'It pleased your grace upon a tyme
To graunt me reason for my ryme,
But from that tyme until this season,
I heard of neither ryme nor reason.'

Whether these lines produced any effect is uncertain, but Mr. Malone discovered, among the records deposited in the Rolls chapel, a grant of fifty pounds per annum from the queen to Spenser. It is not easy to reconcile his possession of this annuity with Ben Jonson's account of his death.

In 1591 were also published a collection of minor poems, entitled 'Complaints,' and the second part of the 'Faerie Queen.' The 'Complaints' comprise 'Mother Hubbard's Tale,' 'Tears of the Muses,' 'Virgil's Gnat,' 'Petrarch's Visions,' 'Bellaye's Visions,' and the printer of the edition of 1679 says that various other minor poems are 'either wholly lost or unkindly concealed from the publique by private hands,' an assertion of still earlier date. The title-page of the Second Part of the 'Faerie Queen' mentions that the work would be in twelve books. The six books which were wanting to complete the work are stated to have been lost in their passage from Ireland by the carelessness of Spenser's servant; but Fenton the poet denies this. Two 'Cantos of Mutability,' which were first published in the collection of 1609, appear to be all that remain to us of the missing six books.

In 1594 he married, but who the lady was is unknown. He alludes to the progress of his passion in the 'Amoretti,' but so obscure is this portion of his history, that it is uncertain whether this was a first or second marriage.

In 1596 he published four 'Hymns,' addressed to the countess of Cumberland and Warwick. In the same year he wrote his masterly 'View of Ireland,' published by Sir James Ware in 1633. His 'Prothalamion,' a nuptial poem, appeared about the same time.

The close of Spenser's career was lamentable. Tyrone's rebellion broke out in 1598. Spenser had been nominated sheriff of Cork a little time previously, by the queen; and to this circumstance, and not to his cupidity, as some writers have asserted, should the awful event detailed by Jonson to Drummond of Hawthornden, be ascribed. Ben Jonson said that 'the Irish having robbed Spenser's goods and burnt his house and a little child new born, he and his wife escaped; and after he *died for lake of bread* in King Street, and refused twenty pieces sent to him by my lord of Essex, adding, "He was sorrie he had no time to spend them."'

Spenser died on the 16th of January, 1598-1599, in King Street, Westminster, though let us hope, for the honour of his numerous friends, not for *lake of bread*. He was buried, at his own request, near Chaucer, in Westminster Abbey, at the charge of the earl of Essex. Thirty years after, the countess of Dorset erected a monument to him, which, in 1778, was restored by the Fellows of Pembroke Hall.

Spenser left two sons, Sylvanus and Peregrine. Hugolin, the son of Peregrine, was restored to the estate in Ireland by Charles II.; but adhering to the cause of James II., he was outlawed, and the estate reverted to the crown. A William Spenser petitioned the House of Commons for its restoration about the year 1700, pleading his ancestry and services as a guide to the royal troops in Ireland; and also that Hugolin 'is very old and unmarried.' He obtained the grant of the estate through the interest of the earl of Halifax.

Pope observed of Spenser, 'There is something in Spenser that pleases us as strongly in one's old age as it did in one's youth. I read the "Faerie Queen" when I was about twelve, with a vast deal of delight.' Campbell calls Spenser 'The Rubens of English poetry.' Speaking of the 'Faerie Queen,' a writer in the 'Retrospective Review,' vol. ii., p. 143, remarks, 'The wonderful fertility of invention, the richness of imagination, the poetical prodigality of the "Faerie Queen" has our unfeigned admiration. The design, it is true, might have been more judiciously framed and the interest of the reader more deeply excited, but nothing can surpass the correctness of description, whether real or allegorical.' This judgment appears to be correct. With all its beauties, a continuous perusal of the poem is wearisome to many readers.

Of Spenser's minor poems it is unnecessary to say much. 'The Retrospective Review' unequivocally condemns them. The 'View of Ireland' will well repay perusal. The style is bold, and the handling of the subject very masterly. The 'Daphnoida,' usually printed with the 'Astrophel,' is a poem of much merit. Sir Philip Sidney, in his 'Defence of Poesie,' says he finds much good poetry in Spenser's works, but can hardly allow the use of the antiquated language. Warton's learned dissertation on the model of the 'Faerie Queen,' and the reasons for the adoption of an antiquated style, are well known.

There are a vast number of editions of Spenser's works. Lowndes, in his 'Manual,' enumerates thirty-two different editions of his works, and thirteen publications relative thereto. The first collection was that of—

1609, folio.
1679, folio; successive editions, edited
1715, by Hughes;
1751, with Life and notes, by Dr. Birch;
1758, by Church;
—— by Upton;
1805, by Todd, with notes and Life;
1806, by Dr. Aikin;
1825, with Essay on Life, by G. Robinson, Esq.,
Warton's 'Observations,' 1754; Jortin's 'Observations, 1734.

Notices by contemporaries occur in the 'Skialetheia,' 1598, a satirical poem, in the very rare 'Eclogue upon the Death of the Right Honourable Sir Francis Walsingham,' by Watson, 1590; in a 'Discourse of English Poesie,' by Webbe, 1586; an Eclog,' addressed to him by Lodge, 1595; Notices, by Camden, in his 'Annals,' and by Sir James Ware, in 1633; and he is eulogised by almost every poet of the Elizabethan æra.

(Dr. Birch's *Life*; *Theatrum Poetarum*; *Biographia Poetica*; Collier's *Decameron*; and *Annals of the Stage*. *Biographia Britannica*; Ritson's *List of Poets*; Lowndes's *Bibliographer's Manual*.)

SPERANSKI, MICHAEL, was born in 1771, in the government of Vladimir. His father, a clergyman of influence, designed him for the church, and sent him to the ecclesiastical academy of St. Petersburg, after a course of preliminary studies in the seminary attached to the convent of Rozhdyêstvenski. Young Speranski however felt no inclination for theology, and devoted most of his time to the study of mathematics, in which he made such proficiency that at the age of twenty-one he was appointed to the professorship of mathematical and physical sciences attached to the academy. He retained this professorship until 1797, when, owing to ill health, he left his situation, retired to a village in the neighbourhood of St. Petersburg, and turned his attention to political science. During this period he formed the acquaintance of Count Kotchubey, who, upon the accession of Alexander, obtained for him the office of secretary to the Imperial council. In 1802 Speranski proceeded to organise the ministry of the interior under the direction of his patron. His plans were not completed till 1806, but were then adopted with the complete approbation of the emperor and his advisers. It was further determined that all the departments of government should be organised on the principle laid down by the young statesman, who had so completely gained the confidence of the government, that in 1808 he was named assistant-minister of justice and governor of Finnland. The latter situation comprised the chancellorship of the university of Abo; but before he proceeded to execute his intended improvements in the system of national education, he reorganised the legislative commission, which had resumed its labours in 1804. [Russia, p. 265.] In the same year his plans for reforming the public schools were taken into consideration, and by his advice all the funds for public instruction received large additions. In the following year he had already obtained power enough to propose a new system of finance, an improved organization of the council of the empire, and a diminution of the power of the senate. All these measures were carried into execution, and Speranski, having thus brought all the chief branches of administration into the hands of the Imperial council, found himself in the capacity of its secretary, at the head of the affairs of the empire.

In the space of two years the whole system of government was changed; a new penal code was introduced; the law for the protection of commerce greatly improved; much of the paper money in circulation was replaced by a new coinage; and the whole method of taxation was remodelled. Speranski enjoyed in the highest degree the confidence of the emperor, who approved of all the changes proposed by him, and seems to have left everything in his hands. In 1809 Speranski had become a member of the privy council. The period between 1808 and 1812 was that of Speranski's greatest prosperity, and it is to these years of his almost unlimited power that some of the best institutions in Russia owe their origin. The nobility, who had lost many of their privileges under his reforming administration, insisted on his dismissal in 1812. The approaching invasion of Napoleon intimidated the emperor, who was in want of money, and felt that unanimity was indispensable in so critical a moment.

In the middle of March, 1812, Speranski was carried off to Nischnei Novgorod with the utmost precipitation, under the pretext that his life was in danger from the French. Six months after he was exiled to Perm, where, suffering from want and vexations of all kinds, he was obliged to apply to the government for a small pension, which was granted, and enabled him to live in retirement. Two years afterwards, a country-seat in the neighbourhood of St. Petersburg was restored to him; and he also obtained permission to live there. In 1817 he was unexpectedly appointed to the government of Pensa; and two years afterwards to that of Siberia. He devoted the first two years of his administration to a journey through the provinces which were entrusted to him, and he was thus led to project a new system of administration for Asiatic Russia. In 1821 he delivered his plan into the hands of the emperor Alexander, who received him with the greatest distinction, and restored him to his seat in the Imperial council of which his exile had deprived him. In 1825 the emperor Nicholas nominated him to the presidency of his chancery, and it was under his able direction that the celebrated 'Svod Zakônow' (or Corpus Juris), which contains the laws and ordinances from 1694 to 1833, was completed. About this time he published his work, 'Précis des Notions Historiques sur la Réformation du Corps des Lois Russes,' &c. (Petersb., 1833).

Speranski died in 1840, at the age of sixty-nine years. His manners were pleasing, and his aspect indicated genius and commanding power.

SPE'RGULA, from *spargo*, 'to scatter,' the name of a genus of plants belonging to the natural order Caryophylleæ. It is possessed of a 5-parted calyx, 5 undivided petals, 5 or 10 stamens, 5 styles, 8-celled, 5-valved, many-seeded capsule. This genus is found in fields and cultivated ground, especially on sandy soils, all over the world. It is divided into two sections, one of which possesses stipules; the other is without these organs. On this ground many writers have constituted new genera. Cambessedes placed the stipulate species in his genus *Spergularia*, whilst Reichenbach has placed the ex-stipulate species in a genus by themselves, under the name of *Spergella*. But the old name with the two sections is most generally adopted. *Spergula arvensis*, the corn-spurrey, or yarr, has its leaves in whorls, with minute membranaceous stipules at their base, the stalk of the fruit reflexed, and the seeds hispid, with a narrow border. It is a native of Europe, in gardens and fields, and in North America on the banks of the Columbia, and is common in Great Britain. Though not cultivated in England, this plant is of some importance on the Continent, and in the Netherlands and Germany is sown as fodder for animals. It is said to be well adapted for poor soils in which scarcely any thing else will grow. It may be sown and reaped in eight weeks, either in autumn or spring, and may be used as fodder either fresh or as hay. Cows and sheep are fond of it, and the milk of the former is said by Von Thaer to be enriched by it, and the mutton of the latter preferable to that of which sheep are fed on turnips. Hens also eat spurrey, and they are said to lay a greater number of eggs in consequence.

Three other species, the *S. nodosa*, knotted spurrey, *S. saginoides*, pearl-wort spurrey, and *S. subulata*, awl-shaped spurrey, are also natives of Great Britain, but are neither ornamental nor useful.

SPERMACETI, or CETA'CEUM, a fatty material, obtained from the Physeter macrocephalus, a species of whale, generally met with in the South Seas, but occasionally also on the coast of Greenland. This animal, called the cachalot, or white whale, is of immense size, frequently sixty or more feet in length, of which the head constitutes one-third. This part is the chief reservoir of the spermaceti, which however is found in several other parts of the body, mixed with the sperm oil. It is mostly lodged in two large cavities of the upper jaw, one above and the other below, divided from each other by the nostrils. These cavities are subdivided into numerous cells, of unequal size, by ligamentous or tendinous partitions; these partitions are of the same nature as those which separate the fat in other animals [Adipose Substance], but owing to the great size of the creature, of a larger and stronger kind. The purest spermaceti is contained in the largest and least ligamentous cells. The object of the great accumulation of spermaceti in the head is supposed to be to float that enormous mass. The part in which it is lodged is quite distinct from the cranium, containing the brain, which spermaceti was at one time supposed to be.

During the life of the animal the spermaceti is in a fluid state; and on the head being opened, has the appearance of an oily, clear, white liquid. On exposure to the air the spermaceti concretes and deposits from the oil. They are then separated, and put into different barrels. The head of a whale sixty-four feet in length has been found to yield twenty-four barrels of spermaceti, and from seventy to one hundred barrels of oil. When brought to England, the spermaceti has not a white shining silky appearance, but a yellowish colour, owing to the presence of some oil. To separate this it is filtered in bags, and the solid part, which remains, is then 'submitted to pressure in hair bags, placed in a hydraulic press. It is then melted in water, and the impurities skimmed off. It is then remelted in a weak solution of potass. It is then fused in a tub by the agency of steam, ladled into tin pans, and slowly allowed to concrete into large, white, translucent, crystalline masses.' (Pereira.) Even after all these processes it still retains a portion of oil, which can only be removed by boiling in alcohol, from which, on cooling, it is deposited in perfectly pure lamellated crystals. It is then called *cetine*. It is also soluble in æther, and volatile and fixed oils. It has a a white, pearly, or silky appearance, considerable tenacity, but may be broken into mica-like scales, with a smooth or fatty feel, slight fish-like odour, and mild mawkish taste. Its specific gravity is ·943; it melts at 112°, and when a lighted body is applied to it, it burns with a clear flame.

Sulphuric is the only acid which dissolves it. It is only partially dissolved by the fixed alkalis, and is with difficulty saponifiable. Hot caustic ammonia forms with it an emulsion, which is not decomposed on cooling.

Long exposure to the air renders it rancid; it may be again purified by washing in a warm ley of potass. It should be protected from air and light.

A hundred parts of spermaceti consist of sixty parts of margaric and oleic acids, forty parts of ethal, and 0·9 parts of a yellow extractiform substance. The ultimate composition of cetine seems to be—carbon, 81; hydrogen, 12; oxygen, 5.

Spermaceti possesses the properties common to fatty matters. It is bland and demulcent, with considerable nutritive qualities, when taken internally. It was formerly much used in colds and coughs, united with mucilage or syrup, to shield the throat from the irritation of the air, also in dysentery. Triturated with sugar-candy, and having warm milk added to it, it is a mild nutrient article, fit for children or old persons. It is however now chiefly employed externally as an ingredient in ointments and cerates. It is also largely used to form candles.

SPERMACOSE (*σπέρμα*, a seed), a genus of plants of the natural family of Rubiaceæ, so named from the seeds being terminated by two remarkable points. The genus is characterised by having the calyx 2-4-dentate Corol 4-lobed. Stigma bifid or entire. Capsule 2-celled, crowned with the limb of the calyx, which is sometimes obliterated. Seeds oval, oblong, marked in the inner side with a longitudinal furrow. The species are very common and abundant in tropical parts of the world; have usually quadrangular stems and branches, with small white or blue flowers. Some of the species, as *S. Poaya* and *ferruginea*, are useful, like other plants of the same family, in having roots which form substitutes for Ipecacuanha.

SPERMADICTYON, a genus of the natural family of Rubiaceæ, named from *σπέρμα*, seed, and *δίκτυον*, a net, from the manner in which the seeds cover the placenta. The genus is characterised by having the calyx tube ovate, 5-partile, persistent; corol densely pubescent; tube long. straight, 5-lobed. Stamens 5, included within the corol-tube. Stigma 5-cleft; capsule crowned by the calyx, contains 5 nuts. The species form shrubs with white and light blue very fragrant flowers, with leaves lance-shaped, shortly petioled; stipules short. They are natives of India, especially near mountains. *S. suaveolens*, the Hamiltonia of Roxburgh, ascends the Himalayas to elevations of 3000 feet, and has been cultivated in this country as a stove-plant.

SPERMESTES, Mr. Swainson's name for a subgenus of FRINGILLIDÆ.

SPERMOE'DIA, the name given by Fries to a certain altered form of the seeds of rye and other grasses, and to which the name *ergot* and *spurred* grain has been commonly applied. The bodies to which this name is given are solid elongated masses, growing from the inside of the ovary of grasses, rootless, of a firm mealy substance, with a concrete scaly or powdery crust. Fries says they have no proper fructification; but other authors state that the interior is composed of flocci and sporules firmly compacted into a solid homogeneous mass. The precise nature of the grains, both on account of their peculiar medicinal effects and their poisonous quality when taken as food, have excited much attention amongst botanical observers. Willdenow supposed the ergot to be merely a diseased state of the grain, and stated that he could produce it at pleasure by excessive watering. General Field made some observations which led him to suppose that it originated from the puncture of insects. De Candolle and others more recently determined that the ergot was a distinct parasitic plant, developing itself from the ovary of grasses, and referred it to the genus *Sclerotium*. Fries, in his 'Systema Mucologicum,' considered the ergot to be a diseased state of the grain, and placed it in the doubtful genus Spermoedia. More recently this production has been carefully investigated by Mr. Edwin Quekett, who communicated the results of his observations to the Linnæan Society in November, 1838. From his examinations, it appears that the great mass of the ergot consists of the albuminous matter of the grain in a diseased state. The interior of these grains had been described as being filled by flocci and sporules compacted together; but on examination with the microscope, after the outside was scraped off, the interior was found to be composed of irregular cells filled with globules of a fatty oil. The cause of this changed state of the internal parts of the grain was found on the outside of the ergotized grain, where a number of very small oval or elliptical bodies were found, about 1-6000th of an inch in diameter, and containing within them a number of smaller granules. These were found to be the sporidia and sporules of a fungoid plant, which, attached to filaments, developed themselves early in the growth of the grain, and produced its diseased state. Mr. Quekett has since succeeded in obtaining ergotized rye by applying to healthy plants of rye water containing the sporules of this fungus diffused through it; thus affording additional proof that plants become diseased by imbibing the seeds or sporules of other plants from the soil in which they grow. For the plant as above described, Mr. Quekett proposes the name *Ergotætia abortans*. It belongs to the tribe *Mucedines* and suborder Concomycetes of the order Fungaceæ of Fries, thus occupying a different position to the *Sclerotium Clavus* of De Candolle or the *Spermoedia Clavus* of Fries. For the medical properties, &c., see ERGOT.

SPERMO'PHAGA, Mr. Swainson's name for a subgenus of FRINGILLIDÆ.

SPERMO'PHILA, Mr. Swainson's name for a subgenus of FRINGILLIDÆ.

SPERMOSPI'ZA, Mr. G. R. Gray's name for a genus of FRINGILLIDÆ, belonging to the subfamily *Coccothraustinæ*, according to his arrangement.

SPESSART. [GERMANY.]

SPEUSIPPUS, the son of a sister of the philosopher Plato, was born in Attica, in the demus of Myrrhinus. He was a disciple of his uncle Plato, whose general principles he adopted in his philosophy; but he differed from his master, as he mixed up empiricism with the idealism of Plato, and consequently attributed more importance to the senses, and also combined with his system several Pythagorian principles. In some of his works, which are mentioned by Diogenes Laertius and Athenæus, he wrote about plants, animals, and natural objects, into which he inquired more deeply than Plato. (Sext. Empir., *adv. Math.*, vii. 145.) But on the whole he must be regarded as the continuator of the Platonic philosophy, and as the founder and the head of the old Academic school of philosophy, in which light he was always considered by the antients themselves. Among his disciples several females are mentioned. Some antient writers blame him for having taken money for his instruction, and for having indulged in sensual pleasures more than was becoming to a philosopher. A long list of his works, of which only few fragments are preserved, is given by Diogenes Laertius (iv. 1).

(Brandis, *De Perditis Aristot. Libris, de Ideis et Bonis*, p. 46. &c.; Ritter and Preller, *Historia Philosophiæ*, &c., p. 228, &c.)

SPEY, a river in Scotland, and one of the largest in Great Britain, as it runs rather more than 96 miles, and drains an area of 1300 square miles. A small lake, called Lake Spey, is its source. This lake is about 10 miles south of the southern extremity of Loch Ness, and is surrounded by the summits of the Coryaranik Mountains, a continuation of the Monadh Leadh Mountains, which traverse Scotland, between 57° and 57° 30,′ in a north-east and south-west direction. The torrents which descend from the adjacent mountains supply the lake with water. The river issues from the eastern side of the lake and continues to run in that direction between high and naked mountains, and in a very narrow and uninhabited glen, for about 10 miles. It then enters, near Garvimore, a plain of moderate extent, which towards the north gradually rises to some moorlands, which extend to the base of the Monadh Leadh Mountains; whilst on the south, the plain, which gradually ascends, terminates on the high ground which lies between Loch Loggan and the Spey, and connects the Monadh Leadh Mountains with the mountains of Drumnasher, or the north-western portion of the Grampians. The greater part of the plain is occupied by the moorlands, but the lower part along the banks contains excellent pasture-ground. Loch Spey is about 1200 feet, and the plain between Garvimore and Laggan 1000 feet above the sea-level. A few miles below Laggan the river turns to the north-east, in which direction it continues to its mouth. It is joined from the south by the river Truim, which descends from the mountains of Drumnasher in a northern direction, and runs between mountains and elevated moorlands in a narrow and nearly uninhabited valley. This river may be considered as the southern branch of the Spey. After its confluence with the Truim, the Spey continues to flow in a fine valley, from one to two miles wide, whose surface is so little above the bed of the river, that the greater part of it is subject to frequent inundations, which circumstance, together with the severe climate, the effect of its elevation, prevents cultivation, but renders the country fit for pasture and meadow-land. On the south-east of this part of the valley, the country rises with a moderately gentle slope towards the Grampians, but being well drained, the surface is not swampy, and is chiefly covered with forest-trees. These are the forests of Kingussie and Abernethy, from which great quantities of timber have been taken in recent times, and floated down the river to Garmouth. Several small rivers traverse this country and join the Spey above Rothiemurches, but none of the valleys are wide enough to be inhabited, with the exception of that of the Fesshie, which is inhabited to the distance of about 6 miles from the banks of the Spey. Before the Fesshie joins the Spey, this river flows through Loch Inch, which is about 3 miles long and a mile wide, and surrounded by fine meadows. North of the valley of the river are moorlands, destitute of trees, and nearly a waste, which extend to the base of the Monadh. A little above Aviemore Inn, the high ground approaches the bed of the river on both sides, so as to have the appearance of a rent, through which the river flows. This narrow passage is called Craig Ellachy, and may be considered the termination of the *upper valley* of the Spey.

At Aviemore Inn begins the *central valley* of the Spey, commonly called *Strath Spey*, into which the valleys of three rivers, the Nethy, Avon, and Dulnain, open. The valley of the Spey is here much wider, being between three and four miles across. Some parts of it are also so low as to be subject to inundation, but others are beyond their reach, and there are several rising grounds in the level country which stand isolated. Several tracts in this part of the valley are under cultivation. The valley of the Nethy is separated from that of the Spey by woodlands. The Nethy runs about 12 miles. Its upper course lies in a narrow glen between high mountains connected with the Cairn Gorum mountain-knot, and is uninhabited, but about the middle of its course the valley grows wider, and contains good pasture-grounds.

The Avon rises in Loch Avon [Avon, vol. iii., p. 117; Ben, vol. iv., p. 209], and the upper part of its valley is too elevated for cultivation. The banks begin to be inhabited after it has terminated more than half its course; and though the valley by degrees widens to one mile and a half, it is intersected by numerous hills, and contains only narrow flats. On both sides of this valley high mountains continue nearly to the confluence of the Avon with the Spey. The Dulnain joins the Spey from the west, and the valley is separated from that of the principal river only by elevated moorlands, except towards the source of the river, where there is an offset of the Monadh Leadh Mountains between them. The first third part of its course is in a deep, narrow, and uninhabited glen; but about two miles above the church of Duthel, it expands into a plain of moderate extent, which rises with a gentle ascent to the south and north towards the higher ground which continues to the mouth of the river. The elevation of the valley renders the crops uncertain, and the rearing of cattle and sheep is preferred to agriculture. This central valley of the Spey terminates near Knokando, where the river begins to run eastward, as south of that place the hills with which the Monadh Leadh Mountains terminate approach to a short distance from the bed of the river on the north.

In its *Lower valley* the Spey runs east between Knokando and Abelour, and afterwards north. Its course here acquires rapidity, which entitles it to the epithet of the swiftest river in Great Britain. Above the church at Abelour it forms a waterfall 30 feet high; and the descent of the waters from the Boat of Bog to the sea, a distance of only three miles, is 60 feet. It is evident that the river here descends with rapidity from the elevated table-land on which its upper course lies. Along the eastern banks of this part of its course there is a high country, which rises into hills, mountain-summits, and flat moors, and approaches so near to the river, that in some places the level tracts are not a quarter of a mile in width. This elevated tract is intersected by the valley of the Livet, which opens into that of the Spey below Abelour. It is about 12 miles long, and not wide, but rather fertile, and contains excellent pasture. On the west of the Spey there are no mountains. The country is considerably elevated above the river; but it extends in wide moors, with a nearly level surface, which however rise towards the north-west, where they are interspersed with low sandy hills about the river Lossie. Between the moors there are some depressions, which run westward in the forms of valleys, and these are the only tracts which are inhabited and cultivated. One of these depressions, called the Plain of Rothes, extends between ranges of hills to the river Lossie; and it is conjectured that at some remote period the Spey took its course through this flat, and that the Lossie constituted its lower course. Near the mouth of the river the flat country extends for nine miles from south to north, and still more from east to west.

The Spey is not navigated, but great floats of timber are sent down from the forests of Kingussie and Abernethy to Garmouth. In order to prevent the timber from being shivered in passing the numerous rapids and cataracts in the lower course of the river, several canals have been cut along the banks. The Spey is the most irregular river in Great Britain: its variations as to quantity of water are extremely sudden.

(Sinclair's *Statistical Account of Scotland;* Sir T. Dick Lauder, *On the Great Floods, &c.;* and MacCulloch's *Highlands and Western Islands.*)

SPEYER, or **SPIRE**, is an antient city in the kingdom of Bavaria, situated in 49° 20′ N. lat. and in 9° 25′ E. long. It stands on the Speyerbach, where it falls into the Rhine, in a pleasant and fertile country. It is surrounded with walls and ditches, and has five gates. The population is probably under 10,000; though Hörschelmann, in 1834, makes it above 17,000; but Cannabich, in 1836, says 8000; the 'Conversations Lexicon,' in 1836, 8000; and the 'Weimar Almanack' for 1840, in a list of towns of more than 10,000 inhabitants, does not include Speyer. The majority of the inhabitants are Protestants; yet of the churches it is stated that 15 are Roman Catholic and only two Lutheran. The most remarkable is the venerable cathedral. The first cathedral was founded by King Dagobert. The present cathedral was founded by the emperor Conrad in 1030, and completed by Henry IV. in 1061. It was very richly adorned, and contained the mortal remains of eight emperors, three empresses, and two Imperial princesses; but their marble sepulchres, their statues, and silver coffins were desecrated and plundered by the French in 1689, and their bones scattered by order of Louvois. The sepulchres of Rudolph of Habsburg, Adolphus of Nassau, and Albert I. have been restored. The French also carried off the archives of the city and of the bishopric to Strasburg. In former times the diet of the German empire was frequently held at Speyer. One of the most important of these diets was that of 1529, when a protest made by the Reformers against certain proceedings of the emperors procured them the name of Protestants. The fine old town-hall is now the seat of the government of the circle, and the former Jesuits' college is now used as barracks for cavalry. The city has a gymnasium, a lyceum, an hospital, an orphan-house, and a botanic garden. In the old town-hall there is a pretty considerable collection of Roman and antient German antiquities found in the neighbouring country. There is no manufacture of any importance: the principal are snuff, sugar of lead, and wax; there are likewise some vinegar-breweries, and considerable cattle and corn markets. The inhabitants have some trade on the Rhine, and the transit trade is very profitable. (Stein; Hassel; Cannabich; Hörschelmann.)

SPE'ZIA, THE PROVINCE OF, called also 'Provincia di Levante,' forms the eastern extremity of the duchy of Genoa, which is annexed to the crown of Sardinia. It is bounded on the north by the high chain of the Apennines, which separates it from the duchy of Parma; on the east by the districts of Massa and Lunigiana, belonging to Modena and Tuscany; on the west by the Sardinian province of Chiavari; and on the south by the Mediterranean Sea. It is a mountainous region, lying along the slopes and among the offsets of the Apennines, and between them and the sea. The Magra, a mountain-stream, coming from Pontremoli, intersects the eastern part of the province from north to south, and is joined above the town of Sarzana by the Vara, another mountain-torrent, which flows from west to east, between the main chain of the Apennines and another and much lower ridge which runs parallel to it along the sea-coast. The new carriage-road from Genoa to Sarzana runs on this latter ridge, and partly along the banks of the Vara, until it reaches the Magra, below the confluence of the two rivers, opposite the town of Sarzana. The Magra is there forded when the water is low, or is crossed by a ferry in time of floods.

The finest part of the province is that which lies round the shores of the deep bay called Golfo della Spezia, which is one of the finest and safest bays in the Mediterranean, about five miles in length, and four in its greatest breadth, in which the largest fleet can ride at anchor in perfect safety. Napoleon, aware of its importance, built forts at the entrance of the bay and batteries along the shores; he formed docks, and intended to make the bay one of his great naval stations. The island of Palmaria lies on the western side of the entrance to the bay, and between it and the mainland is a narrow channel, on which the small town and fort of Porto Venere are built. On the opposite or eastern side of the gulf is the town of Lerici, with about 4000 inhabitants, which is a station for the feluccas and other coasting vessels which trade between Genoa and Leghorn. In the deepest recess of the gulf is the neatly built town of La Spezia, with about 7000 inhabitants. The town of Levanto, which is on the western coast towards Genoa, has 4000 inhabitants. (*Calendario Sardo.*)

The province of La Spezia is divided into three mandamenti, or districts, Levanto, La Spezia, and Sarzana. The last district, which lies along the banks of the Magra, forms part of the region formerly called Lunigiana, from the antient but long since ruined town of Luna, which was in the middle ages a county belonging to the feudal family of Malaspina, but is now divided among the states of Sardinia, Modena, and Tuscany. [MODENA, DUCHY OF.] The site of Luna is in a low plain now called La Marinella, on the left or eastern bank of the Magra, about one mile from its mouth, and four miles south-east of Sarzana. Scanty remains of an amphitheatre and other structures are seen above ground, but the excavations made of late years by order of the present king of Sardinia have brought to light marble pavements, columns, inscriptions, statues, bronzes, and other monuments, which have been illustrated by Carlo Promis, a Piedmontese, in his 'Memorie della Città di Luni.' The best part of these antiquities are now in the museum of Turin. Luna seems to have been originally built by the Etruscans; it was for a time in possession of the Ligurians, and was afterwards taken by the Romans. Livy (xxxiv. 8) mentions the harbour of Luna as the place where the consul M. Portius Cato embarked his troops, 195 B.C., for Spain, and two years later he relates how the Ligurians made a sudden irruption into the country of Luna and into the neighbouring territory of Pisa, devastating the whole maritime region. In the year 185 B.C. the consul M. Sempronius, advancing from Pisa into the highlands of the Apuani Ligures, devastated and burnt their country, and opened his way through their fastnesses and forests to the river Macra and the port of Luna. (Livy, xxxix. 32.) After the battle of Actium, a colony of veterans was sent to Luna. Under Augustus the trade of Luna was greatly increased in consequence of the demand for marble from the neighbouring quarries, which was shipped at that port for Rome [CARRARA], and the trade increased under the following emperors. Pliny (xxxvi. 4) speaks of the white marble of Luna as having superseded that of Paros for statuary. Inscriptions in honour of Trajan and his wife Plotina and his sister Marciana, of Hadrian, of Septimius Severus and Julia Domna, and of Flavia Plautilla, wife of Caracalla, have been found among the ruins of Luna. Rutilius Numatianus, in his 'Itinerary,' speaks in a highly poetical strain of the striking appearance of the marble buildings of Luna as seen from the sea. Luna became early a bishop's see, and there exist several letters written by Pope Gregory the Great to its bishop Venantius. The destruction of Luna was begun about the middle of the ninth century by the Saracens or Moors, who landed on that coast, and was completed in the early part of the eleventh century by another host of Moors from Sardinia, led by Musaït, sovereign of that island. Bishops of Luna however are mentioned till 1204, when, in consequence of the desolation of the place and the unhealthiness of the atmosphere, Pope Innocent III. transferred the see of Luna to the town of Sarzana.

Sarzana is a considerable town, situated on the left bank of the Magra, with the castle of Sarzanello built upon an eminence near the town. Sarzana has a handsome cathedral, an hospital, a theatre, and about 7600 inhabitants, including the territory of the commune. It is the birth-place of Pope Nicholas V., who was distinguished for his love of learning and of the arts. About five miles south-east of Sarzana, the small stream Parmignola forms the boundary between the Sardinian territory and the duchy of Massa, which belongs to Modena.

The population of the whole province of La Spezia is about 61,000. (Serristori, *Statistica dell' Italia.*) The country around the gulf of La Spezia, and about Sarzana and along the banks of the Magra, produces oil, wine, cotton, hemp, and silk; but the highlands of the Apennines in the interior are bleak and barren. A considerable proportion of the inhabitants are engaged in maritime trade.

SPHACTE'RIA. [NAVARINO.]

SPHÆRALCE'A, the name of a genus of plants belonging to the natural order Malvaceæ. It is characterised by a 3-leaved deciduous involucre; 5-cleft calyx; five obliquely emarginate petals; numerous stamens united together, the stamen-tube being longer than the petals; many-celled ovary, with three seeds in each cell; styles consolidated and stigmas capitate; a globose, umbilicated, downy capsule, with cells dehiscent at the back. The species are trees or shrubs with toothed or 3-5-lobed leaves. Flowers on peduncles, one or many-flowered, of a reddish or flesh colour. This genus was separated from Malva, which it greatly resembles, by Auguste St. Hilaire. With the exception of one, which is a native of the Cape of Good Hope, the species are all found in South America. They all of them bear elegant flowers, and will thrive well in gardens in this country. They require a light soil, and may readily be propagated by cuttings, which will strike root when placed under a hand glass.

S. Cisplatina, the Cisplatine globe-mallow, has a slender shrubby stem, ovate 3-lobed toothed or crenate leaves, tomentose beneath; axillary racemose flowers. It is a native of Brazil, in the western part of the Cisplatine province. It is used medicinally in Brazil, in the same manner as marsh-mallows are in Europe. The decoction is given in inflammations of the bowels, and it is also employed as a fomentation in diseases of the chest.

SPHÆRANTHUS, a genus of plants of the natural family of Compositæ, so named from *σφαῖρα*, a 'globe,' and *ἄνθος*, 'a flower,' on account of the globular form of the heads of the flowers. The species are small herbs common in tropical parts of the Old World, with alternate decurrent leaves. Flowers tubular, external ones female, many-rowed, the central ones male with imperfect style. Receptacle naked. Pappus wanting. *S. mollis* is common in most parts of the plains of India, and has a strong aromatic odour, and is used by the natives in medicine, and is supposed by some of the hukeems to be the *Khamadroos* described in their works, which is no doubt the *χαμαιδρις* of Dioscorides. *S. microcephalus* (indicus, L.) has also an aromatic odour, and is employed as a diuretic in Java, according to Dr. Horsfield, and as an anthelmintic in India, according to Rheede, and in fevers, according to others. These, as well as some other species, being bitter and aromatic, may no doubt be useful as tonics and stimulants.

SPHÆ'RIA (from *σφαῖρα*, a sphere), the name of a genus of plants belonging to the natural order Fungaceæ. This genus is known by possessing a rounded external receptacle, which opens at the top with a minute orifice. Within the receptacle, the sporidia, or seed-vessels, are found inclosed in tubes which are arranged in one or more rows. These tubes are called *asci*. The size of the rounded receptacles of these fungi varies from that of a millet-seed to that of a small marble. They are generally found upon decaying vegetable matter, and seem as if they were immersed in the substance on which they grow. Their most frequent position is on the bark of the stem and branches of decayed trees. They are however by no means confined to this situation, being frequently found on decaying leaves, on the stems of grasses, and on the surface of decaying wood. Some of them are found occupying the bark, leaves, &c. of plants that are still living, but in most instances this must be looked upon as indicative of a loss of vitality in the part of the plant thus attacked. One of the species, *Sphæria militaris*, is remarkable for growing from the dead bodies of caterpillars and other decaying animal matters. Another species, the S *entomorhiza*, is also found in the same positions.

Although the plants of this genus are so simple in their structure, yet their receptacle, with its contents, presents so great variety in form, size, colour, &c., that upwards of 600 different species have been described. Of these, 201 have been recorded as British, by the Rev. M. J. Berkeley, in the 2nd vol. of Hooker's 'British Flora.' These plants are very generally diffused throughout the world in the temperate zones. So abundant are they, that scarcely a decaying stick can be taken up in autumn without presenting some form of them.

Like the great mass of the vast order of Fungi, the species of *Sphæria* have not been used as food or medicine, or cultivated as ornament. Their great use in the economy of nature appears to be, the appropriating those elements as materials of their growth, which, if left unconsumed, would become a source of deterioration to the atmosphere. As examples of this genus we shall select a few of the more common of the British species.

S. Hypoxylon, flat-horned Sphæria: receptacle of a black colour, of a corky consistence, single or branched, compressed, at first covered over with a mealy powder, then becoming naked, the stem villous. This is a very common species, and is found on sticks and stumps of trees. Unlike most of the species, it has a great tendency to sport, being sometimes exceedingly branched, sometimes palmate, and sometimes quite simple.

S. stigma, black-dotted Sphæria: effused, often nearly surrounding the branch, flat, even, at length becoming black, the orifices nearly plain. In the course of its growth, it pushes off the cuticle of the bark of the stick on which it grows; it is at first brown, and then becomes black. It is perhaps the most common of all the species.

S. verrucæformis, wart-like Sphæria: receptacles ovate with a short neck, plant of a black colour. Found on branches of the hazel and beech.

S. quaternata, quaternate Sphæria: receptacles generally grouped four together, naked; orifices collected together. It is found on beech-trees alone. Many other forms are found on only one kind of plant.

S. sanguinea, blood-coloured Sphæria: the receptacles scattered, very small, ovate; papillary of a blood-red colour. It is very common on all kinds of decaying wood and sticks, and is easily recognised by its red colour; there are however many other forms with a red colour, but not so common as this.

(For further information consult Fries's *Systema Mycologicum;* Hooker's *British Flora*; and Greville's *Scottish Cryptogamic Flora.*)

SPHÆROCA'RYA, a genus of plants of the natural family of Rhamnaceæ, so named from *σφαῖρα*, a 'sphere,' and *κάρυον*, a 'nut.' The species forms moderate-sized trees in Nepaul. The calyx is 5-parted. Petals are five, and alternate with the five stamens, which, like the petals, are inserted into the calyx, and with five fringed scales placed between the stamens, and opposite the calycina segments. Drupe pear-shaped, containing a smooth round nut. *S. edulis* is so called from its fruit being eaten and relished by the Nepaulese, though not very palatable to a European taste. This tree is a native of the forests of Nepaul, and has alternate, ovate, entire, exstipulate leaves, with axillary and terminal villous racemes of small greenish-coloured flowers, which are without odour.

SPHÆROCOCCUS, a genus of plants belonging to the natural order Algæ. It was formed by Stackhouse, and applied to the plants belonging to it on account of their globose fructification. A great number of species of this genus have been described, including amongst them some of the most useful of the sea-weed tribe. These species have been distributed by later botanists into the genera *Rhodomenia, Gigartina, Chondrus, Gelidium*, and *Phyllophora*, and the genus Sphærococcus has only one species, the *S. coronopifolius.*—The genus *Chondrus* affords the Carrageen moss, which is so much used as an article of diet. It is a species of *Gelidium*, with which the swallows build their nests in the Eastern Archipelago, and which are so highly valued as articles of food by the Chinese. [Sea-Weeds.]

SPHÆROIDI'NA. [Foraminifera.]

SPHÆRULA'CEA, M. de Blainville's name for his first family of *Cellulacea*, consisting of the genera *Miliola, Melonia, Saracenaria*, and *Textularia*. Lamarck uses the term to designate his fourth family of *Cephalopoda*, including the genera *Miliola, Gyrogona* (the seed of a plant), and *Melonia*. [Foraminifera.]

SPHÆRULITE occurs in small botryoidal and spheroidal masses. Surface sometimes rough, at other times smooth.

No regular cleavage. Structure compact, fibrous. Fracture conchoidal. Hardness 7 to 7·5. Brittle. Colour grey, brown, red, yellow, of various shades. Opaque; translucent on the edges. Specific gravity 2·4 to 2·54.

Before the blow-pipe almost infusible, the edges becoming covered with a sort of enamel.

It is found embedded in pitchstone at Speithausen in Saxony; in pearlstone at Glashutte, near Schemnitz, Hungary, and also in Iceland and Scotland.

It yielded by analysis :—

Silica	79·12	
Alumina	12·00	
Potash and soda	3·58	
Magnesia	1·10	
Oxide of iron	2·45	
Water	1·75	
		100

SPHAGNUM, the name of a genus of plants belonging to the natural order of Mosses. It is known by the following characters :—receptacle pedunculated, its peduncle resembling a fruit-stalk; capsule sessile, entire, its lid deciduous, its mouth naked; calyptra irregularly torn. The plants of this genus are very widely diffused over the surface of the earth, perhaps more so than any other, hardly any limits being ascertained for their geographical distribution. They are aquatic plants, and constitute the great mass of our bogs in swampy and moory districts. All the species of this genus used to be included under the name of *Sphagnum palustre;* but later writers have multiplied the species to fourteen. Of these, Sir Wm. Hooker, in his 'Muscologia Britannica,' admits only four, and one or two even of these he thinks may be varieties.

S. obtusifolium; obtuse-leaved bog-moss: has tumid branches, with obtuse ovate leaves. It is found on the surface of watery turfy bogs throughout Europe. The dense masses of vegetation which it forms in these districts are generally filled with water, so that they will not bear the weight of a human being upon them; and from this cause many animals have lost their lives, being deceived by the apparent firmness this moss gives to a mass of water. When the bog-moss has grown long enough in a lake or bog, its decaying leaves and stems present a soil fitted for other plants, and in this situation the various species of Drosera, the Erica tetrali, the cranberry, and others, are frequently found. It is thus that these lowly bog-mosses become important agents in the economy of nature, as by their means immense masses of water are filled with decaying vegetable matter, which in the course of time permits of drainage and the application of manure, and thus a stagnant lake is converted into a fruitful field. The other species of Sphagnum are the same in habit as the foregoing. *S. acutifolium*, narrow-leaved bog-moss, has attenuated branches and ovato-lanceolate leaves; and is very abundant, especially in bogs in mountainous situations. *S. cuspidatum*, the long-leaved floating bog-moss, seems to be a variety of the last, having peculiar characters from growing constantly under water its leaves are looser and narrower than those of the narrow-leaved bog-moss. It seldom bears fruit. Its stems are sometimes four feet long, and its leaves three-quarters of an inch broad.

The economical uses of the bog-moss are several. The Society of Arts gave a reward to Mr. W. Curtis, for having pointed out, the advantages to be derived from using these mosses for packing young trees for exportation. In Iceland and Lapland, and amongst the North American Indians, they are used for lining cradles. The peculiar spongy character of the cellular tissue of which they are composed renders them exceedingly well adapted for those purposes of use in which the non-conduction of heat or the absorption of moisture is desirable. It is on this account that they are used in cold countries for lining clothes, especially the large boots worn by reindeer drivers. The bog-moss also forms an excellent material for bedding, absorbing the moisture of the body at the same time that it allows of the accumulation of warmth from its want of conducting power for heat. When these beds become hard and lumpy from being lain on, they are quickly restored to their original elasticity by being placed in water and then dried. In Lapland these mosses are used as wicks for lamps; and where they are in abundance, the farmer may avail himself of them as an excellent litter for cattle.

SPHE'CIDÆ, Leach (*Sphegides*, Latreille), a family of hymenopterous insects of the section Fossores, distinguished by the following characters:—hinder tarsi at least equal in length to the head and thorax; antennæ generally slender and formed of elongated joints, which are often arched and contorted, at least in the females; prothorax forming a kind of neck, very distinctly separated from the mesothorax, and contracted in front. The base of the abdomen constricted into a long petiole; mandibles internally toothed. The following are the principal genera contained in this family:—

Pepsis (Fab.). Here the labrum is distinct; the antennæ, at least those of the males, are nearly straight, composed of joints closely applied to each other; maxillary palpi scarcely longer than the labial, prominent, and with the joints unequal; all the cubital cells perfect; the first recurrent nervure inserted near the anterior extremity of the second of these cells. The males have the tibiæ and the first joint of the posterior tarsi compressed.

All the known species of *Pepsis* are exotic, and they abound most in South America and in the West Indian islands; they are usually of large size, and have dark-coloured wings.

Ceropales. In this genus the labrum and antennæ resemble those of *Pepsis*, but the maxillary palpi are much longer than the labial, pendant and unequal-jointed.

Pompilus (Fab.). This genus is placed by Latreille in the *Sphegidæ*, but, according to Leach, it forms the type of a distinct family (*Pompilidæ*), characterized by having a transverse prothorax, at least as broad again as long, with its posterior margin acute. The abdomen obovoid, without any contraction, in the shape of a long petiole, at its base.* The antennæ are setaceous and long; the superior wings have one marginal cell, nearly semicircular, and three submarginal cells, the first as long or longer than the two following; the second receiving about its centre the first recurrent nervure; the third, which is either triangular or subquadrate, receives the second; a fourth submarginal cell is sometimes traceable.

Several species of this genus are found in England; they usually make burrows in the sand for nidification, but some are said to make their nests in wood. The perfect insect provides its cell with spiders, these constituting the food of the larvæ.

Ammophila (Kirby). Abdomen with the petiole long; superior wings with one oval marginal cell, and three submarginal cells; the first as long or longer than the two following, the second receiving both the recurrent nervures, the third very small and narrow towards the marginal; legs long, the anterior tarsi slightly ciliated.

These insects, observes Mr. Shuckard, on the authority of St. Fargeau, construct their burrows in sand alone, and supply their larvæ with Arachnidæ and the larvæ of Lepidoptera, and select by preference those of the Noctuæ, sometimes as large as themselves. They sting them towards the middle of the body, which renders them torpid, but does not kill them, and prevents their motion. The *Ammophila* then extending itself in its whole length upon the larva, seizes it with its mandibles near the head, and supports the remainder of the body with its legs. But thus encumbered it can no longer fly; it therefore proceeds slowly, dragging it along. Should it perceive any obstacle in the path, such as a stone or tuft of plants, it quits its load an instant, and springs lightly forward to reconnoitre and explore its way, but returns immediately to resume its burden.

A female has been observed by St. Fargeau, thus loaded, to clear a wall eight or ten feet high, but not without much ingenious contrivance. The caterpillar fell several times to the ground, when the *Ammophila* placed it upon a projecting stone to rest itself and recruit its strength; but it renewed its task with extraordinary perseverance, and succeeded in accomplishing it.

In the genera *Sphex*, *Pronæus*, and *Chlorion*, the mandibles and labrum are comparatively short, and more or less curved at the point.

Pronæus.—Here the second cubital or submarginal cell receives the two recurrent nervures.

In *Sphex* the superior wings have one long and narrow marginal cell, which is rounded at the apex, and three submarginal cells, the first as long as the two following; the second quadrate, receiving the first recurrent nervure towards its extremity; the third forming a truncated triangle with its posterior margins slightly rounded, and receiving the second recurrent nervure in its middle: a rudimentary fourth cell is sometimes observable. One species has been found in England, but appears to be extremely rare.

The genus *Chlorion* has the first recurrent nervure inserted under the first cubital cell, and the second beneath the third cubital.

The genus *Dolichurus*, Latr., has the maxillary palpi much longer than the labial, and nearly setaceous; the mandibles are dentated.

The remaining genera of this family have no teeth to the mandibles: they are, *Ampulex*, *Podium*, and *Pelopæus*. The first of these genera resembles *Chlorion* as regards the insertion of the recurrent nervures in the superior wings, and in the genera *Podium* and *Pelopæus* the second cubital cell receives two recurrent nervures.

SPHE'GIDÆ. [SPHECIDÆ.]

SPHE'NE. [TITANIUM.]

SPHENOCLE'A, a genus consisting of only a single species, which is remarkable as one of the few which botanists are puzzled in knowing in what natural order to place. Dr. Lindley, following Martius, has formed it into a suborder Sphenocleaceæ, and attached it, with a doubt, to the natural family of Campanulaceæ; but he remarks that its exalbuminous seeds, the absence of collecting hairs from its styles and the round subsessile anthers, and the peculiar habit, distinguish it. Endlicher has essentially followed Martius and Lindley, but has imposed upon the genus the name Pongaticea, from the name *Pongatium*, which is applied to it by some botanists, as being the earliest, having been formed by Jussieu from the Pongati of Rheede. The genus is characterised by having a superior 5-parted calyx with inflexed segments. Corol 5-parted, with the segments inflexed and somewhat auricled at the base, and which conceal the 5-sessile stamens. Ovary inferior. Style very short and 2-lobed. Capsule membranous, many-seeded, with a central fungous placenta, circumscissile. Seeds minute, embryo without albumen, straight, with the radicle next the hilum. The only known species, called *S. zeylanica*, is an annual, with alternate entire leaves, without stipules; found in marsh situations in all parts of India, as far as 30° N. lat. The Bengalee name *jeel-murich*, assigned to that plant, and signifying marsh-pepper, would indicate the possession of acrid properties.

SPHENOCLEA'CEÆ, a natural order of plants, consisting of only one species, belonging to the monopetalous subclass of Exogens. It was formed by Martius, and consists of a single genus, which at that time was called *Sphenoclea*, but now known as *Pongatium*. This plant is very like a Campanula in its structure, but it is distinguished from all Campanulaceæ by the absence of albumen in its seeds, and also the want of collecting hairs on its styles. It has also round subsessile anthers, and a habit different from that of plants allied to it in structure. [SPHENOCLEA.]

SPHENOID BONE. [SKELETON.]

SPHENO'PTERIS, a genus of fossil ferns, which are known by possessing twice or thrice pinnated leaves, the ultimate leaflets of which do not adhere to the rachis by their whole base, and are traversed by one or two principal veins in each lobe. They are all coal-measure plants, and are found in company with Sigillaria, Pecopteris, and other fossil genera. About twenty-six species of this genus are described as existing in the Fossil Flora of Great Britain.

---

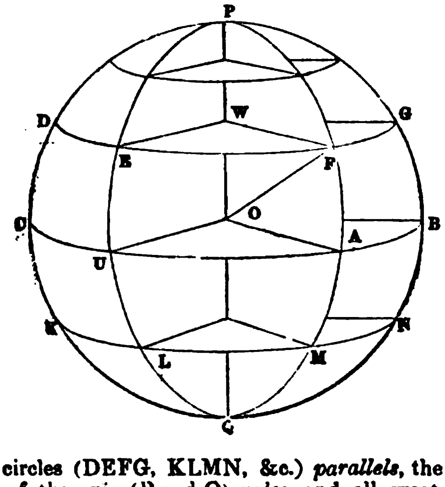
* See Mr. Shuckard's 'Essay on the Indigenous Fossorial Hymenoptera.'

SPHENU'RUS, Mr. Swainson's name for a subgenus of Columbidæ.

SPHERE or GLOBE, a solid body, the surface of which is everywhere equally distant from a given point or centre within it. This distance of each point from the centre is called the radius. In the article Mensuration will be found the formulæ which connect the surface and solidity of a sphere with the radius: we shall here add that the weight of a sphere of pure water is found in ounces avoirdupois, by multiplying the cube of the number of inches in the radius by 2·4171; and in pounds avoirdupois by multiplying the cube of the number of feet in the radius by 261·05. These results multiplied by the specific gravity give the weight of a sphere of any other substance.

A section made by a sphere and plane is always a circle. When the cutting plane passes through the centre of the sphere, this proposition is obvious from the definition of a circle. When the plane does not pass through the centre, the assertion follows as soon as it is shown that a plane curve having all its points equidistant from a given point *not in the plane* is a circle. A section passing through the centre is called a *great* circle, and one which does not pass through the centre a *small* circle. These terms are incorrect, since a small circle may be in size as nearly as we please equal to a great circle: the words *greater* and *smaller* would be more correct.

The centre of a circular section is found by drawing a perpendicular from the centre of the sphere to the plane of the section. All sections whose planes are parallel have their centres on one straight line, namely, the perpendicular to the planes which passes through the centre of the sphere. The great circle in such a system (CUAB) is called the *primitive*, the common perpendicular (POQ) the *axis*, all the small circles (DEFG, KLMN, &c.) *parallels*, the extremities of the axis (P and Q) *poles*, and all great circles passing through the axis and poles (PCQB, PUQ, PAQ, &c.) *secondaries*.



By the angle made by two great circles is always understood the angle made by their planes, which is also that made by their tangents at the point of intersection, and that made by the intersections of the two circles with the third circle to which both are secondary. It is also the angle made by the axes of the two circles. Thus the spherical angle EPF is the angle made by the planes PEQ and PFQ, or the angle made by tangents to the circles drawn through P, or the angle UOA.

The angle made by two straight lines drawn from the centre (as OA and OB) is often confounded with the arc (AB) which that angle marks out on the sphere. When this causes any confusion, which it will sometimes do at first, instead of each arc mentioned, read its angle: thus for the arc AB read the 'angle subtended by the arc AB' or AOB. Thus when we say that the angle made by two great circles is the arc intercepted between their poles, we mean not to equate the angle to the length of an arc, but to the angle which that arc subtends at the centre.

The following propositions are essential to the doctrine of the sphere in geography and astronomy; they may be easily proved, and will serve as exercises in the meaning of the preceding terms:—

1. If the poles of a first circle lie upon a second, the poles of the second will also lie upon the first.

2. If a sphere be made by the revolution of a semicircle round its diameter, the diameter will be an axis, the middle point of the semicircle will describe the primary, all other points will describe parallels, and every position of the generating circle will be a secondary.

3. If a point on a sphere be distant from each of two other points (not opposite) by a quadrant of a great circle, the first point must be a pole of the great circle which joins the second and third.

4. The arc of a parallel (as EF) is found from the corresponding arc of the primary (AU) by multiplying the latter by the cosine of the angle (FOA) which is subtended by the intercepted arc (AF) of the secondary.

5. The surface of the zone intercepted between any two parallels is the rectangle contained under the circumference of the primary and the perpendicular distance between the parallels.

6. The surface of a lune contained between two great circles is such a proportion of the whole surface of the sphere as the angle contained between the two great circles is of four right angles.

7. The part of a lune contained within any zone made by two of its parallels (as EFUA) is such a proportion of the whole zone as the angle of the circles forming the lune is of four right angles.

We are now to show the method of Co-ordinates by which points in the sphere are ascertained, and their relative positions described. Take any great circle CUAB, and choose any point U as an origin, and either direction to be that in which arcs are measured. Say for instance that UA, in preference to UC, shall be the direction in which arcs are measured. The position of any point in this great circle is then ascertained simply by determining its distance from U, since there is a tacit understanding as to the direction in which that distance shall be measured. If we give a name to that distance, be it longitude, right ascension, or any other, the point whose right ascension (if it be right ascension) is 80° means the point which is at 80° distance from U in the direction UA. Again, if we wish to describe any other point, not in the great circle chosen, as F: through F draw a secondary to the great circle (PFAQ), then the point F will be known as soon as A is described, in the manner just laid down, and also as soon as the arc AF is given, and the pole towards which it is measured. These two coordinates, UA and AF, when described in magnitude and direction, form a complete description of the position of the point F on the sphere; and the angles subtended by UA and AF are generally used instead of UA and AF.

For the first steps of the application of spherical geometry to astronomy see the next article.

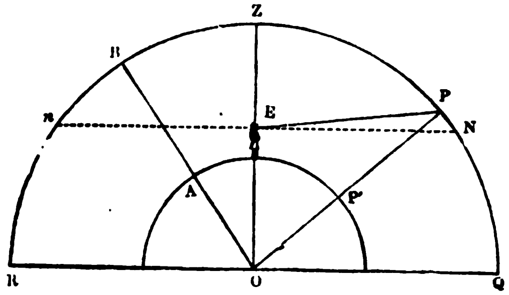
SPHERE, DOCTRINE OF THE. This phrase is generally used to signify the application of the simple geometrical notions in the article Sphere to geography and astronomy. It comes between spherical trigonometry and those two sciences, being merely the explanation of the circumstances under which the former is to be applied to the latter, and the nomenclature which is employed to facilitate explanation.

In geography the end is almost gained when a distinct notion is acquired of the meaning of the terms terrestrial latitude and terrestrial longitude, generally abbreviated into latitude and longitude. These are only names given to a pair of spherical co-ordinates as described in Sphere, the axis of rotation of the earth furnishing the means of proscribing the necessary data. The earth revolves round an axis, say PQ (see the diagram in Sphere), and the great circle perpendicular to that axis is the *equator* (CUAB) An arbitrary point U is chosen as an origin; and P being the pole which is called north, UA is the east direction and UC the west. The English choose the point U in such a way that the secondary PU passes through the Observatory at Greenwich: the French pay the same compliment to their Observatory at Paris, and so on. The co-ordinate UA (or its angle) is called longitude, east or west according as it falls; and the co-ordinate AF (or its angle) is called latitude, north or south according to the pole towards which it is directed. Thus the place F (PU passing through

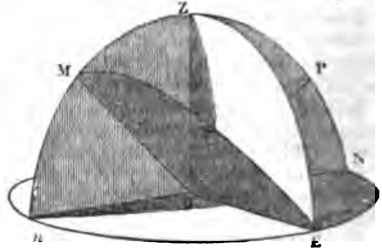
Greenwich) would be described as in longitude UA east of Greenwich, and FA of north latitude; but if the fundamental secondary, PU, be moved any number of degrees to the east, every east longitude must be diminished, and every west longitude increased as much; and all places which the secondary passes over in the transfer, must have the names of the directions of their longitudes changed, and take for their new longitudes the excesses of the angle of transfer over their former longitudes. Again, longitude might be measured all the way round in one direction: thus D, instead of being described as in UC of west longitude, might be considered as in 360°−UC of east longitude.

There are few problems of much interest connected with geography merely; and it must be remembered that the common terrestrial globe, with its brazen secondary to the equator (called a meridian, very incorrectly, except as meaning that it *may be made* a meridian to any place), its ecliptic, and figured horizon, is almost as much a representative of the sphere of the heavens as of the earth; and the most useful problems are those in which the sphere is used conjointly in these capacities. But, merely to show what we asserted at first, that the description and nomenclature which are called the doctrine of the sphere are nothing but the connecting link of geography, &c. and spherical trigonometry, let us ask the following question:—Given a table of latitudes and longitudes, required the distance between two places mentioned? Let D and M be the places (see diagram in SPHERE). then PD is the colatitude of D, or 90°−lat. of D, and PM (on account of M's south latitude) is 90° + lat. of M; while the spherical angle, DPM (which is the angle of the arc AC), is, on account of the longitudes being of different names, the sum of the longitudes of D and M. Hence, if D and M be joined by the arc of a great circle, we have given (from the tables) two sides and the angle included, in the spherical triangle DPM. From these data the third side, DM, can be found, in degrees, &c.: convert this into miles, at the rate of 69 miles to a degree (which is accurate enough for the purpose), and the result will be the distance required.

We now make the passage from the terrestrial to the celestial sphere. The latter is a fiction, derived from the impossibility of distinguishing the distances of the heavenly bodies, on which account they all seem at the same distances, on a sphere so great that the earth, its centre, is but a point in comparison. But it must be remembered that the appearances of the heavenly bodies conform themselves to this fiction, so that the development of the consequences of the latter amounts to an explanation of the phenomena of the heavens. And first, the rotation of the earth from west to east gives to the sphere of the heavens an apparent motion from east to west, round an axis which is obtained by lengthening the axis of the earth. The point of the heavens which answers, for the moment, to the spectator's position on the earth, is that point which is directly over his head, or his *zenith*. And since the spectator is not exactly at the centre of the celestial sphere, we give the following diagram, illustrative of the manner in which the effect of this misplacement is destroyed by the largeness of the sphere.

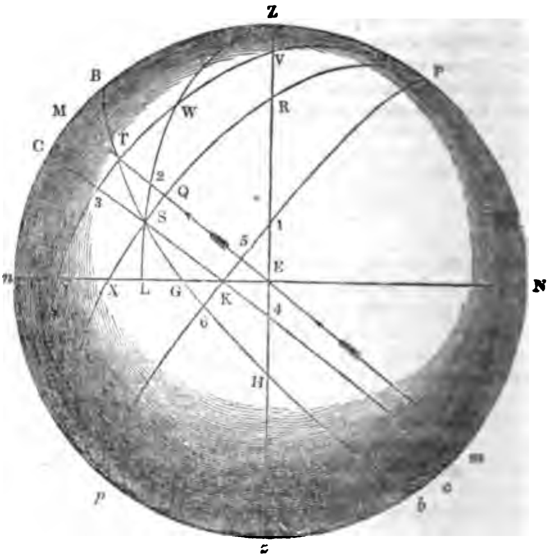


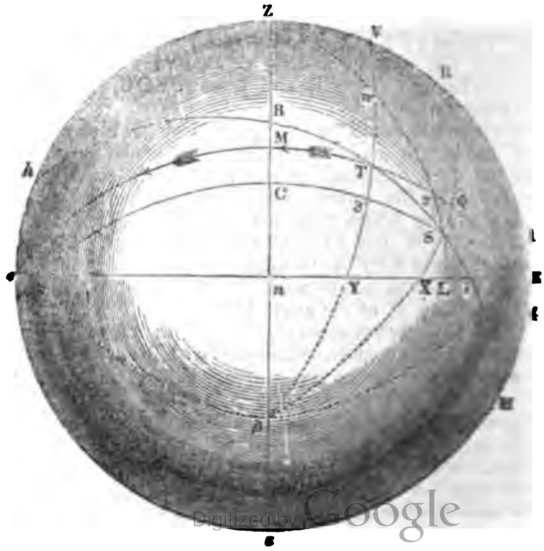
The eye of the spectator is at E, and his zenith-line is OZ. The smaller circle is a section of the earth, and the larger of the sphere of the heavens. The figure is drawn of dimensions so false, that the sphere of the heavens is represented about as well as a common orrery represents the solar system. The HORIZON is the small circle drawn perpendicular to OZ through N*n*; the altitude of the pole of the heavens (P′ being that of the earth) is the angle NEP. Now suppose the earth and the spectator to diminish until they cannot be distinguished from the point O, the sphere of the heavens remaining the same. All angles at O remain unaltered: the altitude of the pole of the heavens becomes QOP, equal to the angle AOE, the latitude of the spectator, and the horizon of the latter coincides with the great circle drawn through RQ perpendicular to OZ. The great circle, QPZR, passing through the pole and the zenith, is the *meridian;* the secondary to the horizon perpendicular to the meridian is the *prime vertical*. We here exhibit a skeleton of the sphere, showing

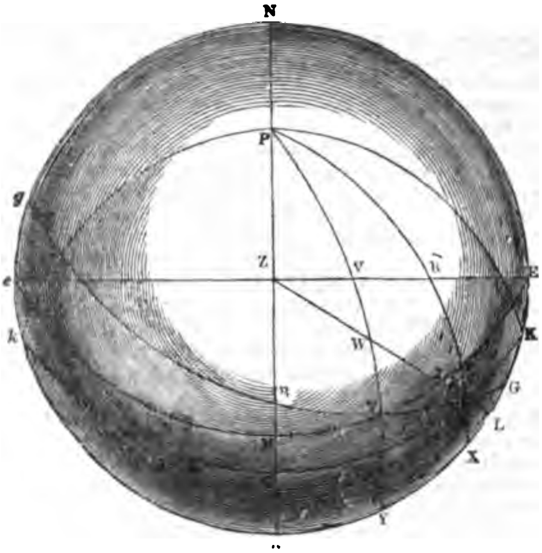


*n*MZPN, half the meridian; NE*n*, the horizon (N, E, *n*, its north, east, and south points); ZE, the prime vertical; a portion of PO, the axis; EM, the equator, perpendicular to the axis.

We now give three positions of the sphere, differing only in the manner of projecting the figure. Each one represents the state of the heavens some two or three hours before noon in an October morning, in a latitude somewhat greater than our own. The first figure is projected on the plane of the meridian; that is, the meridian is the circle which bounds the view of the sphere. The second is projected on the prime vertical; the third, on the horizon.







The diagrams have many letters and numerals which are useless, except in tracing the affinities of the figures. The meridian, *n*PZN; the prime vertical, ZE*z*; the horizon, *n*EN, and its poles, the zenith and nadir, Z and *z*; the equator, ME*m*, and its poles P and *p* (which are called *the* poles, from their importance), are supposed to be well known. The reader who is new to the subject should learn to see the following propositions *in each of the figures*, namely:—the poles of the meridian are the east and west points of the horizon; the poles of the prime vertical are the north and south points of the horizon; the equator and prime vertical make an angle equal to the latitude of the place of observation (which is PN, or the angle of PN); the equator and horizon make an angle equal to the colatitude (90°—lat.) of the place of observation; a star which is distant from the north pole by less than the latitude of the place of observation can never set nor go below the horizon (it is called a *circumpolar* star).

The diurnal motion carries the sphere round the axis in the direction of the arrows marked upon the equator. The meridian, horizon, and prime vertical, must be considered as detached from the sphere, and not moving with it. Every point of the sphere describes a small circle parallel to the equator; and all stars which are at the same distance from the pole describe the same small circle. The whole revolution takes place in what is called a *sidereal* day [TIME], about four minutes less than the *mean solar day* shown by a good clock. A secondary to the equator describes angles uniformly about the pole at the rate of 360° to 24 sidereal hours, or 15° to one sidereal hour. [ANGLE.] Hence if we would know how long it will be before the diurnal motion will bring a star at K into the position S, we must turn the angle SPK, which is measured by the arc Q5, into sidereal time at the rate of 15° to 1^h, and then turn the sidereal time so obtained into common clock time, at the rate of about $23^h\ 56^m$ of clock time to 24^h of sidereal time. For purposes of general explanation, the two species of time may be confounded. The sidereal day is always made to begin when a certain point of the equator, presently to be noticed (the vernal equinox), comes on the south side of the meridian, and the hours are measured on to 24^h.

We shall now explain the systems of co-ordinates which are made use of in describing the positions of stars.

1. *Horizontal System. Altitude and Azimuth.*—In this case the horizon is the primitive circle employed; its north point N is the origin, and the position of a point W is determined by its azimuth NL, and its altitude LW; ZWL being a secondary to the horizon. Since the altitude and azimuth are reckoned by means of a fixed circle, both are perpetually changing their values for any one star. The following assertions will serve to try the reader's comprehension of these terms:—points on the north side of the meridian are in azimuth 0°, on the south side in azimuth 180°; the zenith has all azimuths, and every other point of the east side of the prime vertical 90° of azimuth; the altitude of a star which sets is greatest when it is on the meridian; the meridian altitudes of a circumpolar star are the greatest and least of all its altitudes, and their half sum is always the latitude of the place of observation.

2. *Equatorial System. Right Ascension and Declination.*—The primitive circle here is the equator; the point of the equator called the vernal equinox (presently described) is the origin, and the direction of the sun's motion from west to east is the direction in which *right ascension* is measured. In the diagrams T is not the vernal, but the autumnal equinox, the point opposite to the vernal equinox, consequently T has 180° of right ascension, and so have W, V, and all points on the same half of the secondary PWT. The other co-ordinate, *declination*, is measured on the secondary to the equator north or south according to its direction: thus S has for its right ascension 180°+TQ, and QS of south declination; while R has the same right ascension, and QR of north declination. The secondaries to the equator are called *hour-circles*, and the difference of the right ascensions of two stars is the angle made by their hour-circles: thus the angle QP5, measured by the arc Q5, is obviously the difference of the right ascensions of the point R and 1. The equator moves with the sphere, so that the right ascension and declination of a star remain the same, as long as it moves only with the diurnal motion. The right ascension is generally expressed in time, as before described; and the following assertions will serve for exercise in the meaning of these terms:—the sidereal day beginning when the vernal equinox is on the meridian, the right ascension of any star, turned into time, expresses the moment of the sidereal day at which that star will be on the meridian; when the vernal equinox is on the meridian of Greenwich, the longitude of any place, measured eastwards, is the same as the right ascension of a star which is on the meridian of that place; the meridian altitude of any star, diminished by its declination (if north), or increased by its declination (if south), is the co-latitude of the place of observation; every star which has the same declination as the place of observation has latitude, passes directly over the head of the spectator at that place; the time of rising of a star, and the time during which it remains above the horizon, depend solely upon the declination, and not at all upon the right ascension.

3. *Ecliptic System. Celestial Longitude and Latitude.*—The ecliptic (BTS*b*) is the circle which the sun appears to describe in the course of a year, the direction of this *orbital* motion being from west to east. One half of it is north, the other half south, of the equator; and the point of the equator in which the ecliptic cuts it, and through which the sun passes when it leaves the southern and enters the northern part of the ecliptic, is the *vernal equinox*, the opposite point being the autumnal equinox. Consequently, T, as drawn, is the autumnal equinox, for motion from west to east, or in the direction BTS, makes the sun pass from the northern to the southern side of the equator. In this system of co-ordinates the ecliptic is the primitive circle, the vernal equinox is the origin, longitude is measured from west to east on the ecliptic, and latitude north or south, as the case may be, is measured on a secondary to the ecliptic drawn through the star. In fact, celestial longitude and latitude are to the ecliptic precisely what right ascension and declination are to the equator. The *obliquity* of the ecliptic is the angle made by the equator and the ecliptic; and the secondaries to the ecliptic, drawn through the vernal and autumnal equinoxes, are the equinoctial and solsticial colures.

A complete understanding of all these terms makes the comprehension of the globe easy, and also the application of spherical trigonometry to those who know the latter science. We now describe the diagrams, in order to point out how such applications are made. The point S is the sun, of course in the ecliptic; its right ascension is 180°+TQ, its declination QS south, its longitude 180°+TS, its latitude 0°, its azimuth NL, its altitude LS, its *hour-angle* (a name given to the angle made by the hour-circle of a star with the meridian) SPM, measured by MQ. The parallel to the equator CSK*c* would be the diurnal path of the sun, if it continued at the point S of the ecliptic; but as the sun has a slow motion of its own towards K, it is not strictly (though very nearly) correct to say that, for the day in question, the sun continues in the parallel. Hence we may say, without sensible error, that the sun moves over *c*K during half the night, and through KC during half the day. It rises when at the point K, and the angle KPS, turned into time, shows the sidereal time elapsed since the rising, while the angle SPM shows the time which is yet to elapse before noon. As to the time of the year, observe that the sun was at the autumnal equinox ♎ on the 21st of September, since which time it has moved over TS, independently of the diurnal rotation of the sphere. We see then what is meant by saying that the diagram represents some morning in October. The use of the globe is thus explained, as far as setting it for any hour and day is concerned. The pole P must first be elevated until the elevation is equal to the latitude of the place, the sun must then be put in its proper place in the ecliptic for the time of the year, and its hour-angle must then be made to represent the time which is wanted of noon, or has elapsed since noon. All this on the globe is done without attending to the distinction of sidereal and solar time, which need hardly be attended to when no greater degree of accuracy is wanted than can be obtained on a globe. We now refer the reader to works on the use of the globes, and shall conclude this article by a few indications of the mode of applying spherical trigonometry.

To find the time of sunrise, observe that in the spherical triangle PKN, right-angled at N, we have PK given, being 90° + the sun's declination, and also PN, the latitude of the place of observation. Hence the angle KPN can be found, which being turned into sidereal time, gives a good approximation to the time of sunrise, refraction and the sun's proper motion being neglected.

Given SL the sun's altitude, and the latitude of the place; required the time of day. In the triangle SZP, we now know ZS the sun's co-altitude, SP which is 90° + declination, and ZP the co-latitude of the place. Hence the angle SPZ can be found, and thence the time from noon. If S, instead of the sun, were a known star, the question would be solved in the same way, except that the sun's hour-angle is no longer SPZ, but that angle increased or diminished by the difference of the right ascensions of the sun and star.

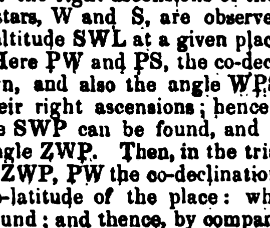
Two known stars, W and S, are observed to be in the same circle of altitude SWL at a given place; required the time of day. Here PW and PS, the co-declinations of the stars, are known, and also the angle WPS, which is the difference of their right ascensions; hence in the triangle SWP the angle SWP can be found, and thence its supplement, the angle ZWP. Then, in the triangle WZP, we know the angle ZWP, PW the co-declination of the star W, and ZP the co-latitude of the place: whence the angle WPZ can be found; and thence, by comparison of W with the sun, the time of day.

For the actual applications we must refer to mathematical works on astronomy.

SPHERICAL EXCESS. [Spherical Trigonometry, &c.]

SPHERICAL TRIGONOMETRY, SPHERICAL TRIANGLE, SPHERICS. We shall confine ourselves in the present article to such a collection of the properties of a spherical triangle as may be useful for reference, referring for demonstration to the treatise on the subject in the 'Library of Useful Knowledge,' and to that on Geometry; adding to the former nothing but a shorter mode of obtaining Napier's Analogies.

By a spherical triangle is meant that portion of the sphere which is cut off by three arcs of great circles, each of which cuts the other two, as ABC. It is now usual however to consider the spherical triangle as a sort of representative of the solid angle formed at the centre of the sphere by the planes AOB, BOC, COA, as follows:—The arcs AB, BC, CA are the measures of the angles AOB, BOC, COA, and are used for them: the spherical angles BAC, ACB, CBA are by definition the angles made by the planes BOA and AOC, AOC and COB, COB and BOA. The spherical triangle then has six parts corresponding in name to the six parts of a plane triangle; but a *side* of it means the angle made by two straight *lines* of a solid angle, while an *angle* of it refers to the angle made by two *planes* of the solid angle.



Throughout this article we shall designate the angles by A, B, C, the sides opposite to them by a, b, c; the half sum of the sides by s. And by A', B', C', a', b', c', we mean the supplements of A, B, &c., so that $A + A' = 180°$, $a + a' = 180°$, &c.

Three circles divide the sphere into eight spherical triangles. Of these four are equal and opposite to the other four, with which they agree in every respect but one [Symmetrical] with which we have nothing here to do. Of the four which are distinct, if ABC be one, there are three others thus related to it: the first has for its sides a, b', c', and for its angles A, B', C'; the second has a', b, c' for sides, and A', B, C' for angles; the third has a', b', c for sides, and A', B', C for angles. Hence every spherical triangle has another, with one side and its opposite angle remaining unchanged, and all the other parts changed into their supplements.

Again, if the three circles be taken which have A, B, and C for their poles, the intersections of these new circles are themselves the poles of AB, BC, and CA; and of the eight new triangles thus formed, each one has all its *angles* supplemental to the *sides* of its corresponding triangle in the first set, and all its *sides* supplemental to the *angles*. Thus there exists a triangle which has the sides A', B', C', and the angles a', b', c'; which is called the supplemental triangle of that which has a, b, c for sides, and A, B, C for angles. Hence, if in any general formula sides be changed into supplements of angles, and angles into supplements of sides, the result is also a general formula.

Any two sides of a spherical triangle are together greater than the third, and the sum of the three sides is not so great as 360°. Any two angles of a spherical triangle are together less than the third angle increased by 180°, and the sum of the three angles is more than two, and less than six, right angles. And the greater side of a spherical triangle is opposite to the greater angle; and the sum of two sides is greater than, equal to, or less than, 180°, according as the sum of the opposite angles is greater than, equal to, or less than, 180°.

The formulæ for the solution of a spherical right-angled triangle are six in number. Let C be the right angle, and let c be called the *hypothenuse*, as distinguished from a and b, which are still called *sides*. [Circular Parts.]

1, 2. The cosine of the hypothenuse is equal to the product of the cosines of the sides, and of the cotangents of the angles:

$$\cos c = \cos a \cos b; \quad \cos c = \cot A \cot B.$$

3. The sine of a *side* is the sine of the hypothenuse into the sine of the *opposite* angle:

$$\sin a = \sin c \sin A; \quad \sin b = \sin c \sin B.$$

4. The tangent of a side is the tangent of the hypothenuse into the cosine of the included angle:

$$\tan a = \tan c \cos B; \quad \tan b = \tan c \cos A.$$

5. The tangent of a side is the tangent of its opposite angle into the side of the other side:

$$\tan a = \tan A \sin b; \quad \tan b = \tan B \sin a.$$

6. The cosine of an angle is the cosine of its opposite side into the side of the other angle:

$$\cos A = \cos a \sin B; \quad \cos B = \cos b \sin A.$$

These formulæ are sufficient for every case. Name any two out of the five a, b, c, A, B (C being a right angle), and in the preceding six formulæ, by repetition ten, will be found those two combined with each of the other three. Thus having given a side a and its adjacent angle B, we find the other parts from

$$\tan b = \tan B \sin a, \quad \tan c = \frac{\tan a}{\cos B}, \quad \cos A = \cos a \sin B$$

These formulæ should be committed to memory: the abbreviation, so called, described in Circular Parts, is only an expeditious mode of wasting time.

When all the angles are oblique, the principal formulæ are as follows (in most cases we give only one, those for other sides, &c. being easily supplied):—

$$1. \quad \frac{\sin A}{\sin a} = \frac{\sin B}{\sin b} = \frac{\sin C}{\sin c};$$

or the sines of sides are to one another as the sines of their opposite angles.

$$2. \quad \cos c = \cos a \cos b + \sin a \sin b \cos C$$

3. $\cos\frac{C}{2} = \sqrt{\frac{\sin s \; \sin (s-c)}{\sin a \; \sin b}}$

$\sin\frac{C}{2} = \sqrt{\frac{\sin (s-a) \; \sin (s-b)}{\sin a \; \sin b}}.$

4. $\tan\frac{C}{2} = \sqrt{\frac{\sin (s-a) \; \sin (s-b)}{\sin s \; \sin (s-c)}} = \frac{M}{\sin (s-c)};$

where $M = \sqrt{\;}(\sin (s-a) \; \sin (s-b) \; \sin (s-c) \div \sin s)$.

5 $\tan\frac{A+B}{2} = \cot\frac{C}{2}\frac{\cos\frac{1}{2}(a-b)}{\cos\frac{1}{2}(a+b)}$

$\tan\frac{A-B}{2} = \cot\frac{C}{2}\frac{\sin\frac{1}{2}(a-b)}{\sin\frac{1}{2}(a+b)}.$

6. $\cot a \sin c = \cos c \cos B + \sin B \cot A.$

7. $\tan \theta = \sin \frac{1}{2} C \sqrt{\sin a \; \sin b} \div \sin \frac{1}{2} (a-b),$
gives $\sin \frac{1}{2} c = \sin \frac{1}{2} (a-b) \div \cos \theta.$

8. $\sin \theta = \sin \frac{1}{2} C \sqrt{\sin a \; \sin b} \div \cos \frac{1}{2} (a-b),$
gives $\cos \frac{1}{2} c = \cos \frac{1}{2} (a-b) \cos \theta.$

The formulæ (5) which are called Napier's Analogies, may be demonstrated more easily than in the usual way, as follows. First—

$$\tan (\tfrac{1}{2} A \pm \tfrac{1}{2} B) \,.\, \tan \tfrac{1}{2} C = \frac{\tan \frac{1}{2} A \tan \frac{1}{2} C \pm \tan \frac{1}{2} B \tan \frac{1}{2} C}{1 \mp \tan \frac{1}{2} A \tan \frac{1}{2} B}$$

from (4) $\tan \frac{1}{2} A \; \tan \frac{1}{2} B = \frac{\sin (s-c)}{\sin s}$, &c.

$$\tan (\tfrac{1}{2} A \pm \tan \tfrac{1}{2} B) \,.\, \tan \tfrac{1}{2} C = \frac{\sin (s-b) \pm \sin (s-a)}{\sin s \mp \sin (s-c)}$$

[TRIGONOMETRY.] $\tan (\frac{1}{2} A + \frac{1}{2} B) \,.\, \tan \frac{1}{2} C =$

$$\frac{2 \sin \frac{1}{2} c \; \cos \frac{1}{2} (a-b)}{2 \sin \frac{1}{2} c \; \cos \frac{1}{2} (a+b)}$$

since $2s-a-b=c$. Hence the first of (5) easily follows, and the second in a similar manner.

The formula (6) is not easily remembered, except by the following:—Write the sides in any successive pairs, as *ab*, *bc*, *ca*, or *ac*, *cb*, *ba*: change the last three into the corresponding angles giving *ab*, *b*C, CA, or *ac*, *c*B, BA; remembering the formula cos ÷ sin = cot, make the middle terms cosines, those on the right and left sines, and those on the extreme right and left cotangents. We have then—

$$\cot a \sin b = \cos b \cos C + \sin C \cot A,$$

which is a case of the formula in question.

We now proceed to the different cases of triangles, observing that these may be taken in pairs, owing to the property of the supplemental triangle. Thus suppose it granted that we can solve the case of finding the three angles when the sides are given, it follows that we can solve that of finding the three sides from the three angles. For if A, B, and C be given, find the *angles* of the triangle whose sides are A′, B′, and C′. If *a*′, *b*′, and *c*′ be these angles, then *a*, *b*, *c* are the sides of the original triangle. Nor is it worth while to separate the several cases, since it generally happens that out of each pair one is of much more frequent occurrence than the other.

Case 1. Given the three sides, to find the three angles. If one angle only be wanted, one of the formulæ (3) answers as well as anything. If all three angles be wanted, the shortest way is to calculate M from

$$M = \sqrt{\;}\{\sin (s-a) \; \sin (s-b) \; \sin (s-c) \div \sin s\}$$

and then the angles from

$$\tan \tfrac{1}{2} A = \frac{M}{\sin (s-a)}, \; \tan \tfrac{1}{2} B = \frac{M}{\sin (s-b)}$$

$$\tan \tfrac{1}{2} C = \frac{M}{\sin (s-c)}$$

Supplement.—Given the three angles, to find the three sides. Make the supplements of the given angles sides, calculate the three angles, and the supplements of the last three angles will be the sides required.

Case 2. Given two sides (*a* and *b*), and the included angle C, to find the remaining parts. If all the parts be wanted, calculate ½ (A+B) and ½ (A−B) from (5), and then find A and B by addition and subtraction: lastly, find *c* from one of—

$$\sin c = \sin b \frac{\sin C}{\sin B}, \; \sin c = \sin a \frac{\sin C}{\sin A};$$

or from both, which will be a verification. But if the remaining side only be wanted, use the formula (7) or (8), which gives this third side at once, by means of the subsidiary angle θ. Or from the extremity of the shorter side given (say *a*), let fall a perpendicular arc *z* on *b*, dividing *b* into *x* and *y*. Then—

$$\tan x = \tan a \cos C, \quad \sin z = \sin a \sin C$$
$$y = b - x, \quad \cos c = \cos z \cos y.$$

Supplement.—Given a side (*c*) and the two adjacent angles (A and B); required the remaining parts. Make A′ and B′ the sides of a triangle, and *c*′ the included angle; find C′ the remaining side, and *a*′ and *b*′ the remaining angles. Then C is the remaining angle of the original triangle, and *a* and *b* are the remaining sides. To find the remaining sides alone, the following formula may be used:

$$\tan\frac{a+b}{2} = \tan\frac{c}{2}\frac{\cos\frac{1}{2}(A-B)}{\cos\frac{1}{2}(A+B)},$$

$$\tan\frac{a-b}{2} = \tan\frac{c}{2}\frac{\sin\frac{1}{2}(A-B)}{\sin\frac{1}{2}(A+B)}$$

Case 3.—Given two sides (*a* and *b*) first both less than a right angle, and an angle opposite to one of them (A); required the remaining parts. This case may afford no solution at all, or may give two solutions; it is therefore sometimes called the ambiguous case. The formula (6) may be used in the manner pointed out in SUBSIDIARY ANGLE; but we should recommend a person who is not well practised in the subject to prefer the following simple method:—From the extremity of *b* which is *not* adjacent to the given angle, drop a perpendicular *z* on the side *c*, and let *x* be the segment adjacent to A. Let $a^{\wedge}z$ and $b^{\wedge}z$ be the angles made by *a* and *b* with *z*. And first calculate sin *b* sin A; if this be greater than unity, the triangle does not exist; if it be equal to unity, the triangle is right angled at B, and may be treated as a right-angled triangle. But if sin *b* sin A be less than unity, find *z* from $\sin z=\sin b \sin A$, and *x* and B from

$$\tan x=\tan b \cos A, \; \sin B=\sin A \frac{\sin b}{\sin a}.$$

There are two values of B, supplements of each other, both of which are possible answers. Let B be the one which is less than a right angle, and B′ that which is greater.

First, when A is acute and *a* less than *b*. Calculate *y* from $\cos y=\cos a \div \cos z$, and $b^{\wedge}z$ and $a^{\wedge}z$ from

$$\cot b^{\wedge}z=\cos b \tan A, \quad \cos a^{\wedge}z=\frac{\tan z}{\tan a}$$

There are two triangles which satisfy the data: in the first, $c=x-y$, B′ is the angle opposite to *b*, and $C=b^{\wedge}z-a^{\wedge}z$; in the second, $c=x+y$, B is the angle opposite to *b* and $C=b^{\wedge}z+a^{\wedge}z$.

Secondly, when A is acute and *a* equal to or greater than *b*. Calculate exactly as in the last case, but there is only one triangle which satisfies the data, namely, the second of the preceding.

Thirdly, when A is obtuse, in which case there is no triangle, unless *a* be greater than *b*. Calculate (using A as more convenient

$$\sin z=\sin b \sin A', \; \tan x=\tan b \cos A, \; \sin B=\sin A'\frac{\sin b}{\sin a}$$

Use the value of B, which is less than a right angle; calculate $b^{\wedge}z$ and $a^{\wedge}z$ from

$$\cot b^{\wedge}z=\cos b \tan A', \; \cos a^{\wedge}z=\frac{\tan z}{\tan a}$$

Then $c=y-x$, and $C=a^{\wedge}z-b^{\wedge}z$.

In the case in which one or both of the sides are greater than a right angle, which rarely, if ever, occurs, it is best to have recourse to one of the adjacent triangles described at the beginning of this article, and to use it in the same manner as the supplementary triangle has been used. It is not however necessary to dwell on this point.

Supplement.—Given two angles (A and B) and a side opposite to one of them (*a*); required the remaining parts. Let A′ and B′ be the sides of a triangle, and *a*′ the angle opposite to A′. Find C′ the remaining side, and *b*′ and *c*′ the remaining angles; then C is the remaining angle of the original triangle, and *b* and *c* the remaining sides.

All the cases would need some subdivision to adapt them to calculation, if it were really often required to solve triangles with very large sides and angles. But in application, it generally happens that the reasoning of the previous part of the process is so conducted as to throw the calculation entirely upon triangles which have at least two sides and two angles, severally less than a right angle. Divide a great circle into three parts, and we have the extreme limit of a spherical triangle: the sum of its sides being 360°, and the sum of its angles six right angles. But a triangle which should be very near to this limit would be best used in reasoning, and solved in practice, by means of one of the other seven triangles into which its circles divide the sphere. And if one of the sides should be greater than two right angles, the remainder of the hemisphere would be the triangle on which calculation is employed. And it is to be understood that all the formulæ are demonstrated only for the case in which every side is less than two right angles. At the same time we should recommend the beginner to procure a small sphere, and to habituate himself to the appearance of all species of triangles.

The area of a spherical triangle is singularly connected with the sum of its angles, on which alone it depends, the sphere being given. Let any two triangles, however differently formed, have the sum of their angles the same, and they must have the same area. If the angles be measured in theoretical units [ANGLE], the formula is as follows: r being the radius,

$$\text{Area} = r^2 (A+B+C-\pi),$$

which gives the number of square units in the area, the radius being expressed in corresponding linear units. But if the angles be measured in degrees and fractions of a degree, the formula is

$$\text{Area} = \cdot 01745329252\, r^2 (A+B+C-180).$$

The angle $A+B+C-180°$ is called the *spherical excess*, and it may be found at once from the sides by the formula

$$\tan^2 \frac{\text{sph. ex.}}{2} = \tan\frac{s}{2} \tan\frac{s-a}{2} \tan\frac{s-b}{2} \cdot \tan\frac{s-c}{2};$$

so that the area of a triangle is easily found from its sides. If a spherical triangle were flattened into a plane one, without any alteration of the lengths of its sides, it is obvious that the sum of the angles would undergo a diminution, being reduced to 180°. The angles would not diminish equally; but, if the sphericity of the original triangle were small, or if it occupied only a small part of the sphere, the diminutions which the several angles would undergo in the process of being flattened would be so nearly equal, that it would be useless, for any practical purpose, to consider them as unequal. For a triangle of small sphericity, then, it may be assumed that in being flattened, each of its angles loses one-third of the spherical excess. This proposition is one of considerable use in the measurement of a degree of the meridian.

SPHEROID, a name given to the class of surfaces which are formed by the revolution of an ellipse about either its longest or shortest diameter. When the longer diameter is the axis, the spheroid is called *prolate;* when the shorter, *oblate*. The earth is an oblate spheroid, or very near indeed to such a figure: hence the oblate spheroid is of much more importance than the prolate one. The general properties of the spheroid are either those which belong to it as particular cases of SURFACES OF THE SECOND DEGREE, or those which are useful in geodesy, and which belong more to the generating ellipse than to the surface.

SPHIGU'RUS. [PORCUPINES.]

SPHINCTER (from σφίγγω, 'I restrain') is a name applied generally to the muscles which close the external apertures of organs, as the sphincter of the mouth, of the eyes, &c., and more particularly to those among them, which, like the sphincter ani, have the peculiarity of being, during health, in a state of permanent contraction, independently of the will, and of relaxing only when it is required that the contents of the organs which they close should be evacuated. One of the most interesting of the results of Dr. Marshall Hall's investigations into the reflex function of the spinal chord is the proof that for this capability of permanent contraction the sphincter muscles depend on the influence of that part of the nervous centre. As soon as the spinal chord is destroyed, the sphincter muscles relax involuntarily; but so long as that part of the chord from which their nerves proceed is uninjured, though it be completely cut off from the influence of the brain and of the will, they remain contracted. They thus stand as it were midway between voluntary and involuntary muscles; the will can either contract them more than they usually are contracted, or can suffer them to be dilated: but that state of contraction which is usual to them is altogether involuntary, and persists during sleep, as well as when the consciousness and the will are most active.

SPHI'NGIDÆ, a family of Lepidopterous insects belonging to the section *Crepuscularia;* in fact, regarding the family in its most extended sense, it composes the section named.

The section Crepuscularia by most authors is placed between the Diurnal and Nocturnal Lepidoptera (sections *Diurna* and *Nocturna*), and corresponds with the genus *Sphinx* of Linnæus.

The insects belonging to this division generally fly in the evening, or early in the morning, but there are many which fly in the day-time. The body is usually stout, and in the typical species remarkable for its pointed apical portion; in some the body is cylindrical. The antennæ are moderately long, angular, and generally increase in thickness from the base, and terminate in an elongated club, having the apex pointed and recurved. The wings when at rest are usually a little inclined, but sometimes horizontal, and in some species the inferior wings project beyond the upper margin of the superior. These inferior wings are provided at the base of their upper margin with a bristle-like spine, which, passing through a hook of the upper wing, serves to unite the two wings. The spines in question are visible upon viewing the under side of the insect; they are also found in the Nocturnal Lepidoptera, but here the antennæ are stoutest at the base, gradually decreasing in thickness. The larvæ are always provided with sixteen legs, six thoracic, eight abdominal, and two anal. In the more typical *Sphingidæ* the larvæ are moreover provided with a spurlike process on the upper surface of the last segment of the abdomen, the point of this somewhat curved and horny process being directed backwards.

According to the views of some authors, the *Crepuscularia* constitute a family, but most modern writers regard this division as one of higher value, and divide it into several families.

The following are the characters of four families adopted in Stephens's 'Illustrations of British Entomology:'—

Sphingidæ.—Antennæ prismatic, sometimes serrated towards the middle, ciliated slightly in the males, terminated by a scaly seta, or naked filiform appendage: palpi short, three-jointed, densely clothed with hair or scales, the terminal joint minute; abdomen conical, not tufted at the apex; larva exposed, cylindrical, or attenuated anteriorly, with a horn on the last segment, naked, sometimes granulated, the sides frequently with oblique or longitudinal stripes; pupa subterranean, or subfolliculated.

The family embraces some of the largest European Lepidoptera: among others may be mentioned the Death's-head Hawk-moth (*Acherontia Atropos* of modern authors; *Sphinx Atropos* of Linnæus), an insect not uncommon in some parts of England, and which measures from tip to tip of the expanded wings usually a trifle less than five inches. Its general colour is dark, the superior wings being mottled with brown, black, and yellow; the body is yellow, has a longitudinal black dorsal mark, and narrow black bands; the under wings are also yellow, and have two black bands; on the thorax are pale markings, which bear some resemblance to a skull. The larva is of a greenish yellow colour, with the back speckled with black, and transverse lateral lines partly blue and partly white. It feeds upon the potato plant, jasmine, &c. When full grown the larva measures about five inches in length; and when about to assume the pupa state, it buries itself in the ground. 'Towards the end of September, or the beginning of October,' says Mr. Stephens, 'the imago is produced, and, like the rest of the group, flies morning and evening only. The conspicuous patch on the back of its thorax, which has considerable resemblance to a cranium, or death's-head, combined with the feeble cry of the insect, which closely resembles the noise caused by the creaking of a cork, more than the plaintive squeaking of a mouse, has caused the insect to be looked upon by superstitious persons as the 'harbinger of death, disease, and famine,' and their sudden appearance in Bretagne, as we are informed by Latreille, during a season while the inhabitants were suffering from an epidemic disease, tended to confirm the notions of the superstitious in that district, and the disease was attributed by them entirely to the visitations of these hapless insects.'

The Death's-head Moth is at times very troublesome to the keepers of bee-hives, which it robs of the honey. [BEE.]

Zygænidæ.—Antennæ fusiform, sometimes bipectinated, without a fascicle of scales at the apex; head smooth; palpi short or elongated, clothed with long scales or hair, the terminal joint elongated; abdomen cylindric, with a slight tuft at the apex; larva exposed, fusiform, slightly villose, not tailed; legs minute; pupa folliculated.

The insects of this family, observes Mr. Stephens, are of a gregarious nature, and, unlike the *Sphingidæ*, they fly chiefly by day. Their flight is very heavy and slow. Their caterpillars subsist upon the leaves of divers plants, and they form a silken web in which they change to pupæ.

The species of this group are generally very brilliant in their colouring, and many exotic species have the wings transparent in parts. Examples of two genera are found in this country, *Ino* and *Anthrocera* (or *Zygæna*). Of the former of these genera but one English species is known, *Ino Statices*, an insect measuring from the points of the expanded wings rather more than an inch. Its superior wings are of a brillant green colour, and the inferior are brownish.

The genus *Anthrocera* contains several indigenous species: the superior wings are usually of a deep metallic green colour, spotted with red, and the under wings are red margined with black. The species are known by the name Burnet moth. The six-spotted Burnet moth (*Anthrocera Filipendulæ*) measures nearly an inch and a half in width, the wings being expanded, and has six red spots on the superior wings. It is very common in various parts of England, making its appearance in meadows, &c. about the end of June. The caterpillar is yellow, spotted with black. It feeds upon the plantain, trefoil, dandelion, &c.

Sesiidæ.—Antennæ prismatic, ciliated in the males, slightly hooked, the apex terminating in an oblique scaly process; palpi short, clothed with scales, the terminal joint extremely minute; abdomen conical, with the apex tufted; larva naked, with a horny appendage on the hinder segment; pupa smooth, without spines, enclosed in a cocoon upon the ground.

To this family belongs the Humming-bird Hawk-moth (*Macroglossa Stellatarum*), an insect not uncommon in various parts of England. Of this species Mr. Stephens says there are usually three broods in the year, appearing respectively at the end of April, June, and August; some of the last brood have been known to hybernate. The moth measures in width about an inch and three-quarters, or rather more, and is of an ashy-brown colour; the upper wings have two transverse waved black marks; the under wings are of an orange colour, edged with black, and on the sides of the body are some white patches. This insect flies about in sunny weather, and is remarkable for the swiftness of its motions; in which respect it greatly resembles the humming-bird, as well as in its habits of feeding upon honey, which it extracts from the flowers by means of its enormously long proboscis, but without settling upon the plant.

Other species of the present family are found in England. They constitute the genus *Sesia*, and are distinguished from *Macroglossa* by the disc of their wings being transparent.

Ægeriidæ.—Antennæ fusiform, a little curved, ciliated in the males, the apex terminating in a plume of scales; ocelli two, minute, placed behind the antennæ; palpi elongate, thickly clothed with scales and long hairs, the last joint elongate; abdomen cylindric, tufted at the apex; wings horizontal and generally transparent, with the exception of the apical portion, which is more or less covered with scales; larva tailless, assumes the pupa state in the stems of plants or dead wood of trees; pupa furnished with spines on the segments of the body.

The species of this family are usually of small size, and remarkable for their transparent wings and the possession of ocelli, or simple eyes, in addition to the ordinary compound eyes. They fly by day, and many of them bear superficial resemblances to insects of other orders, and hence have received such names as *Crabroniformis*, *Ichneumoniformis*, &c. Numerous species are found in England, and these constitute the two genera *Trochalium* and *Ægeria*. In the former of these genera the maxillæ are very short, and the antennæ are short, whilst in *Ægeria* the maxillæ are elongated, and the antennæ also long.

SPHINX (*σφίγξ*), a fabulous being which occurs in the mythology of Greece, Egypt, and India, and appears to have been introduced into the western part of the antient world from Asia or from Ethiopia. (Apollod., iii., 5, 8; Schol. ad Eurip., *Phoen.*, 1748.) Greek sphinxes, as we know partly from the descriptions which the antients give of them, and partly from representations still extant, were portrayed in different ways, but their figure was always a compound of the animal and human form. Palaephatus describes the body as that of a she-dog with wings, and the head as that of a young female; others describe the whole body, with the exception of the head, as that of a lion, to which in some cases the tail of a dragon or of a lion was added; sometimes also the upper part represents a lion, while the lower parts are those of a woman. She was generally represented as lying upon the front part of her body with the paws stretched forward; but she was also represented in other attitudes. Her figure was often used as an ornament on various works of art, and also appears upon several coins, especially those of Chios. The Grecian sphinx, which occurs in the early legends of Thebes in Bœotia, is always described as a female, and of a cruel nature. She was the daughter of Typhon and Echidna, or, according to others, of Typhon and Chimaera, or of Orthus and Chimaera, and dwelled upon the Phician Hill near Thebes, where she proposed a mysterious riddle to every one that passed by. Those who could not solve the riddle were killed by her, and the city of Thebes was in great distress, until at last Oedipus solved the riddle, whereupon the sphinx threw herself from the rock.

The Egyptian sphinxes are lions without wings, and are represented in the same recumbent position as those of Greece; the upper part of their body is either human, and mostly female, or they have the head of a ram. In some cases the head is covered with a kind of cap, which also covers part of the neck. These sphinxes were generally placed at the entrance of temples, where they often formed a long avenue leading to the temple, as at Essaboa in Nubia, at Carnak, and Luxor. The largest of the existing sphinxes is that of Jizeh, which is hewn out of the rock, and is of the enormous dimensions of 143 feet in length, and 62 feet in height in front. The greater part of it is now covered with sand, above which little more than the head and shoulders are visible. A colossal sphinx near Thebes has been discovered and described by Belzoni. Another great sphinx, twenty-two feet long, and consisting of one block of rose-coloured granite, is at present in the museum of the Louvre at Paris. There are several small sphinxes in the British Museum. Herodotus (ii., 175), in speaking of certain sphinxes, calls them Androsphinges, 'men-sphinxes' (*ἀνδρόσφιγγες*), from which some writers have inferred that Egyptian sphinxes were figures in which the male and female sexes were united, but the expression of Herodotus is only intended to distinguish the half-human sphinxes (*ἀνδρόσφιγγες*) from those which have the head of a ram (*κριόσφιγγες*). There are also sphinxes the head of which is that of a man, as is evident from their beard, but their number appears to have been very small in comparison with the others, and few such sphinxes have yet been found.

Sphinxes are also found in India as ornaments of temples, but they are always represented with the head of a man.

(Piroli, *Antiq. d'Hercol.*, iv., tav. 44; Winkelmann, *Werke*, iii., p. 330, &c.; Voss, *Mythol. Briefe*, ii., p. 22, &c.; *Egyptian Antiquities*, i., p. 211, &c.; ii., p. 242, &c.)

SPIDER. [ARACHNIDA.]

SPIGE'LIA, the name of a genus of plants belonging to the natural order Spigeliaceæ. It is commemorative of Adrian Spigelius. The characters of this genus are:—calyx 5-parted; corolla funnel-shaped, with a 5-cleft equal limb; anthers converging; capsule didynamous, 2-celled, 4-valved, many seeded. This genus consists of annual and perennial herbs, and under-shrubs with opposite leaves and rose-coloured or purple flowers. They are natives of North and South America, and are found in various soils. All the species have handsome flowers, and hence are desirable for the garden. They may be planted in a soil consisting of equal parts of loam and peat. The shrubby and perennial kinds are easily propagated by cuttings.

S. Marylandica, Maryland Worm-grass, is an herbaceous perennial, with simple tetragonal scabrous stems; opposite, sessile, glabrous, ovato-lanceolate leaves; solitary spikes; funnel-shaped corolla, and enclosed stamens. It is a native of Virginia, Maryland, Carolina, and Georgia, in rich moist soils, by the edges of woods; also in the forests on the banks of the Arkansas. Although all the species possess active properties the Maryland worm-seed is that which is principally used in medicine.

S. Anthelmia, annual Worm-grass, is an herbaceous annual, with branched nearly square stems; ovate or oblong-acute leaves, with short petioles; floral leaves four in a whorl; funnel-shaped corolla, and enclosed stamens. It is a native of Guiana, Trinidad, and Brazil. It possesses powerful narcotic properties, and is used in the same manner as the last. This species is often cultivated: it has small pale-red flowers.

SPIGE'LIA MARYLA'NDICA (*Lonicera Marylandica*, Linn.), Carolina pink, perennial worm-grass, or worm-seed; a perennial herbaceous plant, native of the southern states of the American Union, abundant in rich soils about the borders of woods. It is from six inches to two feet high, leaves opposite, sessile, ovate, and acuminate. The root has a short caudex, from which issue numerous fibres; all which parts are of a yellowish colour when first dug up, but become black on drying. It is collected by the Creek and Cherokee Indians, and sold to the white traders, who pack it in casks, or make it up into bales, weighing from three hundred to three hundred and fifty pounds. The little care bestowed in packing it generally causes the stalks to be damp and mouldy before reaching the consumer. That contained in casks is generally in the best condition. The odour of the fresh plant is disagreeable, the taste sweetish, slightly bitter, and nauseous. The leaves are less potent than the root, which part, according to Wackerroder's analysis, consists of woody fibre 82, a peculiar principle like tannin 10; bitter acrid extractive 4; and an acrid resin. Both the resin and extractive have emetic properties. Spigelia has slight narcotic powers, and in large doses causes vomiting and purging. In America the fresh plant has decided anthelmintic virtues, but is only useful against the Ascaris lumbricoides, or large round worm. In Europe it is little used, having lost much of its power, by long keeping. Dr. Barton recommends it as a cure for the infantile remittent fever, which often terminates in hydrocephalus, or water in the head. In such a case it acts beneficially by removing the worms, the irritation of which, when propagated to the brain, gives rise to the more serious disease. But the expulsion of the worms by any other means, and the exhibition of any tonic and astringent, like the tannin of the Spigelia, will prevent their recurrence. [ANTHELMINTICA.]

Spigelia is given in powder, or as an infusion or decoction. It is usually combined with senna or some other purgative, but it is better to give it alone, and follow its administration by a dose of calomel and jalap.

The Spigelia Anthelmia, a native of Brazil, which is a much more potent plant, is sometimes mistaken and given for the other. It contains an alcaloid, which is volatile, somewhat like nicotina, the effects of which it also resembles, causing formidable narcotic symptoms, to which lemon-juice, sugar, or carbonate of potash is said to be an antidote.

SPIGELIA'CEÆ, a small natural order of plants belonging to the monopetalous subclass of Exogens. The order consists of herbaceous plants or under-shrubs, with opposite, entire, stipulate leaves, and flowers arranged in one-sided spikes. The calyx is inferior, regularly 5-parted; corolla regular, with five lobes, having a valvate æstivation; stamens 5, inserted in the corolla, all in the same line; pollen-grains 3-cornered, with globular angles; ovary superior 2-celled; fruit a capsule, 2-valved, many-seeded, valves turned inwards at the margin, and separating from the central placenta; embryo very small, lying in the midst of fleshy albumen, with the radicle next the hilum. This order was separated from Gentianaceæ by Von Martius, and is an instance of the great utility of making small orders of those genera which differ much in character from any of the larger orders. If these plants were left among any of the larger groups, they would only tend to weaken the characters of those groups; whilst by separating them, the larger groups are strengthened, and less difficulty is experienced in pointing out their affinities. The principal points of structure for which Spigeliaceæ have been separated from Gentianaceæ are the symmetry of the stamens, corolline, and calycine segments; the division of the valves of the capsule; and the presence of stipules. In this last point they approach Cinchonaceæ.

The order consists of two genera, Canala and Spigelia, the species of which are natives of America. [SPIGELIA.]

SPIGE'LIUS, ADRIAN, was born at Brussels in 1578. He studied philosophy and medicine at Louvain, and afterwards pursued the latter science at Padua, where he received his diploma of doctor. He practised first in his own country, and then in Moravia; but in 1616 he was invited, at the recommendation of his former preceptor Fabricius ab Aquapendente, to take the principal professorship of anatomy and surgery at Padua. He seems to have filled the post with great honour both to himself and to the university, for its reputation was greater in his time than even when Fabricius and Casserius were professors. He died in 1625, of a disease said to have been caused by an accidental wound in the hand, leaving several works which were published after his death by his son-in-law and by Bucretius. The most important of them was that 'On the Structure of the Human Body,' an excellent and well written system of anatomy, in ten books, in which however there is contained little that was unknown to his predecessors; even the lobe of the liver, which is called after his name, having been before described by Vesalius and others. Haller's judgment of Spigelius, that he commends himself chiefly by the purity of his style and by his practical annotations (*Biblioth. Anatom.*, i. 357) is probably correct; and may explain why, as a professor, he had more repute than his two predecessors, both of whom were certainly more learned anatomists. The whole works of Spigelius were published by Van der Linden, at Amsterdam, 1645, folio.

SPIKE is a form of the inflorescence of plants in which the flowers are arranged around a common axis, upon which they are directly seated, no flower-stalk intervening between the axis and the flower, as seen in the Plantago. When the flowers are destitute of calyx and corolla, the place of which is taken by bracts, and when the whole inflorescence falls off after flowering or ripening, it is called an *amentum* or *catkin*. Such an inflorescence occurs in the willow and hazel. 'If a spike consists of flowers destitute of calyx and corolla, the place of which is occupied by bracts, supported by other bracts which enclose no flowers; and when with such a formation the rachis, which is flexuose and toothed, does not fall off with the flowers, as in grasses, each part of the inflorescence so arranged is called a *spikelet* or *locusta*.' (Lindley.) The spadix is also a modification of the spike. [SPADIX.]

SPIKENARD is a substance which has enjoyed celebrity from the earliest period of the world's history, and has engaged the attention of numerous commentators on the works of the antients, as well as of some modern authors. It is interesting therefore not only as making us acquainted with one of the substances known to and esteemed by the Greeks and Romans, but it is important likewise as being mentioned in the Bible, since the Nard of Scripture is supposed to be the same substance as the Nardos of the antients, called also Nardostachys (ναρδόσταχυς), and hence Spikenard, the word *stachys* being rendered by the word Spike.

Reference has been made to this article from Nardus, as also from Schoenanthus and Juncus odoratus, in consequence, as stated, of the very different substances which seem to be referred to under these names being often confounded together by modern writers, though the descriptions are very distinct in the antient authors, and substances may be found in the present day which seem to answer to those descriptions, and which are found in the countries from which the former are said to have been obtained. In antient authors, such as Pliny, Dioscorides, Theophrastus, and Hippocrates, we have notices both of *Indian nard* and of another aromatic, which is commonly called *Calamus aromaticus*. [SWEET CALAMUS.] When such substances are merely mentioned in antient authors, it is difficult to identify them in modern times, as we have the assistance only of the name, sometimes of the properties, and a notice of the country where it is produced. These, though often lending us considerable assistance, are yet insufficient to prove that we have succeeded in identifying a substance. In the first place, it is necessary to be acquainted with the more remarkable natural products of the country which is said to have yielded those which were possessed of properties striking enough to be sought for at very early times from very distant countries. As the productions of nature remain uniform in properties, we may appropriately compare what we now find with antient descriptions. Dioscorides is the most eligible author for such purposes, as he arranges his articles, gives a description, and often synonymes, compares them with other substances, and mentions the country whence the articles were obtained. He was followed by a series of authors, as Galen, Pliny, Oribasius, Ætius, Paulus of Ægina, to the time of the Arabs, who mention the same substances, besides Myrepsus and Actuarius, who were subsequent to some of them. The Arabs, from their position and communication with the East, had a practical knowledge of such articles as were produced in their own territories, or were obtained from India. The Christian physicians, who assisted them in making translations, must have been well acquainted not only with both the Greek and Arabic languages, but also with the substances which were described and used as medicines. That the Arabs were acquainted with Sanscrit works on medicine has been proved by Dr. Royle, in his 'Essay on the Antiquity of Hindoo Medicine.' That Hindu physicians were present at the court of the Caliph of Bagdad was proved by the late Professor Dietz, and recently again by Mr. Cureton and Professor Wilson, in the 'Journal of the Royal Asiatic Society.' Hence, by following the description of a substance through these various authors, we may trace it with a considerable degree of certainty to the countries where it is produced; and this plan we have adopted in the articles LYCIUM and PUTCHUK, which is *Costus* of the antients. Dioscorides, in the first chapter of his first book, treats of the various aromatic and stimulant substances which were known to the antients, and among these, of the various kinds of Nard. Of the first kind, called simply nardus (νάρδος), there are two varieties, the one Syrian, the other Indian; the former so called not because it comes from Syria, but because the mountains in which it is produced have one part turned towards Syria, and the other towards India. This may refer either to the Hindu Khosh, or to so many Indian products finding their way to Syria, by the way of the Red Sea and the Euphrates, from the earliest times. The other variety is called Gangitis, from the river Ganges, near which, while flowing round a mountain, it is produced, bearing many hairy spikes from one root. These are strong-smelling, but those growing in moist situations less so than those found on the mountains. One variety, he further says, is called Sanphariticon, from the name of a place. This first kind being called nardus, and distinguished into the Syrian and Indian varieties; the second kind he calls Celtic nard (νάρδος κελτική), and the third kind a mountain nard (νάρδος ὀρεινή). On consulting Avicenna, we are referred from narden to sunbul, pronounced sumbul, and in the Latin translation from nardum to spica, under which the Roman, the mountain, the Indian, and Syrian kinds are mentioned. This proves, as has been already stated by Sir William Jones, that sumbul, &c. was always considered by Arabian authors as synonymous with the nardos of the Greeks. In Persian works on Materia Medica, all translated from the Arabic, as, for instance, the 'Mukhzun al-adwieh,' or Magazine of Medicines, we have four different kinds of *sunbul:* 1, *Sunbul hindee;* 2. *Sunbul roomee*, called also *sumbul ukletee*, and *narden ukletee*, evidently the above Celtic nard, said also to be called *sunbul Italion*, that is, the nard which grows in Italy; 3, *Sunbul jibullee*, or mountain nard: hence it is evident that the kinds described by Dioscorides are alluded to, and in fact the accounts given are merely translations of his descriptions. The fourth kind of *Sunbul* appears to be a hyacinth or polyanthus. But the first is that with which alone we are at present concerned. The synonymes given to it are, Arabic, *sunbul al teeb*, or fragrant nard; Greek, *narden;* Latin, *nardoom*, and Hindee, *balchur* and *jatamasee.*

Having the Hindee and Sanscrit names of an Indian plant, the next step was to obtain it. This was first attempted by Sir William Jones, at a time when we had no access to the Himalayan mountains, and a wrong plant was sent him. Dr. Royle informs us that on making inquiries on the subject, when at Saharunpore, in 30° N. lat., about thirty miles from the foot of the Himalayas, he learnt that *jatamansi*, better known in India by the name *bal-chur*, was yearly brought down in considerable quantities from the mountains, such as Shalma Kedarkanta, near the Ganges and Jumna rivers, to the plains. Having obtained some of the fresh brought down roots, he planted them both in the East India Company's Botanic Garden, and in the mountains, in a nursery attached to it. The plant produced was found to belong to the natural family of Valerianeæ, and has been named Nardostachys Jatamansi by De Candolle, and formerly Patrinia Jatamansi by Mr. Don, from plants sent home by Dr. Wallich from Gossainthan, a mountain of Nepaul. Mr. Don obtained the additional corroboration that spikenard bought in a chemist's shop by this name exactly corresponded with the roots of the jatamansi. (Royle, *Illust. Himalayan Bot.*, p. 242.)

Hence there can be no doubt that the nardos described by Dioscorides is the jatamansi of the Hindus, and probably the same substance which has been mentioned by such writers as Hippocrates, and there is nothing improbable in its being the nard of Scripture, and it has been shown to be a plant belonging to the natural family of Valerianeæ. It is curious that the Celtic and mountain nards are also Valerians, the former being yielded by *Valeriana Celtica* and *Saliunca*, still exported from the mountains of Austria to Egypt, whence it has spread into both Africa and Asia, being valued for its fragrance, and hence employed in perfuming baths; and the other by *Valeriana tuberosa.* Dr. Royle mentions it as a curious coincidence, if not allowed to be a sign of accurate knowledge, that the Persians should translate the φυ of Dioscorides, which he also calls wild nard, foo of the Arabians, by the term *bekh i sunbul*, root of soonbul. The plant correctly ascertained by Sibthorp has been named by him *Valeriana Dioscoridis.*

Differences of opinion exist respecting the nature of the fragrance of the jatamansi. It may be sufficient to state, that it is highly esteemed in the East as a perfume, and is used to scent oils and unguents. At a late meeting of the Asiatic Society specimens of true jatamansi were sent round, and all were of opinion that it was a highly fragrant drug.

SPILSBY. [LINCOLNSHIRE.]

SPINA BI'FIDA, or cleft-spine, is a disease commencing in fœtal life, and which consists in an imperfection of the posterior part of the spinal canal. It is almost always accompanied by an excessive secretion of spinal fluid, and in these cases it may be regarded as a disease of the same kind affecting the spinal canal as that which, existing in the skull, constitutes hydrocephalus. The two are indeed not unfrequently coincident; and spina bifida is sometimes called hydrorachis.

The arch of each vertebra [SKELETON] is developed and ossified in two pieces which meet behind in the middle line at the base of the spinous process. This is also developed in two lateral portions which subsequently unite together and with the arch, so as to form the one piece of bone which we find in the adult closing in the back of the spinal canal. This development and union of the arches of the vertebræ goes on during an early period of fœtal life, while the spinal column is growing rapidly, and the fluid of the spinal canal and arachnoid sac is being constantly secreted. If this fluid be secreted in an unnaturally large quantity before any or a part of the arches of the vertebræ are completely ossified, it may exert such pressure upon them as to separate their component parts, and produce a permanent aperture in the back of the spinal canal, through which a sac containing the excess of fluid will protrude. Or if the development and ossification of any or all of the arches take place more slowly than it should, then a secretion of not more than the ordinary quantity of fluid may suffice to keep them permanently open. A cleft spine will thus be produced without the watery tumour; but the openness of the spine will generally in cases of this kind lead to the secretion of an unnatural quantity of the spinal fluid; for it seems a general law that, other things being equal, the quantity of fluid secreted in each part is inversely proportionate to the resistance offered by the walls of the cavity into which it is poured.

Spina bifida is almost always characterized by a tumour situated over the defective vertebræ, globular, elastic, and fluctuating, often attached by a narrowed base, and varying in size according to the extent of the fissure in the spinal canal. It is usually covered by healthy skin, and consists of the dura mater, and one or more of the other membranes of the spinal chord, protruded in a sac through the space between the separated arches, and filled by a clear serous fluid. On pressing such a tumour the patient may become insensible, or be convulsed; for the fluid within it communicating with that within or around the brain and spinal chord, the pressure made upon it is felt with equal force by the whole of those organs. The parts of the body below the tumour are often paralytic, not from the pressure of the fluid, for that is equally diffused, but from disease of the chord coincident with that of the arches.

Spina bifida is most common in the lumbar and sacral regions, in which the vertebral arches are latest completed: it is most rare in the neck, and is there also most dangerous, because of the great number of nerves which, by the coincident disease of the spinal chord, may be paralysed. It does not commonly interfere with the general health: but by the friction to which, when the tumours are large, the skin is subjected, and by the distention produced by the increasing secretion of fluid, the sac is liable to inflame and ulcerate, till, exposing the spinal chord, or its membranes, death is produced by their inflammation; or, the quantity of fluid secreted may be so great as to produce death by its pressure on the chord and brain, in a manner similar to that in which hydrocephalus often terminates.

In one of these modes, spina bifida, when accompanied by excessive secretion, almost always terminates fatally, though patients may survive with it for ten or even twenty years. Life may generally be prolonged by maintaining a gentle even pressure upon the tumour, so as to supply the necessary resistance to the effusion of more fluid. In a few cases a repeated evacuation of the fluid, and then firm pressure upon the sac, has been found successful; and lately, M. Tavignot has related some cases which he cured by slicing off the tumour, and instantly bringing together the edges of the mouth of the sac, and so holding them till they had united and formed a firm cicatrix.

That just described is by far the most common form of spina bifida; others more rare are those in which not the arches only, but the bodies of the vertebræ also are cleft, the two lateral portions in which each is developed being kept apart, so that a portion of the spinal canal is open in front towards the cavity of the abdomen. Some differences of character also depend on the seat of the fluid secreted: it is generally in the sac of the arachnoid, but sometimes is in the tissue of the pia mater, or in both it and the sac, or, yet more rarely, in the central canal of the spinal chord.

SPINA VENTO'SA is a term now obsolete, which was applied by old surgeons to abscesses in bone, accompanied with excessive swelling, and then to nearly all the diseases indiscriminately in which either bones or joints become enlarged.

SPINACH. [Spinacia.]

SPINA'CIA (from *spina*, 'a thorn,' on account of its prickly fruit), the name of a genus of plants belonging to the natural order Chenopodiaceæ. This genus is diœcious, the male and female flowers being on different plants. The male flowers are composed of a calyx, with 5 deeply cloven, concave, oblong, obtuse segments, 5 stamens, with filaments longer than the calyx, with oblong double anthers. The female flowers have a monosepalous calyx, with four divisions, two of which are smaller and opposite; a superior ovary with four styles and simple stigmas. As the fruit ripens, the calyx hardens and adheres to it. The ovary contains a single seed. There are only two species, which are herbaceous plants, with alternate leaves, and axillary flowers of a green colour.

One of the species of this genus, the *S. oleracea*, the common Spinach, is well known on account of its use in the kitchen. It has an herbaceous stem one or two feet high, branched, and hollow; arrow-shaped leaves; male flowers in long spikes, abounding with pollen; female flowers on another plant, axillary, herbaceous, and small. The fruit is a small round nut, which is sometimes very prickly.

The common spinach has been cultivated in Europe from time immemorial, but its native region was not known till Olivier announced that he had found it wild in Persia. It does not appear to have been cultivated or known by the antients, and is first mentioned by Arabian physicians under the name of Hispanac, and appears to have been known to the Spaniards from a very early period.

There are two principal varieties cultivated in gardens, the prickly-fruited, with triangular, oblong, or sagittate leaves, and the smooth-fruited, with round or blunt leaves. The former is considered the hardiest, and is therefore employed for winter culture; the latter is used for summer crops. Of these varieties there are several subvarieties, varying in the size, thickness, and shape of their leaves.

For the winter crop the seed is sown at the beginning of August. A light, dry, rich soil should be preferred, and, if possible, in a sheltered situation. When the plants have put forth two pair of leaves, the ground should be hoed and the plants thinned. By October or November the outer leaves of the spinach are fit for use. In February, when fine weather occurs, the plants should be again attended to, cleaned, and thinned out, and in this way it may be made productive till April or May, by which time the summer sort will be ready. The first sowing of the round-leaved spinach or smooth-fruited should take place at the end of January in some sheltered border. This crop should be successively thinned out till the plants are eight or ten inches apart. Successive sowings may be made, in order to ensure a constant supply in February, March, and April, and, if desirable, these sowings may take place between rows of cabbages, &c.

Spinach is often sown in narrow drills, which is rather more troublesome at first, but this is made up for by the facility with which clearing, thinning, and gathering are afterwards accomplished.

For preserving seed, those plants which are of the most stocky growth should be selected. The winter crops run up soonest, but seed may be obtained from spring crops in July and August. The new seed is the best for sowing, although it will keep very well for a year. When the plants are saved for seed, the male plants, which are easily distinguished by their flowers, may after fertilization be drawn and thrown away.

Spinach is sometimes grown by the farmer, for the purpose of obtaining a crop of seed for the uses of the gardener. In the selection of land for this purpose, care should be taken that it is finely prepared by ploughing and harrowing in the early spring, and some well-rotted dung should be ploughed in where the soil is not of the best quality. When the Spinach has blossomed, the male plants should be drawn out, which serve at this time as excellent food for pigs, and might be given to other animals with advantage. There is much uncertainty about this kind of crop; sometimes however it turns out very advantageous.

SPINAL CHORD. [Brain; Nervous System.]

SPINAL COLUMN. [Skeleton.]

SPINCTE'RULUS. [Foraminifera.]

SPINE, in Botany, is applied to the sharp hard conical extremities of the branches of plants. The spine is seen in great perfection in the Gleditschia, sloe, white thorn, and other plants. It is not produced in all plants, and seems to arise from the want of perfect development of the growing point of the plant. That such is the case would appear to be proved by the fact, that when wild plants which bear spines, as the apple and pear, are introduced into orchards, where they have more nutrition, the growing point no longer remains in the state of a spine, but is developed into a branch with leaves. Occasionally spines bear leaves, and this is the case in the white thorn. Spines differ from prickles in being in connection with the wood of the stem, and in being composed of bark and wood, as the stem itself. The prickle consists of merely hardened cellular tissue, and can be removed from the wood with the bark.

SPINELL, *Spinell Ruby*, *Balas Ruby*, *Ceylanite*, *Candite*, *&c.*, occurs in loose and imbedded octohedral crystals. Primary form the cube. Cleavage easy, parallel to the faces of the octohedron of the black opaque variety; difficult in the other varieties. Fracture conchoidal. Hardness greater than that of quartz, but less than that of corundum. Colour red, blue, violet, green, yellow, brown, and black. The first is the most common. Streak white. Lustre vitreous. Transparent; translucent; opaque. Specific gravity 3·5 to 3·7.

Infusible by the blow-pipe; the red varieties are rendered black and become opaque by exposure to it, but on cooling, at first of a fine green by transmitted light, then nearly colourless, and at last become again red.

Spinell is found in Ceylon and Siam in isolated and rolled crystals in the beds of rivers. It is found embedded in carbonate of lime in North America and Sweden.

Several varieties have been analyzed: red transparent spinell, by Vauquelin; blue, by Berzelius; green and black, by Dr. Thomson.

	Red.	Blue.	Green.	Black.
Silica . . .	—	5·48	5·62	5·59
Alumina . .	82·47	72·25	73·30	61·78
Magnesia . .	8·78	14·63	13·63	17·86
Protoxide of iron	—	4·26	7·42	10·56
Lime	—	—	trace	2·51
Chromic acid	6·18	—	—	—
	97·43	96·62	99·97	98·6

SPINELLANE occurs crystallized. Primary form, the cube; usual form, the rhombic dodecahedron. Cleavage parallel to the faces of the dodecahedron. Fracture conchoidal, uneven. Hardness 5·5 to 6·0. Colour brown, grey, greyish black. Lustre vitreous. Translucent. Opaque. Specific gravity 2·28. It gelatinizes in acids.

It is found on the borders of Lake Laach, near Andernach on the Rhine. Analysis by Klaproth:—Silica, 43·0; Alumina, 29·5; Soda, 19·0; Lime, 1·5; Peroxide of iron, 1·0; Sulphuric acid, 2·0; Water, 2·5.

SPINET, a musical instrument of the harpsichord kind, but differing in shape and power, formerly much in use, though now entirely superseded by the piano-forte. The *Spinet* had but one string to each note, which was struck by a quilled jack, the latter acted on in the usual manner by a key. The tone was, of course, comparatively weak, but pleasing, and as the instrument was small in dimensions and cheap in price, it answered the purpose of those who did not find it convenient to purchase a harpsichord. The outline of its ordinary form was nearly that of a harp laid horizontally, supposing the clavier, or key-board, to be placed on the outside of the trunk, or sounding part, of the last-named instrument.

SPINNING. The art of spinning 'consists, philosophically speaking,' observes Dr. Ure, in his 'Philosophy of Manufactures,' 'in forming a flexible cylinder of greater or less diameter, and of indeterminate length, out of fine fibrils of vegetable or animal origin, arranged as equally as possible alongside and at the ends of each other, so that, when twisted together, they may form a uniform continuous thread.' Whatever be the substance operated upon by the spinner, whether cotton, wool, flax, or silk, it is necessary in the first place to lay the fibres or filaments parallel with each other, so as to form them into a soft continuous ribbon or cord, sometimes called a *sliver*. Excepting in the case of flax, this is done by a carding or combing process, the object of which is to disentangle and straighten the tangled filaments; and in all cases it is desirable to distribute their ends as equally as possible in the mass, in order to make the strength of the sliver uniform. If such a sliver or cord be firmly griped or compressed at two points rather farther apart than the average length of its component filaments, it may be extended or drawn out to a greater length; the filaments sliding upon each other. When two or more such cords have been extended in this way, until they will stretch no longer without separating or being pulled asunder, they may be laid parallel to each other, and combined by being slightly twisted together. The compound cord thus formed may be again extended by stretching or drawing; and the repetition of the processes of doubling, twisting, and stretching will enable the spinner to extend the length and diminish the thickness of the cord until it becomes a fine compact thread or yarn. In fact, the power of extension is almost unlimited, except by the imperfect performance of the process, which might occasion the fibres to be so laid that several should terminate at the same point, whereby the cohesion of the thread would be destroyed; or by the attainment of such a degree of twist that the fibres would sooner break than slide farther upon each other,—their mutual compression being sufficient to overcome their individual strength. This explanation will apply to most of the operations classed under the general name of spinning; but various modifications of the process are occasioned by the nature of the material to be spun, or the character of the apparatus employed.

It is needless to enter at length into the history of the art of spinning, an art which has been practised from the earliest times, and to the invention of which so many claims have been brought forward. The primitive modes of spinning by the spindle and distaff, and by the spinning-wheel, which are still extensively practised in the East, and not entirely superseded in some remote districts of Scotland,[*] only enable the spinner to produce a single thread; but with the almost automatic spinning-machinery which has been called into existence by the cotton manufacture, one individual may produce nearly two thousand threads at the same time. The history of the series of inventions by which this result has been gradually attained has been already given under Arkwright, Sir Richard, vol. ii., p. 344; Cotton Spinning, vol. viii., p. 94; and Cotton Manufacture, vol. viii., p. 98. As the application of spinning-machinery to other manufactures has arisen out of the improvements made in that of cotton, it is needless, after the information conveyed in those articles, to do more than add a few remarks respecting the principal variations necessary to adapt similar machinery to the spinning of wool, flax, and silk.

The principle of roller spinning has been explained as above, vol. ii., p. 345. The soft cord or sliver is caused to pass between two pairs of rollers; the space between the two pairs being rather more than equal to the length of the fibres. The two pairs of rollers between which the sliver is compressed do not separate farther from each other in order to stretch it, but that effect is produced by making the second pair of rollers revolve faster than the first. It is necessary to arrange the distance between the two pairs of rollers with reference to the average length of the filaments of which the sliver is composed; because if the two pairs of rollers were too far apart, the soft cord would be liable to separate between them, and if they were too near, so that the opposite ends of a filament should be compressed between them at the same time, the sliver could not extend or lengthen by the sliding of the filaments, but the filaments themselves must break with the strain. Hence, in machinery for spinning wool, on account of the variable length of the filaments, the drawing-rollers are so mounted that they may be readily adjusted to different distances. In consequence of the greater elasticity of wool, the relative velocities of the two pairs of rollers are so arranged as to produce a greater degree of stretching or extension than is usual with cotton.

For spinning flax other modifications are necessary, owing to the greater length of its fibre, and its peculiar character. Instead of being curled and tangled together like those of cotton and wool, the fibres of flax are nearly straight and parallel, but so firmly connected together in bundles as to need splitting or separating by a kind of metallic comb, called a *heckle* or *hackle*. This operation has been usually performed by the hand, in the manner described in the article Flax, vol. x., p. 305, and it has been found very difficult to apply machinery successfully to the process, as no machine can proportion the force exerted to the state of the flax with the same accuracy as an experienced hand. A material difference between the processes of heckling by hand and by machinery consists in the circumstance that in the former case the heckle is stationary, and the flax is moved through it, while in the latter the principal movement is in the heckle itself. Automatic heckles are placed between the pairs of rollers in machinery for drawing the slivers of flax. Machinery for spinning tow is similar, but has a different heckling apparatus, to allow of the rollers being nearer together, because of the comparative shortness of the fibres. As the fibres of flax have not the same tendency to mutual entanglement as those of wool and cotton, it is necessary to moisten them with water to make them adhere to each other during the process of spinning, and also to render them more pliable and easy to twist. Until recently, cold water was used for moistening the flax for machine-spinning; but the substitution of hot water for that purpose has been found a great improvement. By this alteration a much finer, smoother, and more uniform thread may be produced, and a given weight of flax may, it is stated, be spun to double the length that it formerly could. The inconvenience of the spray thrown about by the process of flax-spinning is very serious, although measures have been adopted to lessen its injurious effect upon the health of the spinners. Particular descriptions of the machinery used for spinning flax, with the flax-gill, or automatic heckle, may be found in Dr. Ure's 'Philosophy of Manufactures' and 'Dictionary of Arts,' &c. In the latter work it is stated that the first attempts at spinning flax and hemp by machinery went on the principle of cutting the filaments into short lengths, by which their cohesive strength was wasted. In such experiments tow was used with more success, because of its greater similarity to cotton. The first tolerable results in the spinning of flax by machinery were obtained about the year 1810, as we are informed in the same work, by the brothers Girard, at Paris; but the French have never carried the art to any great practical perfection. In this kingdom many ingenious inventions have been recently brought into operation; and at Leeds, Dundee, and Belfast, the machine-spinning of flax has been brought to a state of perfection little short of that of cotton. The great superiority of rope-yarns made by machinery over those made by hand has been alluded to under Rope, vol. xx., p. 154.

The manufacture of yarns or threads of the best quality of silk is a process essentially different from the spinning of

---

[*] 'Ency. Brit.,' art. 'Spinning.'

Google

cotton wool, or flax. Instead of combining a number of short fibres into a long thread, the silk-throwster receives the silk in the form of very long and exceedingly fine filaments, which merely need cleansing and twisting together until the requisite strength is attained. The twisting process is, in this case, called spinning. There is, however, besides the best portion of the silk, which is wound off from the cocoon, a quantity of loose or *floss* silk, which forms a soft tangled mass enveloping it. This, with the refuse of the superior part of the silk, under the general name of *waste*, is converted into yarns for coarse or inferior articles, by a process very similar to that of spinning other fibrous substances. This waste silk was formerly cut by a machine, to reduce its filaments into short lengths, and then treated much in the same way as cotton wool; but the process of manufacturing it into yarns has been recently much improved by the adoption of contrivances similar to those used in flax-spinning, by which the filaments are heckled or drawn out into a sliver without being cut. A detailed account of the art of spinning silk-waste is given in the article 'Silk Manufactures,' in the new edition of the 'Encyclopædia Britannica.' It is there observed that this art is still in its infancy; but its rapid progress in this country may be inferred from the fact that while, in 1814, the quantity of waste-silk imported into Great Britain was only 28,996 lbs., it amounted to 1,509,334 lbs. in 1836. In 1839, according to the table in the article Silk, p. 12, the quantity imported of this description was 1,042,490 lbs., and the quantity of raw silk of the ordinary character 3,746,248 lbs.

SPI'NOLA, AMBRO'SIO, MARQUIS OF, was born at Genoa in 1569. His family were originally from Spinola, a small town on the confines of the duchy of Milan and the Monferrat; but one of his ancestors removed to Genoa, where he amassed considerable wealth by engaging in mercantile speculations. On the death of his father, Ambrosio followed his pursuits, while his younger brother Frederic embraced the military profession. Having in 1598 entered the service of Philip III. of Spain, with six galleys equipped and armed at his own expense, Frederic was employed against the Dutch, over whom he gained several victories, ruining their trade, and capturing or sinking their ships. In 1601 Frederic was appointed admiral of the Spanish fleet on the coast of the Netherlands, and shortly after was invested with full powers to raise a body of troops to operate against the insurgents of Flanders. He then went to Genoa, and prevailed on his brother Ambrosio to take the command of the land forces, whilst he scoured the sea with his fleet. The army was to be raised in the duchy of Milan and to consist of 9000 men, Italians and Spaniards, whom the two Spinolas were to arm and pay, after the manner of the old *condottieri*, to be afterwards reimbursed by the Spanish treasury. This circumstance, at a time when the conduct of wars depended so much upon the troops being regularly paid, contributed in a great degree to the success which afterwards rendered Spinola so celebrated. While the Spanish troops in Flanders were disorderly and mutinous, those under the command of Spinola were always a pattern of obedience and discipline. Ambrosio left Milan in May, 1602, and entered the Low Countries. He served at first under Mendoza, who sent him to the relief of Grave, besieged by Maurice; but he was defeated in an attempt to break through the enemy's lines, and Grave surrendered on the 20th of September, 1602. The ensuing year (May, 1603) his brother Frederic was killed in a naval engagement with the Dutch. Shortly after Spinola was appointed general-in-chief of the Spanish forces in the Netherlands. He began the campaign by an attempt to relieve the town of Sluys, which was besieged by the Prince of Nassau; but in this he failed, the place having capitulated on the 19th of August, 1604. The Archduke Albert of Austria, governor of the Netherlands, having employed him in the capture of Ostend, which had long been besieged by the Spaniards, it fell into his hands after it had sustained a siege of three years and two months. Although Spinola obtained possession of a mere heap of ruins, his reputation was at once established throughout Europe. After this he repaired to Madrid, where he was received by King Philip with the respect due to his talents, and appointed commander-in-chief of all the Italian and Spanish forces in the Netherlands. On his way back to the theatre of war, he passed through Paris, where he had an interview with Henry IV. This king having asked him what were his plans for the ensuing campaign, Spinola, who penetrated his motives, entered without hesitation into the detail of his projects, and of the military operations which he intended to perform. Taking for granted that Spinola wished to deceive him, Henry wrote to Maurice the very contrary of what he had been told; and when he saw that by performing exactly what he had stated, Spinola had deceived both him and his antagonist, he is said to have exclaimed, 'Others have deceived me by falsehood, but Spinola by telling the truth.' Maurice at length saw the artifice, and changed his plan of operations, but he was unable to gain any decisive advantage over his adversary, who dexterously availed himself of the fortresses and of the nature of the ground to keep him in check. A decisive naval action, in which the Dutch admiral Heemskerk destroyed the Spanish squadron near Gibraltar (1607), induced the cabinet of Madrid to propose an armistice, which was concluded between Spinola and Maurice for twelve years (1609). The war was renewed in 1621, owing to the disputed succession to the duchy of Cleves, and Spain, by her connection with the house of Austria, and the hope of recovering her lost dominion over Holland, entered into it. Spinola commanded the Spanish forces, and Maurice was again his opponent. The advantage however remained entirely with the former. Juliers was invested and taken, and the siege of Breda was commenced. Whilst trying to relieve this city, the Prince of Nassau [Maurice] died of a fever occasioned by the noxious air of the marshy soil, and Spinola himself was reduced to a weak state of health, owing to the same cause; but after ten months' siege, Breda opened its gates (June, 1625). This was Spinola's last achievement, his health obliging him soon after to resign the command. In 1629 he was employed against the French in Italy, but he was unable to gain any decisive advantage, and he died soon after (1630), of vexation and disappointment caused by the complete disregard of his pecuniary claims by the court of Madrid. Spinola was doubtless one of the ablest generals of his time, being second only to his antagonist, Prince Maurice, in military talent.

(Watson's *Philip III.*, Lond., 1783, 4to., p. 86, *et seq.*; Bentivoglio, *De la Guerra di Fiandra*, Cologne, 1634, 4to.)

SPINO'ZA, BENEDICT, the son of a Portuguese Jew at Amsterdam, was born in that city, the 24th of November, 1632. He was christened Baruch, but on his renouncement of Judaism he always called himself Benedict. From his infancy he exhibited remarkable indications of mental acuteness, and his frail sickly constitution forced him to find solace in study. He became well versed in the Hebrew language, and learnt also Italian, Spanish, German, and Dutch. His early studies were principally the Bible and Talmud; and his penetration was so keen, and the logical tendency of his mind was so great, that he won the admiration of Morteira, the chief rabbin, who became his instructor. His studies however led him to speculate curiously on certain points which were received in the Jewish religion. The immortality of the soul, for example, he nowhere found confirmed in the Old Testament; on the contrary, the Old Testament is silent on that point, a matter which has called forth great discussion. Among the most celebrated of the treatises on this subject are Dr. William Sherlock's 'Discourse of the Immortality of the Soul and a Future State,' and Warburton's 'Divine Legation of Moses.' Spinoza made no secret of his opinions on this matter, and two of his young friends soon disseminated the report of his infidelity. Spinoza was in consequence summoned before the synagogue, where his judges, after deploring that one who had given such hopes should have wandered from the right path, informed him that he was summoned to give a profession of his faith. He was accused of having treated the law and religion of Moses with contempt, which he denied, but he maintained his opinions. Long discussions took place, in which Morteira, who was enraged at his disciple, used all his endeavours to get him excommunicated, in which he subsequently succeeded.

A physician called Vanden Ende, who was himself accused of scepticism, instructed Spinoza in Latin and Greek. Vanden Ende had also a daughter, not prepossessing in appearance, but well acquainted with Latin, and an excellent musician. Spinoza took lessons in Latin and love at the same time; and would have married her, had not a young merchant from Hamburg, with the more potent seductions of pearl necklaces, rings, and other articles, won her heart. Spinoza's Latin however was useful in his new philosophical studies, for which he had abandoned theology; and the works of Des Cartes falling into his hands, he read them with avidity. A new world was opened to him, and he always declared that to Des Cartes he owed whatever knowledge he had of philosophy. He had now quite freed himself from the shackles of Judaism, was reserved with the Jewish doctors, and absented himself from the synagogue. It has been asserted that he professed Christianity, and frequented the Calvinist and Lutheran churches, and that he embraced Mennonism, but this is erroneous. It is true that he held many conversations with learned Mennonites and other sectarians, but never declared himself for any one. (*Vie de Spinoza*, prefixed to Boulainvilliers's *Réfut. de Spinoza.*) His attacks on the Jewish doctrine so alarmed the rabbins, that they offered him a pension of a thousand florins if he would consent to comply outwardly with their ceremonies and from time to time present himself at their synagogue. 'Not if the pension were tenfold,' indignantly exclaimed Spinoza.

With such a man there was only one remedy—excommunication; but before that was put in practice assassination was attempted. Coming one night from the theatre, he was attacked by a Jew, who stabbed him in the face. The wound was fortunately slight; but he saw the danger of staying in Amsterdam, and determined to leave it. The day of excommunication at length arrived. The people were assembled in the synagogue to assist in that extraordinary proceeding. A vast quantity of black wax candles were lighted, and the tabernacle wherein are deposited the books of the law of Moses was opened. From the elevated chair, the chanter chanted in lugubrious tones the dreadful words of execration, whilst another sounded the trumpet. The candles were then held over a large tub filled with blood, and melted into it drop by drop, during which the people, awed by this spectacle, and animated with religious horror, cried out Amen.

Spinoza however found an asylum with his friend Vanden Ende: and there he practised himself in the art of making glasses for telescopes, microscopes, &c., in which he soon excelled, and thereby procured an humble subsistence. But Morteira, who pursued him with unabated rancour, got him exiled from Amsterdam, and he retired to Rhynsburg near Leyden, where he followed his trade, devoting every spare hour to his studies. In 1664 he published his 'Abridgement of the Meditations of Des Cartes,' with an appendix in which he expressed opinions wholly inconsistent with those of Des Cartes. He then went to the Hague, where he remained the rest of his life. He lived as a perfect recluse, and with the most rigid economy. His time was spent in study, or in correspondence with the celebrated men of his day. He would frequently not leave his room for three or four days together. His habits were sober, quiet, and retired. The occupation of his life was philosophy; and the only relaxation he allowed himself was his pipe, a little conversation with the people in his house, or watching spiders fight—an amusement which would cause the tears to roll down his face with laughter. His doctrines excited the indignation of theologians, but his virtues endeared him to all who knew him personally. He died of consumption, in the forty-fifth year of his age, A.D. 1677.

His published works are: 'Renati Descartes Principiorum Philosophiæ, pars prima et secunda More Geometrico demonstratæ,' 1663; 'Cogitata Metaphysica,' 1664; Tractatus Theologico-Politicus,' 1670; and 'Opera Posthuma,' 677. The last contain 'Ethica More Geometrico demonstrata; Politica; De Emendatione Intellectûs; Epistolæ et ad eas Responsiones; et Compend. Gram. Ling. Hebr.

The materials for this notice have been drawn from the *Vie de Spinoza* which precedes Boulainvilliers's *Refutation de Spinoza*, in which the Life by Colerus is incorporated, and augmented by many curious matters derived from a manuscript memoir by one of Spinoza's friends.

SPINOZISM. The system of Spinoza is generally identified with atheism, both in France and England, so that it has become a term of extreme odium; with what propriety will be seen from the exposition of his doctrines, which, from their celebrity, and from their having been so frequently misstated and misunderstood, it will be useful to give correctly. The only work of Spinoza which attracts the attention of metaphysicians is the 'Ethica,' which appeared among his posthumous works. 'No treatise,' says Mr. Hallam, 'is written in a more rigidly geometrical method. It rests on definitions and axioms, from which the propositions are derived in close, brief, and usually perspicuous demonstrations. The few explanations he has thought necessary are contained in scholia. Thus a fabric is erected astonishing and bewildering in its entire effect, yet so regularly constructed that the reader must pause and return on his steps to discover an error in the workmanship, while he cannot also but acknowledge the good faith and intimate persuasion of having attained the truth which the acute and deep-reflecting author everywhere displays.' (*Intro. to Lit. of Europe*, vol. iv., p. 243.) Spinoza is indeed the Euclid of metaphysicians; and however widely we may dissent from his doctrines, yet the rigid, close, and perspicuous reasoning, the elaborate construction of his system, and the obvious deduction of his consequences from axioms, recommend it to all thinkers as a great intellectual gymnastic.

The eight definitions and seven axioms which contain his whole system are the following:—

Definitions.—1. By cause of itself I understand that whose essence involves its existence; or that the nature of which can only be conceived as existent.

2. A thing finite is that which can be bounded (terminari potest) by another of the same nature; for instance, body is said to be finite, because it can always be conceived as larger. So thought (cogitatio) is limited by other thoughts. But body does not limit thought, nor thought limit body.

3. By substance I understand that which is in itself, and per se, conceived: that is, the conception of which does not require the conception of anything else as antecedent to it.

4. By attribute I understand that which the mind perceives as constituting the very essence of substance.

5. By modes I understand the accidents (affectiones) of substance by means of which it is conceived.

6. By God I understand the being absolutely infinite; that is, the substance consisting of infinite attributes, each of which expresses an infinite and eternal essence. Whatever expresses an essence, and involves no contradiction, may be predicated of an absolutely infinite being.

7. That thing is said to be free which exists by the sole necessity of its nature, and by itself alone is determined to action; but it is necessary, or rather constrained, when its existence is determined by something else, and its acting by certain and determinate causes.

8. By eternity I understand existence itself, as far as it is necessarily conceived to follow from the sole definition of an eternal thing. For such existence, as eternal truth, is conceived as the essence of a thing, and therefore is not to be explained by duration or time, though duration, beginning, and end may be conceived.

Axioms.—1. All things which are, exist in themselves or in others.

2. That which cannot be conceived per aliud, must be conceived per se.

3. From a given determinate cause the effect necessarily follows; and vice versâ, if no determinate cause be given, no effect can follow.

4. The knowledge of an effect depends on the knowledge of the cause, and includes it.

5. Things that have nothing in common with each other cannot be understood by means of each other; that is, the conception of one does not involve that of the other.

6. A true idea must agree with its original in nature—with its object (idea vera debet cum suo ideato convenire).

7. Whatever can be conceived as non-existent, does not in its essence involve existence.

These fundamental principles of his philosophy will to some appear truisms, to others absurd. But when their language (and we have adhered as closely as possible to Spinoza's barbarous but energetic and expressive Latin) is rightly understood, and their signification seized, which a very slight study of their development will assist, they will appear as some of the most curious positions of speculative philosophy.

Two substances, having different attributes, have nothing in common with each other; hence one cannot be the cause of the other, since one may be conceived without involving the conception of the other; but an effect cannot be conceived without involving a knowledge of the cause (per Axiom 4). This must be understood as meaning a complete conception of the effect, which necessarily depends on a complete conception of the cause, not that the relation of cause and effect itself depends on our conception of them. Two or more things cannot be distinguished except by the diversity of their attributes, or by that of their modes. For there is nothing out of ourselves except substances and their modes. But there cannot be two substances of the same attribute, since there would be no means of distinguishing them except their modes or affections; and every substance, being prior in order of time to its modes, may be considered independently of them; hence two such substances could not be distinguished at all. One substance therefore cannot be the cause of another, for they cannot have the same attribute, that is, anything in common with another. Every substance is therefore self-caused; that is, its existence is implied in its essence. It is also necessarily infinite, for it would otherwise be terminated by some other of the same nature and necessarily existing; but two substances cannot have the same attribute, and therefore cannot both possess necessary existence. The more existence anything possesses, the more attributes are to be ascribed to it. This follows from the definition of an attribute. The more attributes we ascribe to anything therefore, the more we are forced to believe in its existence; and from this is derived the existence of God. God, or a substance consisting of infinite attributes, each expressing an eternal and infinite power, necessarily exists, for such an essence involves existence. If anything does not exist, a cause must be given for its non-existence. If only twenty men exist, an extrinsic reason must be given for this number, since the definition of man does not involve it or any number.

There can be only one substance, God. Whatever is, is in God, and without God nothing can be conceived. For he is the sole substance, and modes cannot be conceived without substance; but besides modes and substance nothing exists. God is not corporeal, but body is a mode of God, and therefore uncreated. God is the cause of all things, and that immanently, but not transiently. He is the efficient cause of their essence as well as their existence, since otherwise their essence might be conceived without God, which is absurd. Thus all particular and concrete things are only the accidents or affections of God's attributes, or modes in which they are determinately expressed. God's power is the same as his essence; for he is the necessary cause both of himself and of all things, and it is as impossible for us to conceive him not to act as not to exist. God viewed in the attributes of his infinite substance is the same as nature, that is, to use his fine and subtle expression, the 'natura naturans;' but in another sense, nature, or 'natura naturata,' expresses only the modes under which the divine attributes appear. And intelligence considered in act, even though infinite, should be referred to 'natura naturata;' for intelligence in this sense is but a mode of thinking, which can only be conceived by means of our conception of thinking in the abstract, that is, by an attribute of God. The faculty of thinking, as distinguished from the act, as also those of desiring, loving, and the rest, have no existence. This is an anticipation of Hume's doctrine. [SCEPTICISM.] There is, says Spinoza, an infinite power of thinking, which, considered in its infinity, embraces all nature as its object, and of which the thoughts proceed according to the order of nature, being its correlative ideas. This agrees with Plato, who says a law of nature is an idea in its objective reality; that is, idea and law (in this sense) are correlations. This opinion is indeed as old as philosophy itself, and is found in every country. The universe is taken as the manifestation of the Deity; not, as many suppose, as the Deity himself; but, to use the words of Cousin, 'the Deity passing into activity, but not exhausted by the act.' (*Cours de Phil., Intro.*) It is owing to the abstract and subtle nature of Spinoza's method that his system has been so often misunderstood. The positions, for example, which we have set down, require patient meditation and an acquaintance with metaphysical language to be intelligible, and some of them are open to the grossest misinterpretations. Thus Spinoza is usually accused of atheism, while not only are his doctrines found in St. Paul, St. Augustin, and the Greek writers, but all the modern German philosophy, from Kant downwards, owns him as its master.

Spinoza does not confound God with the material universe; his words distinctly absolve him from such a charge: 'God is the identity of the natura naturans and the natura naturata' (natura naturans et natura naturata in identitate Deus est). God and nature are not two distinct entities, but one living whole. God is the 'idea immanens,' the true spiritual existence, the living principle which permeates the whole. The material universe is only one phasis of his infinite attributes, namely, extension; but Spinoza rigidly and universally teaches that the One Infinite Substance has two infinite attributes, extension and thought. Extension is visible thought, and thought is invisible extension. The use of the word substance, by which he signifies existence, the 'prima materia' of the schoolmen, has led to much misunderstanding, and his adversaries have replied as if he meant by substance what we express by matter and body. When Spinoza therefore says that God is the infinite substance, he does not mean the material universe, which is only one attribute of existence, namely, extension; he simply gives the Platonic expression (τὸ ὂν καὶ τὸ πᾶν), the unique conception of the All. When Spinoza asserts thought to be the other infinite attribute of substance, he follows Parmenides, of whom Ritter says, 'Thought appeared to him to exhibit merely one aspect of the All.' (*Geschichte der Philos.*, vol. i., p. 460.) It should be observed that the attribute of thought is not proved. He demonstrates the necessity for extension, by saying that we cannot conceive substance without conceiving it as extended; but as we can conceive substance without thought, we may demand a demonstration of the necessity of this attribute, which Spinoza has not given. In other words, from the definition of substance, extension follows as a necessary attribute; but in the definition of substance, there is no necessity involved for thought as an attribute.

God then, according to Spinoza, is the 'idea immanens,' the fundamental fact and reality of all existence, the only power, the only eternity. What we name the universe is only the visible aspect, the realised form of his existence. All concrete things change and perish; they are only modes of the infinite Being, who alone remains unchangeable. It is a gross error (the origin of which may be traced to the misconception of his word 'substance') to assert, as it often has been, and on which Bayle founds his refutation of Spinoza, that this system is pantheistic, in the common acceptation of the term, that it identifies all things with God, and consequently that every concrete thing is a part of God. Such a conception is purely material and superficial. Schelling has well refuted it: 'God is that which exists in itself, and is comprehended from itself alone; the finite is that which is necessarily in another, and can only be comprehended from that other. Things therefore are not only in degree, or through their limitations, different from God, but *toto genere*. Whatever their relation to God on other points, they are absolutely divided from him on this, that they exist in another, and he is self-existent or original. From this difference it is manifest that all individual finite things taken together cannot constitute God; since that which is in its nature *derived* cannot be one with its original, any more than the single points of a circumference taken together can constitute the circumference, which as a whole is of necessity prior to them in idea.' (*Philosophische Schriften*, p. 104.)

We have not space to go through the ideological and moral parts of Spinoza's 'Ethics,' as we have done the metaphysical, but a few of the more important propositions may be usefully quoted.

The mind does not know itself, except so far as it receives ideas of the affections of the body. But these ideas of sensation do not give an adequate knowledge of an external body, nor of the human body itself. The mind therefore has but an inadequate and confused notion of anything so long as it judges only by fortuitous perceptions; but it may attain it clear and distinct by internal reflection and comparison. This is the doctrine of Hobbes and Locke explicitly stated. No positive idea can be false; for there can be no such idea without God, and all ideas in God are true, that is, correspond with their object. Falsity therefore consists in that privation of truth which arises from inadequate ideas; an adequate idea being one which contains no incompatibility, without regard to the reality of its supposed correlative object. Error is imperfect truth. It seizes one aspect of the truth to the neglect of the rest.

All bodies agree in some things; and of these all men have adequate ideas; hence common notions which all possess, such as extension, duration, number. The human mind however can only form a certain number of distinct images at the same time; if this number be exceeded, they become confused: and as the mind perceives distinctly just so many images as can be formed in the body; when these are confused the mind also will perceive them confusedly, and will comprehend them under one attribute, as man, horse, dog, &c.; the mind perceiving a number of such images, but not their differences of stature, colours, &c. Thus are universal ideas formed: first, by singulars, which the senses represent confusedly and imperfectly; secondly, by signs, that is, by associating the remembrances of things with words, which Spinoza calls imagination; thirdly, by reason; and, fourthly, by intuitive knowledge. Knowledge of the first kind is the source of error; the second and third are necessarily true. It is important to distinguish images from words. Those who think ideas consist in images which they perceive, fancy that ideas of which they can form no image are arbitrary. They look at ideas as pictures on a tablet, and hence do not understand that an idea, as such, involves an affirmation or negation. And those who confound words with ideas fancy they can will something contrary to what they perceive, because they can affirm or deny it in words. But thought does not involve the conception of extension; and therefore an idea, or mode of thought, neither consists in images nor in words, the essence of which consists in corporeal motions not involving the conception of thought.

Men can have an adequate knowledge of the eternal and infinite being of God, but cannot imagine God as they can bodies; and hence have not that clear perception of his being which they have of that of bodies, and have perplexed themselves by associating the word God with sensible images, which it is hard to avoid. The existence of God can be conceived; indeed it is a necessary conception from which no mind can escape; but the manner of his existence can never be conceived. The source of error in this case is that men do not name things correctly; for they do not err in their own minds, but in this application; as men who cast up wrong see different numbers in their minds from those in the true result

The mind has no free will, but is determined by a cause, which itself is determined by some other cause, and so on for ever. For the mind is only a mode of thinking, and therefore cannot be the free cause of its actions. Will and understanding are one and the same thing; and volitions are only affirmations or negations, each of which belongs to the essence of the idea affirmed or denied. This subtle opinion is also adopted by Malebranche, Cudworth, and Fichte.

Spinoza's moral system is as rigidly deduced from premises as his metaphysical. Most men who have written on moral subjects, he says, have treated man as something out of nature, as a kind of 'imperium in imperio,' rather than as a part of the general order. They have conceived him to enjoy a power of disturbing that order by his own determination, and ascribed his weakness and inconstancy not to the necessary laws of the system, but to some strange defect in himself, which they cease not to lament, deride, or execrate. But the acts of mankind, and the passions from which they proceed, are in reality but links in the series, and proceed in harmony with the common laws of universal nature. Men finding many things in themselves and in nature, serving as means to a certain good, which things they know to have not been provided by themselves, have believed that some one has provided them, arguing by analogy of the means which they in other instances employ themselves. Hence they have imagined a variety of gods, and these gods they suppose to consult the good of men in order to be worshipped by them, and have devised every means of superstitious devotion to ensure the favour of these divinities. Finding also in the midst of so many beneficial things in nature not a few of an opposite effect, they have ascribed them to the anger of the gods on account of the neglect of men to worship them. Nor has the experience of calamities falling alike on the pious and impious cured them of this belief; they choose rather to acknowledge their ignorance why good and evil are thus distributed, than give up their favourite theory. But all things occur by eternal necessity. Moreover were God to act for an end, he must desire something which he wants; for it is acknowledged by theologians that he acts for his own sake and not for the sake of things created.

Men having thought that all things were created for them, have invented names to distinguish that as good which tends to their benefit; and believing themselves free, have got the notions of right and wrong, praise and dispraise. And when they can easily apprehend the relations of things, they call them well ordered, if not, ill ordered; as if order were anything except in regard to our imagination of it.

We are said to act when anything takes place within us, or without us, for which we are an adequate cause; that is, when it may be explained by means of our own nature alone. We are acted upon when anything takes place within us which cannot wholly be explained by our own nature. Passions are the affections of the body, which increase or diminish its power of action, and they are also the ideas of those affections. Neither the body can determine the mind to thinking, nor can the mind determine the body to rest or motion. For all that takes place in body must be caused by God, considered under his attribute of extension, and all that takes place in mind must be caused by God, considered under his attribute of thought. The mind and the body are but one thing considered under different attributes; the order of action and passion in the body being the same in nature with that of action and passion in the mind. But men, though ignorant how far the natural powers of body reach, ascribe its operations to the determination of the mind, veiling their ignorance in specious words. For if they allege that the body cannot act without the mind, it may be answered that the mind cannot think till impelled by the body, nor are all the volitions of the mind anything else than its appetites, which are modified by the body.

All things endeavour to continue in their actual being; this endeavour being nothing else than their essence, which causes them to be, until some exterior cause destroys their being. The mind is conscious of its own endeavour to continue as it is, which is, in other words, the appetite that seeks self-preservation; what the mind is thus conscious of seeking, it judges to be good, and not inversely. Many things increase or diminish the power of action in the body, and all such things have a corresponding effect on the power of thinking in the mind. Thus it undergoes many changes, and passes through different stages of more or less perfect power of thinking. Joy is the name of a passion, in which the mind passes to a greater perfection or power of thinking; grief, one in which it passes to a less. From these two passions, and from desire, Spinoza deduces all the rest of the passions in a curious but questionable manner.

Such is the substance of Spinoza's celebrated system; a system which has excited so much odium as to have become synonymous with atheism. We have pointed out the source of this error; but we cannot refrain from adding the testimony of the pious Schleiermacher to his religious earnestness. 'Offer up with me,' he exclaims, 'with reverence a lock of hair to the manes of the holy but repudiated Spinoza! The great spirit of the world penetrated him; the Infinite was his beginning and his end; the universe his only and eternal love. He was filled with religion and religious feeling; and therefore is it that he stands alone, unapproachable, the master in his art, but elevated above the profane world, without adherents, and without even citizen ship.' (*Rede über die Religion*, p. 47.) Göthe thus speaks; 'The mind that wrought so powerfully on mine, and had so great an influence on the whole frame of my opinions, was Spinoza's. After I had looked round the world in vain for means of shaping my strange moral being, I fell at length on the 'Ethics' of this man. What I read in this work—what I thought I read in it—I can give no account of; enough that I found there a calm to my passions; it seemed to open to me a wide and free view over the sensuous and moral world But what particularly riveted me was the boundless disinterestedness that beamed forth from every sentence. The all-equalizing serenity of Spinoza contrasted with my all-agitating vehemence; his mathematical precision, with my poetical way of feeling and representing.' (*Dichtung und Wahrheit*, xiv.)

These testimonies from such unquestionable sources will not be without benefit in directing men to look calmly into Spinoza, and meditate upon him. The student will derive great help from Boulainvilliers's *Refutation de Spinoza*, Bruxelles, 1731, in which the doctrines are popularized and divested of their mathematical precision, which repels many readers; also from Jacobi's *Briefwechsel mit Mendelssohn*, Breslau, 1789; and from Hallam's *History of the Literature of Europe*, vol. iv., pp. 243-263.)

SPIRÆA, a genus of plants of the natural family Rosaceæ, tribe Spiraceæ. The name occurs in antient authors, and is supposed to be derived from σπειρα, a cord, in allusion to the fitness of the plants for twisting into garlands. The genus is diffused through the temperate parts of the northern hemisphere, and is characterised by having a 5-cleft permanent calyx; stamens 10 to 50, inserted in a torus with the 5 petals, which are inserted into the calyx; carpels sessile, solitary or several, rarely connected into a capsule; seeds 2-15, pendulous, very rarely ascending. The species, upwards of 50 in number, form small unarmed shrubs or perennial herbs; leaves usually simple, sometimes pinnately cut. Flowers white or reddish. They are found in Europe, North America, Siberia, China, and the Altai and Himalayan Mountains. Several form ornamental shrubs and herbs, which are found in our gardens, and are of easy cultivation. S. Ulmaria, or Meadow-Sweet, is found in our meadows, and S. Filependula on our downs, &c. Pigs are said to be fond of the tubers of the roots. Several of the species are astringent, and might be used in tanning. S. trifoliata is sometimes called Ipecacuanha de Virginia, being employed as an emetic.

SPIRAL, a name belonging properly to curves which wind round a point in successive convolutions. The easiest mode of representing such curves algebraically is by means of polar COORDINATES: hence, in many of the older English works, any curve referred to such coordinates is said to be considered as a spiral. Thus we have the circle considered as a spiral; the ellipse considered as a spiral, and so on. The rest of this article is intended only for those who have some knowledge of the mathematical part of the subject.

If r be the radius vector of a curve, θ the angle which it makes with a given line, and $r = \phi\ (\theta)$ the equation of the curve, it is obvious that if $\phi\theta$ be a common trigonometrical function of sin θ, cos θ, &c., the curve will not have an unlimited number of convolutions. The whole of the curve from $\theta = 2\pi$ to $\theta = 4\pi$, will be merely a repetition of that from $\theta = 0$ to $\theta = 2\pi$. Thus, $r = \sin\theta$ is the equation of a circle of a unit diameter, tangent at the origin to the line from which r sets out; the fifteenth half-revolution of the radius vector is only the fifteenth description of this circle. It is only then when the angle θ occurs independently of trigonometrical quantities, that any curve is represented which can properly be called a spiral. Thus, the spiral of Archimedes, or Conon, of which the equation is $r = a\theta$, has a convolution in which r changes from 0 to $2\pi a$, while θ changes from 0 to 2π; another, in which r changes from $2\pi a$ to $4\pi a$, while θ changes from 2π to 4π, and so on. The principal spirals to which distinct names have been given, are—

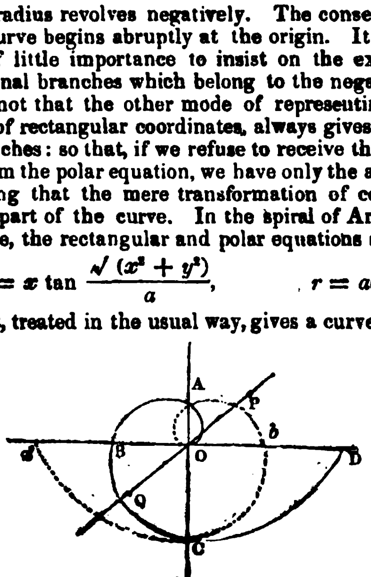
	Equation.
1. Spiral of Archimedes .	$r = a\theta$
2. Reciprocal Spiral . .	$r\theta = a$
3. Lituus	$r^2\theta = a$
4. Logarithmic or Equiangular Spiral	$r = ab^\theta$

with some others of less note. The figures of these spirals are given in all books on the application of algebra to geometry.

It has hitherto been universal to consider spirals in a manner which has deprived these curves of half their convolutions: this has been done by refusing to entertain negative values of the radius. For example, in the spiral of Archimedes $r = a\theta$, a being a positive quantity, the curve is supposed to have no convolutions when θ is negative, or when the radius revolves negatively. The consequence is, that the curve begins abruptly at the origin. It would be a matter of little importance to insist on the existence of the additional branches which belong to the negative radii, if it were not that the other mode of representing curves, by means of rectangular coordinates, always gives the additional branches: so that, if we refuse to receive the latter as coming from the polar equation, we have only the alternative of supposing that the mere transformation of coordinates destroys a part of the curve. In the spiral of Archimedes, for example, the rectangular and polar equations are—

$$y = x \tan \frac{\sqrt{(x^2 + y^2)}}{a}, \qquad r = a\theta.$$

The first, treated in the usual way, gives a curve of which



there is one succession of convolutions beginning with OABCD, and another beginning with O*AbCd*. But the second equation, which is only the first in a different form, does not yield any of the second set of convolutions, unless by means of the negative values of the radius vector answering to negative values of θ.

The manner in which the negative value of r is to be treated, is as follows:—Every line passing through the origin, as POQ, makes two angles with the positive side of the axis of x, POD, less than a right angle in the diagram, and QOD, between two and three right angles: the second of which may be considered as the common angle QOD, taken negatively. The bounding directions of these angles are different, OP and OQ: the rule is, whichever angle the straight line QOP is supposed to make with OD, let the bounding direction of that angle be the positive direction, and the other direction negative. Thus, when POD is the angle, OP is positive and OQ negative: when QOD is the angle, OQ is positive and OP negative. In this manner it will be found that the first three of the four spirals above enumerated have never been completely drawn. There is little need to insist much on the necessity of the extension here described: one more instance may suffice. Let the reader trace the curve whose equation is—

$$2y^2 = 1 - 4x + 2x^2 \pm \sqrt{1 - 8x},$$

derived from $r = 1 - 2\cos\theta$. The rectangular equation gives a curve of two loops, of which the polar equation will only yield one, unless negative values of r be employed, in the manner above described. Nevertheless, if the process had been inverted, and the polar equation deduced from the rectangular, we should have found $r = \pm 1 - 2\cos\theta$ for the former; and the effect of the double sign is that the positive values of r only, in the the two equations $r = 1 - 2\cos\theta$, and $r = -1 - 2\cos\theta$, will give the complete curve deduced from the rectangular equation. As far as this instance goes, it might seem as if the complete polar equation, as deduced from the rectangular, would give the whole curve by means of positive radii; though at the same time a single instance hardly proves anything. But even granting that the passage from the rectangular to the polar equation will always give forms enough to the latter to trace the whole curve from positive radii, it remains indisputable that the other transition, from the polar to the rectangular, requires the negative radii to be taken into account.

SPIRAL of ARCHIMEDES. [SPIRAL.]

SPIRAL STRUCTURE IN PLANTS. In the development of the tissues of plants two tendencies are observed, the one simply that of extension in a vertical direction, the other is that of curvation, mostly resulting in the production of a spire. The tendency to develop parts in a spiral direction, though much more prominent in the vegetable than the animal kingdom, is by no means confined to it. In a recent paper in the ninth volume of the *Annales des Sciences Naturelles*, Mandl has shown that all the tegumentary appendages of animals, as the scales, feathers, hair, &c., have a spiral arrangement, and that many of the internal organs are subject to the same law. The tendency to develop structures in a spiral form appears to be dependent on some of the higher laws regulating organic life; and in this view the subject has been investigated by recent botanists. Goethe, the German poet and philosopher, to whom botanists are indebted for the development of those theoretical views of the structure of plants on which is based the science of morphology, has investigated this subject. In his 'Essay on the Spiral Tendency of Vegetation,' published in 1831, he gives the following view. He supposes that there is a dependence of those properties which plants possess of resisting external agents, and of enduring for a length of time, upon those parts that are developed vertically, whilst the nutritive and reproductive functions are connected with spirally developed structures. In support of this generalization he adduces a number of facts. If a branch of an ash-tree is injured, so that the lower parts become over-nourished, it possesses a tendency to become spiral. When the leaves of the Italian poplar are injured by insects, the petioles become twisted. Spiral vessels exist in greatest numbers in the growing parts of plants, as the alburnum. They also exist in greater number in the higher plants, the lowest possessing none. A spiral arrangement of parts is also much less observable in the lower than in the higher groups of plants. The organs of nutrition and reproduction, the leaves and parts of the flower, have normally a spiral arrangement. Von Martius, Mohl, and others, have also written on the general theory of spiral structure. We shall confine ourselves to pointing out those plants and parts of plants that exhibit this structure.

Cellular tissue was at one time supposed to consist of plain simple cells, but the researches of later botanists have proved that the cells of this tissue are often furnished with fibres, which are twisted in a spiral manner. This spiral fibrous tissue is abundant in the roots of orchidaceous plants, in the seed-coats of many plants, and in the linings of the valves of almost all anthers. Spiral fibres, independent of any cells, and apparently surrounded by vegetable mucus, have been found in the testa of the seeds of Collomia linearis. In the seed-coats of the seeds of species of Blepharis and Acanthodium spiral fibres enclosed in membranous tubes are found in very great abundance. The organs called *elaters*, which are contained with the sporules in the conceptacles of Jungermannia, consist of spiral fibres surrounded by a tube. A structure also of this kind has been described as existing in a species of Trichia, but in general the fungi do not present any spiral structure in their parts. The elaters are analogous in structure to the vascular tissue, which is almost entirely composed of a tissue, which on account of its spiral structure has been called 'spiral vessels.' These vessels appear to be little more than fibrous cellular tissue elongated, the parietes of the cell forming an elongated tube, which is tapering at each extremity, and contains within it one, two, three, or more spiral fibres. This tissue is exceedingly abundant in exogenous and endogenous plants, but is not found in the lower families of Cryptogamia. It exists however in ferns, Lycopodiaceæ, and Equisetaceæ. It is only sparingly found in Coniferæ. These spiral fibres possess the power of moving when touched, which was attributed by Malpighi to irritability, but De Candolle attributes this to their hygrometrical properties.

From the tissues we pass on to the entire plant, where we frequently see the spiral tendency developed in the structure of stem and leaves. The part of the latter which exhibits this structure is the petiole, and in this organ all forms of the spire may be seen, from a single twist to the complicated spires observed in the organs called *cirrhi*. In most plants these cirrhi assist them in climbing, their structure adapting them to this purpose. The spires of the cirrhi twist in some from right to left, in others from left to right; and in the cirrhi of the genera Passiflora and Bryonia the direction changes several times in the course of the spire from right to left and from left to right.

In the structure of many of the Confervæ a spiral arrangement of the tissues is observed, especially of those which approach the animal kingdom in their movements, as the Oscillatoriæ. The setæ which support the conceptacle of Jungermannia, and which contain the spiral elaters before mentioned, possess in many instances a spiral structure. This is also occasionally developed in the same organ in mosses, a remarkable instance of which occurs in *Funaria hygrometrica*. In this moss the setæ are quite straight when young, but assume the spiral structure as they increase in age. In these setæ the spire turns in two directions; from the base about two-thirds up the stem it goes from right to left; it then becomes quite straight, and turns in the opposite direction from left to right. A curious property is possessed by these setæ when the capsules are ripe. If the upper part of the spiral is moistened, the capsule commences turning from right to left; but if the lower part only is moistened, it turns from left to right.

The entire stems of plants are frequently spiral, as is seen in the plants which are called climbers. These plants, by reason of the spiral arrangement of their tissues, twine around the nearest objects, whether organic or inorganic. In most of them the winding of the spire is to the left side, but in a few the turning is to the right. Amongst the former are the genera Cuscuta, Phaseolus, Dolichos, Passiflora, Banisteria, &c.; amongst the latter are the genera Humulus, Dioscorea, Lonicera, Polygonum, &c. This winding in a particular direction is not only confined to the species of a genus, but to the genera of an order; and Mohl, who has paid great attention to this subject, states that he knows of but one exception to this rule, which is the genus Abrus in the family of Leguminosæ, which twines to the left, whilst all the others twine to the right. The direction of the spires of the cirrhi is not so constant. Between the twining of the cirrhi and the stems of plants Mohl has pointed out an essential difference. The cirrhi are first developed longitudinally, and the spiral tendency proceeds from the point to the base; but in stems the first three or four internodes grow straight, and the next internode is developed very rapidly; and from this lower internode the spiral tendency is developed upwards. Sometimes a spiral direction is seen in the direction of trees that ordinarily grow straight; and Göthe records several instances of twisted trunks in the chesnut, the whitethorn, beech, and others. A remarkable instance of spiral structure connected with function is seen in the peduncle of the female flowers of Valisneria, which is a water-plant. The female flowers spring to the surface of the water in the summer, at the time the male flowers have perfected their pollen and scattered it upon the surface of the water. As soon as the pollen is conveyed to the female flower, its spiral stem becomes contracted, and its fruit is perfected at the bottom of the water.

Many theories have been proposed to account for the mere winding of the stem. Dutrochet supposes that it depends on the different relations of cellular and fibrous tissue to each other in plants during the action of endosmose. Mohl thinks that it arises from the irritability of the tissues of these plants, which, on the plant being placed in contact with certain external objects, is called into action, producing the peculiar development observed. This irritability is supposed only to exist on the sides and under surface of the twining part, and when called into action contracts and produces the twisting of the unaffected part. These explanations are not satisfactory. The spiral structure is too intimately connected with the essential existence of plants to be explained in all cases by a reference to immediate agents.

The most remarkable and important exhibition, in a practical point of view, of the spiral tendency in plants is the arrangement of the leaves upon the axis of the plant. If we take a branch of the willow, oak, pear, apple, or many others, and examine the leaves, we shall find they are arranged in such a manner, that if we were to draw a line from leaf to leaf up the stem, we should produce upon it a spiral which would in the case of any of these trees be of a different character from any of the others. In theoretical botany the spiral arrangement of the leaves which makes them alternate upon the stem is looked upon as their normal form, and those leaves which are opposite or verticillate are supposed to be produced by the suppression of an internodium. The spiral arrangement of the leaves on the stem has been made a matter of mathematical investigation by Braun and Schimper, and it is found that this arrangement is possessed of certain fixed mathematical properties. Of course the same observations are applicable to all those parts of the plant, as the bracts, sepals, petals, scales of the fruit, &c., which are considered modifications of the leaf. The fruit of the common pine may be taken as an illustration of these properties. If the cone of a pine or a spruce-fir be broken through the middle, three scales will be observed, 'which, at first sight, appear to be upon the same plane; but a more attentive examination shows that they really originate at different heights, and moreover, that they are not placed at equal distances from each other; so that we cannot consider them as a whorl, but only a portion of a very close spiral. But considering the external surface of the cone viewed as a whole, we find that the scales are disposed in oblique lines, which may be studied—1, As to their *composition* or the number of scales requisite to form one complete turn of the spire; 2, as to their *inclination*, or the angle, more or less open, which they form with their axis; 3, as to their total number, and their arrangement round the common axis, which constitutes their *co-ordination*. Finally, we may endeavour to ascertain whether the spires turn from right to left or *vice versâ*.' (Lindley.)

In the arrangement of the leaves several series of spires are discoverable, and between these there constantly exists a certain arithmetical relation which may be expressed by figures, and which results from the combination of the elements of which they are composed. All the spires depend upon the position of a fundamental series, from which the others are deviations. The nature of this series is expressed by a fraction, of which the numerator expresses the number of turns which make up one spire, whilst the denominator expresses the number of leaves, scales, &c. upon the spire. So that suppose we mark the seat of one leaf at the bottom 0, and go on following the leaves, we shall come at one directly over the first, and this completes the spire; often a leaf occurs after ten turns of the spiral, and there should be eighteen leaves upon the spire, the expression for this series would be $\frac{10}{18}$. By applying this rule very different figures may be obtained for various plants. The following are results obtained by Braun:—

$\frac{8}{21}$ is the expression for the leaves of Woad, Plantago lanceolata, and the bracts of Digitalis lanata. $\frac{13}{34}$ in Sempervivum arboreum, and the bracts of Plantago media. $\frac{3}{8}$ is a common form; it exists in the bay tree, the holly, and Aconite. $\frac{2}{5}$ is the most common, representing the quincunx. It is seen in Mezereum, Lapsana communis, the potato, &c. $\frac{1}{2}$ is seen in the spikes of all grasses, in Asraum, the lime-tree, the vetch, and pea.

No application of this doctrine has at present been made, and these researches are only in their infancy. It seems in some genera to be a mode of distinguishing species. Thus the expressions for the following species of Pinus are P. pinaster $\frac{21}{55}$; P. sylvestris $\frac{13}{34}$; P. cembra $\frac{8}{21}$; P. larix $\frac{8}{21}$; P. micro carpa $\frac{3}{8}$.

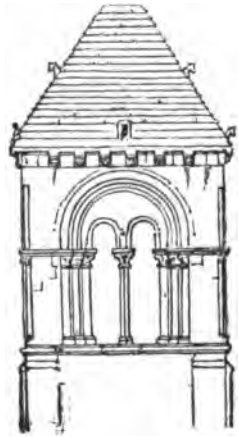
For further information on the subject of this article the reader may consult Göthe, *Ueber die Spiral-Tendenz der Vegetation*; Meyen, *Pflanzen-Physiologie*, Band iii.: Lindley, *Introduction to Botany*; Henslow's *Botany*, in *Cab. Cyc.*; Virey, *Philosophie de l'Histoire Naturelle*.

SPIRATELLA. [Hyalæidæ, vol. xii., p. 372.]

SPIRAL VESSELS. [Tissues, Vegetable.]

SPIRE (in German, *Spitze*, or *Thurm-spitze*; in French, *Flèche*, from its resemblance to the pointed tip of an arrow; but the Latin *spira* signifies a coil, or spiral line, and not an upright cone or pyramid). The term belongs to Gothic architecture, and is used to designate the tapering pyramidal mass erected on a tower by way of finish and ornament. That so little relative to spires is said in works on Gothic architecture is the more remarkable, because, in proportion to the number of examples, they exhibit more variety than almost any other separate feature in edifices in that style. Though the spire is a very striking feature in a building, it has nothing to recommend it on the score of direct utility. It is a mere external appendage to an edifice, since it does not, like the dome, contribute to any kind of effect whatever internally, a circumstance that seems to have been overlooked by Mr. A. W. Pugin, for else he would hardly have made it a reproach against the architect of St. Paul's, that the exterior dome of that fabric is merely for effect. Though the same objection might be made to the spire, we are far from urging it: mere utility is a low test of merit in architecture, and although this merit cannot be claimed for this feature in Gothic architecture, we hold the spire to be one of paramount value in it, inasmuch as that pyramidal figure concentrates all its principles and characteristics, rendering it most eminently the *Pointed* style. So considered, the spire may be said to be the keystone of the whole idea of such style; that which visibly completes it. It serves, moreover, to impart an air of graceful lightness to the whole of a building, and to correct—if we may so express it—what might else be excess of length as compared with the general height of a structure, by giving a corresponding degree of loftiness to one portion of it.

The origin of the spire, like that of the pointed arch, is merely matter of conjecture. The probability is that it arose out of the peaked roof usually given to campaniles and towers of a preceding period, which form was afterwards gradually improved upon and refined, till it eventually grew up into the slender tapering spire. According to such supposition, we would refer to the tower of Than church in Normandy, as an example exhibiting the rudiments of the spire, it being no more than a steep peaked roof or low pyramid, whose height does not exceed three-fourths of its base. A *peak* of this kind differs also from the spire both in being the same in plan as the tower on which it is placed, and in being immediately set upon it, whereas the spire is almost invariably an octagon or other polygon, and is surrounded at its base with a parapet. In Italy, where campaniles are usually detached square towers of very slender or lofty proportions, the spire is almost unknown, for such towers have seldom more than a mere pyramidal roof or peak, which, though it may be considered as the germ from which the Gothic spire was afterwards developed, is in itself of quite different character; yet, at the same time, that of each is best adapted to the respective style. There are some few instances of square spires; among them a very singular one at Egeln in Germany, where two such spires are set immediately together upon the same tower. But however slender in their proportions such spires may otherwise be, they have a certain heavy massiveness of form. When therefore greater loftiness and lightness were aimed at in this feature, the adoption of a polygonal plan for it became almost matter of course; for although in a geometrical drawing the general outline and proportions of a spire are the same whether it be square or octangular in plan, the perspective or actual appearance is widely different; because in the latter case the diagonal breadth of the square tower below is cut off, and each side or plane of which the spire is composed becomes a much more pointed triangle. Besides which, the polygonal spire produces a degree of contrast and variety highly favourable to general effect in the Pointed style.



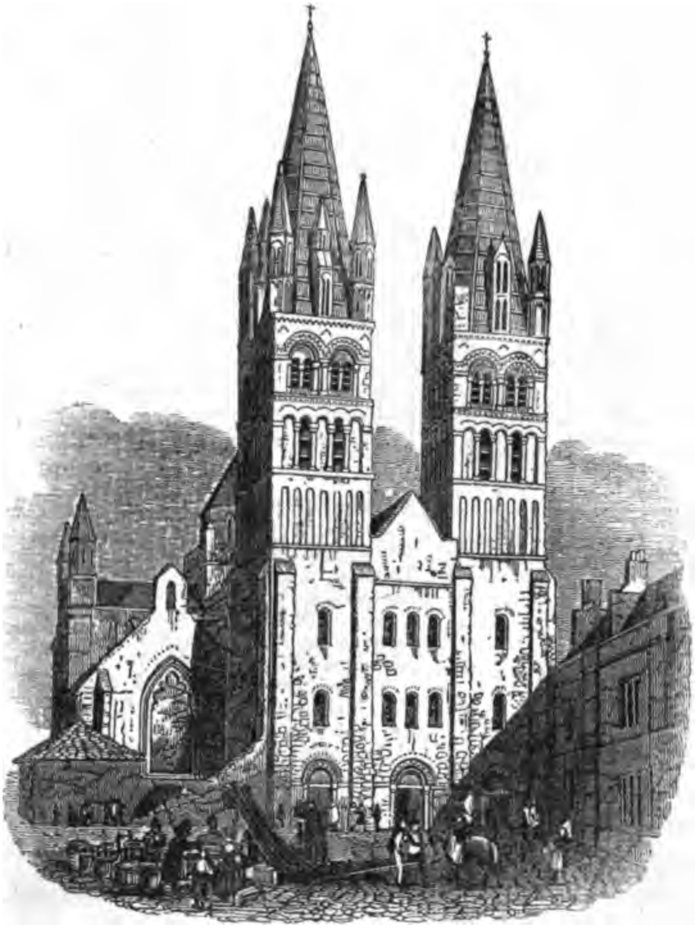
A gradual and progressive transition from the mere peak or pyramidal roof to the slender tapering spire, cannot however be clearly traced. On the contrary, some of the earliest deviations from the simple pyramidal form appear to have produced uncouthness rather than lightness; for although much greater loftiness upon the whole was so occasioned, the appearance of it was reduced by the sides of the tower being made to terminate in gables cutting into, and therefore partly cutting off, the base of the pyramid or spire itself. Many of the earlier German edifices contain examples of this peculiarity—one almost confined to them; among others the cathedrals of Worms and Gelnhausen, the church at Andernach, and that of the Apostles at Cologne, exhibit many varieties of spires, or rather *spire-roofs*, springing up from gables at their base; and in some the gables are so large and rise up so high, that the appearance of spire is almost entirely lost. Such is the case with the pyramidal covering of the square tower at the west end of the church at Gelnhausen, of which the portion above the gable forms a mere capping. The same church offers other specimens of the kind, there being, besides the one mentioned, a spire over the intersection of the transept, one over the apsis at the east end, and two others over the towers adjoining it. All these are polygonal, but otherwise differ—except that those to the towers are similar to each other—both in dimensions and proportions; that over the apsis being not quite so high as it is broad, while that over the transept is one diameter and a half, and the two others three diameters in height. They are all gabled at the base, and their ridges correspond with the apices of the gables, so that the sides or faces of the spire alternate with those of the tower; which last circumstance is almost peculiar to the earliest German spires. Another distinction belonging to them is, that except gables or pediments, they have nothing at their base, neither parapet nor pinnacles of any kind, which would serve at once as a finish to the tower, and as enrichment to the lower part of the spire. This is so different from the usual mode, that in this country a spire set immediately upon a tower without any parapet, &c. at its base, is technically described by the term *Broach*. Many other distinctions are needed, and if no better can be found, we would suggest that of *Stump-spire* for one whose height does not exceed two diameters of its base.

There are indeed so many peculiarities in spires, that it is highly desirable to have descriptive terms for them. First, as regards its base, a spire may be said to be *Cluster-based*, when surrounded below with pinnacles connected with it, and from among which it seems to spring up; of which kind St. Mary's, Oxford, is a celebrated example. The

Hôtel-de-Ville, at Ypres, has a spire clustered with four exceedingly tall pinnacles or lesser spires. Where there are windows placed *against* a spire, rising *upright* like the dormers or lucarnes on a roof, the term *Lucarned* would express that character; we have therefore not scrupled to make use of it in the annexed table of spires, where it is applied, among others, to those of Lichfield cathedral, which have several tiers of such windows, and are described accordingly. *Crocketted* and *Banded* are terms requiring no explanation; but in regard to the first it may be remarked, that spires, otherwise quite plain, are sometimes ornamented with *crockets* along their edges; and with respect to *bands*, they are sometimes little more than string-mouldings, but in other cases broad and enriched surfaces. Many of the spires in Normandy are ornamented with such a number of bands, that they form alternating courses with the plain spaces between them. *Finialled* is a term which does not apply to any of our English spires; but that of St. Stephen's, Vienna, and some other continental spires, have an exceedingly large and rich finial, which ornament gives them a particular boldness of expression. The *Tabernacle-spire* also is one of which there is no example in this country, but of which the one just mentioned, and those of Strassburg, Ulm (as designed), Thann in Alsace, and many others, are specimens, the tower and spire being carried up from the ground in a succession of diminishing stages, all profusely adorned with pannelling, niches, canopies, pinnacles, and other tabernacle-work, in such a manner that it is barely possible to distinguish where the upright portion or tower terminates, and the spire itself begins, the latter seeming little more than the uppermost stage in continuation of the rest. Neither have we any instances of *Open-work* spires, or of such as, if not actually perforated, are yet entirely covered with tracery. That at Freyburg, and those at Burgos and Batalha, are all exceedingly rich specimens of the kind. The chapter-house of Burgos also has a series of very large pinnacles or small spires of tabernacle character. Cambrai and Esslingen on the Neckar afford other examples of open-work spires.

There are various other circumstances which, though they do not affect the spire itself, produce greater or less difference in regard to the character of the structure of which it is a component feature. Very much, for instance, depends upon its situation in the general plan: at Salisbury, Norwich, and Chichester, the spire is raised upon a tower at the intersection of the cross, or in the centre of the plan; whereas in most continental cathedrals and large churches there are two spires on the towers of the west front, though in some instances (Strassburg, Antwerp) only one has been erected. Several however have a single tower and spire in the centre of the west front (Ulm, Freyburg, Thann in Alsace), in which case the tower itself begins to diminish almost from the ground, and the whole becomes what we have described as of the *tabernacle* character. In most of our English churches (not cathedrals) the spire is placed upon a tower at the west end, as at Grantham, Louth, Bloxham, &c. If we except Peterborough, where they are very diminutive, the only English cathedral which has two western spires is Lichfield, which is further remarkable as having a central tower and spire also. Besides the richness and variety thus produced, the larger central spire serves to balance the whole composition, whereas else the body of the structure is apt to look low in comparison with the west end. At St. Stephen's, Vienna, the tower and spire are singularly placed on the south side of the edifice, it having been intended to balance them by a corresponding tower on the north side. At Gelnhausen, on the contrary, there is a group of spires, as already noticed, at the east end.

Although the building itself is by no means a tasteful example, the façade being in a rude and plain Norman design, the annexed view of St. Stephen's at Caen will assist in explaining some of the preceding observations.



We have here two western towers and spires, which last are not parapeted, but merely embased with turrets and pinnacles at their angles, rising up to a considerable height; consequently they answer to what we have denominated *cluster-based*, the turrets with their smaller *stump*-spires being clustered around the larger one. These spires are also *lucarned* below and *banded*; although in the cut those circumstances are rather indicated than expressed.

One circumstance plainly observable is that the whole façade is of narrow proportions, and the space between the towers very small. The spires themselves are short, both in proportion to their own diameters and to the height of the towers, which are carried up so high as to appear very lofty as compared with the rest of the structure.

Though so much depends upon circumstances of this kind, almost the only thing that is specified in the usual description of spires is the entire altitude from the ground, which single measurement, unaccompanied by others, gives no idea of the relative dimensions of the spire or how it is proportioned. Some of the loftiest spires, as they are popularly termed, are by no means lofty, being not above a third of the entire height, and not more than four of their own diameters. The spire of Strassburg, for instance, is only 110 feet out of 474, or less than one-third of the tower itself. At Antwerp again the spire is a mere *peak* crowning the uppermost stage of the tower, while the tower itself is twice as high as the roof of the church. If we compare Salisbury with Norwich, the spire of the latter cathedral will be found, though of less dimensions, much loftier in relation to the rest than the other, being in the ratio of 163 to 308 feet, while Salisbury is only 197 to 404. We have therefore drawn up a table of spires, showing the separate as well as united heights of the respective towers and spires; and although in some instances we have been unable to obtain those dimensions, the table supplies other information in regard to the examples mentioned in it, and will at least serve as a model for a more complete list of the kind. In addition to it we will here briefly enumerate some of the examples arranged according to the proportions of the spires, or their heights as measured by the diameters of their bases: *Six* diameters in height, or more than five, old St. Paul's; St. Stephen's, Vienna; Norwich; *Five*, or more than four, Salisbury, Bloxham, Marburg (4½); *Four*, St. Mary's, Oxford (nearly), Glasgow (do.), Ulm (do.), Bayeux (rather more), St. Stephen's, Caen; Freyburg (rather less); St. Peter's, Caen; *Three*, or more than two, St. Mary's, Stamford; Welford; Strassburg; Batalha: *Two*, Oxford cathedral; small western spires, St. Stephen's, Vienna. *One*, Worms, Gelnhausen.

Table of Spires, English and Foreign.

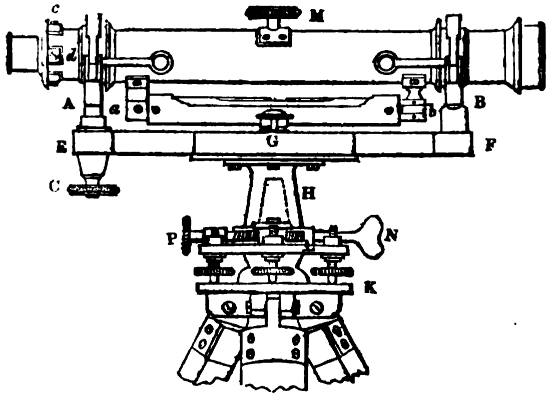
	Tower.	Spire.	Total Height.	Remarks.
Old St. Paul's . . *feet*	260	274	534	Six diameters high.
Salisbury	207	197	404	Date about 1350. Three enriched bands. Nearly five diameters.
Norwich	140	163	303	Plain, rather more than five diameters high.
Lichfield	114	138	252	Lucarned, 5 tiers of windows. Nearly 5 diameters high.
Do., two western	89	103	192	Lucarned, 4 tiers; 4½ diameters high.
Chichester	..	..	270	Pinnacled and lucarned below; banded with one broad rich band else quite plain.
Oxford Cathedral . ..	94	52	146	Date about 1220.
Oxford, St. Mary's . ..	86	94	180	Spire itself quite plain, lucarned with a canopied window below, on four sides. Embased by very rich canopied niches and pinnacles.
Lowth	148	140	288	Embased with lofty pinnacles and flying buttresses. Crocketted. 6 diameters.
Grantham (about) . ..	140	..	250	Lucarned, crocketted, large crocketted pinnacles at base. Base of spire less than tower.
Newark	..	..	..	Short spire, spreading out at its base. Lucarned, with 4 tiers of windows.
Bloxham	101	94	195	A very beautiful example. Spire 5 diameters high. Date about 135
St. Michael's, Coventry ..	136	164	300	This tower and spire a very fine example.
St. Mary's, Stamford ..	..	..	..	Date about 1260. Base without parapet or pinnacles. Lucarned, 4 tiers. Spire 2½ diameters.
Welford, Gloucester . ..	..	..	..	An example of a spire on a low circular tower. Lucarned at its base with lofty gabled windows. Spire 3 diameters.
St. Chad's, Birmingham	88	62	150	Two west towers, only N.W. spire yet erected. (*Comp. to Almanac*, 1842.)
Cologne (as designed) ..	330	200	530	Two west spires enriched with tracery, and crowned by large finials.
Strassburg	364	110	474	Two west towers, only N.W. spire.
St. Stephen's, Vienna ..	285	180	465	On south side of church. Example of a tabernacle tower and spire.
Ulm (as designed) . ..	320	171	491	Tabernacle example. Tower and spire in centre of west front.
Freyburg	221	159	380	Rich open-work spire. Tower and spire in centre of west front.
Marburg	184	88	272	Two west towers and spires. Base of spire gabled. Spire 4½ diameters.
Nürnberg, St. Laurence	180	90	270	Do. do. do.
Nürnberg, St. Sebaldus	170	90	260	Do. do. do.
Thann in Alsace . ..	..	..	..	A tabernacle example, with rich tracery-work on spire. Spire about one-fourth of entire height.
Antwerp	..	..	366	Two west towers, only N.W. spire.
Chartres	..	..	..	Two west spires, the N.W. one loftier and more enriched than the other.
Bayeux	142	104	246	Two west spires. The north-west spire has 6 broad bands; the other plain. Diameter at base 27 feet.
Caen, St. Stephen's . ..	155	107	262	Lucarned at base and banded.
Caen, St. Peter's	134	110	244	Base of spire 24 feet. Spire has 3 bands, with small hexafoil, quatrefoil, and trefoil apertures between them. Crocketted.
Batalha	113	57	170	Very rich open-work spire. Diameter at base 19 feet.
Burgos Cathedral . ..	..	..	..	Two short or stump but very rich open-work spires, at west en Date of spires 1442.
Glasgow	115	105	220	Lucarned, banded, lower band richly moulded and quatrefoiled, and surmounted by fleurons. Diameter at base 27 feet.
Treis on the Moselle . ..	111	128	239	A new church, finished 1831. Lassaulx, architect. Spire, a *broach* splayed off at base. Diameter, above splay, 16 feet; height abo 8 diameters.
St. Marie Hilf, Münich ..	220	60	280	Church erected by Ohlmuller; completed 1839. Spire an open-work *helm* or broach.

SPIRES. [SPEYER.]

SPIRIT, in Chemistry. This word, especially when employed by itself, is now almost exclusively applied to spirit of wine, or alcohol; formerly however the word spirit was given to most substances capable of being vaporized and condensed by distillation, and to some not obtained by distillatio It will be requisite merely to name a few of those compoun to show how extensively it was used and misapplied to su stances of very different origin and composition: thus nitric acid was called spirit of nitre; hydrochloric acid, spirit of salt; sulphuric acid, spirit of sulphur; chloride of tin, spirit of Libavius; solution of ammonia, spirit of sal-ammoniac, and so forth.

SPIRIT-LEVEL, a tube of glass nearly filled with spirit of wine or distilled water, and hermetically sealed at both ends, so that when held with its axis in a horizontal position, the air which occupies the part not filled with the spirit or water places itself contiguously to the upper surface. The tube being supposed to be perfectly cylindrical, the exact horizontality of its axis is ascertained by the extremities of the air-bubble being at equal distances from the middle point in the length of the glass.

The spirit-tube is used in determining the relative heights of ground at two or more stations, and in order to render it available for this purpose, it is placed within a brass case having a long opening on the side which is to be uppermost, and is attached to a telescope; the telescope and tube are then fitted to a frame, or cradle, of brass, which is supported on three legs. In the interior of the telescope, at the common focus of the object-glass and eye-glasses, are fixed, generally, two wires, at right angles to each other, their intersection being in the line of collimation, or that which joins the centres of all the lenses.



The case containing the spirit-tube is made to turn on a oint at one extremity, as *a*, by the revolutions of a screw, , at the opposite extremity; and the telescope rests, near ach end, within two arms at the top of a small pillar, A or , the pillar and its arms resembling the letter Y, and the nterior sides of the arms being tangents to the tube of the elescope. One of these pillars is made capable of a small novement in a vertical direction by turning a screw, C, at ts base, for the purpose of elevating or depressing one end f the telescope and spirit-tube; and in the more perfectly onstructed instruments, both the pillars may be so moved. The pillars are at the extremities of a strong brass plate, EF, the under side of which is connected with the tripod-tand, which supports the whole instrument; and a compass-ox, G, is attached immediately to the plate, as in the cut, r is raised above the telescope by means of four small pilars. A hollow conical socket, H, of brass is screwed to he under side of the plate, and is intended to receive a iece of bell-metal of a corresponding form, which constiutes the upper part of the stand. This piece serves as a ertical axis, upon which the telescope, the spirit-level, and he compass are to turn round horizontally: sometimes owever the conical pivot projects from the under part of he plate, EF, and the socket is on the stand.

The three legs which are to support the instrument are rmly fixed to a circular plate, K, perforated at its centre, nd having about the perforation a hollow spherical zone, esembling a small inverted cup. In the simpler kinds of pirit-levels a circular plate, L, of the same dimensions as he last, carries above it the pivot before mentioned; and rom below it projects a stem, terminating in a ball, which ts the inverted cup or socket. By means of four screws hich pass through one of these two plates (the upper plate the cut), nearly at the extremities of two diameters at ight angles to one another, the upper plate is made parallel the horizon, and consequently the conical pivot which it arries is brought to a vertical position.

The above is a general description, which will serve nearly or every spirit-level at present in use, whatever be its form; and the following is the usual manner of performing the adjustments, preparatory to the instrument being employed on the ground:—

The telescope should, by a proper opening of the legs of the stand, be at first rendered as nearly level as can be estimated by the eye; then, being turned so as to lie vertically above the line joining two opposite screws in what are called the parallel plates (K and L), the spirit-tube is brought to a horizontal position by relaxing the screw nearest to its higher end, and tightening that which is opposite to it: the like operation is to be performed with the other pair of screws, after placing the telescope vertically above them. In order to render the spirit-tube parallel to the axis of the telescope, after the bubble of air has been made to occupy the middle place by the process just mentioned, let the telescope be reversed in the arms (the Ys, as they are called); then, if the bubble does not still occupy the middle, it must be made to do so by successive trials, endeavouring to correct half the error by means of the screw *b*, and the other half by the screw G.

The eye-piece of the telescope must be moved inwards or outwards till the wires in the field of view are distinctly seen; and the object-glass must also be moved by means of the pinion, M, till the station-staff, placed at any convenient distance (suppose 100 yards), is also distinctly seen. By a few trials, the distance between the eye and the object-glass may be made such that the intersection of the wires will appear to remain constantly at one point on the staff while the observer in looking through the telescope varies the position of his eye. It is necessary besides that the intersection of the wires should be precisely in the line of collimation, or the optical axis of the telescope: for this purpose the point of intersection should be directed to some well-defined mark at a considerable distance. The telescope must then be turned on its axis; and if the intersection remains constantly on the mark, that adjustment is complete; otherwise it must be rendered so by means of the screws, *c*, *d*, &c., on the telescope; those screws being placed at the extremities of two diameters at right angles to one another, on being turned they move the plate carrying the wires in the directions of those diameters. In order that the correction may be made, the apparent displacement of one of the wires, in consequence of the telescope being turned half round on its axis, should be observed, and the screws turned till half the displacement is corrected; the like observation and correction may then be made for the other wire: a few repetitions of each adjustment will probably be necessary before the error is wholly removed.

The level constructed by the late Mr. Troughton differs from that which has been above described in having the spirit-tube sunk partly in the telescope; and the latter, being incapable of a movement about its axis, does not admit of a separate adjustment for the intersection of the wires.

Mr. Gravat, who has within a few years made considerable improvements in the mechanism of these instruments, recommends the following method by which the error in the positions of the cross-wires and spirit-tube may be ascertained and corrected:—

Let three pickets be driven into the ground in a line and at equal distances from one another, and let the spirit-level be set up successively in the middle between the first and second, and between the second and third pickets; then, having by the screws of the instrument adjusted the spirit-tube so that the bubble of air may retain the same place while the telescope is turned round on the vertical axis, direct the object-end of the telescope successively to the station-staves held up on the different pickets, read the several heights, and take the differences between those on the first and second, and on the second and third staff. Now the staves being at equal distances from the instrument, it is obvious that any error which may have existed in the line of collimation, or from the spirit-tube not being parallel to that line, will be destroyed, and the differences between the readings on the staves are the differences in the levels of the heads of the pickets; but unless the adjustments are perfect, this will not be the case if the instrument be set up at any point which is unequally distant from all the pickets; therefore from such point direct the telescope to the staves, and take the differences of the readings as before. On comparing these differences with the former, a want of agreement will prove that the intersection of the wires is not in the optical axis; and the error may be corrected by means of the screws belonging to the wire plate. After the agreement has been obtained, should the bubble of air not stand in the middle of the tube, it may be brought to that position by the screw *b*, at one extremity of the case, and the instrument is then completely adjusted. (Simms, *Treatise on Mathematical Instruments.*)

The spirit-level is usually provided with a clamp, N, and a screw, P, by which, when the axis of the telescope has by hand been brought near the object, the coincidence may be accurately made by a slow and steady motion about the vertical axis.

The spirit-tube or level which is employed for the adjustment of transit telescopes or astronomical circles is contained in a case with feet or with loops at its extremities, in order that it may either rest above or be suspended below the horizontal axis of the instrument to be levelled; also the upper part of the case is furnished with a graduated scale, the divisions of which are numbered on each side of a zero point, this point being usually placed near each of the two extremities of the air-bubble when the tube is in a horizontal position. Having set up or suspended the spirit-tube, the two particular graduations at which the extremities of the air-bubble rest are marked; and half the sum, or half the difference of these numbers, according as the extremities of the bubble are in the same or in opposite directions from the two zero-points, being taken, gives the distance of the centre of the bubble from the middle between those points. The level being then reversed, the graduations at which the air-bubble rests are again marked, and half the sum or half the difference is taken as before. A mean of the two distances thus found is the true distance of the centre of the bubble from the middle point on the scale; and the screw which elevates or depresses one end of the axis of the telescope being then turned, till either extremity of the bubble has moved, in a direction contrary to that in which the centre of the bubble had moved from the middle of the scale, through a number of divisions equal to that mean distance, that axis will be brought to a horizontal position. This method is used in preference to that of successive trials, in order to avoid the trouble of making several reversions of the whole instrument.

The levelling-staff till lately in general use for finding the relative heights of ground is a rod consisting of two parts, each six feet long, which, by being made to slide on one another, will indicate differences of level nearly as great as twelve feet. The face of the rod is divided into feet, inches, and tenths, or into feet with centesimal subdivisions; and a vane, or cross-piece of wood, perforated through the middle, is moved up or down upon the rod by an assistant till a chamfered edge at the perforation is seen by the observer at the spirit-level to coincide with the horizontal wire in the telescope. The height from the ground to the chamfered edge of the vane must be read by the assistant; and it being out of the power of the observer to detect any mistake in the reading, it becomes very desirable that the graduations on the rod should be sufficiently distinct to allow the heights to be read at the spirit-level itself. The rod proposed by Mr. Gravat for this purpose is divided into hundredths of a foot by stripes which are alternately black and white, and are numbered at every foot in the usual way with figures great enough to be seen on looking through the telescope; the tenths of a foot are indicated by lines longer than the others. A similar staff has been proposed by Mr. Sopwith and Mr. W. P. Barlow; and the former gentleman, besides the number of every foot, has given a number to every first, third, fifth, and ninth decimal. Mr. Barlow's rod is also divided into centesimals of a foot; but the marks, instead of being stripes whose edges are parallel to one another, have the form of triangles. each tenth mark however is in the form of a lozenge, or double triangle, for the sake of greater distinctness.

SPIRIT-TRADE. [Wine and Spirit Trade.]

SPIRIT of WINE. [Alcohol.]

SPIROGLYPHUS, a genus framed for a species of *Serpula* of authors, which makes a groove for itself upon and in the surface of shells. [Tubicolidæ.]

SPIROLI'NA. [Foraminifera.]

SPIROLOCULI'NA. [Foraminifera.]

SPIRO'RBIS, Lamarck's name for a genus of *Serpula* of authors; the white little shell is coiled round into a spiral disc-like form. Common on the shell of lobsters. [Tubicolidæ.]

SPI'RULA. [Spirulidæ.]

SPIRU'LIDÆ, Professor Owen's name for a family of polythalamous, decapodous, dibranchiate Cephalopoda, thus characterized by him:—

Animal corresponding in external form to the Decapodous type; internal organization unknown, presumed to be Dibranchiate. *Shell* partly internal; cylindrical. multilocular, discoïd; the whorls separated; septa transverse, concave next the outlet, and with regular intervals. *Siphon* marginal and internal, uninterrupted.

Genus Spirula, Lam.

The character of the family is also that of the single genus of which it is at present composed.

Example, *Spirulu Australis*, Lam.

M. de Blainville, who, in the first volume of the *Nouvelles Annales du Museum* (1835), had given a detailed account of the anatomy of the shells of *Nautilus Pompilius* and *Spirula*, with coloured figures, has since published in the *Annales Françaises et Etrangères d'Anatomie et de Physiologie appliquées à la Médicine et à l'Histoire Naturelle*, his observations *Sur l'Animal de la Spirule, et sur l'usage du Siphon des Coquilles polythalames*. His account is founded on dead specimens, more or less complete, 'the remains, doubtless, of the voracity of fishes,' which he owed to the perseverance of MM. Leclancher and Robert, who collected them as they floated dead on the surface of the Atlantic, near the western coast of Africa.

In the last-named memoir, M. de Blainville refers to the former one as having placed beyond doubt, as it seems to him, the very complex composition of the siphon of the shell, 'que,' says he, 'j'ai montré être formé d'une suite de petits entonnoirs s'emboitant plus ou moins les uns dans les autres, de manière quelquefois à former *un tout solide*, mais aussi quelquefois ne se touchant pas, et alors les intervalles étant remplis par une partie membraneuse encroutée d'une couche calcaire, de telle sorte que, même dans ce dernier cas, la partie charnue provenant de l'animal ne peut jamais être à nu dans les loges qu'elle traverse.' He adds, that he had concluded from this anatomical disposition that this peculiarity of appearance in the siphon was nothing else than a mode of attachment of the animal to its shell, a sort of muscular insertion by a tubular prolongation, not continuing itself probably throughout the length of the siphon of the shell. 'Voyons,' he continues, 'si mes conjectures étaient fondées en étudiant aujourdhui ce que je possède de l'animal dont elle fait partie, c'est-à-dire, je le répète, le tronc dont la tête et les bras ont été arrachés.'

M. de Blainville describes the animal of the *Spirula*, limited by the mantle, as in the form of a long case, very regularly symmetrical, of an oval shape, slightly compressed at the sides, narrower and more circular forwards, and more elevated and more compressed backwards. The anterior extremity presents a sufficiently regularly trilobated aperture, there being one median lobe a little longer above, and two lower lateral lobes a little more pointed and separated by a median fissure below. This orifice is constituted by the borders of the mantle or of the sac of the Sepiaceans, the collar of the *Siphonobranchians* forming here a considerable case, in which the head and its appendages can enter and be completely sheltered, a little like the slugs (limaces) under their buckler. The trilobated form of this aperture recals, observes M. de Blainville, sufficiently well that which is at present known respecting that of many ammonites. The posterior extremity of the sac or mantle convex (renflée) and widened vertically (a disposition which is principally due to the shell solidly and vertically encased in the skin) presents, entirely, behind a sort of oblique flatness (aplatissement), at the middle of which is a terminal button, accompanied on the right and left by a small semicircular fin, attached by the right border, and very like that which exists in *Sepiola*. This mantle or case, in its anterior moiety at least, has, besides, an anatomical structure, which brings to remembrance what exists in the Calamaries, that is to say, it is formed of a contractile very thick lamina or derm constituting the principal part, offering on its surface a great number of lacunæ, forming a net; of a nacreous layer on which is the part coloured by small spots, violaceous, doubtless, during life, as in the *Sepiolæ*; and, lastly, of a sort of epidermic varnish or glazing, only the contractile part is perhaps still more solid, and capable of more resistance than it is in the calamaries. But in lieu of being sustained in the back by a cartilaginous or calcareous nearly straight lamina, it contains a shell, whose very much elongated and very regular spiral cone presenting its base open in front, is rolled up vertically backwards behind and below, in coils which are concentric, but disjoined, or not contiguous. This shell is no more really external in any of its points than the cartilage of the calamaries, or the bone of the cuttles. Only fastened on the back and belly in the circumference of a small elongated oval space by the dermomuscular layer, and, as it were, set in it, it forms a sort of hernia, and is not covered in these two places, except by the superficial parts of the skin, the nacreous and coloured layers. With regard to the rest of the spire, it is contained in a subdermic space, occupying the posterior part of the visceral mass, which is perfectly independent of it, being separated from it by a subcutaneous membrane, which is very delicate, but as distinct as in the sepiaceans. This space or lacuna is, nevertheless, traversed by a bridle equally dermic, which passes from one wall to the other, across the disjunction of the whorls.

Before he examines the relations of the shell with the membranous siphon proceeding from the animal, M. de Blainville turns his attention to the mode in which the visceral mass is disposed. Sufficiently considerable, especially at the period when the generative apparatus is in a state of turgescence, it occupies the whole bottom of the cavity of the mantle, prolonging itself more or less on each side of the subdermic envelope, which includes the shell, behind the excretory funnel, situated under the neck, as in the other sepiaceans, and between the two branchiæ, situated one on the right, and the other on the left, in the cavity of the mantle. This visceral mass, which is more or less rounded and convex in front, and, in general, bifurcated behind, is entirely enveloped in a very distinct but delicate and transparent peritoneum, prolonging itself with the organs of generation, or in the bifurcation of the case, resulting from the position of the shell. On dividing the mantle in the median line, as the figure which M. de Blainville will publish in his *Malacozaires* indicates, there appear—

1st. In front the very considerable funnel entirely closed, and advancing probably also under the cephalobrachial mass, to judge of it at least from the eye, left nearly in situ.

2nd. The branchiæ, long, narrow, triangular, directed on each side with the point forwards, free, and only retained by a very loose membranous bridle, except at their base, where the vascular peduncle is found.

3rd. Towards the middle of the lower surface of the visceral mass, the intestinal canal terminating in a small, free, floating appendage, widely open, absolutely as in the cuttles, and accompanied throughout its extent between the two masses of the generative apparatus, by the canal of the ink-bag, containing black matter, which M. de Blainville pressed out by a small orifice situated at the left of the anus.

4th. The principal part of the female organs of generation, viz. on one side (the right) a considerable ovary, and on the other, doubtless, an organ of digestion, forming both together the whole lower surface of the mass, and prolonging itself more or less backwards on each side of the envelope of the shell. The mass of eggs came forth a little below the fasciculi of the muscular attachment of the cephalic mass to the shell. They were few and very large, being a millemetre in length by three quarters of a millemetre in width. Their envelope was hard and friable; it contained an amber-coloured matter, nearly solid, and which was, M. de Blainville thinks, without doubt the vitellus; but he could not perceive any trace of a fœtus, in consequence of the early stage of development in which they were.

M. de Blainville reminds the reader that he has already adverted to the fact, that in all the individuals which he had observed, the cephalic mass and its appendages had been torn away at their point of junction with the body; but on one, the least mutilated, the end of the muscular sheath which traverses the œsophagus was preserved. Its anterior extremity, which goes to the head and its appendages, was truncated at the point of abstraction; but the posterior extremity was in tolerably good preservation; one might see that, narrowing as it proceeded, it attached itself to a fleshy lamina, which completed the bottom of the first chamber of the shell, forming a sort of hood or cap continued by means of its circumference with the envelope of the shell, and giving origin, at the bottom and towards the inferior border, to a tubiform prolongation penetrating into and attaching itself to the siphon of the first chamber, and then continuing itself without any adhesion, as M. de Blainville supposes, up to its origin towards the summit of the shell; from which he was able in fact to withdraw it without breaking it for a considerable length; so that it may be said that this is in a prolongation of the columellar or retractor muscle of the head and its appendages, and that the membranous siphon itself is only a part of this muscle.

The mantle, the envelope of the shell, and the mass of the viscera, afforded the following analysis:—

The shell, entirely free in the dermoid envelope which contains it, has not its terminal excavation augmented in depth by a rather considerable membranous border, as M. de Blainville had supposed in his anatomy of the shell; it is only lined by the membranous hood already described, at the circumference of which terminates anteriorly the fascia of the columellar muscle, and, behind, the subdermic membrane which forms the chamber of the shell. Placed in the back of the animal, this first chamber contains no viscus either in whole or in part; and very certainly the membranous siphon has no connexion except with the fleshy hood, and none whatever with the peritoneal cavity, at the anterior and lower part of which M. de Blainville states that he could easily recognise the heart receiving the branchial vessels, which are very long on account of the advanced position of the branchiæ.

M. de Blainville then observes that the very exact description, as he hopes, thus given of the principal parts of the body of the *Spirula*, and especially of that which forms the entire envelope containing the shell, will not permit him to admit here the theory proposed by Dr. Buckland, in his 'Bridgewater Treatise;' but if it be not applicable to the *Spirula*, continues M. de Blainville, may it not be applicable to the Nautilus, whose organization in fact offers considerable differences, not only in the cephalic appendages, but also in the respiratory funnel divided throughout its length like the branchial tube of the *Siphobranchiata*, and especially in the shell, which is completely external, and in the first chamber of which the animal is lodged, and can retire therein completely? This, says M. de Blainville, is what I cannot decide. At all events, it is sufficiently difficult to conceive that if the tubuliform prolongation which is lodged in the siphon of the shell of the *Spirula* is not hollow, it should be so in the *Nautilus*, and that if the pericardium or the peritoneum does not communicate with this pretended canal in the *Spirula*, it does communicate with it in the Nautilus; and this so much the more, inasmuch as it is at least an unusual thing that this species of *diverticulum* of the pericardium should thus continue in all the whorls to the summit: 'aussi,' continues M. de Blainville, 'attendrons nous avec quelque impatience que M. R. Owen ait pu éclaircir nos doutes au sujet du Nautile; jusque là nous pouvons au moins dire que la théorie de M. Buckland n'est pas applicable à la Spirule. Aussi en proposerons-nous une beaucoup plus simple et plus en harmonie avec ce que nous pouvons voir tous les jours chez les planorbes et les lymnées de nos marais.'

Whether Professor Owen will set to work to clear up these doubts we know not; but we venture to think that, if he does, he will be wasting time that might be much better employed. If M. de Blainville was unwilling to give credit to the Professor's positive affirmation that the hollow membranous tube traverses the siphon of *Nautilus*, and to the Professor's figure exhibiting it, he might have satisfied himself of its existence by examining the dried remains of it in any old recent Nautilus shells, which we never understood to be rare at Paris. The hollow tube is equally demonstrated by the condition of the fossil *Nautili*.

In the museum of the Royal College of Surgeons in London there is a preparation (No. 900 B, *Physiological Series*), made by Professor Owen, and described by him in the second volume of the admirable Catalogue published in 1834. This preparation exhibits the circulation and respiratory organs of the Pearly Nautilus (Nautilus Pompilius); and the description is given in this work. [NAUTILUS, vol. xvi., p. 112.] We have minutely examined the preparation, and can vouch for the accuracy of the description: no one at all versed in the subject can see the former without being satisfied that the prolongation of the mantle and membranous tube to form the siphon is tubular, and not solid. It goes through the pericardium, and consequently communicates by means of the valvular *foramina* at the base of the gills with the branchial chamber.*

Now supposing that M. de Blainville is correct in describing the siphon of *Spirula* to be solid, and upon that fact his argument against Dr. Buckland's theory mainly rests, we cannot allow the inference, which, from observation of a structure for the attachment of the shell to the body in the dibranchiate *Spirula*, with an internal small shell, concludes that the same structure ought therefore to exist in the tetrabranchiate Nautilus, with its great external shell, to be very sound. Nor is this the kind of argument for which we should have looked in the writings of so eminent a zoologist and comparative anatomist as M. de Blainville.

The following is the theory of M. de Blainville as far as regards *Spirula*:—

Admitting as beyond doubt that the chambers of the shell of *Spirula* are empty, or at most filled with an aëriform fluid, which appears to be proved *à priori*, because in fact one cannot conceive how the water could come there, the chambers being closed on all sides, and *à posteriori* because they are so, even when separated from the animal, which makes these shells constantly float on the surface of the sea, and equally or as well when they form a part of the whole, as M. de Blainville had satisfied himself by experiment on all the individuals brought home by MM. Leclancher and Robert; it seems to M. de Blainville that the re-entry and the contraction of the whole brachiocephalic mass into the case formed by the mantle, as well as the application of the fins against its walls, will be sufficient, by notably diminishing the volume of the animal without at all changing its mass, to counterbalance or even overcome the specific lightness of the air contained in the chambers of the shell, which will again gain the ascendency, when the volume of the animal shall return to its first disposition by the protrusion and expansion of its head and arms. It is certainly thus that the *Limnææ* and *Planorbes* [LIMNEANS], act in order to descend to the bottom of the water, for to rise again to its surface they must resort to creeping along solid immersed bodies. With regard to the *Spirulæ*, the kind of natatory bladder formed by the aëriferous chambers of their shell can without doubt elevate them to the surface without effort on their part, according to M. de Blainville, and he is even inclined to think that the size of the chambers is, so to speak, measured by the animal instinctively, so that the extent of the vacant space should always be in proportion to the mass of the animal, and floating must be the result, that is to say, there must be a specific gravity less than that of the ambient medium.

'Cette manière de voir, cette explication du fait, pour le dire en passant, ne démontrerait-elle pas mieux la sagesse du grand géomètre,' asks M. de Blainville, 'que tout ce que l'on a dit à ce sujet?'

To this question, we humbly answer, no. Supposing M. de Blainville's theory to be impregnable, the mechanism by which the Nautilus is *proved*—we write it advisedly—to ascend and descend, is no worse demonstration of the adaptation of means to an end, to say the least of it, than the mode proposed by M. de Blainville.

In fact, continues M. de Blainville, to enable the animal during its growth, that is to say, increasing in mass and volume, to preserve the faculty of floating at the surface in a fluid the density of which varies but little, and that by a hydrostatic disposition, without any effort on its own part, there would *really* be required a very singular combination, consisting in this—that the animal could create for itself a new bubble of air, and that in a determined proportion. This it seems to effect by advancing its muscle of attachment by a single effort (d'un seul coup) on a quantity of air measured, so to speak, and afterwards limiting this space by an impermeable septum (cloison).

On this supposition, says M. de Blainville, in conclusion, the normal disposition of *Spirula* would be to float constantly on the surface of the sea, like the *Janthinæ* [JANTHINA] and *Physsophoræ* [PHYSOGRADA, vol. xviii., p. 137], and equally by the means of an aëriferous float of calculated proportion. In this position it would execute the greatest parts of its functions and its acts; but in order to withdraw itself from danger, it would have the faculty of changing the relation or proportion of the volume to the mass, and of diving more or less; but perhaps without ever reaching the bottom.

Geographical Distribution.—Widely disseminated in the seas of warm climates. [SPONDYLIDÆ.]

SPI'SULA, Mr. J. E. Gray's name for a genus of *Conchifers*, founded on *Mactra fragilis*, and similar species. Ligament subexternal, marginal, not separate from the cartilage. Posterior lateral teeth double and single.

SPITZBERGEN is a group of islands situated nearer to the arctic pole than any other country on the globe. It lies between 76° 30′ and 80° 30′ N. lat., and between 9° and 22° E. long., and is surrounded by the Arctic Polar Sea, of which that portion which lies west of Spitzbergen is distinguished by the name of the Greenland Sea, because it extends to the eastern coasts of Greenland.

The group consists of three larger and numerous smaller islands which lie about the larger islands. The largest island is on the west, and extends from 76° 30′ to 80° N. lat.; it is properly called Spitzbergen, and its most eastern part is called New Friesland. To the east of New Friesland lies North-east Land, which extends from 79° 10′ to 80° 10′ N. lat., and is divided from the larger island by the Henloopen or Waygatz Strait, which is about 70 miles long, and varies in breadth from 4 to 11 miles. East of the main body of Spitzbergen, and south of New Friesland, is Edges Island, which extends from 77° 15′ to 78° 15′ N. lat., is separated from New Friesland by a strait called Walter Tymens fiord, or Alderman Freeman's inlet. This strait is somewhat more than 50 miles long, and less than 10 wide. Along the southern coast of Edges Island numerous small islands cover the sea to a distance of 15 miles from the shores, and this group goes by the name of the Thousand Islands. A considerable number of smaller islands are also dispersed over the sea which surrounds North-east Land on the north and east, in Henloopen Strait, and round the north-western coast of Spitzbergen. In other places along the coast the smaller islands are not numerous, but at the distance of 12 or 15 miles from the western coast of Spitzbergen is Charles Island or Forland, which is about 40 miles long, but only a few miles wide.

Nothing is known of these islands except those parts which are contiguous to the sea, and even the coast is imperfectly laid down in our maps, with the exception of the western coast, which for more than two centuries has been annually visited by many whaling vessels, and thus has gradually become well known, and has been partially surveyed.

The west coast of Spitzbergen is mountainous. The mountains generally rise within three miles of the sea, but in several places they commence at the coast. Between the shore and the mountains is a low level tract, rarely more than three miles wide. It is commonly somewhat above the level of high-water mark, but in some places it is below, and only prevented from being covered by the sea by a natural bank of shingle of the height of 10 or 15 feet. The mountains, which fill the interior of the island, rise, according to an estimate, in general to between 3000 and 4000 feet above the sea-level. Many branches of them run westward, and come close to the shore, where the abrupt termination of the mountain-ridges projects beyond the regular line of the coast, and overhangs the ocean. Where these mountain-ridges occur at no great distances from one another, the intervening valleys, being of moderate extent, are filled with glaciers, which in several places constitute the very shores of the sea, forming a high perpendicular wall of ice from 100 to 400 feet high. The inland valleys, in all seasons, present a smooth and continuous bed of snow, in some places divided by considerable rivulets, but in others exhibiting an unbroken surface for many miles in extent.

The southern extremity of Spitzbergen is called Point Look-out, or South Cape; a low flat, about 40 square miles in surface, constitutes the termination of the coast. On the isthmus, which joins this flat tract to the main body rises a mountain-chain, which runs north, and soon attains a considerable elevation, as a large glacier or iceberg lies here along the sea-shore. North of 77° N. lat. is a wide bay, called Horn Sound, near the southern shores of which lies Mount Horn, or Hedge-hog Mount, which has several summits, chiefly in the form of spires, the highest of which is 4395

---

[*] In the early part of the memoir, M. de Blainville says of Dr. Buckland's theory:—'Pour accepter cette nouvelle hypothèse, il faut admettre les points suivants, que M. Buckland considère, à ce qu'il paroît, comme prouvés: 1. La communication du péricarde avec le siphon. 2. L'existence du siphon membraneux creux et à découvert, dans les loges ou dans les intervalles des cloisons. 3. L'existence constante d'un liquide dans le péricarde. 4. La pesanteur spécifique de ce liquide, plus grande que celle de l'eau de mer. 5. La vacuité complète, si ce n'est d'air, des loges ou chambres de la coquille. Or, de ces différentes thèses, il n'y a peut-être'—that *peut-être*, like our *if*, is a great peace-maker—'que la dernière qui soit complètement hors de doute.' We do not think that we shall be deemed presumptuous, if we add numbers 1 and 2; and we could say something of the others, but let them pass for the present.

feet. Horn Sound has tolerable anchorage. A little to the northward of Horn Sound is a glacier of immense extent, occupying 11 miles of the sea-coast. The highest part of the precipitous front adjoining the sea is 400 feet, and it extends backward towards the summit of the mountain to about four times that elevation. Bell Sound, another wide bay, occurs between 77° 35′ and 77° 40′ N. lat., and within it are several anchoring-places. North of 78° is Ice Sound, where good anchorage is found at Green Harbour. That portion of Spitzbergen which is south of 78° 50′ N. lat. consists of groups of isolated mountains, partly disposed in chains, having conical, pyramidical, or ridged summits, sometimes round-backed, frequently terminating in points, and occasionally in acute peaks not unlike spires.

To the north of 78° 50′ N. lat. are English Bay, King's Bay, and Cross Bay, in which there is good anchorage. Near the head of King's Bay there are three piles of rocks of a regular form, called the Three Crowns, which resemble the *teocallis* of the antient Mexicans. They rest on the top of a mountain, and each commences with a square table or horizontal stratum of rock, on the top of which is another of similar form and height, but of smaller area; this is continued by a third and fourth, and so on, each succeeding stratum being less than that immediately below it, until it forms a pyramid of steps, almost as regular as if it were worked by art. North of Cross Bay the mountains are more disposed in chains than farther south. The principal ridge lies nearly north and south, and the main valley extends from the head of Cross Bay to the northern coast, a distance of 40 or 50 miles. An inferior chain of hills, six or nine miles from the coast, runs parallel to the shore, and from this chain several lateral ridges project into the sea, where they terminate in mural precipices. Between those lateral ridges are the Seven Icebergs, each of which is, on an average, about a mile in length, and near 200 feet high near the sea. The higher mountains terminate near 79° 35′ N. lat., and the lower coast, which extends hence to the north, is indented by many small inlets, surrounded by numerous small islands of considerable height. In this part there are several very good harbours and anchorages, both in the inlets and between the islands, as Magdalena Bay, the excellent harbours of Smeerenberg, Fair Haven, Vogel Sang, the Norways, Love Bay, Heckla Cove, in the bay of Treurenburg, on Waygatz Strait, and others.

The centre of Charles Island, which lies opposite the western coast of Spitzbergen, is occupied by a mountain-chain about 30 miles in length, rising on the west side from the sea, and on the east from a narrow strip of level ground only a few feet above the sea-level. The central part of this chain is perhaps the highest land near the sea. It rises from the water's edge by a continual ascent, at an angle at first of about 30°, and increasing to 45° and more, until it terminates in five distinct summits, of which the highest is 4500 and the lowest 4000 feet above the sea-level.

Along the north shores of Spitzbergen and North-east Land the country is neither so elevated nor are the hills so sharp-pointed as on the west coast. Some of the smaller islands which occur along these shores, and considerable tracts of the mainland, are comparatively level. They also contain much more earth and clay, and the vegetation is rather more vigorous. Along the east coast of North-east Land there is a continuous line of glaciers extending to the shore. We have very little information respecting the eastern and southern coasts of Spitzbergen, as well as those of New Friesland and Edges Island.

Extending to within 10° of the pole, the climate of Spitzbergen is intensely cold. The mean temperature of the three warmest months on the western coast does not exceed 34·50°, and even at that season this part of the island is occasionally subject to a cold of three, four, and more degrees below the freezing-point. In the northern parts the longest day is four months; but from the 22nd of October to the 22nd of February the sun does not rise above the horizon. This long night however is not quite dark, for the sun, even during its greatest south declination, approaches within 13½° of the horizon, and causes a faint twilight for about one-fourth part of every twenty-four hours. If we add to this the aurora borealis, which sometimes exhibits a brilliancy approaching to a blaze of fire, the stars, which shine with unusual brightness, and the moon, which in her north declination appears for 12 or 14 days together without setting, we may conceive that during the long night there is generally sufficient light to enable a person to go abroad. The winter sets in at the end of September, or beginning of October, with winds from the north, north-north-west, or north-west, or with calms, hard frost, and snow. In the middle of October the frost is sometimes very intense, and it increases rapidly in November. But throughout the whole winter, when strong south winds occur, they are generally accompanied with mild weather, and sometimes with thaw. Storms in this season are so frequent that two-thirds of the weather may be said to be boisterous. The highest winds occur about the time of the equinoxes, and blow most frequently from the south. A great quantity of snow falls every winter, but it accumulates principally in the sheltered glens, lying on the level ground seldom more than five feet deep. Captain Parry however found that the climate of the northern coast is remarkably temperate in summer for the latitude, and very agreeable, but only so near the land, that of the adjacent sea being of a totally different character, owing to the almost continual fogs. In May and June the sea was almost entirely covered with large fields or floes of ice, but in August it was hardly possible to discover a single piece of ice, so great was the change which had been produced by the continual presence of the sun.

The number of species of plants which have been found in Spitzbergen hardly exceeds forty, but vegetation is very rapid. Most of the plants spring up, flower, and produce seed in the course of a month or six weeks. They are of a dwarf size, and the only plant which partakes of the nature of a tree is a *Salix herbacea*, which grows to the height of three or four inches. The islands do not produce vegetables suitable or sufficient for the nourishment of a single human being.

As only a small part of Spitzbergen has been visited, we know very little of its mineral productions. In some parts of King's Bay a very beautiful marble and coal of good quality are abundant.

The quadrupeds are—polar foxes, polar bears, and reindeer. The adjacent sea abounds in many species of whales and some other large fish, and for more than two centuries a very advantageous fishery has been carried on. There are also many morses or walrusses, and abundance of seals. Sea-fowl are exceedingly numerous: some of the rocks along the western coast are literally covered with them.

Spitzbergen was discovered in 1596, by Barentz, Hemskerke, and Ryp, in their endeavour to effect a north-east passage to the Indies. It was named by them Spitzbergen (pointed mountains) from the numerous peaks observed on the coast. In 1607 it was visited by Henry Hudson, and four years afterwards the English began to resort to it for the whale fishery. Some sailors were left on these shores by accident on several occasions, and they passed the winter there: in some instances they died of the scurvy, but in other cases they survived and returned home. In 1743 four Russians were left there for six years, and thus the fact was ascertained that human beings could pass the winter in Spitzbergen without injury to their health. Since that time the Russians have frequently visited these islands. They proceed from Archangel, Mezen, Onega, and Kola, in vessels of 60 to 160 tons, some of which are intended for the summer fishing and others for the winter. The former put to sea in the beginning of June, and return in September; the latter sail about a month later, winter in some of the harbours, and return home in August or September of the following year. They also kill a great number of morses, polar bears, and foxes, and bring home many skins of these animals.

(Scoreby's *Account of the Arctic Regions*; and Parry's *Narrative of an Attempt to reach the North Pole in Boats*.)

SPIZAËTUS, M. Vieillot's name for a genus of FALCONIDÆ, placed by Mr. Swainson under the subfamily *Buteoninæ* or *Buzzards*.

Generic Character.—Form aquiline, with the bill of a buzzard. Bill strong, high, curved from the base, with a prominent festoon. Orbits and lores covered with down and hairs. Wings short. Tarsi moderate, feathered. Inner toe, without the claw, shorter than the outer. Rasorial. (Sw.)

Mr. G. R. Gray arranges the genus under the subfamily *Aquilinæ* or *Eagles*.

SPIZELLA, the name given by the Prince of Canino to a genus of *Fringillinæ* or *Finches*.

SPLACHNUM, the name of a genus of cryptogamic plants belonging to the natural family of Mosses. The word is adopted from Dioscorides, who used both *σπλάχνον* and *βρύον* to designate the families of lichens and mosses. It is known by its terminal fruit-stalk; single peristome with 8 double teeth; capsule with an evident apophysis, and mitriform, glabrous, furrowless calyptra. They are generally annual plants, and remarkable amongst their tribe for their size and beauty as well as singularity. Seven of the species are British. The most common in England is the *Splachnum ampullaceum*, purple gland-moss, which is found growing chiefly on rotten cow-dung. The receptacles are obtuse, inversely conical, of a greenish-purple colour, and three times as thick as the capsule.

S. sphæricum, green globular gland-moss, has a green globular receptacle, with ovato-lanceolate, pointed, entire leaves, and a capillary fruit-stalk. It is a native of alpine situations in the north of Europe and Scotland, and is generally found on cow-dung. It occurs in green tufts, and has elegant slender wavy tawny fruit-stalks from one and a half to three or four inches high.

S. rubrum, red umbrella gland-moss, has an orbicular convex red receptacle, with partially toothed leaves. The fruit-stalks are six inches in length; the receptacle is very conspicuous, being half an inch wide, and having the form of an inverted cup, which is of a rich crimson colour and finely reticulated, making this moss one of the most remarkable and beautiful in the family. It is a native of Norway, Finland, Russia, and Siberia.

SPLEEN (Σπλήν, *Lien*, *Splen*). There are few parts of the human body on which more has been written than on the spleen, and none where the result has been more unsatisfactory. The purpose which it serves in the animal economy still remains entirely unknown; and the physiological part of this article must consist of a mere historical recapitulation of the various theories respecting its functions, which have successively been for a time adopted, and have then fallen into oblivion.

The spleen is an organ which is not found in any tribe below the class of fishes. Some animals have two, and this number has not unfrequently been found in man; for, as Haller says (*Elem. Physiol.*, t. vi., p. 388), everything connected with this organ is uncertain and variable. Its form is generally somewhat oval, being smooth and convex on the exterior, where it is in apposition with the diaphragm, and irregularly concave on the opposite side, which is unequally divided into two parts by a transverse slit for the transmission of its vessels. (Quain, *Elem. of Anat.*) It is for the most part placed in the left hypochondriac region, between the diaphragm and the stomach, and beneath the cartilages of the ribs. (Quain.) It varies so much in size, that it is almost impossible to say what are its normal proportions. (Bichat, *Anat. Descr.*) It is much enlarged by disease, as will be hereafter noticed; but in health, taking a general average, its greatest diameter may be said to measure about four inches, its breadth three, and its thickness from two to two and a half; its usual average weight is from eight to ten ounces. It is of a slight spongy consistence (ἀραιὸς καὶ σπογγοειδής, Hippocr. *De Morb. Mulier*, lib. i., tom. ii., p. 683, ed. Kühn), and is at all times easily torn; and in many cases it is found, soon after death, so soft as to be readily broken by a slight pressure, when it appears a grumous, dark, confused mass. Its colour is deeply red, with a tinge of blue, particularly round its margin. It has a peritonæal investment prolonged to it from the stomach, by which, as well as by vessels, it is connected with that organ; but it has also a smooth and fibrous tunic proper to itself, which is so firmly adherent to the serous investment above mentioned, that they cannot be separated except at its concave surface. (Quain.) No organ receives a greater number of blood-vessels in proportion to its size than the spleen; a fact noticed by all anatomists, and the more so because it secretes no fluid of any sort, at least none that has hitherto been discovered. (Bichat.) Almost all the blood that it receives is derived from the *splenic artery* (Haller, p. 400, 401): this is the largest branch of the cœliac axis, and near the spleen divides into several branches, some of which enter the fissure in that organ, and are distributed to its substance. These are called the *rami splenici;* they are five or six in number, and vary in length and size. (Quain.) They are the proper terminal branches of the artery, and by infinite ramifications form within the substance of the spleen a capillary system, which probably anastomoses in a direct manner with the capillaries of the veins (Bichat), as is proved by the facility with which injections pass from one to the other. The *splenic vein* is a vessel of very considerable size compared with the bulk of the organ; and it returns the blood not only from the spleen, but also from the pancreas, duodenum, the greater part of the stomach and omentum, the left colon, and part of the rectum. It commences by five or six branches, which issue separately from the fissure of the spleen, but soon join to form a single vessel. Its direction is then transverse from left to right, embedded in the substance of the pancreas, in company with the splenic artery, beneath which it is placed. On reaching the front of the spine it joins the *superior mesenteric vein* nearly at a right angle, from the conflux of which proceeds the *vena portæ*. (Quain.) The nerves of the spleen accompany the splenic artery, and are derived from the *solar plexus*, forming an interlacement called the *splenic plexus*, previous to their entrance into it. (Ibid.) They are small compared with the size of the organ; and accordingly the spleen has very little sensation, a fact which was noticed as early as the time of Aretæus. (See *De Caus. et Sign. Diuturn. Morb.*, lib. i., cap. 14, p. 111, ed. Kühn; Haller.) Its lymphatic vessels are very numerous; but as no appreciable product is elaborated by this apparatus, it has no excretory duct. (Quain.) The fibrous or proper coat of the spleen sends into its interior a multitude of cellular bands and fibres, which form by their intersections cells of various forms and sizes, and support the soft, pulpy, red tissue of the organ. In the red substance there are in many animals contained whitish round corpuscules, visible to the naked eye, which were first discovered by Malpighi, and of which the existence in the human spleen has been at one time admitted and at another denied. The corpuscules of the human spleen are described by Dupuytren and Assolant as greyish bodies, devoid of internal cavity, and measuring one-fifth of a line to one French line in diameter, and so soft as to take a liquid form when raised on the knife. Meckel describes them as roundish whitish bodies, one-sixth of a line to one line in diameter, most probably hollow, and at all events very soft and very vascular. In the human spleen the Malpighian corpuscules are distinguished with great difficulty. Müller mentions (*Elem. of Physiol.*, by Baly, vol. i., p. 618) having seen them in a spleen which had been macerated. They were very firm, and much smaller than the greyish soft points sometimes seen in cut surfaces of the spleen, which have been described under the name of *Malpighian corpuscules*, but which are in reality very different from them.

Physiology.—Of the functions of the spleen, as was before remarked, we still remain in perfect ignorance. The most antient opinion concerning its use in the animal economy is that which is found in the writings attributed to Hippocrates, and is connected with the famous doctrine of the four humours. 'The heart,' says the author of the fourth book *De Morb.* (tom. ii., p. 325, ed. Kühn), 'is the source of the blood (αἷμα), the head of the phlegm or pituita (φλέγμα), the spleen of the water (ὕδωρ), and the liver of the bile (χολή)'. This *water* was attracted by the spleen from the fluids received into the stomach (*ibid.*, p. 333; *De Morb. Mul.*, lib. i., tom. ii., p. 683), and thus the whole of this theory bore a striking resemblance to one of those that have been proposed in quite modern times. In another part of the Hippocratic collection (*De Loc. in Hom.*, tom. ii., p. 130), it is said that 'those persons whose spleen is large have their body meagre' (Conf. Gal., *De Natur. Facult.*, lib. ii., cap. 9, tom. ii., pp. 132, 133), an idea which is found also in Plato (*Timæus*, cap. 47, ed. Stallb.), and which gave rise to the well-known comparison of Trajan, who said that the imperial treasury was like the spleen, because when that was rich the people were impoverished. (Aurel. Vict., *Epit.*, cap. 42, sec. 21.) Aristotle (*De Part. Anim.*, lib. iii., cap. 7, p. 86), calls the spleen a spurious (νόθον) liver, to which it is a sort of equipoise (ἀντίζυγον, *ibid.*, cap. 4, p. 76), says that it is not an organ necessary for all animals (*ibid.*), and that it assists the liver in performing the functions of digestion (*ibid.*, p. 87, ed. Tauchn.) In another obscure passage (*ibid.*, p. 88), he says that 'the spleen attracts from the stomach (κοιλία) the superfluous and excrementitious humours (ἰκμάδας τὰς περισσάς), and concocts them,' by which he is supposed by Casp. Hofmann (*De Liene*, cap. 5) to mean the chyle. It is surprising that so eminent an anatomist as Erasistratus, while confessing that nature does nothing without a reason (Gal., *De Usu Part.*, lib. iv., cap. 15, tom. iii., p. 315; id., *Comment. in Hippocr. 'De Alim.,'* sec. 14, tom. xv., p. 308), should nevertheless consider the spleen to be a useless organ (Gal., *ibid.*; id., *De Atra Bile*, cap. 7, tom. v., p. 131; id., *De Natur. Facult.*, lib. ii., cap. 4, 9, tom. ii., pp. 91, 131, sq.)

an opinion adopted also by Rufus Ephesius (*De Appellat. Part. Corp. Hum.*, p. 59, ed. Clinch), and apparently by Pliny, who says (*Hist. Nat.*, lib. xi., cap. 80), that runners used to have their spleen removed in order to increase their speed. The followers of Erasistratus dissented from this opinion of their master, and said that the spleen first prepared the chyle (χυλὸν) for the liver afterwards to turn into blood. (Gal., *De Atra Bile*, loco cit.) The opinion of Galen, which had more supporters than any of the others, was, that the humour called *black* bile (χολὴ μέλαινα) is secreted by the spleen, in the same way as the *yellow* bile (χολὴ ξανθή) is secreted by the liver (*De Loc. Affect.*, lib. vi., cap. 1, tom. viiii., p. 377, 378; *Comment. in Hippocr.* '*De Humor.*,' lib. iii., sec. 4, tom. xvi., p. 367; *De Atra Bile* passim, tom. v., p. 104, sq.; et alibi); and it was from the supposed accumulation of this humour that persons afflicted with melancholy were believed to suffer. Aretaeus (*De Caus. et Sign. Diuturn. Morb.*, lib. i., cap. 15, p. 114, ed. Kühn) says that the spleen is nourished by black blood, of which it is the receptacle (ἐκμαγεῖον), and that when it is diseased this fluid is not elaborated by it, but is taken into the general circulation. Serenus Samonicus (*De Medic.*, v., 430, sq.) seems to consider the spleen as the organ of mirth, and that after its removal a person never laughed. (Conf. Pers., *Sat.* 1, v. 12; Lactant., *Div. Instit.*, lib. vi., cap. 15; id. *De Opif. Dei*, c. 14):

> 'Splen tumidus nocet, et risum tamen addit ineptum,
> Ut mihi Sardois videatur proximus herbis,
> Irrita quæ miseris permiscent gaudia fatis.
> Dicitur exsectus faciles auferre cachinnos,
> Perpetuoque aevo frontem praestare severam."

The same idea is found also in Pliny (*Hist. Nat.*, lib. ii., cap. 80), who however does not state it on his own authority, and seems hardly to believe it. It seems at first sight strange that as the organ was considered to be the seat of mirth and laughter, the words *spleen*, *spleenful*, *splenetic*, &c. should be commonly used in the present day to signify exactly the contrary state of mind. It has probably arisen, 1st, from the spleen having been supposed to secrete the black bile, μέλαινα χολή, whence the word *melancholy* is derived; and, 2nd, from its having been considered as one of the causes of melancholy when he 'doth not his duty in purging the liver as he ought, being too great or too little, in drawing too much blood sometimes to it, and not expelling it.' (See Burton's *Anat. of Melanch.*, part 1, sec. 2, mem. 5, sec. 4, and elsewhere.) Oribasius follows Galen's doctrine (*Collect. Medic.*, lib. xxiv., cap. 26, p. 540, ed. H. Steph.), as does also Alexander Trallianus (*De Arte Med.*, lib. viii., cap. 12, p. 268, ed. H. Steph.), Paulus Ægineta (*De Re Med.*, lib. iii., cap. 49), Joannes Actuarius (*De Urin. Differ.*, cap. 4, p. 34, ed. H. Steph.), and Haly Abbas (*Lib. Reg. Theor.*, lib. iii., cap. 29). Theophilus Protospatharius (*De Corp. Hum. Fabr.*, lib. ii., cap. 12) and Meletius (*De Nat. Hom.*, cap. 20) also agree with Galen concerning the functions of the spleen, and add, that it gives tone to the stomach, excites its appetite for food, and assists the digestion. Theophilus also mentions the warmth which it imparts to the stomach (*ibid.*, c. 4). According to Avicenna, the spleen assists the stomach in the process of digestion, by the warmth which it imparts, and which it derives not from its own substance, but from the numerous veins and arteries that it contains. (*Canon.*, lib. i., fen. i., tom. i., p. 28, ed. Venet., 1564.) Hofman mentions that some of the other Arabic writers considered the office of the spleen to be to cool and refresh the heart. In other antient writers (as, for example, St. Ambrose, *Hexaem.*, lib. vi., sec. 71), we find a slight modification of Galen's opinion, viz., that the spleen is placed near the liver in order to draw away the useless part of the aliment, and so, after retaining that which is necessary for its own support, transfer the purified and subtle remainder through the liver to the blood. (Compare Theodoret, *De Provid.*, lib. iii., tom. iv., p. 517, ed. Schultze.)

Various other more modern hypotheses on this subject are enumerated by Haller (*Elem. Physiol.*, loco cit.), as, for example, that it secretes a fluid which enters the stomach, or which is absorbed by the nerves, or which lubricates the joints, or which is an inferior sort of chyle. Of all these theories however, and of many others that might be mentioned, part are entirely destitute of anything like proof, and others are contradicted by experiments, which, if they have not assisted in determining what is the office of this organ, have at least decisively proved that most of the uses hitherto assigned to it are wholly fanciful and imaginary. Müller, one of the latest and ablest writers on physiology, confesses (*Elem. of Physiol.*, by Baly, 1840) that we are quite ignorant of the office of the spleen. 'We merely know,' says he, 'that its importance in the economy is not great, as the experiments of numerous observers have shown that it may be extirpated without any remarkable ill consequence.' Dupuytren observed increased voracity in dogs after the operation. Mayer (*Med. Chirurg. Zeit.*, 1815, 3 bd., 189) states that the lymphatic glands become enlarged, but this is certainly not a constant effect. It has been said by others that the secretion of urine becomes more abundant, but Tiedemann and Gmelin (*Versuche über die Wege*, &c., p. 105; *Recherches sur l'Absorption*, transl. by Heller) deny that such is always the case. Mead and Mayer had noticed signs of imperfect digestion after the removal of the spleen; and some writers have stated that the bile becomes very bitter and dark-coloured, both of which the Heidelberg professors likewise deny to be constant phenomena. 'The refutation of the hypotheses proposed to explain the use of the spleen' (continues Müller) 'will not occupy us long; for they either rest on wholly incorrect premises, or they are such as can neither be proved nor disproved. All the theories which regard the spleen as essentially connected in its function with the liver can be shown to be fallacious. Döllinger supposes the spleen to be formed merely for the sake of symmetry, to be the fellow of the liver—the rudimentary liver, as it were, of the left side' (an opinion formerly held by Aristotle, as has been noticed); 'but,' says Müller, 'the liver is originally symmetrical, and the spleen is also developed in the middle line. No greater value can be accorded to the circumstance that the splenic veins join the *vena portae*, and to the hypothesis, thence deduced, that the spleen prepares the blood for the secretion of the bile; for in this respect it does not differ from all the chylopoetic viscera, nor even from the inferior extremities in the lower vertebrata, and the generative organs and air-bladder of fishes.' (Froriep's *Not.*, 615.)

Some physiologists imagine, without any reason, that the spleen may exert a deoxidising influence on the blood; others again believe that it favours the secretion of the gastric juice, because, they say, it receives less blood at the time that the stomach is full, which is at least doubtful; while others, as Lieutand and Moreschi, regard it as a reservoir of blood for the stomach, supposing that the stomach, when distended with food, may attract more blood to itself, or may press on the splenic artery so as to diminish the quantity of blood sent at that time to the spleen. Dobson's hypothesis (*London Med. Phys. Journal*, Oct., 1820) is very similar: he states that he has found the spleen to have its maximum volume at the time when the process of chymification is at an end, viz., five hours after food is taken; and to be small and contain little blood seven hours later, no food having been taken in the interval: hence he inferred that the spleen is the receptacle for the increased quantity of blood which the system acquires from the food, and which cannot, without danger, be admitted into the blood-vessels generally, and that it regains its previous dimensions after the volume of the circulating fluid has been reduced by secretion. 'The premises of this theory,' says Müller, 'do not appear to me to be sufficiently proved. Dobson repeated Magendie's experiment of injecting fluids into the veins of an animal, and, he says, with the same result with regard to the spleen, viz. the increase of its size. The assertion of Defermon (*Nouv. Biblioth. Méd.*, Mars, 1824; Froriep's *Not.*, 148) that the spleen undergoes changes of volume when certain substances are taken into the system (*e.g.* that it becomes smaller under the influence of strychnine, camphor, and muriate of morphia), appears to me likewise to require confirmation.' Sir Everard Home (*Philos. Trans.*, 1808, p. 45, &c. and p. 133, &c.) revived the old theory of Hippocrates, and made the spleen to receive a great portion of our drink from the cardiac extremity of the stomach, so that the fluids passed through some short passage, hitherto unknown, from the stomach to the spleen, and thence into the mass of the blood. (Blumenb., *Physiol.*) He supposed that the spleen served as a reservoir or receptacle for any fluid that is received into the stomach, more than what is sufficient for the purposes of digestion; that this excess of fluid is not carried off by the intestines, but is transmitted directly to the spleen by the communicating vessels, and is lodged there until it is gradually removed, partly by the veins and partly by the absorbents. He illustrated his opinion by numerous experiments upon living animals, in which coloured infusions were injected into the stomach, and were afterwards discovered in the spleen, while it appeared that they had not passed through the absorbents of the stomach. (Bostock, *Physiol.*) This idea however he subsequently abandoned. Tiedemann and Gmelin represent the structure of the spleen as essentially resembling that of the lymphatic glands, and regard it as an organ which is merely an appendage to the absorbent system. They believe that its specific function is to secrete from the blood a reddish fluid that has the property of coagulating, is carried to the thoracic duct, and, being there united with the chyle, changes it into blood. 'The facts elucidated by the experiments of these physiologists,' says Mr. Cooper (Good's *Study of Med.*, vol. i.), 'are of great value; but it must be confessed that their hypothesis relative to the spleen being an essential organ of sanguification, is seriously shaken by the facts that a vast difference really exists between the structure of the spleen and that of an absorbent gland; that the chyle does not invariably exhibit a reddish hue; and that the absence or removal of the spleen may happen, not only without fatal effects, but even without much subsequent disturbance of the animal economy.' Mr. Hewson (*Experimental Inquiries*, chap. ii., p. 45, &c., 95, &c.) supposed that it was the office of the spleen, as well as of the lymphatic glands and thymus body, to secrete from arterial blood a fluid, which, mixed with lymph, should give rise to the formation of red blood particles. 'This however,' says Müller, 'cannot be true; for the red particles are formed equally well after the extirpation of the spleen. The reddish colour of the lymph of this organ, observed by Hewson, Tiedemann, and Fohmann, is not constant. Mayer has asserted that the spleen is reproduced after extirpation. He says that after the lapse of some years he has found in ruminating animals, in the place of the spleen, which had been removed, a body of the size of a lymphatic gland This would be an interesting fact if it could be satisfactorily proved, which however is scarcely possible, as animals often have small accessory spleens (*spleniculi*), and besides in the operation of extirpation a small portion of the organ might be left behind in the body. The presence or absence of the bunches of white corpuscules, above described, might aid in determining whether any substance were really spleen or not. The blood of the splenic vein, according to Tiedemann and Gmelin, does not differ from other venous blood; they saw it coagulate like the blood of other organs. The elder physiologists however, and more recently Authienreth (*Physiologie*, ii. 77), maintain that the blood has peculiar characters. Schultz (Rust's *Magazine*, 1835, 327) also found the blood of the vena portae of a darker tint than any other venous blood, and the dark colour was most evident in animals which were fasting. Neither neutral salts nor the action of the air had the effect of rendering it of a brighter red colour; its coagulum was less firm than that of other blood, and it contained less fibrin and albumen, but more fatty matter.' Müller's own idea of the function of the spleen is as follows:—'It probably consists,' says he, 'in the production of some change of unknown nature in the blood which circulates through its tissues, and in thus contributing to the process of sanguification; or in the secretion of a lymph of peculiar nature, which, being mixed with the contents of the lymphatic and lacteal system coming from other parts, tends to perfect the formation of the chyle. There are no other ways than the lymphatics and veins by which any animal matter, modified by the action of the spleen, can be conveyed away from it. Tiedemann believes that the lymphatics perform this office, but whether he is correct or not is quite uncertain, and the nature of the change which the animal matter is supposed to undergo in the spleen is still less known.' Perhaps the most plausible opinion on this subject is that the spleen *is* a sort of safety-valve to the vascular system, calculated to receive a large quantity of blood at a moment when over-distention would cause disease or death, the rupture of a blood-vessel, or even of the heart itself. This might happen, either when the cutaneous circulation is repressed by extreme cold applied to the surface, or during the cold stage of intermittent or remittent fevers; also in the case of running, hard riding, violent laughing, or any tumultuous agitation of the mind. The cellular structure of the spleen, and the large size of the artery which supplies it with blood, correspond perfectly with this hypothetical view of its function. From these observations may be deduced a ready explanation of the two principal facts in the pathology of splenic diseases: 1st, Their connection with intermittent fevers, and dependence upon malaria; and 2nd, The liability of the circulating system to hæmorrhage during the presence of splenic disease. These circumstances have been long known, and the explanation of them which physiology suggests appears both simple and satisfactory. (Gregory, *Theory and Practice of Medicine.*)

Pathology, &c.—The opinions of the antients respecting the diseases of the spleen, and the curative means to be employed, are thus summed up by Mr. Adams, in the notes to his 'Translation of Paulus Ægineta' (book iii., chap. 49). Hippocrates describes several diseases of the spleen in his work *De Internis Affectionibus* (tom. ii., p. 483, sq.). He states that in scirrhus the spleen is sometimes larger and sometimes smaller than natural. It is an affection which continues long, but is not fatal. Sometimes, he says, it terminates in dropsy, and sometimes in suppuration, when he approves of burning the side. He also recommends diuretics and purging with hellebore. Aretaeus remarks (*De Caus. et Sign. Diuturn. Morb.*, lib. i., cap. 14, p. 110, sq.; id., *De Curat. Morb. Diuturn.*, lib. i., cap. 14, p. 328) correctly that the spleen is very subject to scirrhus, but little so to suppuration. Scirrhus, he says, is removed with difficulty. (Compare Leo, *Conspect. Medic.*, lib. v., cap. 22, ap. Ermerins, *Anecd. Med. Gr.*, Lugd. Bat., 1840.) For scirrhous enlargement of the spleen Celsus recommends (*De Medic.*, lib. iv., cap. 9, p. 198, ed. Argent.) unction, friction, and sudorifics. He directs to avoid all sweet things, milk, and cheese. He approves of pickled and salted things, acids, the vinegar of squills, a decoction of wormwood, and water in which a red-hot iron has been extinguished. Emollient ointments are to be applied externally. Cœlius Aurelianus says (*De Morb. Chron.*, lib. iii., cap. 4, p. 453, ed. Amman.) that some had directed, to cut out the spleen when it is much diseased; but he held the proposal as mere words of course, and believes that the operation had never been performed. Octavius Horatianus recommends (*Rer. Medic.*, lib. ii., cap. 28, ed. Basil.) as general remedies for complaints of the spleen, bleeding, purging, and fomentations with wool soaked in equal parts of oil and vinegar. When it becomes indurated, he approves of vinegar of squills, friction, gestation, dropaces, salt-baths, &c. Most of the remedies recommended by Paulus Ægineta are taken from Galen, who treats fully and scientifically of diseases of the spleen. He states, as a general principle of treatment, that the proper medicines in cases of indurated spleen are such as are of an incisive and attenuant nature. He therefore approves of the mixture of bitter with austere things (*De Meth. Med.*, lib. xiii., cap. 16 sq., tom. x., p. 916, sq.). Alexander Trallianus forbids (*De Re Med.*, lib. viii., cap. 10, sq., p. 472, sq., ed. Basil.) strong purging at the beginning of an inflammation either of the liver or spleen. The Arabians treat of these affections similarly to the Greeks. Haly Abbas remarks (*Lib. Reg. Theor.*, lib. ix., cap. 32; *Pract.*, lib. vii., cap. 40.) that the spleen can bear much stronger medicines than the liver, and recommends in the indolent diseases of it various bitter and very acid medicines. In inflammation he very properly bleeds. These are his general principles of treatment, the details of which he explains at great length. Avicenna (*Canon*, lib. iii., fen. 15, tract 1, sq.) and Alsaharavius (*Pract.*, tract 19, ed. Aug. Vindel.) treat of these diseases more minutely than any other of the antient authorities. Rhazes recommends (*Almans*, lib. ix., cap. 70) camel's milk in cases of indurated spleen. He joins Archigenes (apud Galen, *De Compos. Medicam. Secundum Locos*, lib. ix., cap. 2, tom. xiii., p. 256) in directing the application of sinapisms and leeches to the side.

The diseases of the spleen do not appear to have been much studied in this country, because they do not very frequently occur; they are however by no means of unusual occurrence in moist climates, whether warm or temperate, as Italy, Holland, South America, and some parts of India; in fact wherever malaria exits. The spleen is liable to many sorts of disease: Dr. Bigsby (*Cyclop. of Pract. Med.*) enumerates as many as ten, but of these only the most important can be here noticed. Splenitis*, or inflammation of the spleen, may be either acute or chronic; though Dr. Baillie remarks that this organ is much less subject to inflammation than many other of the abdominal viscera. (*Posthumous Lectures and Observations on Medicine*, 1825, unpublished.) Acute inflammation of the spleen, together with heat, fulness, and tenderness in the splenic region, with pain upon pressure, is accompanied with the usual pyrectic signs, and often with a pain extending over the whole of the abdomen, but particularly in the left side, and shooting from the diaphragm to the left shoulder. There is also not unfrequently a dry short cough, and sense of constriction in the præcordia, sickness, or nausea, and a discharge from the rectum of black or livid blood, from a rupture of some of the splenic vessels. Of this disease a remarkable instance, which terminated in nine days, has been recorded by Dr. Ley, in the 'Transactions of the College of Physicians of London' (vol. v., p. 304). The texture of the spleen after death was in this case so altered as to resemble an extremely soft piece of sponge, of which the cells had been filled with an intimate mixture of pus and grumous blood. On placing it in water, innumerable vessels, as fine as the fibres of swans' down, floated separately, rising from every point of the superficies of the organ. The contents of this spongy mass having been removed by repeated washings, something like an attempt at the formation of cavities to contain the matter manifested itself. No regular cyst however had been formed. All the other viscera, abdominal and thoracic, were healthy, except the uterus, whose inner surface was gangrenous. The common causes of inflammation of the spleen are much the same as those of inflammation of the liver, viz. suddenly suppressed perspiration, especially from currents of cold and damp air, and excess of spirituous potation; sometimes however the cause is too obscure for detection. With respect to the treatment, the usual antiphlogistic remedies may be employed, but promptly and energetically. Dr. Baillie says, he is not aware that inflammation of the spleen would require a different treatment from that of other viscera.

---

* It should be mentioned that this term is used in its common acceptation, not in its classical sense. In the antient Greek authors this word, like *hepatitis*, only occurs (as far as the writer is aware) as an adjective joined with φλέψ to signify the splenic vein; the term applied to persons affected with disease of the spleen was σπληνικός. (See Rufus Ephes., *De Appellat. Part. Corp. Hum.*, p. 41, ed. Clinch.)

If after a certain period the inflammation do not yield, it assumes the chronic form, in which the variation in the severity and duration of the complaint is very great. If it has accompanied ague, the symptoms may possibly not have been urgent in the outset, but it is almost always a painful as well as formidable disease. It commonly lasts for some months, and may continue for years with remissions. With respect to the terminations of chronic Splenitis, resolution does not take place often; suppuration is also rare upon the whole, and Dr. Baillie says he 'had never met with an abscess in the spleen in all the dead bodies which he had examined.' When pus is formed, it is of the ordinary creamy kind, but is sometimes concrete; it varies in amount from a few ounces to many pounds. The matter may find its way into the stomach, colon, or peritoneal cavity; it may burst into the left side of the chest, or into the lungs, inducing symptoms of phthisis; or it may empty itself outwards through the abdominal walls. Ossification of the spleen after inflammation is rare, as is also gangrene; softening, induration, and hypertrophy, especially the last, are much more common. With respect to the treatment of chronic splenitis, perhaps the best plan that can be adopted is the combination of aperients with iron and sedatives; the good effects of mercury in this disease being now generally considered precarious, trivial, and at best temporary. Local applications, such as cupping, issues, setons, &c., are sometimes productive of great benefit.

Besides the inflammatory softening of the spleen, there is another of a character quite peculiar, and unattended by any of the characteristics of inflammation, wherein the structure of the spleen is more or less destroyed, and it is often reduced to a simple bag, containing a substance which varies from the state of clotted or grumous blood to that of tar. This was very frequent in the Walcheren fever, in which cases the spleen was usually found after death of great size, and generally a mere bag filled with a liquid like tar, and weighing from three to five pounds.

One of the most common diseases of the spleen is hypertrophy, the most usual causes of which are ague and remittent fever. It is therefore chiefly to be found where these are endemial, but it is not very uncommon in any part of Great Britain. The size which this organ sometimes attains is enormous, and it is surprising to find how long persons can carry about with them very enlarged spleens, and at last die of some other disease. Dr. Bigsby quotes from Lieutaud the case of a woman who had for seventeen years a spleen weighing thirty-two pounds; similar facts are to be found in Haller. Dr. Baillie mentions (*Posthumous Lectures*) having met with cases where it was so large as to occupy nearly all the left side of the abdomen, extending from the diaphragm to the pelvis. When the enlargement is so considerable that the lower end of the spleen can be felt under the margin of the ribs upon the left side, there can be no doubt with respect to the disease. When the hypertrophy does not reach this extent, its most characteristic symptoms are a sense of weight in the left side, with or without evident swelling; inability to lie with ease on the right side; debility, without corresponding emaciation; disordered stomach, irritable bowels, dry cough, and absence of fever. The spleen, when enlarged, is always felt to be harder than in a natural state, but pressure upon it with the hand seldom produces pain. An hypertrophy of the spleen is sometimes followed by ascites; but there will frequently be no dropsy of the abdomen, even where this organ has been for a long time much enlarged. When this form of disease has been connected with ague, it more frequently subsides than in any other case; and the quina, which has been prescribed to cure the latter affection, will probably be serviceable also to the former. 'When the enlargement has taken place independently of this cause,' says Dr. Baillie, 'it hardly ever subsides of itself, or is materially diminished by medicine. According to my experience, mercury, administered both externally and internally, produces very seldom any good effect; I have seen, I think, more advantage from a seton inserted under the skin which covers the spleen. In some cases it has appeared to be diminished in size by this remedy, and to be rendered softer; but I do not recollect a single instance, except after ague, in which it has been reduced to nearly its natural size. Temperate living, abstaining from violent exercise, and keeping the bowels open, must be to a certain degree useful in retarding the progress of the disease.' The remedy largely employed in India for the cure of chronic tumour of the spleen is a compound of garlic, aloes, and sulphate of iron. When emaciation and diarrhœa are present, the garlic and aloes are macerated in brandy; under other circumstances, in vinegar. The proportion of aloes is so regulated as to produce three evacuations daily; and the medicine also produces copious secretions from the kidneys. The *Decoctum Aloes Compositum* with the *Tinctura* or *Acetum Scillæ* would probably prove equally effectual. The moxa, and even the actual cautery, have been recommended for this disease; and emetic cataplasms of tobacco-leaves, renewed constantly so as to keep up frequent vomiting, have in some instances produced the happiest effects.

Atrophy of the spleen is by no means so common as hypertrophy; and though some instances are related by modern writers, yet their statements are so meagre and unsatisfactory, that no use can be made of them. It is sometimes found exceedingly small and even shrivelled when some other organ is much enlarged, where there have been great discharges of blood, in ascites, and in extensive chronic disease. This form of disease of the spleen obviously admits of no remedy.

Hydatids in the spleen are found now and then, but not very often; Dr. Baillie had never met with a single case of them. It is hardly possible to discover their existence during the life of the patient, nor, even if it were more easy, could the complaint receive any cure, or even amendment, from medicine. The disease arises quite unconsciously to the patient; the first intimation of its existence being debility, dyspepsia, and the uneasiness created by a slowly increasing tumour, which in its progress causes further derangement by compression and displacement of other organs, and becomes itself perceptible externally. It is only when the containing membrane, or some organ, becomes inflamed, that fever, pain, and their fatal consequences ensue. Hydatids may prove fatal by passing into the peritoneal cavity from ulceration of the containing sac, or by disturbing the circulation, or by irritating other viscera; or the patient may live very long with this complaint, and die eventually of another disease during the indolent continuance of this.

Melanosis and calculi of the spleen are noticed shortly by Dr. Bigsby, but the instances are too rare to require any particular remarks here.

Rupture of the spleen from some external violence occurs not unfrequently; but in the majority of cases the injury is so overwhelming that little is left for the medical practitioner to do. Free venesection and perfect rest have occasionally saved life; but in many instances the patient dies in a few hours. In these latter cases the symptoms are great shiverings, coldness of body, vomiting, and other signs of extreme collapse: when there is time and strength for reaction, there is considerable fever, with a remarkable heat of skin, and great pain in the left side or all over the abdomen; the stools and urine are not materially affected.

(Good's *Study of Med.*; Gregory's *Theory and Pract. of Med.*; Bigsby, in *Cyclop. of Pract. Med.*, from which works, with Dr. Baillie's (posthumous) *Lectures and Observ. on Med.*, great part of the pathological part of this article is taken.

SPLINT is a piece of wood or other rigid substance which is used in surgery to maintain any part of the body in a fixed position, and especially for the purpose of holding steadily together the portions of a fractured bone. Splints vary almost infinitely in form and size, according to the part to which they have to be adapted, and the position in which it is to be held; the number and the arrangement of them in each case are equally subject to variation; nor can a surgeon have a better rule than that of following no general plan, but of determining in each case the apparatus best fitted for its peculiar exigencies. As much as can be said in general on the forms and modes of adaptation of splints is contained in the article FRACTURE. The material of which they are commonly made is light wood; each splint consisting either of one piece cut nearly to the form and size of the limb, or of several pasted together with a strap of linen so as to be flexible in one direction. In some cases tin is a preferable material; in some stiff pasteboard. In many cases also it is very advantageous to adapt the splints exactly to all the irregularities of the limb; and as this cannot be done with wood or any unyielding material, it is usual to employ one which, being applied moist and soft, gradually hardens. Stiff pasteboard will sometimes be sufficient, especially for children; but a better material for general use is sole-leather, applied while quite pliant after having been well soaked in hot water, and then bandaged closely to the limb and allowed to dry. Another plan of this kind now much employed is to form a splint of linen and some glutinous material, such as starch, or a mixture of white of egg and flour, or of mucilage of gum-arabic and whiting, made as thick as bird-lime. In using these, the limb or other part should be thinly padded with soft lint; then strips of coarse linen soaked in the tenacious material should be laid on one over the other, till on each side of the limb they form a layer about as thick as a common wooden splint. The whole should then be surrounded with a neatly-applied bandage soaked in starch. When dry, splints of this kind will so exactly fit the part to which they are applied, and be so rigid, that a patient may with safety execute the slighter natural movements of a limb within a fortnight after it has been fractured. All the further care of a simple case of fracture will generally consist in the occasional replacement of the starched bandage, and the adaptation of the splints, by cutting their edges, to the change of form which the limb may undergo as the swelling diminishes. Splints of this kind however must not be applied till all the inflammation immediately consequent on the fracture has ceased.

SPLUGEN, MOUNT. [ALPS.]

SPODU'MENE, *Triphane.* Occurs in embedded crystalline masses. Primary form a rhombic prism. Cleavage parallel to the primary faces, and to the diagonal planes; that parallel to the smaller diagonal is most brilliant, and that parallel to the greater most difficult. Fracture uneven, granular. Hardness, scratches glass and gives fire with steel. Colour whitish and greenish grey. Streak white. Lustre pearly on the cleavage planes. Specific gravity 3·17 to 3·188. Before the blow-pipe it swells and fuses into a glass almost colourless and transparent; with borax it swells, but does not easily dissolve.

It is found at Uto in Sweden, in the Tyrol, Ireland, and North America. Analyses of this mineral by Arfwedson from Sweden, by Stromeyer, and Le Hunt from Ireland, give the annexed results:—

	Arfwedson.	Stromeyer.	Le Hunt.
Silica . .	66·40	63·288	63·812
Alumina . .	25·30	28·776	28·508
Lithia . . .	8·85	5·626	5·604
Lime . . .	—	—	0·728
Protoxide of iron .	1·45	0·794	0·828
Protoxide of manganese	—	0·204	—
Moisture . .	0·45	0·775	0·360
	102·45	99·463	99·840

SPOFFORTH, REGINALD, a composer in whom were united much originality, a very elegant taste, and a thorough knowledge of his art, was born in 1768, at Southwell in Nottinghamshire, and there received his early musical instructions from his uncle, organist of the Collegiate Church of that place. Repairing to London, he took lessons on the piano-forte from the celebrated Steibelt, and completed his studies in harmony under Dr. Benjamin Cooke. It was his fate, as unhappily it is the fate of the English musician generally, to depend during the greater part of his life almost wholly on his practice as a teacher, and he was in considerable repute as a piano-forte master. As a composer, he is now, and will be hereafter, known only as a glee-writer. Two of his earliest glees gained, in the year 1793, the prize gold medals given by the Catch-Club. This merited success established his reputation, and encouraged him to produce other works of the same kind, the best of which were published by himself, and most of these have taken their station among the classical musical productions of this country. On the death of his uncle, Mr. Spofforth came into the possession of considerable property, but did not long enjoy his independence, for his devotion to his profession and his unrelaxing industry brought on a nervous disease, which terminated in paralysis, and in 1826 deprived music of one of its most ingenious votaries, and society of one of its most amiable members.

SPOHN, FRIEDRICH AUGUST WILHELM, a German philologist, was born May 16, 1792, at Dortmund. He was educated at the university of Wittemberg, and afterwards went to Leipzig, where he was, in 1817, made professor extraordinary of philosophy, and in 1819 professor in ordinary of antient literature. He was a scholar of the greatest industry, and died at an early age, January 17, 1824, worn out by the severity of his studies. He illustrated antiquity by a variety of works in the several departments of criticism, philology, and geography. He published an edition of the 'Odyssey,' with valuable dissertations prefixed, entitled 'De Agro Trojano in Carminibus Homeri descripto,' Leipzig, 8vo., 1814; 'Commentarius de extremâ Odysseæ parte inde à rhapsod. Ψ 297, ævo recentiore orta quam Homerico,' Leipzig, 1816. He revised the text of Hesiod with great care; the edition was commenced in 1819, but never completed. In 1817 he edited the 'Panegyricus' of Isocrates; and in the last year of his life published 'Lectiones Theocriteæ.' He projected also Annals of the reign of Augustus, deduced from a chronological arrangement of the various passages in Latin authors illustrative of this period.

As a geographer, he made great additions to the materials collected by Bredow. His researches into the mythology of the antients led him to study Egyptian hieroglyphics; some remarks of his on this subject appeared in a German publication called 'Amalthæa.' In 1822 he was employed in examining and arranging the Egyptian antiquities brought to Berlin by Minutoli. His untimely death arrested the publication of his work on hieroglyphics, which has since been edited by Seyffarth, of Berlin, under the title 'De Linguâ et Literis veterum Ægyptiorum, cum permultis tabulis lithographicis literas Ægyptiorum tum vulgari tum sacerdotali ratione scriptas explicantibus atque interpretationem Rosettanæ aliarumque inscriptionum et aliquot voluminum papyraceorum in sepulcris repertorum exhibentibus. Accedit Glossarium Ægyptiacum,' Leipzig, 1825, with a life and portrait of Spohn. This work has not contributed very much to solve the difficulties still attending the interpretation of hieroglyphics. There is a life of Spohn in the 'Zeit-genossen, Neue Reihe,' heft xv.

SPOLE'TO E RIE'TI, DELEGAZIO'NE DI, an administrative division of the Papal state, formed by the union of the two former provinces of Rieti and Spoleto. The highlands of Rieti, which comprise a great part of the country of the antient Sabini, have been described under RIETI. The western part, or province of Spoleto Proper, consists of the valley of the Nera, one of the principal affluents of the Tiber, and of the valley of the Maroggia, another affluent of the Tiber, and of several ridges of highlands between these various rivers. This country was known in the dark ages after the fall of the Western Empire by the name of Umbria, being part of the region so called in antient times. (Paulus Diaconus, ii. 16.) The Longobards, about A.D. 570, established the duchy of Spoleto, which became one of the most powerful of their dukedoms, extending over the country of the Sabini, Picenum, and the country of the Vestini and Marrucini, or part of modern Abruzzo. The series of the Longobard dukes of Spoleto ends with the year 788, after which a Frank duke was appointed by Charlemagne.

The dukedoms in Italy were not hereditary, but the appointment of a successor after the death of a duke depended upon the will of the kings of Italy; and accordingly we find that the duchy of Spoleto passed through several families. It was for a time united with the duchy of Tuscany, and Godfrey the Humpbacked, husband of the famous countess Mathilda, appears to have governed both Spoleto and Tuscany. The series of the dukes of Spoleto ends with the twelfth century, when Pope Innocent III. took possession of the duchy. Since that time it has been annexed to the Papal State.

The united province of Spoleto and Rieti is bounded on the east by the kingdom of Naples, on the north by the Papal provinces of Ascoli and Camerino, on the west by those of Perugia and Viterbo, and on the south by the Comarca of Rome. The area is about 2000 square miles, and the population, by the census of 1833, was 166,142 inhabitants, distributed in nine walled towns, and 87 Terre, or open market-towns or villages. (Calindri; Neigebaur; Serristori.) With regard to the productions of the soil, the valleys of the Nera and of Spoleto are generally fertile, but the intervening highlands are rather poor. The fertility of the plain of Rieti has been already noticed. [RIETI.]

The province of Spoleto Proper is divided into the three districts of Spoleto, Norcia, and Terni. Spoleto, the head town of the province, is situated on an elevation, below which runs the Maroggia: the Maroggia flowing northwards, joins the Topino below Foligno, after which both streams run into the Tiber. The Nera flows southwards, and the two rivers are separated by the mountain of Somma, an offset of the Apennines, which lies between Spoleto and Terni. The high road from Rome to Ancona and Perugia passes through Spoleto.

An aqueduct, which served also as a bridge, crosses the Maroggia; it is a work of the Longobard times, but is now in a ruinous state.

Spoletum, then a Latin colony of Rome, was attacked by Hannibal after the battle of Trasimenus, but the inhabitants repulsed his attack, and thus checked his advance towards Rome. (Livy, xxii. 9.) An inscription above the gate called the gate of Hannibal, though built in much later times, records the event. Spoletum is honourably mentioned among the faithful colonies which furnished men and money to carry on the war against Hannibal, when other colonies refused (xxvii. 10).

Spoleto has a handsome cathedral, adorned with frescoes by Filippo Lippi, who was buried in it in 1469, after a life full of strange adventures. A monument was raised over his tomb by Lorenzo de' Medici, with an epitaph by Politianus. Several other churches, the town-house, and the palace of the family Ancajani, are also worthy of notice. The castle of Spoleto contains some remains of Cyclopean walls. There are also remains of a Roman theatre, of several temples, and other antiquities. Spoleto is a bishop's see, and has a college: it has also manufactories of hats and woollens, and about 7000 inhabitants. It carries on a considerable trade in corn, oil, wine, and truffles, which are found in the neighbourhood. The convent and hermitage of Monte Luco, in the neighbourhood of Spoleto, is a delightful spot, surrounded by a forest of old oaks; its attractions have been described in Latin verse, by Giustolo, a native poet, of the latter part of the fifteenth century. Near the post-house of Le Vene, half-way between Spoleto and Foligno, are the sources of the Clitumnus, a small but limpid stream, which seems to have been once much more considerable. (Pliny, *Hist. Nat.*, viii. 8.) It is an affluent of the Maroggia, which it joins after a course of six miles. The fine large-horned cattle which fed on the banks of the Clitumnus were preferred by the antient Romans for sacrifice, and also for the ceremony of their triumphs. (Virgil, *Georg.*, ii. 146.) There is a small temple of antient construction, but partly repaired and transformed into a Christian chapel, near its banks.

The other towns of the province are—1, Terni, the antient Interamna, built near the confluence of the Velino with the Nera, a bishop's see, with an old cathedral, the remains of an amphitheatre and of an antient temple, and about 6000 inhabitants. The territory of Terni produces much oil and some wine. The country is full of picturesque localities. 2, Narni. [NARNI.] 3, Ameria, a small town of 2000 inhabitants, and a bishop's see, situated on a hill, not far from the left bank of the Tiber, and above the confluence of the Nera, is noted for its raisins and its prunes, which are exported. Ameria is said to have been built by the Umbri several centuries before the foundation of Rome, and was afterwards in possession of the Etruscans. (Pliny, *Hist. Nat.*, iii. 19.) 4, Bevagna, the antient Mevania, likewise a town of the Umbri, near the confluence of the Maroggia with the Topino, has about 2000 inhabitants. 5, Norcia, the antient Nursia, at the northern extremity of the province, near the borders of Naples, and at the foot of the lofty Apennine group called Monte della Sibilla, the antient Mons Tetricus, is 1200 feet above the sea; it is a bishop's see, and has 3000 inhabitants. A great number of swine are reared in the neighbourhood. The Corno, an affluent of the Nera, flows through a deep glen near Norcia. 6, Cascia, on the Corno, south of Norcia, among the highlands of the Apennines, is situated near the site of the antient towns of Carseoli and Marruvium. Medals, idols, and other remains of antient times have been found in the neighbourhood. The whole of this highland region, though very interesting, is little known, being removed from the high roads, and scarcely ever visited by travellers. The mountains are covered with chesnut and oak trees. Cascia and its territory contain about 3000 inhabitants. (Calindri.)

SPON, JACOB, the son of Charles Spon, an eminent French physician, was born at Lyon, 1647, and educated at Strassburg. He took the degree of doctor of medicine at Montpellier, and returning to his native place in 1669, studied medicine and archæology. In 1673 he published 'Recherches des Antiquités et Curiosités de la Ville de Lyon,' 8vo., and the following year endeavoured to draw attention towards the remains of antiquity in Greece, by the publication of 'Relation de l'Etat Présent de la Ville d'Athenes, avec un Abrégé de son Histoire et de ses Antiquités,' Lyon, 1674, written by the Père Babin, a Jesuit, who had been resident there. In 1675 he went to Italy, and spent some time at Rome studying antient art. At Venice he met with an English traveller, Sir George Wheler, and set out with him on a tour to the East. Their route lay through Dalmatia, the Archipelago, Constantinople, and Asia Minor: they then visited Athens and the Peloponnesus. From Negropont they set sail for Venice whence Spon returned to Lyon in the middle of the year 1676. In 1678 he published his Travels, printed at Lyon, 3 vols. 8vo.; reprinted Amsterd., 1679, 2 vols. 12mo. The third volume contains inscriptions, great numbers of which relate to the demi of Attica. In the same year he published 'Miscellanea eruditæ Antiquitatis, in quibus Marmora, &c., Grutero et Ursino ignota referuntur et illustrantur,' Lyon, fol., published in tom. 4 of the 'Thesaurus' of Polenus, and containing much interesting matter. About this time, having noticed the falsehood of Guillet's account of Athens, published under the name of La Guilletière, he became engaged in a controversy with him, and succeeded in exposing him as a literary impostor. (Leake's *Athens*, 2nd ed., i. 94, contains a full account of this matter.) In 1683 appeared a work of his, entitled 'Recherches Curieuses d'Antiquité,' Lyon. He continued to practise as a physician, and published several medical treatises. Being a Protestant, he quitted Lyon before the revocation of the Edict of Nantes, and went to Geneva, and thence to Vevay, where he died in great distress, 25th December, 1685. His archæological works are very valuable: his Travels show great learning, as well as accuracy of observation; and the fidelity of his descriptions has been confirmed by the testimony of later travellers, and by the recent discoveries at Athens. (Dr. Ross, *Die Acropolis von Athen.*) Spon and his companion were among the first European travellers who visited the Parthenon before its destruction during the siege of Athens by the Venetians, A.D. 1687.

The *Biographie Universelle* gives a list of Spon's works, but omits several which are in the Catalogue of the British Museum. (Jöcher's *Allgemeines Gelehrten-Lexicon.*)

SPONDEE (*spondeus*, σπονδεῖος) is a foot which consists of two long syllables (- -). The name is derived from σπονδή, a libation, as the metrical prayers on such an occasion were generally of a slow and solemn movement. To produce this solemnity the spondee is often used instead of a dactyl in the hexameter or pentameter: and in iambic, trochaic, or anapaestic metres, instead of an iambus, trochee or anapaest. There is no metre which consists of spondees alone, and indeed such a metre would be very disagreeable, even if it were possible; but spondees produce a good effect closed with a tightly fitting cover hinged to the spoon. The end of the tubular handle is then closed with the thumb, which, by precluding the access of air, prevents the medicine from running out until the spoon is placed in the mouth of the patient; the thumb being afterwards removed, air enters by the handle, and the medicine flows out from the point of the spoon, and is swallowed with very little annoyance from its disagreeable taste.

SPOONBILL. [Herons, vol. xii., p. 167.]

SPORA'DIC (the Greek word σποραδικός, with the termination dropped) is a term applied to any disease which, being usually epidemic or contagious, occurs at any time in a few persons, without spreading extensively through a district. For example, in the year just past (1841) several cases of *sporadic* cholera have occurred; that is, several persons, at different times and in different parts of the country, have been affected with a disease in no respect different from the cholera which raged as an epidemic in 1832; but it has not spread beyond them by contagion, nor has it attacked a number sufficient to give it the character of an epidemic. The circumstances on which the occasional occurrence of diseases that are usually epidemic, in a sporadic form, depend, are altogether unknown.

SPORA'NGIUM (from σπορά, a sowing, and ἄγγος, a vessel), a term first employed by Hedwig to designate the capsule of Mosses, and since applied very generally in cryptogamic botany to that part of the reproductive apparatus which contains the spores. It is used in almost all the cryptogamic tribes synonymously with the terms *theca*, *capsule*, *conceptacle*, *folliculum*, *involucrum*, *sporocarpium*. The multiplication of names applied to parts performing the same functions in the various tribes of Cryptogamia has often led to much inconvenience; and it is much to be desired that writers on this department of botany would agree to the adoption of a few well-defined terms, that would apply to the whole of this class of plants.

In the Ferns, the sporangia are seated in the back of the frond, forming little heaps called sori. [Sorus.] They are small brittle compressed bags, consisting of cellular membrane, and are partially surrounded by a thickened ring called the *gyrus*. By means of this ring the sporangia burst, and emit the spores which they contain. Most writers consider these organs to be the analogue of the ovary, or female organs, in the flowering plants. In Ophioglossaceæ, a small tribe of ferns, there are no sporangia, the spores being contained in two lines parallel with the midrib of the fertile frond, and are emitted when the frond unfolds itself.

In Lycopodiaceæ the sporangia are seated in the axils of a bract upon the fruit-stalk, and either burst by distinct valves or are indehiscent. In this order there are two kinds, the one containing minute powdery granules, the other containing only three or four roundish fleshy bodies. The contents in both cases are considered sporules.

In Marsiliaceæ the sporangia form a sporocarpium. [Sporocarpium.] In Salviniaceæ they are of two kinds: in the one kind the sporangia are composed of a thin reticulated membrane, and contain one or six and nine granules in their interior; in the other kind the granules are attached by pedicles to a central column, and are much smaller than the first. These latter have been supposed to be male organs, and the former female organs.

In the Mosses the sporangia are open and urnshaped, and are mostly elevated on a slender stalk called the *seta*. The brim of this organ is furnished with an elastic ring called the *annulus*, and it has an interior organization called *peristomium*. This internal part of the sporangium has been called by Endlicher the *sporangidium*. In the small section Andreæaceæ the sporangia are closed and split into four valves. Linnæus supposed the sporangia were the male organs of the Mosses.

In the Jungermanniaceæ the sporangium has no central column, as in Mosses, nor does it open by an operculum. It is a valvular brown case elevated upon a cellular frequently twisted seta. It is filled with spiral fibres, called *elaters*, among which the sporules lie intermixed. The spiral fibres by their hygrometric properties open the sporangium, which is composed of four valves, and in this way the spores escape.

In Marchantiaceæ the sporangium is placed, in some, beneath a fungus-like receptacle, which is covered by a calyptra; and in others it is buried in the substance of the frond or seated upon it.

Sporangium is not applied to the reproductive organs of Lichens, but the analogues of this organ in these plants are what are called the *shields*, or *apothecia*, which are filled with little tubes called *asci*, in which the sporules are contained. There is also another form of the reproductive organs in Lichens, called *soredia*, which are little heaps of powdery grains scattered over the surface of the plant, which are also the analogues of the sporangia.

In the Algæ, the sporules are scattered in most instances throughout the substance of the plant, so that they have no proper seed-case or sporangium; but whenever the sporules are collected together into one spot, and covered over by a distinct case, this is called a sporangium.

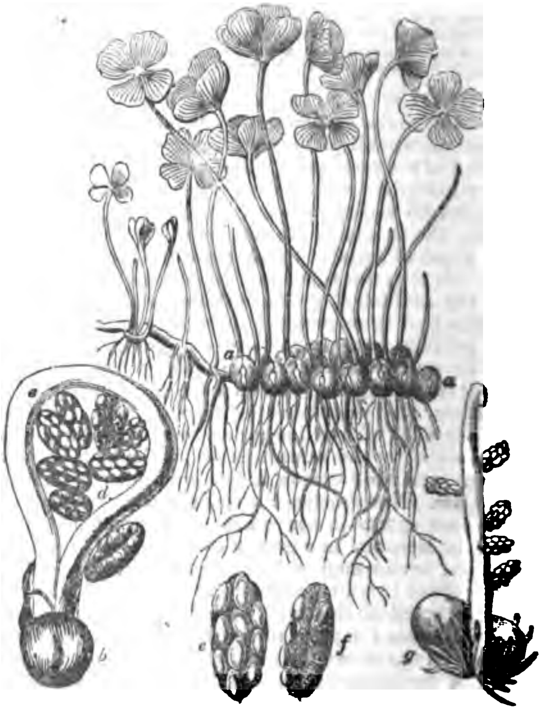
Among the Fungi the spores are frequently disseminated throughout the cellular tissue of the plant, so that they have no particular organ to contain them. Some of the Fungi however consist of a hollow case containing spores, as the Lycoperdons and Sphærias, and the case consisting of the whole plant is called by many writers the sporangium [Sporules.]

SPORENDO'NEMA, a genus of plants belonging to the natural order Fungi and the tribe Mucedines. It is exceedingly simple in its organization, consisting merely of sporidia disposed in rows within the tubular pellucid flocci. There are two species of this form of mould, the one, *S. Casei* (red cheese-mould), is found on cheese, presenting little red tufts, which, under the microscope, exhibit the flocci somewhat branched and woven together. The other species, *S. muscæ*, is called fly-mould, and is found on the bodies of flies in the autumn of the year. It consists of flocci glued together, forming little white-lobed tufts, which make their appearance between the plates of the abdomen of the insect. This is one of the few instances of plants being parasitic on animals. This however has been denied, and some writers assert that the fly-mould is nothing more than a diseased secretion from the body of the fly. But Fries, Berkeley, and other cryptogamists have recognised this mould as a plant.

SPORES. [Sporules.]

SPOROCARPIUM (from σπορά, a seed, and καρπός, fruit), a term proposed by Link, and very generally adopted by German cryptogamic botanists, to express a combination of sporangia when placed near together, and more especially when any number of sporangia are enclosed in a common membrane.

Sporocarpium in this sense has been applied by Endlicher to the organ containing the reproductive organs in the



Marsilea Fabri.

aa, Sporocarpia or involucra seated in the axils of the leaves; *b*, sporocarpium bursting; *c*, a mucilaginous curved cord, to which the sporangia are attached; *d*, the sporangia; *e*, the same removed from the cord, exhibiting the ovules; *f*, reverse side showing the anthers; *g*, the mucilaginous cord straightened, with the sporangia seated on it.

order Marsileaceæ. To this part the name involucre has been given by many writers. The sporocarpium of Marsilea when cut into exhibits several cells, which contain little granular bodies. In the course of time these granular bodies are projected from the sporocarpium, which splits into two valves, being arranged around a mucilaginous cord, which when it first appears is curved round, as seen at *c* in the accompanying drawing of Marsilea Fabri. This mucilaginous cord eventually becomes straight (*g*), bearing upon it the granular bodies arranged in a spiral whose expression is $\frac{3}{8}$. The granular bodies, or sporangia, consist of two parts: first, the upper surface, which presents a number of small globular bodies, *e*, called ovules, and are surrounded by a little projecting hood surmounted by a papilla; and, second, the under surface, which presents a number of little membranous sacs, which are filled with grains resembling pollen, and hence have been called anthers. For an accurate account of the structure of this singular tribe of plants we are indebted to M. Fabre, who made his observations upon a new species of Marsilea discovered by himself, and named after him by M. Dunal. His paper is printed in the seventh volume of the second series of the *Annales des Sciences Naturelles*. In the course of his observations M. Fabre found that the ovules above described did not germinate unless the little papilla at their point had been brought in contact with the pollen grains contained in the sacs on the under surface of the granular bodies. M. Fabre's paper is a valuable contribution on this obscure department of vegetable physiology, and points out in this plant a beautiful link between the flowering and flowerless plants.

SPORULES, or **SPORES**, the minute organs in cryptogamic or flowerless plants from which new plants are produced, answering to the seeds in the phanerogamic or flowering plants. Although these organs perform the same office in the economy of the plant as seeds, yet they differ very essentially, and the objection that some have made to giving them a different name has been very properly disregarded by most writers on cryptogamic botany. They differ from seeds, first, in their *origin*. Seeds are produced as the result of the action of two organs on each other, whilst in spores, whatever may be the anxiety of botanists to discover in the organs of reproduction of the lower plants parts analogous to stamens and pistils, there is no evidence of their general existence. In *structure* they differ also very much. The action of the stamen on the pistil in flowering plants is to introduce a pollen-grain from the former into a little bag, the ovule, in the latter, which becomes the embryo constituting the essential part of the seed. In the spore no embryo exists. It consists of a simple cell of tissue, frequently containing a fluid, in which smaller grains may be observed floating about. Lastly, in the *germination* of spores and seeds there is also a great difference. In the seed, the embryo plant is provided with organs, the plumule and radicle, which it sends upwards and downwards always from the same point, and no treatment will induce the one to grow up and the other down. But in the spores generally there is no fixed point from which the root or stem proceeds. That part of the spore which is exposed to the light will put forth a stem, and that which is towards the dark will put forth a root, and so much is this a matter of indifference in plants produced from spores, that Mirbel found that up to a certain point, by merely inverting the germinating sporules of a Marchantia, he could make the root assume the character and functions of the stem, and *vice versâ*. Some observations have however been lately made by Mr. Valentine on the spores of *Pilularia*, from which he infers that in the higher Cryptogamia, at least, the direction of the root and stem is fixed. (*Linnean Transactions*, vol. xviii.)

The situation of the sporules is exceedingly various. In the Fungi and Algæ they are frequently diffused throughout the substance of the plant without any proper covering or receptacle. In the higher forms, as the Mosses, Ferns, Jungermannias, &c., they are contained in a special organ called the SPORANGIUM.

The sporules of many plants exhibit a curious relation with the animal kingdom in their power of spontaneous movement. This is seen to a greater extent amongst the Algæ than any other, especially the group which has been called Zoocarpeæ. In these plants the sporules, after being discharged, assume the existence and character of animalcules: at the end of a short time they attach themselves to some surface, commence germinating, and spend the rest of their existence as plants. [ZOOCARPEÆ.] In many of the higher Cryptogamia these movements are observed In the organs called antheridia of the genus Sphagnum, Unger and Meyen have observed a kind of spermatic animalcule resembling a Vibrio, which seems to be only another form of the sporules of this plant. The granular matter contained in the middle of the sporules is also endowed with motion; and when the sporule bursts, the grains are sometimes very active. The same circumstance is also observed in the pollen-grains of the flowering plants.

A question has arisen amongst botanists as to whether the spores of all cryptogamic plants have a specific power of reproduction. It has been maintained by men of no mean reputation that the lower tribes have no such power; that their sporules are a common matter, which, meeting with a proper nidus, develops the various forms which are seen, according to the character of the nidus. Many facts can be brought forward to support this theory; but seeing we have so much evidence in favour of the existence of a specific power of reproduction in the seeds and sporules of higher plants, it seems to be more philosophical to conclude from analogy that the same law regulates the reproduction of lower plants, than to have recourse to the supposition that a different law prevails where we cannot disprove the existence of the other. In objecting to the doctrine of equivocal generation, Fries says: 'The sporules are so infinite, that in a single individual of Reticularia maxima I have counted above 10,000,000, so subtile that they are scarcely visible to the naked eye, and often resemble a thin smoke, so light that they may be raised by evaporation into the atmosphere; and are dispersed in so many ways by insects, wind, elasticity, adhesion, &c., that it is difficult to conceive a place from which they can be excluded.'

Although the spores have been stated to be the analogues of the seeds in higher plants, it is very evident that they are a much lower development of the reproductive energy of the vegetable system; and as in the animal kingdom it is found that all the higher forms of beings pass through stages at which the lower ones have stopped, so the seeds have passed through a stage of existence in which they have resembled spores. This stage will be found to be the period before the embryo-plant was introduced into the ovule, that is, when it possessed the form of a pollen-grain; and the spores may be looked upon as nothing more than permanent pollen-grains. This view has been developed by Mr. Valentine, in the volume of the 'Linnean Transactions' above referred to. He confines his remarks principally to the sporules of mosses, and gives the following points of resemblance between them and pollen-grains:—1, They are both enclosed in cases of a similar kind, the sporangia of cryptogamia and the anther-cases having a similar structure; 2, the lining membrane of sporangia and anther-cases are alike; 3, they are both developed in a similar manner by the union of fours in the cavities of simple cellules; 4, they have neither of them any organic connection with the plant in which they are developed; 5, the action of sulphuric acid on the pollen-grain and the sporule are precisely similar, as Mr. Valentine has proved by a series of experiments; and lastly, when the sporules commence germinating, they emit their lining membrane in the form of a tube, which is exactly analogous to the pollen-tube.

SPOTSWOOD, JOHN, archbishop of St. Andrews, was born in 1565, in what is now the parish of Mid-Calder, in the county of Edinburgh, of which, and of West Calder, then forming one parish, his father, a descendant of the antient family of Spotswood of Spotswood in Berwickshire, still subsisting, was parson.* The house in which he was born, called Green-bank, is still, or was a few years ago, shown near the village. The parson of Calder (whose father had fallen at Flodden Field) was soon after his induction to that benefice invested with the office of superintendent of Lothian, Merse, and Teviotdale (a sort of bishopric under what was thought a less odious name), which he held till his death in 1585. Spotswood's mother was Beatrix Crichton, described by the English writer of his Life, prefixed to his 'History of the Church of Scotland,' as 'a grave and a discreet matron, daughter to the laird of Lugton, an antient baron of Scotland.'

---

* The spelling of the name which we have adopted is that given on the title-page of Spotswood's 'History of the Church of Scotland,' and is also that followed by his contemporaries Calderwood and Martine. But it is often written Spotiswood; that is the spelling of the writer of the biographical memoir prefixed to the History, and also in the inscription on the archbishop's monument.

Spotswood was educated at the university of Glasgow, where he is stated to have 'received his degrees' in his sixteenth year; 'for,' says his biographer, fantastically enough, 'though the fruits of the earth under that northern clime do not mature so soon, the men generally are of better mould, and mellow as early into ripeness as any of those nations who, because they have more of the sun, plead for a priority, forgetting that some kind of grain are ripened best by frosts; and this so many excellent men of all sorts as have been of that nation are so many examples of.'

At the age of eighteen Spotswood was appointed to take the place of his father, who was disabled by age and infirmities, as parson of Calder; and for several years he confined himself mostly to the duties of his parish. During this period of his life however, he appears to have been considered as belonging to the ultra-presbyterian party, and to have gone along with the majority of the church in their opposition to the attempts of the government to restore episcopacy. Calderwood seems to assert (*History of the Church of Scotland*, p. 369) that the remarkable paper published by Bruce, one of the ministers of Edinburgh, in 1697, as his apology or defence for refusing to subscribe the bond demanded from the clergy by the king, engaging that they would not hold themselves privileged to utter sedition or treason in their pulpits, was written, or at least revised, by Spotswood; 'he would seem,' says Calderwood, 'so frank in the cause, that he would needs write it with his own hand, and give it a sharper edge.' It is sharp and also sly enough in various passages. 'The Greek proverb, *ἀνὴρ ὁ φεύγων* [*καὶ*] *παλὶν μαχήσεται*, He that fleeth will fight again,' says Bruce, who had taken to his heels, and dates from the place of his sojourning, 'requireth a wise foresight in men, and forbids foolhardiness. It is natural to fear death, and provide for life; and to be prodigal of the life that God hath given, I see nowhere allowed,' &c. This is not unlike a touch of Spotswood's. Latterly however symptoms of a tendency to defection may be detected. We find him mentioned (Calderwood, p. 394) as one of twenty-one ministers appointed by the General Assembly, which met at Perth in 1597, to confer with the king's commissioners upon certain articles propounded by his majesty; but, in the notion of the zealous historian, the acts and proceedings of that and several subsequent assemblies 'were framed as best might serve for advantage to the corrupt party.' In the Assembly again, which met at Burntisland in 1601, which, says the historian, 'began with small contentment to either party,' and ended, he intimates, in not much more, Spotswood was one of twenty-five members commissioned to act with the king's ministers, or any nine of them, in supplying ministers to churches in burgh-towns. And perhaps there may be other occasions on which he is mentioned that may have escaped us, for Calderwood's large volume is without an index.

Spotswood's father had, before becoming minister of Calder, been employed by Matthew, earl of Lennox (afterwards regent, and the father of Darnley); and now, in 1601, when the earl's descendant Ludowick was sent on an embassy from king James of Scotland to France, Spotswood was appointed to attend him as his chaplain. While in Paris, according to Calderwood, the parson of Calder 'made no scruple to go in to mass.' Spotswood has himself given a detailed account of the embassy (*History*, pp. 465-6), but does not descend to such particulars. He returned in the duke's retinue through England, 'having, while in France,' according to his biographer, 'so discreetly carried himself as added much to his reputation, and made it appear that men bred up in the shade of learning might possibly endure the sunshine, and when it came to their turns might carry themselves as handsomely abroad as they whose education being in a more pragmatic way usually undervalue them.' At the last General Assembly however Spotswood was delated (or indicted) for his attendance at mass while in France; and Calderwood says, 'he was *removed*, notwithstanding of the opposition of the king and some ministers; many voting that he should be suspended or deposed.' We should conjecture the word 'removed' here to be a misprint for 'reproved.' 'The king and commissioners,' it is added, 'packed it up.' There is no hint of this little affair either in Spotswood himself or his biographer.

When James set out for England, in April, 1603, Spotswood was one of five Scotch clergymen whom he appointed to attend him on his journey, along with the bishops of Ross and Dunkeld, the duke of Lennox, and other noblemen and gentlemen. While his majesty was at Burleigh House, near Stamford, he received intelligence of the death, at Paris, of James Bethune, archbishop of Glasgow; on which he immediately nominated Spotswood to that see, which he had never hitherto regarded as vacant, although Bethune had been out of the country for many years, and continued to adhere to the old religion as long as he lived. Spotswood, thus elevated, was, as he tells us himself, immediately sent back to Scotland to attend the queen on her journey, and serve her for 'eleemosinar,' or almoner. He was also made a privy-councillor for Scotland. It is remarkable however that none of the Scotch bishops were consecrated till 1610, when Spotswood and the bishops of Brechin and Galloway were summoned to London for that purpose, and, being consecrated at London House, on the 21st of October, by the bishops of London, Ely, Bath and Wells, and Rochester, conveyed their new character in the same manner to their brethren on their return home. The bishop of Ely (Andrews) would have had them be ordained first deacons and then priests before their ordination as bishops, as was in fact done in the case of Sharp and Leighton, when they were appointed to the sees of St. Andrews and Glasgow, after the Restoration; but in the present case, according to the relation of Spotswood himself, 'the archbishop of Canterbury, Dr. Bancroft, who was by, maintained that thereof there was no necessity, seeing, where bishops could not be had, the ordination given by the presbyters must be esteemed lawful; otherwise that it might be doubted if there were any lawful vocation in most of the reformed churches.' This was applauded by the other bishops, and Andrews acquiesced. Burnet's account is that Andrews's objection was overruled by the king himself, 'who thought it went too far towards the unchurching of all those who had no bishops among them.' Neither of the archbishops was appointed to officiate in the consecration of Spotswood and his brethren, to prevent its being supposed that there was any intention to revive the old claims of the sees of Canterbury and York to a supremacy over the Scottish church; this was James's own arrangement, and the same precaution was taken in the consecration of Sharp and Leighton in the next age.

The next year Spotswood returned to London, bearing a letter or petition from the synod of Lothian, supplicating the king for a General Assembly, a prayer which his majesty did not grant, and which the archbishop probably did not very earnestly urge. 'Returning from court,' writes Calderwood, 'he rideth out of Haddington when the people were repairing to the kirk to hear sermon upon the Lord's day. And it was always the custom of this profane bishop to cross the ferries or to ride upon the Lord's day in time of sermon.' (p. 487.) This historian afterwards inserts some Latin verses on the Scotch bishops, which, he says, were spread in Edinburgh, in January, 1609, beginning, 'Vina amat Andreas, cum vino Glasgua amores.' (p. 601.)

Spotswood, as might be expected, employed his best exertions in re-edifying and strengthening the ecclesiastical system, of which he had thus been appointed one of the chief overseers; but the detail of the proceedings in which he bore a part must be sought for in the histories of Scotland and of the Scottish church. 'At his entry to the archbishopric of Glasgow,' says his biographer, 'he found the revenues of it so dilapidate, that there was not one hundred pounds sterling of yearly rent left to tempt to a new sacrilege; but such was his care and husbandry for his successors, that he greatly improved it, and yet with so much content to his diocese, that generally both the nobility and gentry, and the whole city of Glasgow, were as unwilling to part with him as if he had been in the place of a tutelar angel to them.' Yet, 'part with him they must,' as this cordial panegyrist proceeds to relate; for in June, 1615, on the death of Archbishop Gladstanes, Spotswood was appointed to the metropolitan see of St. Andrews. According to Calderwood, when he returned from London to Glasgow, on the 10th of that month, he seemed to be 'altogether ignorant who had obtained the gift [of the vacant mitre], till one of his servants, attending in Edinburgh upon the king's patent, sent to him advertisement to come in haste to Edinburgh. When he came, he seemed to be miscontent, as desirous to stay still at Glasgow; but in the meantime his gift passeth the seals.' He had previously, in 1609, been appointed an extraordinary lord of session, when it was proposed to restore that court to its antient constitution of a mixed civil and ecclesiastical tribunal; but this design was abandoned the following year, on the erection of the two courts of High

Commission, over one of which Spotswood was appointed to preside, and which were united under his presidency on his removal to St. Andrews.

As soon as he obtained the primacy, his biographer informs us, 'he, by his favour with the king, procured three hundred pounds sterling of yearly rent (being by the sacrilege of former times swallowed up in the crown revenues) to be restored to his see,' and, continues the same authority, 'all King James his time he lived in great favour with him, and was the prime instrument used by him in several assemblies for the restoring the antient discipline, and bringing that church to some degrees of uniformity with her sister church of England. . . . Nor was his industry less for the recovery of some remnants and parcels of the church's patrimony, which (although they were but as a few crumbs in comparison of that which at a full meal sacrilege had swallowed), he found to be an hard province; yet by his zeal and diligence he overcame many difficulties, and so little regarded his own ease, that, for the effecting of this, and what else conduced to the recovery of that church in patrimony and discipline, they who knew the passages of his life have computed that he made no less than fifty journeys from Scotland to London.' Spotswood was succeeded in the see of Glasgow by Law, bishop of Orkney. 'Here it is to be observed,' writes the acrimonious Calderwood, 'that Mr. John Spotswood and Mr. James Law, both sometime ministers within the presbytery of Linlithgow, two pretty foot-ball men, are now the only two archbishops in Scotland, and have now, as we use to say, the ball at their foot. They were both near the point of suspension in the purer times for the profanation of the Sabbath; now they have power to suspend, deprive, imprison, fine, or confine any minister in Scotland. Out of preposterous pity they were spared then; but now they spare not the least and the most blameless.' (p. 655.)

The same royal favour that he had enjoyed in the time of James, Spotswood retained under the new king Charles I., whom he crowned in the Abbey church of Holyrood on the 18th of June, 1633. The writer of his Life states, that besides procuring the revenues of the priory of St. Andrews, which were then in lay hands, to be added to his see, he prevailed with the king to separate so much of his diocese as lay to the south of the Forth, and to erect it into the new bishopric of Edinburgh This was in 1633. Within two years after, on the death of the Earl of Kinnoul, Spotswood was made lord high chancellor of Scotland.

He had not yet attained this last height of promotion when, in 1634, he drew upon himself a storm of popular odium by his conduct in instigating the oppressive proceedings against Lord Balmerino, who, on the ground of his having had in his possession a petition, considered to be seditious, which had been drawn up with the design of being presented to the king by a number of the opposition peers, and the knowledge of which had been betrayed to the archbishop, was arraigned for the then capital crime of leasing-making (verbal sedition), brought to trial before the court of justiciary (in which Spotswood's second son, lord president of the court of session, sat as one of the assessors to the justice-general), found guilty by an intimidated jury, condemned to death, and only pardoned at last, after a long imprisonment, in consequence of the government becoming afraid to permit the execution of the sentence, much, it was understood, to the disappointment of the archbishop and the other prelates. The part that Spotswood took in this business excited the greater disgust from his notorious hereditary enmity to Balmerino, whose father also had been disgraced and destroyed six and twenty years before, chiefly through his management. The prosecution of Lord Balmerino contributed as much perhaps as any other single cause to produce the general dissatisfaction in Scotland which a few years later broke out into so wild a flame. It was followed in 1637 by the ill-managed attempt to impose a liturgy on the Scottish church, which was the immediate provocation of the rebellion against the government. This scheme, too, has been attributed to Spotswood by some of his indiscriminating admirers: Martine, in his 'Reliquiæ Divi Andreæ' (p. 251), describes this 'grave, sage, and peaceable prelate,' as deserving 'a singular note and mark of honour,' among other things, 'for composing one excellent liturgie.' But in truth, Spotswood appears to have been all along disinclined to the innovation, though, possibly, as the project was one upon which Charles himself had set his heart, he did not openly oppose it; it was pushed principally by Laud, who had formed a party among the younger Scottish bishops and the new liturgy and book of canons were compiled by three or four members of this party, whose adherence to the English primate had for some time thrown them into opposition to the head of their own church. Spotswood, who was constitutionally of a temporising disposition, and could gain nothing by any disturbance of the established state of things, did what he could to check the precipitation of these zealots, and, in recommending delay and caution, is believed to have entertained the hope of being able to prevent the perilous experiment altogether. But of course he shared with the rest in the destruction brought upon their whole order by its failure. Deposed from his 'pretended' office of a bishop, declared infamous, and excommunicated, by the famous Assembly which met at Glasgow, in November, 1638, he fled to England, 'where,' says his biographer, 'age and grief, with a sad soul in a crazy body, had so distempered him, that he was driven to take harbour in Newcastle, till by some rest, and the care of his physicians, he had recovered so much strength as brought him to London.' Laing, in his 'History of Scotland' (iii. 154), says, we do not know upon what authority, that he now 'resigned the seals for a pecuniary consideration:'—if so, the money was probably all he had to subsist upon. The writer of his Life expressly affirms that he enjoyed the honour of the chancellorship 'to his death.' But, however this may be, he soon fell ill again, and died on the 26th of November (6to *Calendas Decembris*), 1639. 'The manner of his burial,' concludes his biographer, 'by the command and care of his religious king, was solemnly ordered; for, the corpse being attended by many mourners, and at least 800 torches, and being brought near the abbey church of Westminster, the whole nobility of England and Scotland then present at court, with all the king's servants and many gentlemen, came out of their coaches, and conveyed the body to the west door, where it was met by the dean and prebendaries of that church in their clerical habits, and buried according to the solemn rites of the English church, before the extermination of decent Christian burial was come in fashion.'

Burnet, in his 'History of his own Time' (i. 26), has described Spotswood as 'a prudent and mild man, but of no great decency in his course of life; for,' he adds, in a passage first printed in the Oxford edition of 1823, 'he was a frequent player at cards, and used to eat often in taverns; besides that all his livings were scandalously exposed to sale by his servants.' This version of the gossip of the day may be taken as giving us a tolerably correct view of the archbishop's character. Like the generality of the members of the Scottish episcopal church in that age, he appears to have signalised his aversion and contempt for the precisianism of the Puritans by a laxity of manners which would now be accounted indecorous in a churchman; but those were the days when even the puritanical Abbot, wearing the mitre of Canterbury, was wont to join in the diversion of the chase; and there is no evidence that Spotswood led an any respect an actually immoral life; on the contrary, writers of his own party warmly eulogise the piety and simplicity with which he demeaned himself. 'In his life,' says his biographer, 'he had set so severe a watch upon himself, that his conversation was without reproof, even in those times when the good name of every clergyman was set at a rate, as formerly were the heads of wolves.' He was no doubt an ambitious man; and he was probably chargeable with the carelessness as to money matters, and something of the unscrupulousness in other respects, which are the frequent concomitants of political ambition. Of the superiority of his general talents his success in the world may be taken as a sufficient evidence; of his learning and literary abilities we have a sample in his 'History of the Church of Scotland, from the year 203 to the end of the reign of James VI.,' a folio volume of about 550 closely printed pages, published at London in 1655. It was undertaken, we are told, in obedience to the command of King James, and it is dedicated by the author to Charles I. in an epistle dated 'from the place of my peregrination, 15th Novemb., 1639.' This would be only eleven days before the archbishop's death, according to the common account; yet the dedication, which extends to three pages, contains no allusion either to the illness or the exile of the writer. On the contrary, he speaks throughout as if he were still in Scotland. All but the first 120 pages of this work, which bring down the history of the Scottish church to the Reformation, may be regarded as the narrative of a contemporary; and it contains some details not elsewhere to be found: but its chief value consists in its giving us the views of public events entertained by one of the principal actors; and in this way even its suppressions and perversions of facts are not without interest. It is written in a clear enough but in rather a poor and unimpressive style, the chief merit of which is its comparative freedom from the fashionable pedantry and quaintness of the age. Spotswood's biographer says that he had heard of no other works which he had left behind him; but Martine, in his notice of him in the 'Reliquiæ,' attributes to him likewise 'a like tract, in good and refined Latin, called Refutatio Libelli de Regimine Ecclesiæ Scoticanæ, dedicated to King Charles I., a learned and eloquent piece, pitifully refuted by Mr. David Calderwood, under the name of Dido Clavius.'

By his wife 'Rachel Lindsay, daughter to David Lindsay, bishop of Ross, of the house of Edzell, an honourable family in Scotland,' Archbishop Spotswood left two sons and a daughter. Of the eldest, Sir John Spotswood, his father's biographer, writing in 1655, says that he was then alive, 'though not in a plentiful, yet in a contented condition, not any way cast down or ashamed of his sufferings, but comforting himself rather, that, in this general ruin brought upon his country, he hath kept his conscience free, though his estate hath suffered.' These are like the expressions of a man speaking of himself, and would lead us to conjecture that Sir John Spotswood was the writer of this sketch of his father's life, and the editor of his 'History.' The archbishop's second son, Sir Robert Spotswood, after having been made a lord of session by James VI., and lord president of that court by King Charles, was removed from the bench by the Covenanters in 1641, and in January, 1646, after the defeat of Montrose at Philiphaugh, was executed at St. Andrews, along with other adherents of that royalist general. A son of one of these brothers was also put to death at Edinburgh, in March, 1650, a few days after the execution of Montrose. The archbishop's daughter was married to Sir William Sinclair of Rosslyn.

In the neighbourhood of his residence at St. Andrews, Archbishop Spotswood has left a memorial of his taste in the church of the parish of Dairsie, 'which,' his biographer tells us, 'he publicly at his own charges built, and adorned . . . after the English form;' adding that 'if the boisterous hand of a mad reformation hath not disordered' it, 'it 'is at this time one of the beautifullest little pieces of church-work that is left to that now unhappy country.' The church still stands, though disfigured in the interior, and stripped of whatever decoration it had that could be torn down without pulling the building to pieces. There is a view of it, and also of a house (now, we believe, entirely demolished) built by the archbishop in the neighbourhood of the church, in the last edition of Sir Robert Sibbald's 'History of Fife and Kinross,' 8vo., Cupar-Fife, 1803. Spotswood had purchased the estate of Dairsie.

SPOUT, WATER, a meteorological phenomenon of the same class probably as the whirlwinds which raise pillars of sand in the deserts of Africa. The manner in which it has been observed to take place at sea is nearly as follows:—

Below a thick cloud the sea appears to be greatly disturbed within a circular area, whose diameter varies from 100 to 120 yards, the waves tending rapidly towards the centre of the agitated mass, where there is formed a vast body of water or aqueous vapour; from hence there rises, with a spiral movement, towards the cloud, a column of a conical form resembling a trumpet. Vertically above this ascending column there is formed in the cloud, but in an inverted position, a corresponding cone, whose lower extremity (the apex of the cone) gradually approaches the summit of the ascending column; and at length both are united, the diameter at the place of junction being only two or three feet. The water-spout is said to be accompanied, during its formation, by a rumbling noise, and, when complete, it assumes a magnificent appearance. The whole column, which extends from the sea to the clouds, is of a light colour near its axis, but dark along the sides, which gives it the appearance of being hollow.

The spout appears to move with the wind, though, even when no wind is felt, it sometimes varies its position, tending successively in different directions. It frequently happens that the upper and lower parts of a column move with different velocities, and then, after the whole has taken an inclined position, the parts separate from one another, often with a loud report. Previously to the rupture of the column, the dark parts seem to be drawn upwards irregularly, leaving only a slender tube in connection with the water below. The whole of the vapour is at length absorbed in the air, or it descends into the sea in a heavy shower of rain. The duration of the phenomenon is various: some spouts disappear almost as soon as they are formed, and others have been known to continue nearly an hour: occasionally they form themselves, continue for a short time, vanish, and again appear, and so on several times successively. No ship could escape if it were carried within the vortex; and mariners formerly endeavoured to accelerate the fall of the column by a discharge of artillery towards it. (See a description in Falconer's 'Shipwreck,' canto 2.)

Water-spouts are occasionally seen above land, and consequently there is then no ascending column of water or vapour to meet that which descends from the clouds. In Dr. (Sir David) Brewster's 'Journal of Science' (No. 5) there is an account of one which was seen in France: it is stated to have appeared like a conical mass of vapour, and to have given out a strong sulphureous smell; flashes of lightning issued from it, and it threw off a great quantity of water. It moved forward in one direction over high grounds and valleys, and it crossed the course of a river, but on coming to hills of a conical form, it passed round them. Water-spouts have occasionally been witnessed in this country. In 1718 one of them burst in Lancashire, when, at the place where it fell, the ground was torn up to the extent of about half a mile in length, and to the depth of seven feet, so as to lay bare the surface of the rock underneath. (*Phil. Tr.*, No. 363.)

The formation of water-spouts has been ascribed to a whirling motion produced in the air by currents coming in opposite directions; it has been supposed that the particles of vapour in the upper regions thus acquire, by the centrifugal force, a tendency to move towards the exterior parts of the column, leaving the interior void or in a rarefied state. The pressure of the atmosphere being thus removed from the surface of the sea or ground immediately below, that which takes effect on the surrounding water (when the spout is formed at sea) must impel the latter towards that part, and cause it to rise into the space where the partial vacuum exists. There is great probability that the elevation of the sea under the cloud is in part caused by the rarefaction of the air; but as the pressure of the atmosphere could only raise the water in a perfect vacuum to the height of about 30 feet, and as the height of a water-spout is known to be sometimes about half a mile, some other explanation of the phenomenon must be sought for.

From the occurrence of such phenomena at seasons when the electrical principle in the air is most active; from the sulphureous smell, the flashes of lightning, and the storms of rain or hail by which they have been accompanied, and from the destruction of trees, buildings, &c. which they have produced, their formation has been ascribed with great probability to the action of electricity. The cloud and the sea or ground may be in opposite electrical states, and therefore there will be a mutual attraction between them; this will of course be attended by all the consequences of a vast discharge of the fluid; but it must be admitted that the precise manner in which the phenomena are produced by the agency of electricity is not yet satisfactorily known.

SPRAGGE, SIR EDWARD, was a distinguished commander in the naval battles between the English and Dutch during the reign of Charles II. Of his parentage, the date of his birth, and the circumstances of his early life, there are no records. He fought as a captain in the battle between the English and Dutch, June 3, 1665, and for his gallantry on that occasion received the honour of knighthood. He was engaged in the four days' battle which took place in June, 1666; and also in the following one of July 24th. When Van Tromp sailed up the Thames in 1667, he defended Sheerness; which however, from the weak state of the garrison, he was compelled to abandon He afterwards collected a few frigates and fire-ships, and when the Dutch admiral Van Nes sailed up the Thames, Spragge engaged him, burnt some of his ships, and chased him out of the river. In 1671 Sir Edward Spragge fought against the Algerines, burnt several of their vessels, and did considerable damage to the castles and towns on the coast of Algiers. In the battle of Solebay, May 28, 1672, he sunk a Dutch ship of 60 guns. In 1673 he was made admiral of the blue, and on the 28th of May in that year another fight took place, in which Spragge and Van Tromp were compelled to change their ships two or three times in consequence of the damage done to them. On the 4th of June he fought Van Tromp again, and the two admirals were once more compelled to leave their shattered vessels. On the 11th of August another similar contest took place between them, when Spragge, passing in a boat from the battered St. George to the Royal Charles, was drowned, a shot having struck and sunk the boat. He was buried in Westminster Abbey. Sir Edward Spragge has been highly praised by his contemporaries, not only for his courage and skill as a commander, but for his gentlemanly manners and amiable disposition.

(Campbell's *Lives of the Admirals*.)

SPRAIN, or STRAIN, is an injury of muscular or tendinous tissues, resulting from their being forcibly stretched beyond their natural length. Its ordinary consequence is, after the first pain is gone by, to produce some degree of swelling, and a considerable dull aching pain of the injured part, which is greatly increased by any movement of it. These signs are due to an inflammation of the sprained tissues, which partakes of the slowness and obstinacy that characterise all the diseases of the tendons and ligaments, and which, if not early and duly attended to, frequently terminates in thickening, rigidity, and even more serious disorganization of them and the adjacent parts.

The treatment to be adopted for sprains is the immediate application of leeches, in number proportionate to the severity of the injury and the importance of the part. They should be repeated till the pain and swelling are distinctly decreased: the part should be kept perfectly at rest and cool, and the patient's general health should be kept or made good. When the pain has nearly ceased, and there remains little more than stiffness of the injured part, stimulating liniments (the common soap liniment, or a mixture of hartshorn and oil, for example) may be used.

SPRAT. [CLUPEIDÆ.]

SPRAT, THOMAS, was born in 1636, at Fallaton in Devonshire. He was the son of a clergyman, and was educated at Wadham College, Oxford, of which foundation he became fellow. He took the degree of MA. in 1657. In 1659 he published a poem on the Death of Oliver Cromwell, and another, 'The Plague of Athens.' Having been ordained after the Restoration, he was made chaplain, first to the duke of Buckingham, whom he is said to have assisted in writing 'The Rehearsal,' and afterwards to the king. At this time he was made one of the original fellows of the Royal Society, and in 1667 published its history. In 1668 he was made prebendary of Westminster, in 1683 dean of Westminster, and in 1684 bishop of Rochester. In return for these marks of royal favour, Sprat in 1685 published a history of the Rye-house plot, entitled 'A true Account and Declaration of the horrid Conspiracy against the late King, his present Majesty, and the present Government;' but he repented of having written this work; and when requested by James, after Monmouth's execution, to add a second part, he refused, on the ground that the lives of many innocent persons would be endangered thereby. (See his letter to the earl of Dorset, written in 1689, printed in 1711, 4to.) In the following year he was appointed one of the commissioners for ecclesiastical affairs: he voted in this office for the acquittal of the bishop of London; and in 1688, though he had himself acknowledged the king's declaration of Toleration, he refused to take part in any proceedings against the disobedient clergy, and withdrew from the commission. On the abdication of James, Sprat was one of those who in the convention held on that occasion proposed the appointment of a regent; but after the settlement of this question, he did not refuse allegiance to William. In 1692 an attempt was made to implicate the bishop in a pretended plot for restoring James, his signature having been fraudulently obtained by two men of infamous character, Robert Young and Stephen Blackhead. He succeeded after some little time in triumphantly establishing his innocence and the villany of his accusers. From this time till his death, May 30, 1713, at Bromley in Kent, he lived undisturbed by any political troubles. His property was bequeathed to his son Thomas Sprat, archdeacon of Rochester.

Burnet, who appears to have viewed Sprat with the jealous eye of a rival, speaks slightingly of his moral character, but his conduct on many occasions shows an integrity superior to the feelings of personal gratitude towards the king. There is a list of his works in Wood's 'Athenæ Oxon.,' among which is a Life of Cowley, and some sermons and letters: there is also a letter of his among the Lansdowne MSS., British Museum. His prose style is remarkable for choiceness of expression and beauty of structure: he is styled by Wood a commanding and eloquent preacher, and this praise is confirmed by Burnet. He wrote a few short poems, in the manner and with all the faults of the school of Cowley. The longest of them, 'The Plague of Athens,' is, to borrow Sprat's own words in the dedication of it, 'an example how much a noble subject is changed and disfigured by an ill hand.' (See 'Some Account of the Life and Writings of the Right Reverend Father in God Thomas Sprat, DD.,—with a True Copy of his Last Will and Testament,' London, printed for E. Curll, 1715; and Johnson's 'Lives of the Poets.')

SPRENGEL, CURT, one of the most learned physicians and botanists of the last and present century, was born on the 3rd of August, 1766, at Bolderkow in Pomerania, where his father was a clergyman. His early studies were entirely directed by his father, and he is represented at the age of fourteen as being conversant not only with the Latin and Greek classics, and some modern languages, but to have made considerable progress in Hebrew and Arabic. Nor was his attention confined to languages, for at this age he published a little work on botany, in a series of letters, entitled 'Botany or Ladies.' In 1784 he commenced his studies at Halle, and devoted himself to both theology and medicine, but he soon gave up the former for the latter. In 1787 he took his degree in medicine, and on this occasion presented as his thesis a paper entitled *Rudimenta Nosologiæ Dynamicæ.*

During his medical studies he kept up his acquaintance with the antient languages, and extended his knowledge of those of the East, and was thus remarkably qualified for the study of the history of medicine. To this department he applied himself, and in 1789 was appointed extraordinary professor of medicine in the university of Halle. In 1795 he was made ordinary professor of the same department. Although his application to the study of medicine was great, and he had already commenced his work on the 'History of Medicine,' and had published his 'Manual of Pathology,' he yet found time to cultivate his acquaintance with plants, and in 1797 was appointed professor of botany. To this department he applied the same learning that he had done to medicine, and his prolific pen has furnished the most complete history of botany extant.

Through his works he became celebrated throughout his native country, and was called upon to fill very important chairs. In 1803 he was invited to Marburg to fill the chair vacated by Baldinger; in 1809 to Dorpat; and on the death of Willdenow, in 1812, he was invited to occupy his place at Berlin. All of these he refused, and remained his whole life at Halle. The fame of his learning however was not confined to Germany; almost every country in Europe sought to confer honours upon him. Upwards of seventy learned societies and academies sent him their honorary diplomas, and many kings conferred upon him their orders of distinction. These however were objects at which he never aimed, and which he never allowed to divert him from his favourite studies. He was one of the most industrious and learned men of his age, but whilst his great learning enabled him to become perfectly conversant with what had been done by previous writers, he did not neglect to observe for himself, and add the fruit of his own experience to that which had been previously produced.

The early part of Sprengel's life seems to have been more particularly directed to medicine. In 1788 he published a defence of Galen's doctrine of fever, and in 1798 an apology for Hippocrates. In 1792 the first part of his 'History of Medicine' appeared, and was not completed till 1820. These works were followed by smaller ones on various departments of the science of medicine, a complete view of which was given in his 'Institutiones Medicæ,' a work in six volumes, which appeared at various intervals from 1809 to 1816. In this work the whole field of medical science is gone over, and each department displays the author's characteristic learning. As a botanist Sprengel stands very high. He had in early life contracted a love for botany, and after his appointment to the professorship of that science in Halle, he never ceased, till disabled by disease, contributing important additions to its literature. In 1798 he published his 'Antiquitates Botanicæ,' which was followed in 1808 by his 'Historia Rei Herbariæ.' In these works he has brought his knowledge of antient languages to bear upon the illustration of botany in the earliest times, and in the latter work the history of the science is brought down to the period at which it was written. To descriptive botany he made great additions, especially in the 'Flora Halensis,' published in 1806, and subsequent editions. These works were illustrated by many plates from his own pencil. Besides these he has published many other papers in this department of botany. He took a part with Schultes in preparing an edition of the 'Systema Vegetabilium' of Linnæus, and subsequently, in 1824, published an edition of that work himself, with an appendix. He also described a part of the Brazilian plants, collected by Sellow, in his 'Neue Entdeckungen im ganzen Umfang der Pflanzenkunde,' published in 1820. In the systematic arrangement of plants he established many improvements, both in the Linnean and natural systems, the principal of which are contained in his works on descriptive botany. In 1811 he published a work on physiological and descriptive botany, entitled, 'Von dem Bau und der Natur der Gewächse,' in which he has given the result of the labours of others, and added many new observations of his own. In 1822 he published a German translation of Theophrastus's 'Natural History of Plants,' and in 1829 a new edition of 'Pediani Dioscoridis Anazarbei de Materia Medica Libri v.' His last work was an edition of the 'Genera Plantarum' of Linnæus, in 1830.

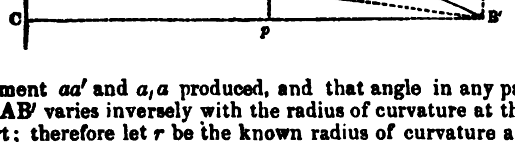
His eldest son William was professor of surgery at Greifwald, and died in 1828. This loss affected the father very severely, and he never recovered the stroke. He was attacked by several apoplectic fits, and died in one of these seizures, on the 15th of March, 1833.

SPRING. [SUMMER and SPRING.]

SPRING, in Mechanics, is an elastic plate or rod, which is employed as a moving-power, or a regulator of the motions of wheel-work; also to ascertain the weights of bodies, or to diminish the effects of concussion.

The elder Bernoulli was the first whose attention was directed to the curvature assumed by elastic bodies, and he succeeded in resolving the problem in the case of a rectilinear plate being fixed at one end and bent by a weight applied at the other: it being assumed as a principle that, at any point in an elastic body, the force by which the body when bent by any power endeavours to recover its previous position is proportional to the angle of contact at that point; that is, to the angle which a tangent to the curve surface of the body makes, at the point, with that surface.

In order to give some idea of the manner in which the effects of elasticity are to be determined mathematically, let AB be a thin elastic plate immoveably fixed at A, and bent into the form AB′ by a power P applied at B, and let *a, a*, *aa′* be two consecutive elementary portions of the bent plate: let also E represent the unknown force of elasticity acting perpendicularly to *aa′* by which that element tends to recover the direction $a_, a$, from which it has been made to deviate by the power at B; and for simplicity let it be supposed that this power acts in the direction B′C parallel to AB. Let fall *ap* perpendicularly on B′C; also represent B′*p* by x and *ap* by y. Then, by mechanics $P.y$ expresses the momentum of the power at B′ to bend the plate at *a*, and in the case of equilibrium we have $P.y = E$. But E varies with the angle of contact, or the angle between the element *aa′* and $a_, a$ produced, and that angle in any part of AB′ varies inversely with the radius of curvature at that part; therefore let r be the known radius of curvature at a point where the force of elasticity is given, and let this force be represented by e: also let R be the radius of curvature at a point, as *a*, where the force is represented by E. Then $\frac{1}{r} : e :: \frac{1}{R} : E$, or $\frac{er}{R} = E$, and putting E′ for er, we have $P.y = \frac{E'}{R}$. Substituting in place of R the differential expression for the radius of curvature, the elastic force might be obtained by the processes of integration. The integral however can only be obtained approximately.



If the elastic plate were in a vertical position with its lower end A resting on an immoveable object, and a weight P, applied at the upper extremity B′, were to act in a direction towards A, the equations of the curve, approximately determined, are (the deflection being small)

$$y = \Delta \sin. x \left(\frac{P}{E'}\right)^{\frac{1}{2}}, \text{ and } L = \left(1 + \frac{P.\Delta^2}{4E'}\right)h,$$

where x is any abscissa from B′ on the line B′A, y is the corresponding ordinate, Δ is the greatest deflection, or the ordinate at the middle point in B′A, $h = $ B′A, and L is the length of the curve line A*a*B′: also the greatest weight which the plate or spring will bear without bending when pressed in that direction is expressed by $\frac{E'\pi^2}{L^2}$. ($\pi = 3{\cdot}1416$).

If P exceed by a small quantity the value of $m^2 \frac{E'\pi^2}{L^2}$, where m is any whole number whatever, the spring will make several bends crossing the straight line AB′ in $m - 1$ points between the two extremities.

When the elastic plate, in a horizontal position, is fixed at one end, as A, and the weight P, applied at the extremity B′, acts always vertically, the equation becomes (the deflection being small)

$$y = \frac{1}{E'}\left(\frac{1}{6} Px^3 + Cx\right)$$

where C is the tangent of the angle of contact at B′. If, on account of the smallness of this angle, C be neglected, it will follow, when x is made equal to B′C, that the whole deflection AC or BB′ will vary nearly with the weight P, and with the cube of the length of the spring.

The use of a spring as a moving-power may be best exemplified in its application to watch-work. The mainspring of a watch is a thin and narrow plate of well-tempered steel, which is coiled in a spiral form: one of its extremities is attached to a pivot or axle, and the other to the interior circumference of the cylindrical box in which it is contained. In being wound, the spring closes round the axle, and afterwards, in the effort by its elasticity to recover its former position, it turns the cylinder in a contrary direction: thus the chain which is attached to the exterior circumference of the cylinder and to the fusee causes the latter to revolve.

A slender and highly elastic spring of a like form is employed to produce a vibratory motion in the *balance* ring of a watch: one extremity of the spring is attached to the axle of the balance, and the other to some part of its circumference. If a movement of small extent about the axle be given in one direction to the balance, the spring will be compressed near the axle, and, in the effort to recover its previous state, the balance-ring will be moved round in a contrary direction; but the force of elasticity carries any point in the ring beyond the place which it occupies when the ring is in a state of rest; and when that force is destroyed by the compression again produced in the spring, near the axle, the balance is made to return in the direction in which it was at first moved. Thus an alternate motion in the balance-ring is continued; the time of the vibrations, and consequently the velocities with which the wheels revolve, depending upon the force of elasticity in the spring. The elastic power of the spring varies with the tension, and is directly proportional to the angle through which the spring is wound about the axle; and thus the vibrations of a spring, like those of a pendulum in a cycloidal arc, are isochronous. [ELASTICITY, p. 327.] The length of the spring and the diameter of the balance are increased by heat and diminished by cold; consequently, without some compensating power, the times of vibration will vary according to the changes of temperature.

When a carriage moving along a level road passes suddenly over an obstacle, so that a point in the circumference of the wheel is in contact with the obstacle, the centre of the wheel describes a circular arc about the point of contact as a centre; and then, if the carriage is perfectly rigid, a portion of its velocity will be lost. In order to maintain that velocity, an additional force of draught would be necessary; and an expression for this additional force is investigated in Whewell's 'Mechanics' (art. 261, and the following). Part of this additional force is employed in counteracting the motion of ascent, and the remainder, which is generally much the greater quantity, in diminishing the effect of the sudden change which takes place in the direction of the motion of the carriage. This latter part may be in a considerable degree removed by the use of springs; for then, on the wheel meeting the obstacle, the suspended body of the carriage bending the springs by its weight, the centre of gravity of that body is made to describe a curve line, to which its previous rectilinear direction is a tangent; and thus the jerks which arise from movements in directions making finite angles with one another are avoided.

The force of draught required in addition to that which is due to friction, when a stiff carriage passes over a roughly paved road, varies as the square of the velocity and the height of the stones directly, and as the radius of the wheel inversely.

SPRING-BALANCE, a machine in which the elasticity of a spring of tempered steel is employed as a means of measuring weight or force. The name is most commonly applied to machines for the former purpose; those employed to ascertain the muscular strength of men and animals, the amount of power required to move a carriage or a boat, or any other force applied in the form of a pull, being called dynamometers.

One of the simplest kinds of spring-balance is that which, when employed as a weighing-machine, is known as the spring or pocket steelyard. It consists of a helical spring formed by bending a steel wire spirally round a cylindrical mandril or axis, so as to form an extensive series of convolutions. This spring is placed in the interior of a tube of brass or iron, closed at both ends; one end of the spring abutting against the plate which closes the lower end of the tube. A rod, having a hook or loop at its lower extremity, to hold the article to be weighed, passes through a hole in the bottom of the tube, and up the inside of the spring. At the upper end of this rod is a small plate, which slides up and down like a piston in the tube, and rests upon the upper or free end of the spring; thereby causing it to collapse when a heavy body is attached to the hook at the bottom of the sliding rod. The machine is supported by means of a hook or ring attached to the upper end of the tube; and the extent of the motion of the spring, and consequently the weight of the body suspended from it, are indicated by the degree to which the rod is drawn out of the tube. For this purpose a graduated scale is engraved upon the rod; the divisions indicating the extent of compression produced in the spring by the application of known weights. Several spring-balances on the same principle are made for various purposes. That known as Salter's balance has a brass plate attached to the tube or cylinder, within which the spring is enclosed, and a vertical slit through the plate and tube. A scale is engraved on the face of the brass plate, and the weight is indicated by a pointer which moves up and down with the spring, with which it is connected through the vertical slit in the tube. A very delicate balance of this kind has been manufactured for weighing letters, since the introduction of Rowland Hill's plan of penny postage. In 1814 the Society of Arts rewarded Mr. Martin for an 'index weighing-machine,' acting upon the same principle, but having a circular dial-plate and a revolving pointer or index, resembling the hand of a clock. On the axis of the index, but at the back of the dial-plate, is a toothed pinion, which is turned by a straight rack attached to the vertical rod, which rises and falls with the spring. The index remains in a vertical position when the balance is unloaded, and deviates more or less from it when a weight is attached to the hook. One advantage of this construction is that the point of the index traverses a much greater space than the spring itself, so that a very small movement of the spring becomes readily discernible.

Spring-balances with helical springs are applied to several useful purposes besides that of ascertaining the weight of bodies. A spring of this character is sometimes used to hold down the lever of the safety-valve in a steam-engine boiler, the movement of the index also showing the pressure of the steam. Such an apparatus is especially useful in a ocomotive engine, the shaking motion of which might derange a valve loaded with moveable weights. A helical spring-balance forms also a good cable-stopper. When applied to the measurement of muscular force, the tractive power of a locomotive carriage, &c., one end of the cylinder n which the spring is enclosed is made fast to an immoveable object, and the power to be measured is applied to the sliding-rod. If used to ascertain the force necessary to draw a carriage, the spring is placed between the carriage to be drawn and the power employed to draw it. In using a spring-dynamometer for this purpose, especially when the carriage is moved by animal power, some inconvenience is occasioned be the vibration of the index with every trifling variation in the force applied, to remedy which Mr. H. R. Palmer contrived an apparatus in which the quick vibration of the spring is checked by means of a piston moving in a cylinder filled with oil. A very narrow space is allowed for the oil to pass between the edge of the piston and the cylinder, so that a considerable resistance is opposed to the motion of the piston and the springs, and the index consequently represents the mean amount of force applied without being affected by sudden variations.

The ingenious method adopted by Mr. Martin for transmitting the motion of a spring to an index moving upon a circular dial-plate, is applicable to spring-balances of other than the helical construction. It was used by M. Hanin, a French gentleman, who was rewarded by the Society of Arts, in 1790, for an apparatus for showing at one view the weight of an object according to several different scales or systems of weights. His machine, which is described and figured in the ninth volume of the Society's 'Transactions,' consists of a dial-plate, on which are marked several concentric circles, divided according to the systems of weights used in different countries, and an index moved by a rack and pinion, as before described. The spring, instead of being of a helical form, is semicircular; its upper extremity being firmly attached to the back of the dial-plate by means of screws, while its lower end is attached to the hook which carries the weight, and the sliding rack by which the index is moved. Marriott's patent weighing-machine is very similar to that of M. Hanin, but the spring is a perfect ellipsis, with its longer axis laid horizontally. The stem to which the ring for holding the apparatus is attached is fastened by a nut and screw to the middle of the upper side of the spring; and the rack, with the hook which holds the article to be weighed, to the corresponding point on the lower side of the spring. The spring, rack, and pinion are enclosed in a circular box at the back of the dial-plate, the periphery of which serves as a stop to prevent the spring from being overstrained. A similar apparatus, contrived by M. Regnier, has been used as a dynamometer, as well as a weighing-machine.

A scale-plate or dish may be added when necessary to any of the spring weighing-machines which have been described. On account of the absence of weights, and the great simplicity of their application, spring-balances are very useful in cases where extreme accuracy is not required, especially when a portable weighing-machine is desirable. Machines for ascertaining the weight of the human body are often made on this principle, a kind of chair being suspended from the spring.

It has been proposed to apply the elasticity of steel springs for indicating the weight of very heavy bodies, such as loaded carriages; but we are not aware that the suggestion has been carried into effect. The apparatus commonly used for this purpose is described under WEIGHING-MACHINE.

(*Manufactures in Metal*, vol. ii., p. 297, in Lardner's 'Cabinet Cyclopædia;' Hebert's *Engineer's and Mechanic's Encyclopædia*, arts. 'Dynamometer' and 'Steelyard.')

SPRING-CARRIAGE. The progress of a wheel-carriage, even upon the best of roads, is continually impeded by the wheels coming in contact with, and being compelled to rise over, undulations or asperities of surface, which check their rolling motion. In a well-constructed iron railway this kind of resistance is reduced to the minimum, but it is not entirely obviated, as no degree of care which can be bestowed in practice will prevent small irregularities at the joints, or minute undulations in the surface of the rails. On a stone pavement, owing to the greater frequency of the joints, and the comparative roughness of the stone, deviations from a perfectly smooth surface are more frequent and greater in amount. Indeed in many old rough pavements, owing to the openness of the joints, and the wear of the upper edges of the stones, the road consists of a series of blunt ridges, in passing over which the motion of the wheel can be no other than a succession of jolts. The surface of a well-made road of broken stone, when in perfect order, presents few important asperities; but when metal or broken stone has been recently laid on, it is exceedingly rough. If a rigid carriage be drawn over any of these surfaces, the irregularities which affect the path of the wheels will be communicated through them to the body, to which they will impart a jolting or vibratory motion

When the carriage is moved very slowly, the path traced by the axle, or by any point of the body, supposing the vehicle to have but two wheels, and to be free from other disturbing causes, will be nearly the same as the surface of the road in the track followed by the wheel; every undulation of the surface being transmitted to the body of the carriage. In a four-wheeled carriage the movement of the body will be influenced by the discordant motions of the fore and hind wheels; and also, supposing its construction to be perfectly rigid, it will be continually liable, owing to the imperfections of the road, to have the whole of its weight thrown upon three wheels, whereby the framework will be exposed to injurious strains. With either kind of carriage, if the speed be increased, the impulses received from the irregularities of the road will follow each other in such rapid succession as to set the carriage in violent vibratory motion, throwing the weight alternately from side to side, and causing the wheels to leap from one prominence to another; and so producing a series of concussions tending to the rapid destruction of the vehicle, and extremely unpleasant to the riders. To enable it to sustain such strains, the framework of carriages which are unprovided with springs or contrivances for eluding concussion must be made very strong and heavy; and the destructive and painful effect of increasing the velocity of inelastic carriages would alone have been sufficient to limit the speed of vehicles intended for the conveyance of passengers before the introduction of springs. Alluding to the earliest English stage-coaches, which had no springs, Edgeworth observes, 'The danger of sitting on the roof of the coach was then never hazarded by outside passengers; they were stuffed in straw in a huge clumsy basket, that was fastened precisely over the hind axletree of the coach.' 'When springs came into fashion for gentlemen's carriages,' he continues, 'stage-coaches were obliged to adopt them; and by degrees outside passengers ventured to sit on the tops of coaches, and coachmen found, to their surprise and profit, that their horses could draw a greater number of passengers than formerly.'

One of the simplest means of alleviating concussion to the riders is that often adopted in light carts, of suspending the seat from the sides of the body by leather straps or lashings. Next to this is the use of straps to suspend the body itself, an expedient which seems to have been occasionally resorted to from a very early period. The first approach to a slung carriage which had been met with by Mr. Adams, occurs in an illustration to a Saxon MS. in the Cottonian Library, of which an account is given in his interesting work on 'English Pleasure-Carriages.' It is found in a representation of the meeting of Jacob and Joseph; the latter is seated in a kind of chariot, consisting of a hammock suspended from a framework of wood, mounted upon four wheels. The vehicle in which Jacob is seated is described as a cart, which, from its primitive simplicity, may be supposed to be a faithful representation of those in common use at the time when the illumination was executed. It is supposed from this illustration that carts were then used by the common people, and the superior kind of vehicle by the principals only. With very few exceptions, it appears that slung or suspended carriages were not used until the seventeenth century. In the early carriages of this kind the straps were usually attached to a framework of wood at each end of the vehicle, rising to a considerable height above the axles. 'The antique four-wheeled carriages of Europe used for state purposes are mostly constructed on this plan, and their great weight and slow movement prevent any violent concussion.' 'Many of the public stage-coaches of France,' proceeds Mr. Adams, 'are suspended on the same principle, as well as those of the United States and Canada: for in the latter countries, though there is not any lack of enterprise or want of energy to improve the public vehicles, it is found by experience that the imperfect condition of the roads precludes the possibility of using steel springs with a due regard to economy.' A serious disadvantage of this construction is the great length of carriage that it renders necessary, and the cumbrous character of the wooden framework which supports the braces. The carriage must also be heavily loaded, in order to make the motion tolerably comfortable, especially when the straps or braces are suspended from points not much higher than the bottom of the body. In the light carri-coche of Buenos Ayres, which is supported on two nearly straight braces, or twisted cords of untanned hide, the quick vibration when on a rough road is stated to be almost as unpleasant as actual concussion. As an illustration of the necessity of weight to render a suspended carriage agreeable, Adams observes, 'Those who have travelled in the heavy and heavy-loaded French diligences at a slow rate will not have found their motion unpleasant; but whoever has experienced the movement of the rude leather-covered carts formerly used for the conveyance of the French mail will never wish to repeat the experiment.' To remedy the defects of the primitive slung carriage, it was desirable to render the pillars from which the straps were suspended somewhat elastic. This could not be readily effected with wood, because the pillars were necessarily short, and therefore stiff. Hence arose the use of elastic steel supports, which have gradually assumed the form now well known as C-springs. These were formerly used for almost all kinds of spring-carriages; but the great improvement of our roads has made way for the introduction, in all stage-coaches, and in many private carriages, of the less yielding, but lighter and more compact, straight and elliptic springs.

Straight springs of steel probably owe their origin to the straight wooden springs occasionally used in light vehicles in this and other countries. Used either singly or in combination, they afford sufficient elasticity for many purposes, without raising the body to an inconvenient degree, or interfering with its form; since they may be placed entirely beneath it, and require but little room for their play. Elliptical springs have, in some degree, the same advantages; but they require rather more depth than straight springs.

Carriage-springs are usually formed of several thin plates of steel, of various lengths, so laid and fastened together that the spring shall be thick in the centre, or at the end by which it is fixed, and thin, or consisting of only a single plate, at the end or ends where the greatest play is required. The steel used is of coarse quality, and has little carbon in its composition. It is fashioned by rolling-machinery to the transverse dimensions required, which vary from one inch and a half to three inches in width, by one-eighth of an inch to three-eighths of an inch or half an inch in thickness. The plate forming the back of the spring is usually thicker than the rest, on account of its being the longest, and having its ends formed into bolt-eyes, to receive the bolts by which the body is connected with it. With this exception, it is not usual to make any difference in thickness in the several plates of a spring, notwithstanding their different lengths. The mode of construction may be understood from the following description, extracted from Adams, of the process of making a straight double spring; that is, a spring which is fixed in the centre, and acts or plays towards each extremity. The spring described is intended to rest upon the axle, which it crosses at right angles:—

'The back plate being cut to the proper length, the ends are slightly tapered in the direction of their thickness, by the hammer, and curled round a mandril of the size of the suspension-bolt. The side which fits against the other plates is then technically 'middled;' *i. e.* it is hollowed by hammering, so that the centre may be sunk below the edges. The next plate is then cut nearly as long as the first, and the ends are tapered down; after which it is 'middled' on both sides. A slit is then cut at each end, about an inch in length and one-quarter of an inch wide, in which a rivet-head is to slide and connect it with the first plate; so that whichever way the force or weight may act, these two plates sustain each other. At a little distance from this rivet, a stud is formed upon the under surface by a punch, which forces out a protuberance, sliding in a slit in the next plate; by which contrivance all the plates are retained parallel while they work. The next plate is prepared in precisely the same manner, with the exception that it is from three to four inches shorter at either end; and so on with as many plates as the spring may happen to consist of. The last one, like the first, is only 'middled' on one side.' After the plates are thus wrought into the form required, they are hardened by heating them in a hollow fire, and then plunging them into water. They are subsequently tempered by drawing them again through the fire, until they become so hot that a stick rubbed over the surface will be kindled to a blaze. Any accidental warping acquired in these processes is removed by a hammer, the plates being slightly warm during the operation, to avoid the risk of breakage. This is called *setting*, and is, at best, an open tion very liable to strain and injure the plates. They are then finished by filing all the parts that will be exposed to view when the spring is complete; and are finally put together, and secured by a square hoop of iron, which is shrunk on hot, and by a rivet passing through the hoop and through all the plates. 'After this mode,' Mr. Adams states, 'all carriage-springs are made, whether they be straight or circular, double or single; the only difference being that the circular spring requires more setting.'

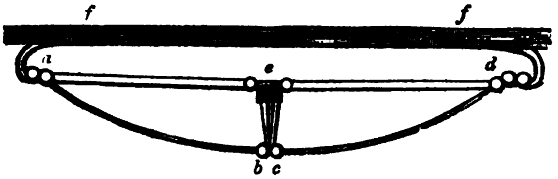
In the work from which these particulars are derived, suggestions are made for several improvements in the manufacture of springs. Those engaged in the business generally state that steel of superior quality would not answer for carriage-springs; but Mr. Adams conceives that the use of an inferior material is persisted in on account of its smaller cost, and because the spring-makers are trained to working it; and he is of opinion that steel of better quality might be used with economy, even as regards first cost, because a smaller quantity of metal might prove equally efficient. It would also be desirable to vary the thickness of the plates in proportion to their length, and to taper each plate regularly from the hoop to the points, instead of, as at present, tapering the ends only. The tempering process is susceptible of much improvement. The operation depends, as commonly performed, on the experience and skill of the workman, instead of being regulated by such means as are adopted in some other kinds of tempering, as in the manufacture of saw-blades. [Saw, vol. xx., p. 477.] The practice of *middling*, or hollowing the centre of each plate, produces a series of cavities in the spring, which collect and retain water, and thereby facilitate the destruction of the spring by rust. The rust greatly impedes the action of the spring, by occasioning much friction; and very soon impairs its elasticity, by corroding and wearing away the hardened surfaces of the plates, wherein much of their elasticity resides. It also injures the appearance of the carriage by oozing out between the edges of the plates. To check this evil, some coach-makers paint the inner sides of the spring-plates before putting them together; but this practice interferes with the action of the spring, by rendering it difficult for the plates to slide upon each other; and it is of little avail, since the paint soon wears off the parts which come in contact with each other, and so allows the corrosion to take place. Adams recommends tinning the plates as a better remedy, and conceives that their surfaces should be perfectly flat and smooth.

Coach-makers apply distinct names to a great many varieties of springs, or rather of combinations of springs; but those which are most generally used may be briefly enumerated. The straight spring, if single, or acting only on one side of the point at which it is fixed, is technically named the *single-elbow spring*. The *double-elbow spring* is a straight spring, acting on both sides of the fixed point. It is a kind of spring very extensively used in stage-coaches, omnibuses, and light two-wheeled vehicles. Elliptic springs, which are usually but little curved, are used single in some carriages, between the axle and the framework; the spring resting on the axle, and being connected with the carriage by means of a curved bar of iron, called a *dumb-iron*, placed over it like another spring. The spring, which is then called an *under-spring*, is hinged at one end to the dumb-iron, and connected with it at the other end by means of a shackle, which permits the trifling variation of length occasioned by its play. Elliptic springs are often used in pairs, under the name of *nut-cracker springs*, the two springs being hinged together at each end, so as to form a long pointed ellipsis. In this way elliptical springs are much used in such four-wheeled carriages as have no perches. *C-springs*, which are chiefly used in private carriages, usually consist of two-thirds of a circle, lengthened out into a tangent; the tangent being laid horizontally, and bolted down to the framework of the carriage. When these springs are used, the body is not, as in most other cases, connected immediately with the springs, but it is suspended by leather straps, which pass round the back of the springs, and are fastened to the framework near to their base. To prevent the body from swinging too far backwards and forwards, small check-straps are added before and behind, and another check-strap attached to the pole limits the vertical action. In old carriages these springs were generally less curved; in some cases deviating but little from a straight line, and being attached to the framing vertically, instead of horizontally. Other curved springs have been occasionally used, but it is unnecessary to continue the enumeration farther. The following are some of the principal combinations of springs used by English carriage-builders. *Telegraph-springs* are combinations of straight springs in sets of four. Two are placed longitudinally, resting either immediately upon the axles, or upon the lower framework of the carriage; and two others, placed transversely, are suspended from their ends by shackles. The body is supported upon the centres of these transverse springs. This arrangement is adopted both in two-wheeled and four-wheeled carriages; two sets of springs, or eight single springs, being used in the latter case. *Tilbury-springs* are another combination of straight springs used for the two-wheeled carriage called a tilbury. Two single-elbow springs are attached to the hinder part of the body, and suspended by means of leather braces from the ends of a transverse spring which is elevated on an iron standard at the back of the framework. The front of the body is suspended from the shafts by two single-elbow springs with short leather braces, and sometimes a pair of double-elbow springs are interposed between the shafts and the axle. In this arrangement there is much unnecessary weight. *Dennet-springs* are a combination of three straight springs, two of them placed across the axle, and attached at their fore ends to the shafts or the framing of the body, and the third placed transversely, suspended by shackles from their hinder extremities, and fastened to the body at its centre. Springs of this kind are used for two-wheeled vehicles, and for the hinder part of some with four wheels. They are adopted in most modern omnibuses, and in light stage-coaches or private carriages without perches, the fore part of the carriage in such cases usually resting upon under-springs with dumb-irons. The bodies of private cabriolets are usually hung upon C-springs, with small curved springs in front, and double-elbow springs are frequently added between the shafts and the axle. The combination of springs used in what are called under-spring carriages is stated by Mr. Adams to be 'the most effective which has yet been discovered for producing the minimum of concussion or motion to the passengers.' The body of such a vehicle is suspended by braces from C-springs; and the framework of the carriage, to which the C-springs are fastened, is supported upon under-springs, which intercept concussion from the unevenness of the road. The weight of a carriage hung upon this principle is its chief disadvantage: but the smooth and elastic motion which it occasions, by relieving every part of the vehicle, excepting the wheel and axles, from concussion, tends so greatly to its durability, that, when under-springs were first used, it was prophesied that they would be the ruin of coach-making.

Of these various springs, none but the C-springs with leather braces allow universal motion to any important extent. Telegraph-springs, owing to the shackles by which they are connected with each other, have, to a very small extent, the power of universal motion; but elliptic and elbow-springs, as commonly constructed, play in a vertical direction only. A plan has been lately adopted by which double elliptic springs have a little lateral motion; but it is necessarily very trifling in amount. In some carriages loops of leather or caoutchouc have been used, instead of iron shackles, for connecting straight springs, by which means the motion is rendered pleasanter, and the rattling noise of the shackles is avoided. A contrivance of this kind has been tried, we believe with success, in railway carriages, in which, owing to the great weight of the vehicle, the springs are usually very thick and rigid. This limited motion of straight and elliptic springs is not only uncomfortable to the riders, but injurious to the carriage and to the springs themselves; irregular lateral and longitudinal strains being unavoidable. Another defect of ordinary springs is their want of adjustibility to the weight they have to carry. They must, of course, be made strong enough to sustain the maximum weight they are intended to bear; but, by being so, they become too stiff to play easily under a light load. To meet the deficiencies of the springs in common use, Mr. Adams contrived one on the principle of the bow, which will yield in any direction, and may be made capable of adjustment, by means of screws, to a light or heavy load.

This spring consists of a single plate of well-tempered steel, forced into a curved form by the tension of a chord, which may be made either of prepared hempen rope, or of a riband of iron or steel, and to which the axle is attached.

In the form in which this kind of spring was first used, the bow was placed above the axle, and secured by its centre to the body of the carriage; while the axle was attached, by suitable fastenings, to the centre of the chord; but the action being found defective and uncomfortable, the form represented in the following cut was adopted. In this there are two bow-springs, *ab* and *cd*, connected with each other and with the same axle. These are jointed together at *bc*, and attached to the body, of which the lower framing is shown at *ff*, by moveable joints at *a* and *d*, which allow the springs to lengthen and shorten in playing. The chord of each bow is in two parts of unequal length, each of which is connected at one end with the bow, and at the other with the axle at *e*; so that the chord of the bow, *ab*, takes the direction *aeb*, and that of the bow, *cd*, the direction *ced*. When connected with the fore axle of an ordinary carriage, the springs are frequently attached to a dumb-iron. Springs of this sort are already much used, both on common roads and on railways; and, on the latter especially, their use is extending. Among the advantages claimed for them are their lightness and extreme elasticity, arising from the superior quality of the steel, and the absence of the friction which attends the action of the common laminated springs.



As some degree of elasticity is essential to the durability of every part of a carriage intended for rapid motion, it is desirable that even the wheels should possess it in a slight degree. How this is provided for in ordinary wheels is explained under WHEEL; and the numerous plans which have been tried for spring-wheels require no notice in this place, beyond the remark that their contrivers often appear to have overlooked the circumstance that, if the wheel be capable of becoming in any sensible degree elliptical or excentric, by the weight bearing upon its axle, the labour of draught will be increased; the effect being the same as that of constantly ascending a hill.

The great advantage of springs in lessening the labour of draught has been ably illustrated by Edgeworth, who thus explains their action in this respect: 'Theory shows,' he observes, 'that whilst the wheels of a carriage pass over an obstacle, the load on the carriage must rise along with the wheels, unless it be supported by springs; but that if the load be hung upon springs, whilst the carriage-wheels tend to throw the load upwards, as they rise suddenly over an obstacle, the springs will bend, because they are opposed not only by the weight, but by the *vis inertiæ* of the load acting downwards; and the load will consequently not be thrown up *suddenly* so high as if there were no springs.' But the advantage does not rest on theory alone. Among the interesting experiments on carriages of which the results are recorded in Edgeworth's treatise, are some which are very decisive as to the saving of labour occasioned by them. In one experiment, with two-wheeled carriages, a gross load of 8 cwt. 2 qrs. was drawn with rather greater ease, *with* springs, than a gross load of 5 cwt. 2 qrs. 7 lbs. *without* them. In another trial, with four-wheeled carriages, the gross weights drawn with and without springs were respectively about 17 cwt. and 15 cwt.; but in this case, it is stated, the carriages were not loaded sufficiently to bend the springs with facility, so that their full effect was not ascertained. Some of these experiments were directed to the effect of wooden springs; and the results were sufficient to show how much might be gained by their general adoption in such carriages as are usually constructed without any springs whatever. In one of the cases related, a man was found capable of drawing, in a two-wheeled carriage, with wooden springs blocked to prevent them from acting, a load of 2 cwt.; but when the springs were allowed to play, he drew a load of 3 cwt. 2 qrs. with equal ease. Edgeworth states that he had employed carts with wooden springs for nearly four years, and had used both straight and elliptic wooden springs successfully. He recommends, as cheap and durable, a piece of common tough ash, five inches and a half deep in the middle, two inches deep at each end, and three inches broad, mounted on fixed shackles at one end, and with linking plates at the other. The ironwork of the shackles will last for many years, and the wooden springs may be renewed at very trifling cost. Three wooden springs, connected in a similar manner to dennet-springs, may be used conveniently for common carts.

All the springs that have been alluded to in this article are *bearing-springs*, for supporting the weight of the body of the carriage, and of the load which it conveys. In ordinary carriages no other springs are used; but in those employed upon railways, springs are also used to impart elasticity in the direction of the line of draught, so as to render the starting and stopping of the carriages gradual and easy. [RAILWAY, vol. xix., p. 258.] Somewhat akin to these are the spring splintre-bars which have been recommended for equalizing the pull of the horses in ordinary carriages, and preserving the riders from any unpleasant jerking sensation occasioned by their isolated and sometimes irregular impulses.

(Adams's *English Pleasure-Carriages*; Edgeworth's *Essay on the Construction of Roads and Carriages.*)

SPRING WHEAT. [WHEAT.]

SPRINGS. Rain and snow fall in quantities so unequal in different districts, and on soils which exercise upon them such various influences, that the phenomena of springs, which are primarily dependent on the penetration to some depth in the earth of water which was absorbed at the surface, are extremely complicated and curious. It is very interesting to geologists to classify and determine the causes of these phenomena, and very important in agriculture and the arts to acquire a power of directing the water currents in and below the soil and strata. The art of draining consists essentially in giving to the diffused and injurious springiness of particular soils and situations a concentrated, perhaps beneficial, current; while artesian wells relieve the hydrostatic pressure prevalent at great depths, and yield copious streams in dry lands and deserts.

As a general rule, springs are permanent in proportion to the depth to which the water which supplies them has descended from the surface; they are perennial and almost inappreciably constant in temperature and volume, whether hot or cold, copious or full, in situations where, from the arrangement of the mineral masses of the globe, deep subterranean channels exist for the reception of rain, and particular impediments direct and contract the passages of reflux to the surface. Such cases are common in stratified countries where jointed limestones or sandstones receive water at elevated points on the surface, and conduct it downwards below strata of clay, which are only pervious at a few points, and there permit natural discharges at lower levels than the recipient surfaces. Frequently these argillaceous strata are so nearly impervious, that artificial perforations relieve the pressure of the subterranean columns of water better than the few natural points of efflux, and thus pits and levels excavated for mines may drain springs at some distance.

On the contrary, in a country which contains narrow and frequently mixed masses of clay and gravel, or clay and sand, which cover the solid rocks, concentrated springs are almost absent, but there is a prevalent humidity and diffused springiness along the limit of the gravelly or sandy tracts. After a continuance of dry weather such springs and wetness disappear, to be renewed after the next fall of rain.

The particular points at the surface where springs, or 'wells,' as they are often called in the districts where somewhat of the Saxon elements of our language remains (*quelle*, in German, signifying not what is commonly understood by the English word 'well,' and the French 'puit,' but a spring), are determined in general by one of three things:—

1. They occur at the point of lowest level, on the edge of the impervious clay which dams up the water. This happens in the cretaceous and oolitic districts of England,

2. They are often dependent on the lines of great joints, or fissures of the rocks, produced in the course of the consolidation and shrinking of the mineral masses. Large springs are thus poured out of the mountain-limestone of England.

3. The waters are directed to the surface by lines of fault, which are often quite impervious to water, and traverse the rocks in vertical or inclined planes. The be springs of England and Wales are mostly thus circumstanced.

In general then, the water which issues from the earth in one copious spring has been received by minute absorption on a large surface: as the living tissue of a sponge receives water by absorption through the numerous pores, collects it internally in a few channels, and rejects it by a very limited number of orifices, or as the capillaries collect blood for the veins, and these supply the heart, so the porous texture and channelled structures of rocks permit that continual circulation of water below the earth's surface, on which, in a great degree, its habitable character depends.

Between perennial or constant springs, and those which are merely dependent on the last shower of rain, the gradations are insensible, and the explanation is entirely obvious upon the general principles stated. One of the most interesting cases of this intermediate series, is that of the 'intermitting' springs. It is a common circumstance on the chalk downs of the South of England (Wiltshire, Dorsetshire) for the valleys to be quite dry in one part of the year (autumn or winter), and very fully watered in another (spring, summer); the springs bursting higher up the valley in some years than in others, according to the quantity of rain which fell in some previous season (as the autumn), and the rate of its transmission through the jointed and absorbent chalk. A Wiltshire proverb says—

'As the days lengthen, the springs strengthen.'

Another peculiarity of springs flowing out of cavernous limestone rocks is marked by a variable discharge; the springs now gush with vehemence, now subside, shrink away, and disappear. These ebbing and flowing wells are noticed in many districts, as near Dynevor in Caermarthenshire, at Tideswell in Derbyshire, and near Settle in Yorkshire. The explanation most generally received supposes the water to fill cavities underground, from which the discharging channels are siphon-formed, so that at a particular moment the full cavity begins to be discharged and finally runs out, and the current then ceases till the space be again filled to the vertex of the siphon-formed arch.

In thus descending downwards and rising upwards through various mineral masses, springs become impregnated with gaseous, saline, earthy, or metallic admixtures—as carbonic acid gas, sulphuretted hydrogen gas, nitrogen, muriate of soda, sulphate of lime, carbonate of lime, silica, carbonate of iron, &c. There appears to be a connection (See Murchison's *Silurian System* in regard to the sulphuretted wells of Llandrindod) between the extrication of sulphuretted hydrogen from springs and the lines of trap rocks or great faults; nitrogen is a frequent concomitant of hot springs which have similar geological relations (Daubeny, in *Reports of British Association*); and even carbonic acid gas and supercarbonate of lime appear in uncommon abundance on the lines of great dislocations. [ARTESIAN WELLS; WATERS, MINERAL.]

SPRUCE BEER, a fermented liquor made from the leaves and small branches of the spruce fir, with sugar, molasses, or treacle. Though called *beer*, it is, in fact, observes Professor Donovan, a *wine* as much as many others that are acknowledged as such. There are two kinds of spruce beer—the brown and the white—of which the latter is considered the best. The following directions for making white spruce beer are condensed from Donovan's 'Domestic Economy,' vol. i., forming part of Lardner's 'Cabinet Cyclopædia;'—Dissolve seven pounds of the cheapest loaf-sugar in four gallons and a half of hot water, and when the temperature has fallen to blood heat, mix in about four ounces of essence of spruce, and dissolve it perfectly by agitation; then add half a pint of good solid yest from a brewery, and mix it in thoroughly. Fermentation will soon commence, and will proceed rapidly in summer, but must, if in winter, be maintained by keeping the cask in a warm apartment. When this fermentation very perceptibly subsides, the liquor should be drawn off, and the cask should be washed. The liquor being then returned to it, a second fermentation, inconsiderable in degree, will take place; and when this diminishes, the beer is fit for bottling. The corks should be wired down, and the bottles laid on their sides until the liquor becomes brisk and in high order, which must be ascertained by trial. The bottles should then be placed upright, lest they should burst; but if they are kept too long in that position, the beer is apt to become flat, in which case they may be placed on their sides again. Brown spruce beer may be made according to the same directions, only substituting an equal quantity of molasses or treacle for the white sugar. In places where spruce-firs abound, a simple decoction of the leaves and small branches is used instead of the essence of spruce. This agreeable and wholesome beverage is useful as an anti-scorbutic.

SPRUCE FIR. [ABIES.]

SPUR-WING, the English name for species of the genus *Parra*. [RALLIDÆ, vol. xix., p. 280.]

SPURI'NNA, VESTRI'TIUS, a Roman poet, who lived in the time of Pliny the younger, who in one of his letters (iii. 1) speaks of him as one of the most delightful persons that he ever met with, and states that he wrote lyric poetry both in Latin and Greek. He further adds that his poems were distinguished for their extraordinary sweetness, elegance, and cheerful spirit. At the time when Pliny wrote this letter, Spurinna was seventy-seven years old, and enjoyed in his old age the leisure and comforts which he had earned by a long and active life, during which he had held several offices, and had also distinguished himself in the administration of the provinces. (Compare Plin., *Epist.*, i. 5; ii. 7.)

There are extant four odes bearing the name of Spurinna, which however, as some critics think, were written by another person, as they do not possess those merits which Pliny assigns to the poetry of Spurinna. But the whole letter in which Pliny speaks of the poet is written with such an enthusiastic admiration of the man, that nothing is more natural than to conceive that he greatly overrated his poetical powers. The odes were first edited by Caspar Barth, in 1613, in his collection of 'Poetæ Latini Venatici et Bucolici,' from an antient manuscript in the library of Marburg. They are also contained in Wernsdorf's 'Poetæ Latini Miores,' iii., p. 326, &c.

SPURN POINT, or SPURN HEAD, a long curved bank of sand and pebbles, which in a slight degree contracts the entrance of the Humber æstuary, and supports two lighthouses, in the construction of the higher of which the talents of Smeaton were employed. This eminent engineer paid much attention, while considering in what part of the moveable mass of sea-drifted sand and pebbles constituting 'the Spurn' (as it is commonly called) he should fix the lighthouse, to the daily action of the tides and currents, and was thus enabled to choose for the works a situation probably the best which could be had. (See Smeaton, *On the Eddystone Lighthouse.*) The peculiar elongation and incurved form of the Spurn is due to the set of the tide, which runs southward on the seaward side and drifts the materials which fall from the wasting cliffs of Holderness into the Humber Channel, and then turns suddenly up to the west. Should the waste of the Holderness Coast at a point north of the Spurn (Kilnsea) continue at its present rate for many years, the Spurn may become an island, and other great geographical changes ensue. Ravenspurn was situated within the protection of this low sandy ridge, on the north bank of the Humber, which has witnessed the accumulation of Sunk Island, and undergone great changes within very modern periods.

Spurn Point has been very often considered by antiquarians to be the 'Ocellum Promontorium' of Ptolemy, but there is more reason to give this title to the bold promontory of Flamborough Head, than to the flat sand of the Spurn, which in Camden's time perhaps hardly extended beyond the firmer and higher land near Kilnsea, and which between 1676, when M. Angell constructed the lights, and 1766, when Smeaton restored them in a new situation, had been elongated so as to impede the navigation, and render the old lights dangerous. The low lights which Smeaton began in 1776 fell by the sea's force in 1786.

SPURZHEIM, JOHANN GASPAR, was born in 1776, at Longwich, near Treves. He was educated in the university of Treves, and in 1799 went to study medicine at Vienna, where he first became acquainted with Dr. Gall, the founder of the system of phrenology. Spurzheim attended his lectures for the following four years, and then associated himself with him for the prosecution of his researches. In 1805 they left Vienna and visited the principal parts of Germany, France, Prussia, and Denmark, to confirm and promulgate their doctrine. In 1807 they settled at Paris, and there first delivered their joint courses of lectures. They pursued their subject together till 1813, when they separated; and Spurzheim, after taking the degree of Doctor of Medicine at Vienna, came to this country and continued for three years, lecturing in many of our principal towns, and actively engaged in publishing works on phrenology, and in defending it against the severe criticisms to which it had been subjected. From 1817 to 1825 he resided and lectured at Paris; and when the French government prohibited the delivery of lectures except with special permission, he returned to Britain. At this visit he found his doctrines entertained with much more favour than during his former residence here; but he still occupied himself with the greatest energy in their promulgation by lecturing in nearly all the large towns of the whole kingdom, and by repeated publications. In 1832 he embarked on a similar mission for America; and in a few months after his landing, he died at Boston.

In the articles **Gall** and **Phrenology** we have given a general account of the differences between the systems of Spurzheim and his preceptor. The scientific reputation of the former must rest chiefly on his having proved the fibrous structure of the brain, and many other very important facts in its anatomy, which, though published in his name jointly with that of Gall, were certainly due to the researches of Spurzheim alone. These indeed have as yet no certain application in phrenology; yet Spurzheim must be regarded as having exercised an important influence on the progress of that science. He claims the merit of having discovered eight new cerebral organs, of analysing and classifying the mental powers, of pointing out the moral and religious relations of phrenology, and the relation of natural language or bodily actions to it, and of having made many improvements in the mode of investigating the facts bearing upon it. Admitting these claims however to their fullest extent, the scientific merit of Spurzheim (whether phrenology be true or not) must stand far below that of Gall. The great influence which he has had in giving the predominant character to the phrenology of the present day must be ascribed entirely to his power of rendering it a subject of popular study. For this purpose he was admirably adapted. He was an eloquent lecturer, and a most agreeable companion; his style both of speaking and of writing was fluent, bold, positive, and unhesitating: his illustrations were always pointed and amusing; his arguments, though often quite illogical, were very easy of apprehension; his conclusions general and indefinite; and he always treated his subject with an enthusiasm which none could feel but one convinced of the truth of his cause, and which was enough in itself to carry conviction to the minds of all who were not well-disciplined in the fallacies of science. That which Gall discovered and invented, but could scarcely have taught, was by Spurzheim made to seem intelligible to the most ordinary understanding; and to him therefore must be attributed the reputation of having made phrenology one of the most popular studies of the present day.

The works of Spurzheim are very numerous, and most of them are generally known. A complete account of them is given, with his Life, in the 'Phrenological Journal,' vol. viii. A memoir of the life and philosophy of Spurzheim was published at Dublin, in 1833, by Mr. Carmichael.

SPY. It is proper to premise that in the discussion of this and many other questions of international law the terms Right, Law, Lawful, and others of the same class, must be understood in a different sense from their proper technical meaning. What writers on international law speak of as a right is very often merely what appears fair, reasonable, or expedient to be done, or to be permitted. It is this reasonableness or expediency alone which is the foundation of those various usages which are recognized by independent civilized nations in their intercourse among one another, and constitute what is called the Law of Nations. Thus a person or a power is said to have a right according to the Law of Nations, which means that the usage of civilized nations permits the act, and this is the least objectionable sense in which the word Right is used. But when writers use the word Right merely in the sense of what is expedient, without reference to its being the foundation of a recognised usage, they are confounding the reason or foundation of a usage with the usage itself.

No doubt, we believe, has ever been intimated by any writer of authority on International Law, as to the right of nations at war with each other to avail themselves of the service of spies, or secret emissaries, in carrying on their hostile operations. 'Exploratores, quos mittere jure gentium haud dubie licet, quales misit Moses, qualis fuit ipse Josue,' are the expressions of Grotius, in the only passage in which he touches upon the subject, (*Bel. et Pac.*, iii. 4, § 18, par. 3): 'Spies, whom it is, without doubt, permitted by the law of nations to employ; Moses made use of such, and Joshua himself acted in that capacity.' And still more expressly is the general right of employing spies conceded to every conductor of military operations by Vattel: 'If those whom he employs make a voluntary tender of their services, or if they be neither subject to, nor in any wise connected with, the enemy, he may unquestionably take advantage of their exertions without any violation of justice or honour.' (*Le Droit des Gens*, iii. 10, § 179, in the common English translation as edited by Chitty, 8vo., Lon., 1834).

At the same time it is generally held that the right can only be exercised under limitations of various kinds.

First, as to the right of the general, or of the sovereign for whom he acts, to compel any one subject to his authority to serve as a spy. Grotius, in the passage to which we have referred, admits that spies when caught are wont to be treated with extreme severity; and he adds, that this is sometimes done justly by those who have a manifestly just cause of war—by others, in the licence which the law of war tolerates (licentia illa quam dat belli jus); a useless distinction, upon which no practical rule can be founded. In fact, as Grotius himself notices, the custom is, when a spy is caught, to put him to death. Vattel attempts to assign the reason for this severity: 'Spies,' he says, 'are generally condemned to capital punishment, and with great justice, since we have scarcely any other means of guarding against the mischief they may do us.' This is making short work of the question of capital punishments; but what we have to attend to here is, Vattel's inference from the fact which he has stated. A man of honour, he proceeds to observe, always declines serving as a spy, as well from his reluctance to expose himself to this chance of an ignominious death, as because, moreover, the office cannot be performed without some degree of treachery: 'the sovereign therefore has no right to require such a service of his subjects, unless perhaps in some singular case, and that of the highest importance.' Such loose exceptions as that here stated abound in the writers on International Law, and detract very much from the practical value, as well from the scientific character of their speculations. In ordinary cases, Vattel therefore decides, the general must be left to procure spies in the best way he can, by tempting mercenary souls by rewards.

Secondly, the employment of spies is conceived to be subject to certain limitations in respect to the manner of it and the object attempted to be gained by it. 'We may lawfully endeavour,' says Vattel, 'to weaken the enemy by all possible means, provided they do not affect the common safety of human society, as do poison and assassination.' It is held accordingly, that the proper business of a spy is merely to obtain intelligence, and that such secret emissaries must not be employed to take the lives of any of the enemy, although that, done in another way, is commonly the main immediate object of the war. Yet it might be somewhat difficult to establish a clear distinction between what would be called an act of assassination by a spy, and many of those surprises of an enemy which, so far from being condemned or deemed dishonourable to the actors, have usually been admired—such, for example, as the famous (though possibly fabulous) exploit of Mucius when he sought the tent of King Porsenna. It will not do to rest upon the circumstance that Mucius exposed his life in this attempt; for that is what a spy always does, as much as any soldier who seeks reputation 'even in the cannon's mouth.' Neither can we well say that the circumstance of the spy disguising himself, and pretending to be what he is not, constitutes the ignominy of his trade, and distinguishes him from an honourable adventurer pursuing the same object. Mucius, besides assuming, as he must have done, the air of being an Etrurian, hid his sword, we are told, under his robe, and it may be argued that on the same principle he might have taken any other available precaution to conceal his intrusion or his purpose. Something like this latter distinction however is that which has been commonly taken: it has been maintained that an officer or soldier cannot be treated as a spy in any circumstances, if he had his uniform on when apprehended. See Martens, *Précis du Droit des Gens Moderne de l'Europe* (traduit de l'Allemand), Paris, 1831, liv. viii., ch. iv., § 274; where references are made to Bruckner, *De Explorationibus et Exploratoribus*, Jen., 1700; to Hannov., *Gel. Anzeigen*, 1751, pp. 383 et seq;

and, in regard to the celebrated case of André in the American war, to Martens, *Erzählungen merkwürdiger Fälle*, i. 303; and to Kamptz, *Beyträge zum Staats und Völkerrecht*, tom. i., No. 3.

A question closely connected with the so-called lawfulness of employing spies, and indeed forming in one view a part of that question, is that of the lawfulness of soliciting the enemy's subjects to act as spies, or to betray him. Vattel discusses this matter in reference to considerations both of right and of honour or conscience. 'It is asked in general,' he begins, 'whether it be lawful to seduce the enemy's men, for the purpose of engaging them to transgress their duty by an infamous treachery.' It has been already stated that he lays down the principle that we may lawfully endeavour to weaken the enemy by any means not affecting the common safety of human society; and he determines that seducing an enemy's subject does not come under this exception. Such measures, accordingly, he observes, are practised in all wars. But still, he argues, they are not honourable nor compatible with the laws of a pure conscience; an evidence of which we have in the fact that generals are never heard to boast of having practised them. 'If such practices,' concludes Vattel, 'are at all excusable, it can be only in a very just war, and when the immediate object is to save our country when threatened with ruin by a lawless conqueror. On such an occasion (as it should seem) the guilt of the subject or general who should betray his sovereign when engaged in an evidently unjust cause would not be of so very odious a nature.' But who ever heard of a war that was not thought by those engaged in it to be a just war on their own side and an unjust war on the part of their adversaries? So that this distinction settles nothing. It is held however to be perfectly allowable in every point of view merely to accept the offers of a traitor. In this case, Vattel argues, 'we do not seduce him; and we may take advantage of his crime, while at the same time we detest it. Fugitives and deserters commit a crime against their sovereign; yet we receive and harbour them *by the law of war*, as the civil law expresses it.' If such offers have ever been rejected, as that of the physician of Pyrrhus, who offered to poison his master, was by the Romans, he holds the act to be one of magnanimity indeed, but yet as one which no general or sovereign is bound to imitate. Or, as Grotius has expressed it, such a course may evince loftiness of mind in those who pursue it, or their confidence of being able to compass their objects by open force, but has nothing to do with the question of what is lawful or unlawful. Martens holds, with still less qualification, that we cannot condemn as an illegitimate means of carrying on a war the corruption employed to seduce the officers or other subjects of the enemy, and to tempt them either to reveal a secret or to surrender a post, or even to get up a revolt; it is the business of each state, he argues, to protect itself from such attempts by a careful choice of the persons it employs or trusts, and by the severity of the penalties with which it punishes their treachery. 'But,' he adds, 'it is without doubt to overleap by a great way the bounds of the law of war, and to declare itself an enemy of the whole human race, for a nation to try to stir up every other people to revolt by a general promise of assistance, as was done by the French National Convention in their decree of the 19th of November, 1792.' Yet, wildly absurd as this decree was, its violation of the law of nations seems to have consisted merely in its not being confined to the case of such foreign countries only as the French republic might be then at war with. Unless indeed it was intended to be taken, as it could not fail to be, for a declaration of war against all existing governments.

The proper question as to the so-called law of nations with regard to spies, is what practices are sanctioned by the general usage of independent civilised nations. Such practices as are now permitted by such usage constitute a part of this so-called international law. Those practices which are not generally permitted or acknowledged are not yet a part of such law. Persons who have occasion to write or think on this subject will find that much of the indistinctness and confusion observable in the treatises on the law of nations will be removed if they will first form for themselves a clear conception of the proper meaning of the word law, and of the improper meanings which it has also acquired; and they will thus be enabled to give the necessary precision to those terms which are used so vaguely by writers on international law. [LAW; RIGHT.]

SQUADRON, the principal division of a regiment of cavalry: the numerical strength of a squadron has varied at different times, but at present it consists of one hundred and sixty men, of whom about one-sixth are not under arms. This body of men is divided into two troops, each of which is commanded by its captain, who has under him a lieutenant and a cornet. The word is supposed to be derived from 'squadra' (Italian), which is itself corrupted from the Latin word 'quadratum;' acies quadrata denoted a body of men drawn up in a square form. The term 'escadron' occurs in Froissart's 'Chronicles,' and probably it was very early used in the French armies to designate a body of cavalry.

The strength of an army, with respect to cavalry, is usually expressed by the number of squadrons in the field, as it is with respect to infantry by the number of battalions. Each regiment of cavalry consists of three or four squadrons; and when in line, one yard in the length of the front is allotted for each man and horse: the interval in line between every two squadrons is equal to one-quarter of the extent occupied by each squadron.

For the manner in which a regiment of cavalry is encamped, see ENCAMPMENT.

SQUA'LIDÆ, a family of fishes of the section *Chondropterygii*. In this family, which includes the various species of sharks, the branchiæ are attached by their outer margin to the skin, and the water taken in for respiration makes its escape through narrow outlets corresponding in number to that of the interspaces between the branchiæ. The number of these openings is usually five. So far the present fishes agree with the Ray or Skate family (Raiidæ); but the peculiar rhomboidal form of the body renders it easy to distinguish the Rays, which moreover have a peculiar cartilage arising from the nasal part of the skull, and extending towards, or even meeting the anterior part of the crest of the pectoral. This character is pointed out by Messrs. Müller and Henle, who state that it is found in all the Ray tribe, and also in *Rhinobatus* and *Pristis*, whereas there is no trace of it in any shark.

In the sharks the body is elongated, and tapering gradually from the head to the tail, or but little dilated in the middle; the muzzle is rounded or pointed, and depressed, and projects over the mouth; the nostrils are situated on the under side of the muzzle, in the form of oblique openings, which vary somewhat in figure, according to the species. The fins generally consist of two dorsals, two large pectorals, two ventrals, an anal fin, and a caudal, the form of which is peculiar.

The portion of the tail of the shark which supports the tail-fin is almost always bent upwards at an obtuse angle with the body; the fin itself may be divided into three parts—a superior, an apical, and an inferior portion; that which runs along the upper surface is usually narrow; that on the under surface is broader, but decreases in width to its point of junction with the apical portion, which is more or less dilated at the extremity, and obliquely truncated. Such is the most common character of the tail and tail-fin in the present fishes, and one which is not found in any recent fishes not belonging to the Chondropterygian group.

The male sharks are smaller, and differ externally from the females in possessing two elongated appendages, one of which is attached to the hinder edge of each of the ventral fins, the uses of which are not known. Some species of sharks bring forth their young alive, whilst others are enclosed in oblong semitransparent horny cases, at each extremity of which are two long tendrils. These cases are frequently found on the sea-shore, and are called sea-purses, mermaids' purses, &c.; they are deposited, observes Mr. Yarrell, by the parent shark near the shore in the winter months. The convoluted tendrils, hanging to seaweed or other fixed bodies, prevent the cases being washed away into deep water. Two elongated fissures, one at each end, allow the admission of sea-water; and the young fish ultimately escapes by an opening at the end, near which the head is situated. For a short time the young shark continues to be nourished by the vitelline fluid contained in the capsule attached to its body by the connecting pedicle, till having acquired the power of taking food by the mouth, the remains of the ovum are taken up within the abdomen, as in birds and some other animals.

'A curious peculiarity has been observed in the young both of the sharks and skates during a very early stage of their existence. From each of the branchial apertures branchial filaments project externally; each filament contains a single minute reflected vessel, in which the blood is thus submitted to the action of the surrounding medium. The appendages are only temporary, and the blood of the fish is afterwards aerated by the true gills. This very interesting discovery, which, I believe, is of recent date, forcibly reminding us of the temporal external branchiæ in the young Batrachian reptiles in the tadpole state, has been observed by Mr. Richard Owen in the Blue Shark, *Carcharias glaucus;* by Mr. John Davy, in the Torpedo; and by Dr. Allan Thompson, of Edinburgh, in the Thornback. Cuvier had previously noticed it, and, in the *Règne Animal,* has referred to a figure, published by Schneider, of a very young shark in this condition, for which, regarding it as the normal state of the fish, that industrious pupil of Bloch had proposed the name of *Squalus ciliaris.*'[*]

The teeth of the Sharks are arranged in several series, one within the other, of which the outermost row is that in use; the other rows are decumbent, and serve to replace the foremost when injured. Their form varies much in the different species; and even those of the upper and lower jaw are often very dissimilar. Though very variable however, they most commonly exhibit modifications of a triangular form, are sharply pointed, and have the lateral edges sharp and frequently serrated. It is upon the modifications observable in the form of the teeth, the form of the snout, mouth and lips, and of the caudal fin; the existence or absence of the eyelid (*membrana nictitans*), spiracles, and of the small depression on the root of the tail; the situation of the branchial openings, and of the dorsal fins, &c., that the various divisions of the present family are formed.

The *Squalidæ* and *Raiidæ* have long occupied the attention of Prof. Müller and Dr. Henle, who have conjointly published an excellent work on these groups, 'Systematische Beschreibung der Plagiostomen.' The characters of the various genera into which the sharks are divided, as communicated by these gentlemen to the 'Mag. of Nat. Hist.' (vol. ii., pp. 33 and 88), are here given. At the head of the sharks these authors place the *Scyllia*, a group in which the species have the teeth small and pointed, and with one, two, or more lateral denticles; an anal and two dorsal fins; the first dorsal placed behind or opposite, but never before the abdominal fins. The spiracles are distinct in all, and tolerably large in most of them. The eyelid (*membrana nictitans*) is wanting. To this section belong, as it would appear, all the oviparous sharks.

Scyllium, Cuv.—This genus is restricted to such species as have the anal fin placed nearer to the head than the second dorsal fin. Eleven species are known, of which three are found on the British coast; the small spotted dog-fish (*Scyllium canicula*), the large spotted dog-fish (*Scyllium catulus*), and the black-mouthed dog-fish (*Scyllium melanostomum*), of Yarrell's 'British Fishes.'

Pristiurus, Bonap., differs from *Scyllium* in having a long snout, and also in possessing a series of larger scales, arranged like the teeth of a saw on the upper edge of the tail. Contains but one species.

Chiloscyllium.—In this genus the anal fin is placed farther back than the second dorsal, and the last branchial opening approximating to the fourth. The under lip is broad and membranaceous, and separated from the skin of the throat by a kind of furrow. The upper nasal valve bears a cirrhus. Four species are known.

Hemiscyllium, Müller and Henle.—Here the situation of the fins is the same as in *Chiloscyllium;* the nose and mouth as in Scyllium. One species.

Crossorhinus, Müller and Henle.—Remarkable for a great number of small membranaceous lobules situated between the nostrils and the first branchial opening. The mouth is nearly at the extremity of the muzzle. The two dorsal fins are placed towards the posterior end of the animal, the first of them being situated above, and a little behind the abdominal fins. This genus is founded on the *Squalus lobatus* of Bloch Schn., the only known species.

Ginglymostoma, Müller and Henle.—Has small spiracles; the two last branchial openings approximating to each other; the first dorsal fin above the abdominal fins; and the second dorsal opposite the anal. In adult specimens the inferior part of the fold bordering the corners of the mouth, is distinctly separated from the skin of the lower jaw by a vertical furrow. The number of lateral denticles to the teeth is four on each side. One species.

Stegostoma, Müller and Henle.—In this genus the first dorsal fin begins a little before the abdominal ones. The branchial openings are as in *Chiloscyllium.* A large and thick wreath or rim conceals the upper jaw, and the opening of the mouth, which is placed transversely: the nasal valves are reduced to lateral edges of this wreath. The teeth are in the form of trifid leaves. Type and only species of the genus, *Squalus fasciatus*, Bloch Schn.

The second division of sharks contains species having, like the *Scyllia*, an anal and two dorsal fins, and five branchial openings; but the first dorsal fin is always placed between the pectoral and abdominal fins.

A large group is distinguished by the possession of a *membrana nictitans*, by the situation of the second dorsal fin, which is opposite the anal one, and by the situation of the branchial openings, the last or two last of which are always placed above the base of the pectoral fins. They are divided as follows:—

A. *Without spiracles.*

a. Teeth flat, sharp, the edges serrated or smooth.

1. *Carcharias*, Cuv.—Teeth flat, sharp, and serrated on each side, either in the upper jaw only, or in both jaws. Spiracles are never met with in the adult specimens, though the rudiments of these organs may be observed in the fœtus of a few species. Twenty species of this genus are known. Three are recorded as occurring on the British coast.

2. *Scoliodon*, Müller and Henle, differs only in having the teeth of both jaws alike: the points of these teeth are directed towards the corners of the mouth; their edge is smooth, and they have a truncated protuberance, which is either smooth or indented on the exterior side of the base. Five species.

3. *Zygæna*, Cuv.—The species of this genus are remarkable for having the sides of the head greatly produced in a horizontal direction, from which circumstance they have received the names of hammer-headed sharks. The teeth are as in *Scoliodon*, but in adult specimens they are distinctly serrated. Three species are known: one has been found on the British coast.

These three genera have the valve of the intestine longitudinal and rolled; an incision near the extremity of the elongated upper lobe of the caudal fin, and a small dimple at the root of the fin.

b. Teeth pointed, and with lateral denticles, as in Scyllium.

1. *Triaenodon*, Müller and Henle.—Teeth with a denticle on each side, which on the exterior side of most of those of the lower jaw is double. Caudal fin, as in *Carcharias*, with a dimple at the root. One species.

2. *Leptocharias*, Andr. Smith.—Teeth numerous, one or two lateral denticulations on each side. The dimple near the caudal fin wanting, and the inferior lobe of the fin scarcely indicated. The nasal valve elongated into a cirrhus. One species.

B. *Possessing spiracles.*

a. Teeth, flat, sharp, serrated or not serrated.

1. *Galeocerdo*, Müller and Henle.—Teeth strongly serrated on the exterior edge, finely on the interior. Spiracles small. A dimple on the root of the tail: the upper lobe of the caudal fin elongated, with two incisions. Valve of the intestines short, as in *Carcharias.* Two Species.

2. *Loxodon*, Müller and Henle.—Teeth without serrature, as in *Scoliodon.* Spiracles very small. Valve of intestine, dimple of the tail, and caudal fin, as in the preceding genus; but the upper lobe of that fin with only one incision. One species.

3. *Galeus*, Cuv.—Teeth in both jaws serrated on the exterior edge, inclined outwardly. Tail as in *Carcharias*, but wanting the dimple. Valve of intestine spiral. One species known, and this frequents the British seas.

b. Teeth pointed as in Scyllium.

Triakis, Müller and Henle.—Teeth as in *Triaenodon*. Dimple of the tail wanting: the inferior lobe of the caudal fin not distinct. One species.

c. Teeth pavement-like, or presenting a general continuity of surface, as in the Skates.

Mustelas, Cuv.—Spiracles large. Inferior lobe of the caudal fin very short. *Membrana nictitans* rudimental. Valve of intestine spiral. One species known, and recorded as British

The remaining genera have no trace of the *Membrana nictitans.*

Section[*] 2. *Lamnoidea.*—Branchial openings large, all situated before the pectoral fins. Spiracles small. Caudal fin in the form of a crescent, with a lateral keel and a distinct dimple, and the small anal and second dorsal fins opposite each other

---

[*] Yarrell's 'British Fishes, ii., p. 369.

[*] Messrs. Müller and Henle regard the Sharks as forming an order, and the sections Scyllia and Lamnoidea as families.

1. *Lamma*, Cuv.—Head pointed, conic; spiracles extremely small; teeth long, pointed, with two lateral denticles, indistinct or wanting in young individuals. The third tooth of the upper jaw, sometimes also the fourth or fifth, smaller than the rest. Two species, both of which occur on the British coast.

2. *Oxyrrhina*, Agassiz.—Teeth long and thick, like nails, without lateral denticles, the anterior ones introverted; the third tooth of the upper jaw small and short. Two species.

3. *Carcharodon*, Andr. Smith.—Teeth as in *Carcharias*, serrated on both edges. The third tooth of the upper jaw smaller. One species.

4. *Selachus*, Cuv.—Teeth very small, narrow, conic, and numerous; snout short. One species, the *Selachus maximus* of Le Pelerin. Basking Shark of Yarrell's 'British Fishes.'

5. *Rineodon*, Andr. Smith.—Teeth exceedingly small, pointed. Mouth at the apex of the snout.

The following three genera differ as much from each other as from the preceding group, and, in the opinion of Messrs. Müller and Henle, should in a system be regarded as the types of families.

Triglochis, Müller and Henle.—Branchial openings large, spiracles small, as in *Lamna*. The first dorsal fin stands before the abdominal fins: the second dorsal between the abdominal and anal fins, and they are all tolerably large. Teeth long, pointed, with one lateral denticle, or two on each side. This is probably the genus *Odontuspis* of Agassiz.

Alopecias.—Head, dorsal and anal fins, and spiracles, as in *Lamna*; but the branchial openings small, and the last above the pectoral fins; the upper lobe of the caudal fin extremely elongated. A dimple on the tail, but no lateral keel. Teeth sharp, triangular, without serrature or protuberance. Intestinal canal spiral. One species.

Cestracion.—Branchial openings as in *Alopecias*; second dorsal fin between the anal and abdominal ones, like *Triglochis*. Spiracles small. Teeth arranged in pavement; the anterior rows small and pointed. A bony spine before each dorsal fin. One species.

The third division of sharks comprises those species which, like the preceding divisions, have an anal fin, but they have only one dorsal. It contains two genera, which are distinguishable by the number of branchial openings. They are the *Hexanchus* and *Heptanchus* of Rafinesque. In the former genus there are six branchial openings, and in the latter seven.

In the fourth division there is no anal fin; the *membrana nictitans* is wanting, but the spiracles are present. It is divided into two groups, according to the presence or absence of certain bony spines. The first is called *Acanthorhinus* by De Blainville, and contains species which are provided with a bony spine in front of each dorsal fin. It is divided into four genera.

1. *Acanthias*, Bonap.—Teeth alike in both jaws, with a transverse edge, the point directed outwardly. Four species.

2. *Spinax*, Bonap.—Teeth in the lower jaw as in the preceding genus; teeth of the upper jaw with an elongated point in the middle, and two shorter points on each side. One species known, the Piked Dog-fish (*Spinax acanthias*) of Yarrell's 'British Fishes.'

3. *Centrina*, Cuv.—Teeth of the lower jaw nearly straight, leaf-like, with a serrated edge, and a flat triangular point; those of the upper jaw also straight, but more narrow, conic, pointed, and forming a cluster in the central portion of the *maxilla*. One species.

4. *Centrophorus*, Müller and Henle.—The lower teeth with a transverse edge indistinctly serrated, the point of each being directed towards the corner of the mouth: the point of the upper teeth is directed downwards; they are equilateral, and without any serrature. One species.

The group without spines to the dorsal fins (*Scymnus*, Cuv.) comprises three genera:—

1. *Scymnus*, Müller and Henle.—Teeth in the upper jaw straight and narrow; in the lower jaw crooked, pyramidal, equilateral. The first dorsal fin before, and the second behind, the abdominal fins. Two species, one of which, the Greenland Shark (*Scymnus borealis*), is occasionally found on the British coast.

2. *Læmargus*, Müller and Henle.—Fins situated as in the preceding genus. Lower teeth with a transverse edge, as in *Acanthias*; upper teeth narrow, conic, straight, or curved outwardly. Three species.

3. *Echinorhinus*, Blainv. (*Gonoidus*, Agassiz).—First abdominal fin opposite the abdominal fins. Teeth in both jaws broad and low, the edge nearly horizontal. The lateral edges with one or two transverse denticles. One species, described in the Supplement to Yarrell's 'British Fishes.'

The fifth and last division contains but one genus (*Squatina*), of which there are two species. They have no anal fin; the mouth is protractile and at the apex of the muzzle. The eyes are placed on the dorsal surface of the head, and not at the sides as in other sharks. The muzzle is obtuse, the body is broad and depressed, and the pectoral fins are very large. Both the dorsal fins are situated behind the ventrals. To this genus belongs the Angel-fish of British authors, the *Squatina angelus* of Dumeril, Cuvier, &c.

SQUAMA, in Botany, a scale, is a term applied to parts which, strictly speaking, are not bracts or leaves, and are arranged upon a plant in the same manner as the scales of fishes and other animals. Almost all the organs that are thus designated are parts of the plant which stand in the position of leaves, but are not developed sufficiently when seated on the stem to become bracts or true leaves, or, when forming parts of the flower or fruit, to become sepals, petals, stamens, &c. Examples of the squama are seen in those parts of the amentum or catkin which contain the organs of reproduction, and which, if further developed, would be called bracts; also in the carpellary leaves which constitute the hardened part of the fruit of Coniferæ; the undeveloped external leaves of the buds of most plants, &c.

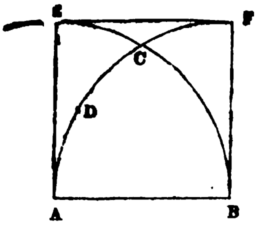
Squamula, the diminutive of the above term, has been applied in various senses. It is most frequently employed to designate the small internal organ which, in the flower of grasses, is placed nearest the seed.

SQUARE. We believe that the old English meaning of this word had reference only to the corners of a figure, or at most to right-angled corners. The old word for a square figure is a *four-square* figure; the carpenter's rule for drawing a right angle is called a T-*square* to this day. The French word équerre (antiently esquerre, originally derived, like the Italian *squadra*, from *quadratum*) is the immediate origin; and this (in French) means also an instrument for drawing a right angle. In Recorde's Ground of Arts, the earliest English geometry extant, he calls what is now a square by the name of *square quadrate* (*square*, right-angled, *quadrate*, four-sided figure); and it is not until he is considerably advanced in his work, that he seems to find out that he may drop the second word, and retain the first only. There was still an incorrectness, for a square figure should have meant one having all its angles right angles; that is, what we now call a rectangle, whether its sides were equal or not. To complete the proof of connexion between the square and the right angled corner, we may mention that before now a right-angled *triangle* has been called a *square*. In or about 1613, Thomas Bedwell published a work, of which the title was '*Trigonum* Architectonicum, the Carpenter's Squire.'

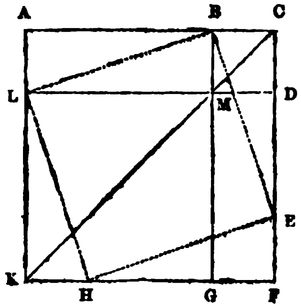
In geometry, a square means a four-sided plane figure with all its sides equal, and all its angles right angles. In algebra, it signifies the number produced by multiplying a number by itself. The reason of the double meaning is obvious enough. [RECTANGLE.] A square of seven units long contains 7×7 square units; so that the operation 7×7 is the arithmetic of finding the content of a square of seven units in length and breadth. We have spoken in the article just cited of the confusion which is caused by this double use of the word square; and proposed to correct it by speaking of the square *on* a line in geometry, and the square *of* a number in algebra. It has been the fashion of late years to publish what are called *symbolical* editions of Euclid, in which AB^2 is made to stand for the square *on* the line AB, because a^2 stands for the square *of* the number a. The learner who uses this species of symbol will not without great care avoid false reasoning in making the connection between geometry and algebra.

A square is divided by its diagonal into two isosceles right-angled triangles: its diagonals are equal, and bisect each other at right angles. The easiest way of drawing a square is to describe two circles on the side AB, and, bisecting AC in D, to make CE and CF equal to AD; the figure AEFB is then a square.

Of all similar figures, squares are those to the areas of which reasoning is most easily applied. If three similar



figures be described on the sides of a right-angled triangle, the sum of those on the sides is equal to that on the hypothenuse. This proposition is learned with reference to squares [HYPOTHENUSE] long before it can be proved with reference to similar figures in general: the consequence is, that the general proposition is almost overlooked by the previous occurrence of the particular case. We have noted in the article just cited the Hindu proof of this celebrated case; the simplest properties of the square may be made to give a more easy proof, founded on the same principle; it being remembered that the first four propositions of the second book of Euclid do not require the last two of the first book. The proof is as follows:—Let AB, BC be the sides of a right-angled triangle, and on their sum describe a square; make CE, FH, KL, each equal to AB. It is easily proved that LBEH is the square on the diagonal of the triangle; and it is made by subtracting four times the triangle from the whole square AF. But if four times the triangle be subtracted by taking away the rectangles AM and GD, we have (Euc., ii. 4) the sum of the squares on the sides, which is therefore the same as the square on the diagonal.



SQUARE ROOT, the name given to a number with reference to its square. Thus, 49 being the square of 7, 7 is the square root of 49. When an integer has no integer square root, it has no square root at all in finite terms: thus 2 has no square root. But since 1·4142136 multiplied by itself gives very nearly 2, or has a square very near to 2, it is customary to say that 1·4142136 is very nearly the square root of 2: more properly, the square root of something very near 2.

The extraction of the square root came into Europe with the Indian arithmetic, the method followed by Theon and other Greeks (which was substantially the same) having been forgotten. The earliest extensive treatise on the subject is that of P. A. Cataldi (Bologna, 1613), though the books of algebra and arithmetic had then been long in the habit of giving the rule. The process presently given for finding the square root of a number in a continued fraction was first given (in a less easy rule) by the same Cataldi, who was thus the first who used continued fractions. This fact has been pointed out by M. Libri, since the article BROUNKER in this work was written.

The rule for the extraction of the square root is a tentative inverse process very much resembling division; and is contained under the general rule given in INVOLUTION AND EVOLUTION. The peculiar simplicity of this case however allows of a condensation of form, and makes the demonstration easy. The general rule just alluded to might be demonstrated on the same principle.

In order to turn the square of a into the square of $a+b$, we must add to the former $2ab+b^2$, or $(2a+b)b$. This follows from

$$(a+b)^2 = a^2 + 2ab + b^2$$

An example will now show how the square root is extracted; first roughly, afterwards more skilfully in the choice of trials. Let the number be 104713. The square of 100 being 10000, which is much too small, we go on adding 100 to the square root, until no more hundreds can be added; all the while forming the squares by the rule, each square from the preceding. We then begin to add tens, forming the squares also, until the addition of one more ten would bring the square past 104713; we then add units, until either the square is exactly 104713, or the nearest to it. Or, instead of continual additions, we might subtract every number, as we get it, from 104713 until no more subtractions can be made. Both modes are exhibited in the following:—

$$\begin{array}{rr@{\qquad}rl}
100^2= & 10000 & 104713 & \\
100\,(2\times100+100)= & 30000 & 10000 & \\
\cline{2-3}
200^2= & 40000 & 94713 & a \\
100\,(2\times200+100)= & 50000 & 30000 & \\
\cline{2-3}
300^2= & 90000 & 64713 & b \\
10\,(2\times300+10)= & 6100 & 50000 & \\
\cline{2-3}
310^2= & 96100 & 14713 & c \\
10\,(2\times310+10)= & 6300 & 6100 & \\
\cline{2-3}
320^2= & 102400 & 8613 & d \\
1\,(2\times320+1)= & 641 & 6300 & \\
\cline{2-3}
321^2= & 103041 & 2313 & e \\
1\,(2\times321+1)= & 643 & 641 & \\
\cline{2-3}
322^2= & 103684 & 1672 & f \\
1\,(2\times322+1)= & 645 & 643 & \\
\cline{2-3}
323^2= & 104329 & 1029 & g \\
1\,(2\times323+1)= & 647 & 645 & \\
\cline{2-3}
324^2= & 104976 & 384 & h
\end{array}$$

In the first column we feel our way, so to speak, by hundreds, by tens, and by units, up to the result that 323^2 is too small, and 324^2 too great; so that we see that 104713 has no square root. In the second column we go down from 104713, and subtracting the squares already formed in the first column, we come to the result that 104713 is 384 more than 323^2, but less than 324^2. The results of the second column are—

$$\begin{array}{r@{\qquad}r}
94713=104713-100^2 & 2313=104713-320^2 \\
64713=104713-200^2 & 1672=104713-321^2 \\
14713=104713-300^2 & 1029=104713-322^2 \\
8613=104713-310^2 & 384=104713-323^2
\end{array}$$

The best method of making the trials depends upon the following circumstances:

1. A square number followed by an even number of ciphers, such as 16000000, is also a square number.

2. If $b\,(2a+b)$ is to be found as near as possible to R, and if $2a$ be considerable compared with b, the value of b is near to that given by $b\times 2a=\mathrm{R}$, or $b=\mathrm{R}\div 2a$.

Taking the number 104713, and parting it into periods of two numbers each, we have 10, 47, 13, and 9,00,00 is the highest square belonging to a simple unit followed by ciphers, which can be contained in it. Choose 300 for the first part of the root, and we have 14713 for the remainder. If b be the number of tens in the root, we have to make $10b\,(2\times300+10b)$ as near as we can to 14173, or, $10b$ not being much compared with 600, we must try $10b\times600=14713$, or $b=14713\div6000$, whence 2 is the highest (perhaps too high, but that will be seen by the remainder). If $b=2$, $10b\,(600+10b)$ is 12400, which, subtracted from 14713, gives 2313. The part of the root now obtained is 320, and if c be the number of units, $c\,(2\times320+c)$ must be made equal, or as near as can be, to 2313. Now c is very small compared with 640, and $c\times640=2313$ shows that $c=3$ at most, giving 3×643, or 1929, to be subtracted from 2313, which leaves 384. The process may be written thus:—

$$\begin{array}{rr|l}
 & \dot{1}0\dot{4}7\dot{1}3 & (300+20+3 \\
 & 90000 & \\
\cline{2-2}
600 & 14713 & \\
20 & 12400 & \\
\cline{2-2}
640 & 2313 & \\
3 & 1929 & \\
\cline{2-2}
 & 384 &
\end{array}$$

which, omitting superfluous ciphers, is the one commonly used. We do not intend to dwell on the common process, which is in all the books, but confine ourselves to the explanation, which is frequently omitted.

We now take a longer instance, at full length, followed by a statement of its results:

$$\begin{array}{r|r|r}
 & \dot{2}9\dot{0}2\dot{2}5\dot{2}9\dot{6} & 10000 \\
 & \underline{100000000} & 7000 \\
20000 & 190225296 & 30 \\
7000 & \underline{189000000} & 6 \\
34000 & 1225296 & \\
30 & \underline{1020900} & \\
34060 & 204396 & \\
6 & \underline{204396} & \\
 & 0 &
\end{array}$$

The following are the successive conclusions:—

$$\begin{aligned}
290225296 - 10000^2 &= 190225296 \\
290225296 - 17000^2 &= 1225296 \\
290225296 - 17030^2 &= 204396 \\
290225296 - 17036^2 &= 0
\end{aligned}$$

whence the given number is the square of 17036.

The rationale of the approximate extraction is as follows:—Suppose we wish to find, to four places of decimals, the square root of 1·74, that is, to find a fraction a, such that a^2 shall be less than 1·74, but that $(a+{\cdot}0001)^2$ shall be greater than 1·74. Give this fraction the denominator 1,00,00,00,00, which requires that its numerator shall be 1,74,00,00,00. This numerator is found, by the integer rule, to lie between 13190^2 and 13191^2, or 173976100 and 174002481. We have then—

$$\begin{aligned}
(1{\cdot}3190)^2 &= 1{\cdot}73976100 \\
(1{\cdot}3191)^2 &= 1{\cdot}74002481
\end{aligned}$$

which satisfy the conditions.

The common process of contraction, explained in books of arithmetic, has the following rule:—When the number of places in the divisor has so much increased as to exceed by 2, or thereabouts, the number of places yet remaining to be found, instead of proceeding with the complete operation, leave the remainder unaugmented by any new period, strike one figure off the divisor, and proceed as in contracted division. If R be the remainder, a the part of the root found, b that remaining to be found, we have $b\,(2a+b)=\text{R}$. If a be very large compared with b, $2ab=\text{R}$ nearly, or $b=\text{R}\div 2a$ nearly; now $2a$ is the *divisor* in the rule. The fact is that b must lie between

$$\frac{\text{R}}{2a} \text{ and } \frac{\text{R}}{2a+\dfrac{\text{R}}{2a}}$$

Processes of this sort are often best shown, as to mere operation, by an instance in which the numerical computation gives no trouble. The following is a complete instance of the rule, exhibited in finding the square root of 4444·444444, &c.

$$\begin{array}{r|l}
 & 4\dot{4}4\dot{4}\cdot4\dot{4}4\dot{4}4\dot{4}, \text{ \&c.} \;(66{\cdot}66666666667 \\
 & \underline{36} \\
126) & 844 \\
 & \underline{756} \\
1326) & 8844 \\
 & \underline{7956} \\
13326) & 88844 \\
 & \underline{79956} \\
133326) & 888844 \\
 & \underline{799956} \\
1333326) & 8888844 \\
 & \underline{7999956} \\
13333326) & 88888844 \\
 & \underline{79999956} \\
13,3,3,3,3,3,2) & 8888888 \\
 & \underline{7999999} \\
 & 888889 \\
 & \underline{800000} \\
 & 88889 \\
 & \underline{80000} \\
 & 8889 \\
 & \underline{8000} \\
 & 889 \\
 & \underline{800} \\
 & 89 \\
 & \underline{80} \\
 & 9 \\
 & \underline{9} \\
 & 0
\end{array}$$

The given number is in fact 4444$\frac{4}{9}$, which is the square of 66$\frac{2}{3}$.

When R is the remainder, and a the part of the root found, the remaining part of the root is the continued fraction [FRACTIONS, CONTINUED]

$$\frac{\text{R}}{2a+}\,\frac{\text{R}}{2a+}\,\frac{\text{R}}{2a+}\,\frac{\text{R}}{2a+}\,\text{\&c.}$$

But this is not a continued fraction of the most useful form, except when $\text{R}=1$. To reduce the remainder of a square root to a continued fraction in which all the numerators are units, proceed as follows: the process comes first and is followed by the explanation.

To extract the square root of 21—

$$\begin{array}{c|cccccc|c}
4 & 1 & 3 & 3 & 1 & 4 & 4 & 1 \\
1 & 5 & 4 & 3 & 4 & 5 & 1 & 5 \\
4 & 1 & 1 & 2 & 1 & 1 & 8 & 1
\end{array}$$

Let the number be N, the integer part of its root a, and write under one another in the first column, a, 1, a. Proceed to form the second, third, &c., columns, each from the preceding, in the following way:—If p, q, r, be in one column (found), and p', q', r', in the next (to be found), then—

1. q' is $\dfrac{\text{N}-p^2}{q}$, and is always integer.
2. r' is the integer part of $\dfrac{a+p}{q'}$.
3. p' is $q'r'-p$.

Thus for the second column we have $(21-16)\div1$, or 5, for the second row; the integer of $(4+4)\div5$, or 1, for the third row; and $1\times5-4$, or 1, for the first row. In the third column we have $(21-1)\div5$, or 4, for the second row; the integer of $(4+1)\div4$, or 1, for the third row; and $1\times4-1$, or 3, for the first row. In the fourth column we have $(21-9)\div4$, or 3, for the second row; the integer of $(4+3)\div3$, or 2, for the third row; and $2\times3-3$, or 3, for the first row, and so on. This process must, after a time, begin to repeat itself; as soon as this happens, the last row shows the integer of the square root, and the succession of denominators of the continued fraction, which must be repeated as often as is necessary to give the required degree of accuracy. Thus,

$$\sqrt{21}=4+\frac{1}{1+}\,\frac{1}{1+}\,\frac{1}{2+}\,\frac{1}{1+}\,\frac{1}{1+}\,\frac{1}{8+}\,\frac{1}{1+}\,\frac{1}{1+}\,\frac{1}{2+}\,\frac{1}{1+}\,\frac{1}{1+},$$

&c.

If we proceed with the continued fraction as in the article cited, we have for the successive approximations to its value

$$\frac{1}{1}\;\frac{1}{2}\;\frac{3}{5}\;\frac{4}{7}\;\frac{7}{12}\;\frac{60}{103}\;\frac{67}{115}\;\frac{127}{218}\;\frac{321}{551}\;\frac{448}{769}\;\frac{769}{1320},\ \text{\&c.}:$$

and $4\dfrac{769}{1320}$ only differs from $\sqrt{21}$ in the 8th decimal place. The use of this method is, not to extract the square root of any number which accidentally occurs, but to find convenient approximations, if possible, for square roots which frequently occur, and as to which it is therefore worth examination whether there may not be some common fraction which will serve the purpose as well as a decimal of considerable accuracy. For instance, we take $\sqrt{2}$ and $\sqrt{3}$, which represent the diagonals of a square and a cube having a unit for their sides. The processes are as follows:—

$$\begin{array}{c|cl}
1 & 1 & 1,\ \text{\&c.} \\
1 & 1 & 1,\ \text{\&c.} \\
1 & 2 & 2,\ \text{\&c.}
\end{array}
\qquad
\begin{array}{c|cccl}
1 & 1 & 1 & 1 & 1,\ \text{\&c.} \\
1 & 2 & 1 & 2 & 1,\ \text{\&c.} \\
1 & 1 & 2 & 1 & 2,\ \text{\&c.}
\end{array}$$

$$\sqrt{2}=1+\frac{1}{2+}\,\frac{1}{2+}\,\frac{1}{2+\text{ \&c.}} \qquad \sqrt{3}=1+\frac{1}{1+}\,\frac{1}{2+}\,\frac{1}{1+}\,\frac{1}{2+},\ \text{\&c}$$

The successive approximations to the fractions are—

$$\frac{1}{2}\;\frac{2}{5}\;\frac{5}{12}\;\frac{12}{29}\;\frac{29}{70}\;\frac{70}{169},\frac{169}{408}\;\frac{408}{985},\ \text{\&c.}$$

$$\frac{1}{1}\;\frac{2}{3}\;\frac{3}{4}\;\frac{8}{11}\;\frac{11}{15}\;\frac{30}{41}\;\frac{41}{56}\;\frac{112}{153}\;\frac{153}{209}\;\frac{418}{571}\;\frac{571}{780},\ \text{\&c}$$

Thus we immediately see a convenient mode of finding the diagonal of a square, derived from

$$\sqrt{2}=1+\frac{29}{70}=\frac{99}{70}=\frac{100-1}{70},\ \text{nearly.}$$

the excess of which above the truth is less than the 11830th part of the side. Thus to find the diagonal of a square of 769·23 feet we have

$$\begin{array}{r} 76923 \\ 769\cdot23 \\ \hline \cdot70)76153\cdot77 \\ 1087\cdot911 \end{array}$$

which is too great by only about 6-hundredths of a foot.

The rule for extracting the square root of an algebraical quantity is very little needed, but is a remarkably good exercise in the operations of algebra. Arranging the square in powers of some one letter, the rule is identical with that for the square root of numbers in every point but this, that the new term is always found by dividing the *first term* of the remainder by the *first term* of the divisor. A couple of examples will suffice. Let it be required to find the square root of $1+2x+3x^2+4x^3+\ldots.$

$$\begin{array}{rl} & 1+2x+3x^2+4x^3+\ldots\ldots \quad (1+x+x^2+x^3+\ldots \\ & 1 \\ \hline 2+x) & 2x+3x^2+\ldots \\ & 2x+\ x^2 \\ \hline 2+2x+x^2) & 2x^2+4x^3+5x^4+\ldots. \\ & 2x^2+2x^3+x^4 \\ \hline 2+2x+2x^2+x^3) & 2x^3+4x^4+6x^5+7x^6 \\ & 2x^3+2x^4+2x^5+\ x^6 \\ \hline & 2x^4+4x^5+6x^6 \ \&c. \end{array}$$

Again, to find the square root of $1+x$:

$$\begin{array}{rl} & 1+x\left(1+\frac{x}{2}-\frac{x^2}{8}+\frac{x^3}{16}-\frac{5x^4}{128}+\ldots\right. \\ & 1 \\ \hline 2+\frac{x}{2}) & x \\ & x+\frac{x^2}{4} \\ \hline 2+x-\frac{x^2}{8}) & -\frac{x^2}{4} \\ & -\frac{x^2}{4}-\frac{x^3}{8}+\frac{x^4}{64} \\ \hline 2+x-\frac{x^2}{4}+\frac{x^3}{16}) & \frac{x^3}{8}-\frac{x^4}{64} \\ & \frac{x^3}{8}+\frac{x^4}{16}-\frac{x^5}{64}+\frac{x^6}{256} \\ \hline & -\frac{5x^4}{64}+\frac{x^5}{64}-\frac{x^6}{256} \end{array}$$

SQUATA'ROLA. [PLOVERS, vol. xviii., p. 282.]

SQUILL. [SCILLA.]

SQUILLA, the name of a genus of plants belonging to the natural order Liliaceæ. It is characterized by possessing 3 coloured spreading sepals; 3 petals very like them, but a little broader; 6 stamens shorter than the petals, with smooth filaments, and dilated at the base; a 3-parted ovary, which is surmounted with three nectariferous glands at the apex; a smooth simple style, with an obscurely-lobed stigma; a 3-cornered 3-celled capsule, with numerous seeds. This genus was constituted by Steinheil, and separated from the old genus Scilla, from which it differs in the possession of the nectariferous glands on the ovary, and other minor points.

S. maritima, the maritime squill, has large roundish ovate bulbs, half above ground, with integuments pale green or red; leaves appearing long after the flowers, broad, lanceolate, channelled, spreading, and recurved; scape two feet high, terminated by a dense long ovate raceme, bearing flowers of a pale yellowish-green colour, with a green stain along the middle of each segment. It is a native of the coasts of the Mediterranean, and is the Skilla (Σκιλλα) of Dioscorides.

S. Pancration is a smaller plant than the last. The bulb is about half the size, of a pale-green or red colour; the leaves are shorter, more acute, and narrower; the stem is more glaucous; the flowers smaller, and flower-stalks shorter, and the petals and sepals are spread fully out. According to Steinheil, this is the Pancration (Παγκράτιον) of Dioscorides, which acted much more mildly as a medicinal agent than the former species. By most writers this plant has been confounded with the former. See Steinheil, in 'Annales des Sciences Naturelles,' tom. vi., second series. Lindley, in the 'Flora Medica,' places Roxburgh's Indian Squill (*Scilla Indica*) in the genus Squilla. This plant possesses the same sensible properties as the former species, and probably might also be used in medicine with the same success. [SCILLA.]

SQUILLA. [STOMAPODS.]

SQUILLA'CE. [CALABRIA.]

SQUILLERECHTHUS. [STOMAPODS.]

SQUINTING (*Strabismus*). It is a condition essential to correct vision that the axes of both eyes correspond in direction, and be turned simultaneously towards the object we regard. Now to ensure the fulfilment of this condition, the orbital muscles (motores oculorum) are so supplied with nervous influence, that we cannot will the movement of one eye without the other being called into involuntary and harmonious action. There are some individuals however whose optic axes are not parallel, and whose eyes do not move in harmony with each other; such persons are said to squint, or to be effected with strabismus. Squinting may take place either upwards, downwards, inwards, or outwards, or in the intermediate directions; it may also be confined to one eye; or may affect both. As the inward and outward varieties of squint are by far the most common, we shall devote the following remarks to them alone.

Inward Squint, or Strabismus convergens, is met with in three distinct forms: 1, single convergent strabismus; 2, double convergent strabismus; and 3, alternating strabismus. In the first form of the affection one eye is habitually turned more or less inwards towards the inner angle of the orbit, whilst the other maintains its natural position, and is capable of being directed to any object that the individual wishes.

On closing the sound eye, the inverted one then becomes strait, and can be turned in every direction nearly to the same extent as the other; but as soon as it is again opened, the one affected with strabismus revolves inwards, and there remains; or if it do move along with the good eye, yet never so as to permit the two axes to be pointed at the same object. Double convergent strabismus differs from the preceding in its affecting both eyes; the axis of each eye is inclined unnaturally inwards, as if the person were regarding some object placed close to his face. On directing his attention to distant objects, the eyes do not become parallel, but the one least affected (for one is always more so than the other) becomes strait, whilst its fellow preserves its former position, or is turned more strongly inwards. With regard to the relative frequency of strabismus in one or in both eyes, it is said to affect most frequently one eye only, and this the left. Thus in an analysis of 200 cases by Mr. Radclyffe Hall, 110 were of the left eye, 71 of the right, and only 19 of both eyes; and in 125 cases recorded by Mr. Liston, 67 were of the left eye, 54 of the right, and 4 of both eyes.

Mr. Elliot of Carlisle however questions the propriety of separating the above-described cases of strabismus into single and double, and we think with justice. He calls attention to a fact, previously pointed out by Fischer of Ingoldstadt in 1781, and again by Purkinje in 1825, viz. that the eye which is habitually strait when open squints when its lids are closed; while, as we have before seen, the squinting eye becomes straight, so that, in point of fact, it is merely a change of the squint from one eye to the other. Here then there is evidently an association in the movements of the two eyes, the position of the one being always dependent on that of the other, so that it cannot strictly be said the individual squints with one eye only. For these reasons Mr. Elliot purposes to confine the term single squint to those cases in which there is no association whatever in the motions of the two eyes; but the inverted eye remains fixed in the inner angle of the orbit, whether the sound one be open or closed.

Alternating Strabismus differs from the ordinary form of squint, in its affecting both eyes *equally*, though never both at a time. An individual thus affected appears to use either eye indifferently; and the change of inversion from one eye to the other is a voluntary act, independent of the opening or closing of the eyelids.

Outward Squint, or Strabismus divergens.—Nearly all that has been said in reference to convergent strabismus, may be applied, mutatis mutandis, to divergent squint. In this form of the affection, one eye is more or less everted, whilst the other is directed straight forwards; the patient is likewise incapable of directing both eyes inwards simultaneously. These cases we believe to be most frequently of the alternating kind; that is, the individual can employ either eye singly, and bring it into the central axis, but then its fellow becomes everted. It is a more rare affection than the former one, and the deformity arising from it is seldom so obvious. Whether we regard strabismus as affecting one eye or both, it is certain that the vision of the one most distorted is nearly always imperfect, and usually in a direct ratio with the degree of distortion. Now we know that if impressions on the two retinæ are dissimilar in force, the mind disregards the weaker, and takes cognizance only of the stronger; so that a person who squints badly generally sees objects with the sound eye only. If the sight of both eyes is equal or nearly so, double vision results whenever both are employed together, because the images of objects do not fall on corresponding portions of the two retinæ [SIGHT]; and as the defect of sight is generally in a direct ratio with the degree of distortion, double vision is most frequently experienced in slight cases of squint.

Causes.—The inequality of power in the two eyes has been regarded by many as a cause of strabismus; the defective eye, it is said, 'instead of being fixed on the object before it, is left to wander from the true axis of vision.' When however we consider how numerous are the examples of unequal vision with the two eyes, yet unattended with squint, and the great and immediate improvement of sight which generally results from the operation for the removal of the defect, we may fairly question the influence of this cause in the production of strabismus. Among the remote causes which unquestionably contribute to this effect, may be enumerated convulsions, teething, the irritation arising from worms, ophthalmia, imitation, a habit of misdirecting the eyes, as by frequently looking at a mole on the nose, &c. The proximate cause resides in some affection of the muscles or nerves of the eyeball; either the balance of power between the former is lost, or the sympathy which exists naturally between the motor-oculi nerves of the two eyes is impaired.

Treatment.—This must depend upon whether the affection is of a temporary or permanent nature; in the former case it will be found to arise from some local irritation, and can be removed by suitable therapeutic remedies; in the the latter, an operation will generally be required. Among the different other plans of treatment which occasionally have proved successful, we may enumerate binding up the sound eye; the employment of spectacles having glasses of different power; blinders projecting in front of the temples, with a view of attracting the eyes outwards; electricity, &c. The operation for the cure of strabismus is said to have suggested itself first to Dr. Stromeyer, from witnessing the success of tenotomy in contractions of the limbs. Dr. Dieffenbach of Berlin however was the first who had the boldness to carry it into practice on the living subject. The operation consists in dividing the muscle by which the distortion is produced, and thus allowing its antagonist to draw the eye again into the centre of the orbit. Although most cases of strabismus may be either completely cured or very much bettered by this operation, it is proper to remark that in some, neither this nor any other plan of treatment is of any avail. Provided however that the subjects to be operated on are judiciously selected, and the surgeon qualified for the task, there is no operation within the whole range of surgery which is more simple, more free from danger, or more satisfactory in its results, than the one in question.

Readers who wish for more full information on the subject of strabismus are referred to the works of Mr. Lucas, Mr. Duffin, and Mr. Mackenzie; also to a very interesting practical paper on the same subject by Mr. Elliot, published in the 55th volume of the *Edinburgh Medical and Surgical Journal.*

SQUIRE, SAMUEL, D.D. (born 1714, died 1766), a learned prelate of the English church, and author of various works, was the son of an apothecary at Warminster in Wiltshire. He was educated in St. John's College, Cambridge, and became early in life chaplain to Dr. Wynne, bishop of Bath and Wells, by whom he was made chancellor of Wells and archdeacon of Bath. He was afterwards chaplain and private secretary to the duke of Newcastle. In 1750 he became rector of St. Ann's, Westminster. He had no other preferment, till in 1760 he was made dean of Bristol, and, in 1761, bishop of St. David's. His life was prosperous, but short: he died at the age of fifty-two. His principal published writings are:—'An Enquiry into the Nature of the English Constitution;' 'The Antient History of the Hebrews Vindicated;' two essays, 1, 'A Defence of the Antient Greek Chronology;' 2, 'An Enquiry into the Origin of the Greek Language;' an edition of Plutarch's treatise 'On Isis and Osiris;' 'An Essay on the Balance of Civil Power in England;' 'Indifference for Religion inexcusable;' and 'Remarks on Mr. Cart's Specimen of his General History of England.' There is also a Catechism by him, and a collection of sermons preached by him on public occasions. More may be read respecting him in Nichols's 'Literary Anecdotes of the Eighteenth Century,' vol. ii., p. 348.

SQUIRRELS, SCIURIDÆ, a family of RODENTIA. Mr. Swainson makes this family the fourth great division of the rodent animals, and he remarks that the strong resemblance which several of the American marmots (*Spermophilus*) have to squirrels, leads him to believe that the two groups naturally follow one another; a supposition which is, he observes, considerably strengthened by the subgenus *Tamias*, Ill., putting on as it were an intermediate form. With regard to these ground-squirrels, as he says they may be justly called, he adverts to the description of the habits and manners of two species (*Tamias Lysteri* and *Tamias quadrivittatus*) by Dr. Richardson, which two species live almost like marmots, and both construct burrows beneath the surface of the ground. Mr. Swainson remarks that some of the squirrels have short and rounded ears, but that the generality of the species have them tufted with a pencil of hairs, as a perfect example of which he refers to our common squirrel (*Sciurus vulgaris*). Mr. Swainson does not omit to notice the grace and liveliness that reign in the movements of these sprightly little animals. 'Their agility upon all occasions of motion,' says he, 'is very great; but when exerted to the utmost, it is truly surprising: so quick indeed do they bound from branch to branch, and so great is the rapidity with which they suddenly turn and wind about, that the eye, partly confused by the intervention of other objects, is frequently unable to follow their movements. The true squirrels, unlike those of the subgenus *Tamias*, live almost entirely in trees, and build their nests on a fork of the branches.'

Mr. Swainson then adverts to the flying squirrels (*Pteromys*), which are equally arboreal in their habits. 'These,' he writes, 'as their name implies, have an expansive skin, forming a sort of sail, between the fore and the hind feet, examples of which structure we also see among the marsupial or pouched quadrupeds of New Holland.' [MARSUPIALIA, vol. xiv., p. 460.] 'There are six species of *Pteromys* found in India, three in America, and one, common in Siberia, is likewise an inhabitant of Lapland. Of the habits belonging to the Oriental species, we know but little or nothing; but those of the Siberian *Pteromys* have been recorded by Pallas. It feeds principally on the young shoots of the pine-tree; and these, after being digested, preserve so much of their resinous quality, that the dung will burn with a bright flame and a strong scent of resin. Like the ordinary squirrels, this species lives entirely in trees, sits erect, feeds itself with the fore-paws, and takes prodigious leaps, assisted greatly by the expansive membrane between the legs, which acts as a support, to break the force of its descent. It appears however that the flying-squirrels are nocturnal animals, in which respect they differ essentially from the true squirrels, which are diurnal. Dr. Richardson, speaking of an American species, expressly states this:—'The *Pteromys Alpinus* of the Rocky Mountains lives in dense pine-forests, and seldom ventures from its retreat, except in the night.' Pallas, alluding to the Siberian species, asserts the same; and adds, that its eyes are provided with a nictitating membrane.' (*Classification of Quadrupeds.*)

This family then of Rodents, with very distinct clavicles, may be naturally and popularly divided into three groups, the True Squirrels, the Ground-Squirrels, and the Flying-Squirrels.

Family Character.—Molars simple, with tuberculous crowns, five above, four below, on each side; the lower incisors very much compressed. Toes long, armed with sharp claws, four on the anterior and five on the posterior feet; anterior thumb very short. Tail long and tufted. Cheek-pouches in some. In others the skin of the sides extended between the anterior and posterior limbs.

Geographical Distribution of the Sciuridæ.—The geographic range of the Squirrels is very wide both in the Old and New World. None appear to have been discovered in Australia.

The *Sciuridæ* have been divided into two principal groups:—

A. Squirrels with free limbs.

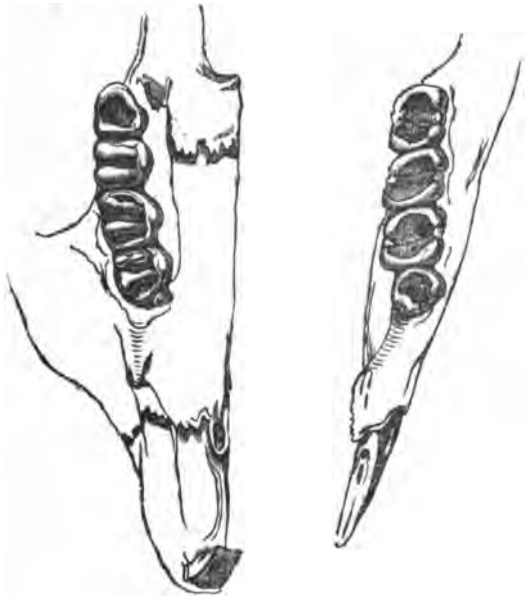
Genera.—Tamias, Sciurus, Macroxus, and *Anisonyx*.

B. Squirrels with their limbs invested in the skin of the sides.

Genera.—Pteromys, Sciuropterus.

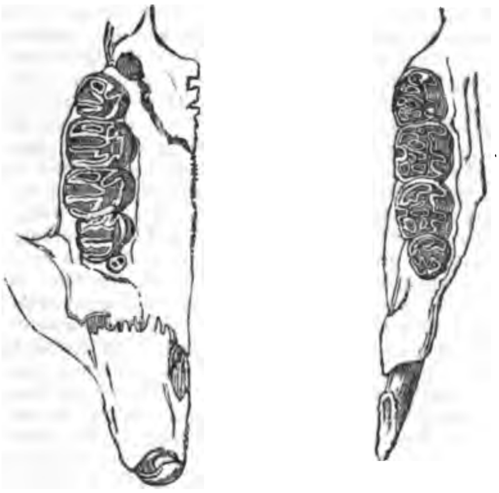
The following dentition is given by M. F. Cuvier for *Tamias, Sciurus, Macroxus*, and *Sciuropterus*:—

$$\text{Incisors } \frac{2}{2};\ \text{molars } \frac{5-5}{4-4} = 22.$$



Teeth of Tamias, Sciurus, Macroxus, and Sciuropterus.

The same author has published the following modification as characteristic of *Pteromys*, the numbers of the teeth being the same with those of the genera above mentioned.



Teeth of Pteromys.

General Characters.

Tamias. (Ground Squirrels.) Skull presenting a uniform curved line on its upper part when viewed in profile, and offering, when seen below, a very slender condition of all the anterior parts. Cerebral cavity but little extended, and advancing only to one half of the skull.

Geographical Distribution.—Europe, Asia, North America.

Sciurus. (True Squirrels.) A slight depression of the frontal bones, and a very slight posterior projection of the same; profile of the face very nearly straight; cranial cavity as long as two-thirds of the face. No cheek-pouches. Tail distichous.

Geographical Distribution.—Europe, Asia, India and Indian Islands, Africa, North America, South America, and West Indian Islands.

Macroxus.—Frontal bones very much depressed: nasal bones but little elongated; a deep depression between the cranium and the face. Tail round. No cheek-pouches.

Geographical Distribution.—Sumatra, India, Africa, and South America.

Anisonyx.—Teeth like those of the squirrels. No cheek pouches. All the feet with five toes; the two internal toes of the anterior feet very short. Claws very long. Tail distichous. A genus, considered as not certain, established by M. Rafinesque for the reception of animals approximating to the squirrels and the marmots, from which they differ in the number and form of the toes.

Geographical Distribution.—Columbia.

Pteromys.—Posterior part of the nasal bones a little convex; the frontal bones strongly depressed in their middle and rising slightly afterwards; the posterior parts of the head do not begin sensibly to curve downwards before the middle of the parietal bones; cerebral cavity small, only half the length of the head.

Geographical Distribution.—Asia, the Moluccas, the Philippine Islands, and Java.

Sciuropterus.—Differing from *Pteromys* in having the anterior part of the profile line of the head straight to the middle of the frontal bones, where it takes a curved direction, very much arched, without any intermediate depression. Occiput projecting; frontal bones elongated; and the capacity of the cranium comprising three-fifths of the length of the head.

Geographical Distribution.—Northern Asia and North America.

For Mr. Waterhouse's arrangement of the *Sciuridæ*, see Rodentia, vol. xx., pp. 61, 62.

European Squirrels.

Examples,—*Tamias striatus.*—*Description.*—Upper part of the body yellow-brown, with five brown longitudinal stripes and two white ones on the upper parts; white beneath; lumbar region rusty, as well as the tail, which is blackish above, and bordered with black below. Length rather more than nine inches, including the tail, which measures about three inches.

Habits, &c.—Pallas states that this ground-squirrel burrows in woody districts, in small hillocks, or near the roots of trees; but never makes its nest in the trunks or branches of trees, like the common squirrels, although, when frightened from its hole, it climbs with ease, speedily making its way from branch to branch. The nest is reached by a winding tunnel, and there are generally two or three lateral chambers, for the stowage of winter food. It is allied in its habits to the hamster and *citillus* (*Spermophilus*), is connected with the latter by the convexity of its nose, and has cheek-pouches, but differs altogether in its manners from the tree-squirrels. The head is longer than that of the common squirrel; the ears are rounded and without tufts; the roundish hairy tail is seldom turned up; the body is slender, the extremities are shorter than those of the common squirrel, and the fur is very short, and not so fine. Its habits are diurnal, it does not become torpid in winter, and in these respects it approaches the true squirrels. It is not easily tamed.

Dr. Richardson remarks that the *Sciurus* (*Tamias*) *Lysteri* of Ray, the *Hackee* of the United States, *Ohihoin* of the Hurons, *Striped Dormouse* of Pennant, is considered by the author of the above description, and subsequent writers, to be the same with the Asiatic *Sciurus striatus*; but the Doctor adds that the descriptions given of the latter do not exactly correspond with American specimens, and that he is not aware that the identity of the species on the two continents has been established by actual comparison. He allows however that the observations of Pallas regarding the manners and form of the Asiatic animal apply exactly to the American one.

The *Hackee*, Dr. Richardson states, is common on the north shores of lakes Huron and Superior; but he does not believe that it exists in a higher latitude than the 50th parallel. Although very wild, it is, he says, fond of establishing its abode in the immediate vicinity of man, and multiplies greatly in cultivated places. (*Fauna Boreali-Americana.*)

Sciurus vulgaris.—*Description.*—Head thick, rounded posteriorly, flattened at the sides and on the forehead; nose prominent; eyes black, prominent, large, and placed rather high on the sides of the head; ears straight, large, terminated by a pencil of long hairs; cutting teeth of the upper jaw broader than those of the lower, which are almost pointed, and much flattened at the sides; grinding-teeth four above and below, with the addition of a rudimentary one, consisting of a single tubercle, and often deciduous, placed immediately before the others in the upper jaw; neck short, but distinct; body thick; back arched; tail long and very bushy, the hairs distichous; hinder legs very long, the heels touching the ground; fore-feet formed for holding food; fingers long, furnished with prominent cushions, and with long, sharp, curved claws. Colour above reddish-brown, beneath white. (Bell.)

The length of the common squirrel including the tail (which last measures about six inches three lines) is about fourteen inches nine lines. Mr. Bell, after stating that it is liable to considerable variety of colour, becoming grey in the northern regions, and quoting the passage in *Lachesis Lapponica*, which relates how the inhabitants of the Lapland Alps procure a number of this species in their grey or winter clothing for the sake of their skins, proceeds to remark that even in this country a certain degree of change takes place in the colour of the fur in spring and autumn. Mr. Blyth informed him of this fact. In summer the fur is coarser and more uniformly red, and the pencils of hairs on the ears are lost; in winter a greyish tint appears on the sides, the pencils on the ears are long and well developed, and the fur is softer and fuller. In July, and not till then, the summer change is perfect.

This is the *Ecureuil* of the French; *Scojattolo*, *Schiarro*, and *Schiaratto* of the Italians; *Hardu*, *Hardella*, and *Esquilo* of the Spaniards; *Ciuro* of the Portuguese; *Eichorn* and *Eichmermlin* of the Germans; *Inkhoorn* of the Dutch; *Ikorn* and *Graskin* of the Swedes; *Ekorn* of the Danes; and *Gwiwair* of the antient British.

Geographical Distribution.—Europe and the north of Asia.

Habits, &c.—'This animal,' says Pennant, 'is remarkably neat, lively, active, and provident; never leaves its food to chance, but secures in some hollow tree a vast magazine of nuts for winter provision. In the summer it feeds on the buds and young shoots, and is particularly fond of those of the fir and pine, and also of the young cones. It makes its nest of the moss or dry leaves, between the fork of two branches, and brings four or five young at a time. Squirrels are in heat early in the spring, when it is very diverting to see the female feigning an escape from the pursuit of two or three males, and to observe the various proofs they give of their agility, which is then exerted in full force.'

Their agility is indeed surprising; the rapidity with which they will run up a tree, or down, head first; the leaps which they will take from bough to bough, and from tree to tree, and the skill with which they dodge out of sight when pursued, baffle description. It is a very difficult thing to shoot a squirrel in motion. They have been seen, when hard pressed, and when the distance to the next tree has been beyond their most extravagant leaps, to throw themselves off, spreading abroad their limbs so as to make their body as parachute-like as possible to break their fall; and on reaching the ground without harm, bound along for the few intervening paces, and ascend the tree with a celerity almost too quick for the eye to follow. Their fondness for the shoots of the fir tribe make them ill neighbours to plantations of that race of trees, the leaders of which they bite off. When they have paired, they are generally much attached to their home and to each other, and a pair of squirrels, like a pair of carrion crows, will go on from year to year living and breeding in the same tree if undisturbed.

White mentions a curious instance of the transfer of the maternal affections of a cat, which had lost her kittens, to some young squirrels that were thrown upon her protection. 'A boy,' says he, 'has taken three little young squirrels in their nest, or drey, as it is called in these parts. These small creatures he put under the care of a cat which had lately lost her kittens, and finds that she nurses and suckles them with the same assiduity and affection as if they were her own offspring. This circumstance corroborates my suspicion, that the mention of exposed and deserted children being nurtured by female beasts of prey who had lost their young, may not be so improbable an incident as many have supposed; and therefore may be a justification of those authors who have gravely mentioned what some have deemed to be a wild and improbable story. So many people went to see the little squirrels suckled by a cat, that the foster-mother became jealous of her charge, and in pain for their safety; and therefore hid them over the ceiling, where one died. This circumstance shows her affection for these fondlings, and that she supposes the squirrels to be her own young. Thus hens, when they have hatched ducklings, are equally attached to them as if they were their own chickens.' (White's 'Selborne.')

In captivity the common squirrel is always in motion, but it is painful to see one of the most agile of animals condemned to tread the same unvaried round without advancing an inch. The number of cages made for this favourite mode of incarceration is very great.

Sciuropterus Sibiricus.

Before we proceed to describe this species, it may be desirable to give some notion of the organization which characterises the Flying-Squirrels generally.

'The group to which this attractive little animal belongs, says Mr. Bennett, in his description of the American *Pteromys Volucella*, 'are principally distinguished from the Common Squirrels by what is usually termed their flying membrane. This apparatus consists of a folding of the skin along either side so as to form broad lateral expansions, supported anteriorly and posteriorly by the limbs between which they are extended, and by peculiar bony processes arising from the feet. These expansions are not naked and membranous, like those of the Bats, but are actual continuations of the skin, clothed externally by a dense fur similar to that which invests every other part of the body. Neither do they serve, like the flying membranes of many of the Bats, the purposes of wings; their functions being limited to that of a parachute, giving to the animal a considerable degree of buoyancy, and thus enabling it to take leaps of almost incredible extent, through which it passes with the velocity of an arrow. The name of *Flying-Squirrels* is consequently founded on an erroneous assumption; but it may nevertheless be admitted as a metaphorical expression of their most distinguishing peculiarity.' (*Zoological Gardens.*)

Description of Sciuropterus Sibiricus.—Eyes full, the lids edged with black. Membranes extending to the base of the fore-feet, and forming a large wing-like expansion on each side. Tail full and rounded at the extremity. Body, above, of a fine grey colour, resembling the hue on the back of a sea-gull; beneath, pure white. Total length about 9½ inches, of which the tail, measured to the end of the hair, is five.

This is the *Mus Ponticus vel Scythicus* of Gesner; *Sciurus Petaurista volans* of Klein; *Sciurus volans* of Linnæus; *Sciurus Sibiricus volans* of Brisson; *Quadrupes volatilis Russiæ* of the *Acta Petropolitana*; *Polatucha* and *Letaga* of the Russians; *Polatouche* of the French; *Konige der Grauwerke* (King of the Squirrels) of the Germans; *Wiewiorka Lataica* of the Poles; and *European Flying-Squirrel* of English authors.

Locality.—Finland, Lapland, the Russian dominions from Livonia to the river Kolyma or Kowyona in the north-east of Siberia.

Habits.—This species haunts the woody mountainous country, feeding on the buds and fruit of the birch-trees and on the cones of the fir tribe. It is a solitary animal, and does not affect the company of others of its own kind, nor does it retire in the winter, at which season it wanders about. Its dwelling is in the hollows of trees, and its nest is generally made of moss from the birch. It raises the tail when at rest, but when it takes its flying leaps, extends that member.

ASIATIC SQUIRRELS.

Examples,—*Tamias Palmarum.*

Mr. Bennett states that he is not satisfied with regard to the genus in which the *Palm-Squirrel* should be placed. It seems, he observes, as M. F. Cuvier has remarked, to form the type of a new one, intermediate between the tree-nesting and nut-cracking squirrels on the one hand and the burrowing and frugivorous *Tamias* on the other. There is much justice in these observations; but as this species approaches much nearer to *Tamias* than *Sciurus*, we think that the continental naturalists may be followed in arranging it under the former genus. The anterior part of the face is even more slender than that of a true *Tamias*, and contrasts strongly with the comparatively bluff visage of *Sciurus*.

Description of Tamias Palmarum.—Pennant thus describes the species: 'Squirrel with plain ears; an obscure pale yellow stripe on the middle of the back, another on each side, a third on each side of the belly; the two last at times very faint; rest of the hair on the sides, back, and head, black and red, very closely mixed; that on the thighs and legs more red; belly pale yellow; hair on the tail does not lie flat, but encircles it, is coarse, and of a dirty yellow barred with black. Authors describe this kind with only three stripes: this had five, so possibly they vary.' Length about 13 inches, of which the tail measures 6.

Vary they certainly do, for Mr. Bennett has figured two marked varieties in his *Zoological Gardens*. One was perfectly black, and exhibited no traces of the usual stripes. The other variety had red eyes, and appeared to be an albino: it was of a dull reddish white, marked with three very faint stripes of a still lighter hue. They were presented to the Zoological Society in 1828.

This species is the *Mustela Africana* of Clusius; *Sciurus palmarum* of Linnæus; and *Le Palmiste* of Buffon.

Locality.—India.

Habits, &c.—The *Palm-Squirrels*, which derive their name from being often seen on those trees, are common about Indian towns and villages, dwelling about the roofs of houses and old walls. The female lays her young in holes of the latter. They are great destroyers of fruit, but are very familiar, entering houses to pick up the crumbs. Pennant states that Governor Loten informed him that they lived much in the cocoa-trees, and were very fond of the *Sury*, or palm-wine, which is procured from the tree; from which it obtained, among the Indians, the name of *Suricatsje*, or the little cat of the *Sury*.

Pennant adds that, according to Clusius and Ray, this species does not erect its tail like other squirrels, but has the faculty of expanding it sideways. The two noticed by Mr. Bennett ate sitting upright upon their haunches, and conveyed their food, which was entirely vegetable and consisted of bread chiefly, to their mouths between their fore-paws. He says that the tail is occasionally elevated in a vertical position, but seldom brought forward over the back.

Sciurus maximus, the Malabar Squirrel.

Description.—Upper parts and external surface of the limbs bright chocolate brown, which colour terminates abruptly, and is joined by the pale yellowish brown on the under parts, fore-arms, and internal surface of the limbs. Front of the fore-legs, neck, throat, face, and head between the ears, lighter in colour: a broad darker patch on the rest of the upper part of the head extends from the forehead to the middle of the nose. Back and shoulders sometimes deepening into black. Ears short, covered with long tufted hairs and brush-like; from the longer part of each ear a narrow line of deep brown passes downwards and backwards in an oblique direction. Whiskers scanty, long, and black. Claws incurved and strong, those of the anterior thumbs broad, short, and flattened. Tail distichous, the hairs expanding widely towards the extremity, bright chocolate-brown at the base, black in the middle, and chestnut in the extreme third part. Length about 33 inches, of which the tail measures rather more than one-half.

Locality.—The Malabar Coast.

Habits, &c.—Sonnerat appears to have been the first zoologist who observed this richly coloured species, the largest of the true squirrels. It haunts among palm-trees, and is stated to be very fond of the milky juice of the cocoa-nut, as well as of the solid part of the nut. In captivity it is tame and familiar; but it tries its teeth upon most substances that come within its power, and should be guarded against accordingly.

Sciuropterus Sagitta (*Sciurus Sagitta*, Linn.; *Pteromys Sagitta*, Geoff.).

Description.—Squirrel with a small rounded head; cloven upper lip; small blunt ears; two small warts at the outmost corner of each eye, with hairs growing out of them; neck short; four toes on the fore-feet; and instead of a thumb, a slender bone, two inches and a half long, lodged under the lateral membrane, serving to stretch it out; from thence to the hind-legs extends the membrane, which is broad, and a continuation of the skin of the sides and belly; the membrane extends along the fore-legs, and stretches out near the joint in a winged form: five toes on the hind-feet, and, on all the toes, sharp, compressed, bent claws. tail covered with long hairs disposed horizontally; colour of the head, body, and tail a bright bay; in some parts inclining to orange; breast and belly of a yellowish white; length from nose to tail, eighteen inches; tail, fifteen. (Pennant.)

Locality, Habits, &c.—Inhabits Java and others of the Indian islands. Leaps from tree to tree as if it flew; will catch hold of the boughs with the tail. Differs in size: that described by Linnæus was the size of our squirrel; that killed by Sir Edward Michelbourne in one of the Indian islands was greater than a hare. Nieuhoff describes this species under the name of the *Flying Cat*, and says the back is black; he has given two very good figures of it; one in his frontispiece, the other in the page he describes it in. (Pennant.)

This seems to be the *Sciurus maximus volans, seu Felis volans* of Brisson; *Le Taguan ou Grand Ecureuil volant* of Buffon.

In the descriptions of Pennant, above given, there are two points which deserve consideration: that which describes the animal as catching hold of boughs with its tail, and that which states its difference in size. The first is given on the authority of Sir Edward Michelbourne's voyage, in Purchas's *Pilgrims*, and should be received with caution. The second would lead to the conclusion that more than one species had been included under the name of the animal now under discussion.

We accordingly find that Dr. Horsfield, in his valuable *Zoological Researches in Java*, describes two Flying Squirrels (*Pteromys genibarbis* and *Pteromys lepidus*), both nocturnal in their habits, nearly approaching to *Sciuropterus Sagitta*. He describes the first as living on fruits; the second as found in the closest Javanese forests, where the height of the trees and the luxuriance of the foliage effectually conceal it. Some have thought these two were only one species. In the work last above referred to, Dr. Horsfield has given a *General Enumeration of Indian Sciuri* well worthy of the attention of the zoologist. He enumerates sixteen species of *Sciuri*; four of which were first described by himself. These do not include the *Flying Squirrels*.

AFRICAN SQUIRRELS,

Sciurus Getulus.—Description.—Eyes full and black, with white orbits. Head, body, feet, and tail cinereous inclining to red: lightest on the legs: sides marked lengthwise with two white stripes: belly white: tail bushy, marked regularly with shades of black, one beneath the other: size of the common squirrel. (Pennant.)

This is the *Sciurus Getulus* of Caius and Linnæus: *Barbary* or *white-striped Squirrel* of Pennant; *Barbarian Squirrel* of Edwards; *Le Barbaresque* of Buffon.

Locality and Habits.—The north of Africa, especially Barbary, where it lives in trees, preferring those of the Palm tribe.

Sciurus Cepapi.—Description.—Ochrey-yellow above, slightly marbled with blackish-brown; sides of the body and feet ochrey-yellow; upper lip, superciliary stripe, and lower parts of the body white, belly tinged with yellow; tail distichous, ochrey-yellow varied with blackish-brown; ears short, with obtuse *apices*, the external margin notched near the point; eyes brown. Figure slender. Head small. Legs long. Tail depressed, narrow, slightly distichous, and pointed at its extremity. The tints vary in different specimens. Length 14 inches 9 lines, the tail being 7 inches long. Female resembling the male in colour and size. (Smith.)

Locality.—South Africa.

Habits, &c.—Dr. Smith, who named this species, and has described and figured it in his *Illustrations of the Zoology of South Africa*, observed it for the first time upon the immediate banks of the Limpopo River, in about 24° 20′ S. lat. It was occasionally discovered upon the ground, but more frequently upon trees; and when it happened to be surprised in the former situation, it invariably endeavoured to reach the latter, and, if successful, either attempted to conceal itself in the forks of the branches, or in holes, if any existed, in the trunks or other parts. Its flight, when on the ground, was effected with amazing rapidity, and the perpendicular ascent of the tree was accomplished with equal facility. Dr. Smith concludes by stating that it feeds by day, and, according to the natives, also by night, and that in all the specimens he obtained the stomachs were fully distended with berries, &c

American Squirrels.

Tamias quadrivittatus; Four-banded Pouched Squirrel.—*Description.*—Head long, tapering considerably from the eyes to the end of the nose, which is not, however, remarkably sharp. Mouth situated far back. Whiskers black and rather shorter than the head. Eye small when compared with a true squirrel. Ear erect, semi-ovate, obtuse, and flat, except a slight duplicature at the base of the anterior margin; it is covered on both sides with a coat of short hair. Cheek-pouches extending to the angle of the jaw. Body more slender than that of the squirrels in general. Five blackish lines and four alternating white ones occupy the whole back: sides reddish-brown, under parts grey: tail long and slender, exhibiting dusky and light-brown colours. Length 9 inches 9 lines; of which the tail measures 4 inches 3 lines.

This is the *Four-lined Squirrel* of Godman, and *Sassacka-wappiscoos* of the Cree Indians.

Locality and Habits.—Dr. Richardson, from whose long and accurate description the above characters are drawn, states that this diminutive Ground-Squirrel is common throughout the woody districts, as far north as Great Slave Lake, if not farther. It is found, he tells us, at the south end of Lake Winipeg, in lat. 50°, and, within that range, seems to replace *Sciurus Lysteri.* He refers to Mr. Say's observation of it on the Rocky Mountains, near the sources of the Arkansas and Platte; and to specimens brought by Mr. Drummond from the sources of the Peace River, which rises on the same ridge. 'It is,' says Dr. Richardson, 'an exceedingly active little animal, and very industrious in storing up provision, being generally observed with its pouches full of the seeds of leguminous plants, bents, and grasses. It is most common in dry sandy spots where there is much underwood, and is often seen in the summer-time sporting among the branches of willows and low bushes. It is a lively restless animal, troublesome to the hunter, and often provokes him to destroy it by the angry chirruping noise that it makes on his approach, and which is a signal of alarm to the other inhabitants of the forest. During the winter it resides in a burrow, with several openings, made at the root of a tree, and is never seen in the surface of the snow at that season. When the snow disappears, many small collections of hazel-nut shells, from which the kernel has been extracted by a minute hole gnawed in the side, are to be seen on the ground near its holes. Mr. Say states its nest to be composed of an extraordinary quantity of the burrs of *Xanthium*, portions of the upright *cactus*, small branches of pine-trees, and other vegetable productions, sufficient in some instances to fill a cart. On the banks of the Saskatchewan the mouths of their burrows are not so protected. The four-banded squirrel is, in common with the *Hackee*, named *Le Suisse* by the French Canadians, an appellation which, according to Father Theodat, arose from their skins being rayed with black, white, red, and grey, like the breeches of the Switzers who form the pope's guard. The same author informs us that they bite bitterly when taken. The tails of this kind of squirrel, particularly of the males, are often mutilated in their contests with each other, and they are very liable to be broken off in the attempt to catch them, so that it is very rare to attain a specimen with a perfect tail.' (*Fauna Boreali-Americana.*)

Sciurus cinereus; The Grey Squirrel.

Description.—Ashy grey on the upper surface and sides, each hair being marked by alternate rings of black and grey. Inner sides of the limbs and under surface of the body pure white. Tail nearly equal in length to the body, and when thoroughly developed, completely overshadowing it. Both surfaces of the tail similar in colour to the back and sides, the under surface being somewhat lighter; the long diverging hairs ringed in such a manner as to give the appearance of an external border of white, enclosing a broad band of greyish black. No decided tinge of brown on the muzzle, nor on the sides of the body, but a slight intermixture of that colour is visible on the muzzle on close examination. Ears covered with very short close-set hairs, without any appearance of the bushy pencils which surmount those of the common squirrel. Size one-third larger than the last-named species.

Such in substance is the very accurate description given by Mr. Bennett 'of two unquestionable specimens which exist among the numerous individuals' in the collection of the Zoological Society. The value of this description rests on the number of squirrels that are regarded by many zoologists as mere varieties of the species under consideration, which is the most common species in the United States.

Locality.—Nearly the whole of the United States of America: most abundant in Pennsylvania and the Carolinas.

Habits, &c.—The nest of the Grey Squirrel, which swarms in some of the localities where it is found, is made upon the extremities of branches of trees, and its food consists of buds, tender shoots, nuts, acorns, and grain. In winter the provident animal retires to hollow trunks where its stores have been laid up. The fur is sought after in the market, but the grey skins of the common squirrel are considered of more value. They are exceedingly destructive to the crops, especially of maize, and were proscribed accordingly. Pennant says that three pence per head was the reward for every one killed, and that such a number was destroyed in one year that Pennsylvania alone paid in rewards 8000*l.* of its currency.

'So much confusion,' says Dr. Richardson, in his description of the black squirrel (*Sciurus niger*, Linn.), 'has crept into the accounts of the American squirrels, that great uncertainty respecting the species alluded to by authors must exist until some resident naturalist favour the world with a good monograph of the squirrels of that country. The black squirrels have been considered by some to be a variety of the *Sciurus cinereus*, or of the *Sciurus vulpinus*, and by others have been referred to *Sciurus capistratus*. M. Desmarest describes a small black squirrel, which is distinguished from the large black variety of the masked squirrel by the softness of its fur. Pennant's black squirrel is evidently the *Sciurus capistratus* of later writers.'

'The squirrel,' continues Dr. Richardson, 'which is the subject of this article, is larger than the *Ecuruil gris de la Caroline* of M. F. Cuvier (lesser grey squirrel; Pennant, *Hist. Quad.*), and rather smaller than the "large grey squirrel" of Catesby. It is not an uncommon inhabitant of the northern shores of lakes Huron and Superior, where the greater and smaller grey squirrels are never seen, and is by far the largest squirrel existing on the eastern sides of the Rocky Mountains to the northward of the Great Lakes. It does not extend farther north than the 50th parallel of latitude, but its range to the southward cannot be determined until the species of American squirrels are better known. It is probable that it is not rare in the United States. There are at present (1829) two pairs of American grey squirrels in the menagerie of the Zoological Society, which differ from each other in size, and in the smaller kind (lesser grey squirrels) having a tawny-coloured belly. Both these kinds have, as was pointed out to me by Mr. Vigors, a peculiar wideness in the posterior part of the body, and a fulness of the skin of the flanks, being an approach to the form of a *Pteromys*. In the *Sciurus Hudsonius* (the *Chickaree*) the hind quarters are as slender and distinct from the flanks as in common European squirrels; and there does not appear to have been any peculiar extension of the skin of the flanks in the specimen of a black squirrel procured for me at Penetanguishene by Mr. Todd, surgeon to the naval depôt there.' The total length of this specimen was 26 inches, of which the tail, including the fur, measured 13. Dr. Richardson adds, that there is a specimen of rather larger dimensions procured at Fort William, on Lake Superior, and presented to the Zoological Society by Captain Bayfield. Dr. Richardson describes it as having a few white hairs scattered among the fur of the body, and rather more in the tail, and he adds, that Lewis and Clark mention their having met with grey squirrels on the Columbia, observing, that, from our ignorance of the species to which they belong, he could not admit them into his work (*Fauna Boreali-Americana*).

The well known industry of Dr. Richardson makes it important that these observations should be widely diffused, in the hope that some zoologist competent to the task may be induced to undertake it. He will have a tangled skein to unravel; but a well executed monograph would be highly valued by all who are interested in the subject.

A friend informs us from experience that the grey squirrel and black squirrel make excellent pies; the flesh tasted like that of the rabbit, but it was much more juicy.

Another friend states that the grey squirrel is a common dish in Virginia. It is usually broiled, and is very palatable.

Pteromys Sabrinus, var. *β. Alpinus ; Rocky Mountain Flying-Squirrel.*

Description.—Yellowish brown above: tail flat, longer than the body, blackish grey; flying membrane with a straight border. Length 14 inches 3 lines; of which the tail, including fur, measures 6 inches 3 lines.

This is the *Pteromys Alpinus* of Richardson, *Zool. Journ.*, vol. iii., p. 519.

Dr. Richardson observes that this animal was discovered by Mr. Drummond, on the Rocky Mountains, living in dense pine-forests, and seldom venturing from its retreats, except in the night. Dr. Richardson had received specimens of it from the head of the Elk river, and also from the south branch of the Mackenzie. It approaches, he says, nearer to the *Pt. volans* of Siberia in the colour of its fur than to *Pt. Sabrinus*, but it has much resemblance to the latter in its form. It is, he adds, entirely destitute of any rounded process of the flying membrane behind the fore-leg, and when its skull is compared with that of *Pt. Sabrinus*, the frontal bone between the orbits appears narrower. The size of its limbs and tail is also greater. These remarks were made by Dr. Richardson on a comparison of the specimens of this animal and of *Pt. Sabrinus*, which he at first received, and he was induced to think that they were specifically distinct; but having afterwards had an opportunity of examining a more complete suite of specimens from Hudson's Bay, doubts were excited on the subject, and although he thought it probable, from the distance between their respective localities, that they may prove eventually to be distinct, he considered it better, when he wrote, to describe them as mere varieties. He concludes by observing that, except that the size of both these species is considerably greater than that of *Pt. volans*, they might be united with that species without any great inconvenience.

Pteromys Alpinus, or Pteromys Sabrinus, var. *β*. (Richardson, *Fauna Boreali-Americana.*)

Fossil Squirrels.

Fossil squirrels (*Sciurus*) occur in the Eocene period of the tertiary series of strata (first lacustrine period). They have been found in the gypsum quarries in the neighbourhood of Paris. Their remains have also been taken from the loam which fills the cavities of the gypsum in the valley of the Elster near Köstritz in Saxony. [Souslik.]

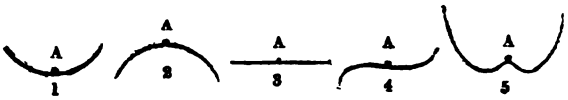
SRINAGHUR. [Serinaghur.]

STA'AVIA, a genus of plants of the natural family of Bruniaceæ, which was so named by Thunberg after Staaf, one of the botanical correspondents of Linnæus. The genus consists of several small shrubs, which are indigenous at the Cape of Good Hope, and are remarkable for their flowers being arranged in heads resembling those of some of the Compositæ. Calyx with the lower part of its tube attached to the ovary. Petals 5, stamens 5, inserted into the calyx. Capsule crowned by the calyx, diœcious, cocci bivalved at the apex, and one-seeded. A few specimens are cultivated in our greenhouses, and may be propagated from cuttings in sand covered with a bell-glass.

STABLE. [Farm.]

STABLE AND UNSTABLE; STABILITY. A system is said to be stable when a slight disturbance of its actual condition would not produce a continually increasing effect, but one which finally ceases to increase, diminishes, becomes an effect of a contrary character, and so on, in an oscillatory manner. The ordinary vibration of a pendulum is an instance; the oscillation takes place about a stable position of equilibrium. We can give no instance of an unstable position; for by definition, such a thing is a mathematical fiction. Any disturbance, however slight, produces upon an unstable system an effect which continually increases: no unstable equilibrium therefore can exist a moment, for no system made by human hands can be placed with mathematical exactness in a given position. The pendulum of which we have just been speaking has a position of equilibrium exactly opposite to that about which it can oscillate, but no nicety of adjustment will retain it in that position: it may appear to rest for a moment, but will almost instantly begin to fall.

The following curves or lines are all such that, supposing them to be rigid matter, a molecule placed at A would rest:



In the first, a displacement to the right or left would produce nothing but oscillation, and the equilibrium is stable: in the second, neither displacement would be followed by any tendency to restoration, and the equilibrium is unstable; in the third, displacement would only be a removal to another position of rest, and the equilibrium is called indifferent. In the fourth, displacement to the right would be followed by restoration, but the velocity acquired in restoration would carry the molecule to the left, on which side there is no tendency to restoration: the equilibrium would then be permanently disturbed, and practically unstable: though it might be convenient to say that it is stable as to disturbances to the right, and unstable as to those to the left. In the fifth, the equilibrium at A is unstable, but if a push, however slight, were given to the molecule, it would obviously, by reason of the two contiguous stable positions, oscillate about A as if A were itself a stable position: and in the same manner a stable position, with an unstable one near to it, might, for a disturbance of sufficient magnitude, present the phenomena of an unstable position.

Now, suppose that the point A, instead of being a single molecule, is the centre of gravity of a system acted on by its own weight only; and let the curve drawn be the path of the centre of gravity, which, owing to the connection of the parts of the system with its supports, that centre is obliged to take. The phenomena of the single point still remain true: there is in every case a position of equilibrium when the system is placed in such a position that its centre of gravity is at A. In (1) the equilibrium is stable; in (2), unstable; in (3) indifferent; in (4), stable or unstable, according to the direction of disturbance; in (5), unstable, with results like those of stability. It is an error to state, as is frequently done, that there is no equilibrium in such a system except when its centre of gravity is highest or lowest; as is obvious from (3) and (4). The general proposition which *is* true is this—that a system acted on by its own weight is in equilibrium then, and then only, when its centre of gravity is placed at that point of its path which has its tangent parallel to the horizon, or perpendicular to the direction of gravity.

When a system is supported on three or more points it is well known that there is no equilibrium unless th vertical passing through the centre of gravity cuts the polygon formed by joining these points. This must not be confounded, as is sometimes done, with a case of distinction between stable and unstable equilibrium; for it is a case of equilibrium or no equilibrium, according as the central vertical cuts or does not cut the base of the figure. Of course it is in the power of any one to say that stability means equilibration and instability non-equilibration: but such is not the technical use of these words in mechanics: stability and instability refer to equilibrium, stable equilibrium being that which would only be converted into oscillation by a disturbance, and unstable equilibrium that which would not be so converted.

Neither must the effects of friction or other resistances be confounded with those of a stable or unstable disposition. A ladder resting against horizontal ground and a vertical wall is maintained by friction; were it not for friction, there would not be rest in any position; and as it is, the angle which the ladder makes with the ground must not be too small. There is thus a set of positions, from the vertical one to a certain inclination, depending on the amount of friction, in all of which there is equilibrium; while in every other position there is no equilibrium. Again, when a bar rests on two inclined planes, without friction, there is a position of equilibrium which is really unstable: any displacement would throw the bar against one of the planes without any restoration. The stable position of equilibrium is found by inverting the position of the inclined planes, or turning their angle downwards, grooving them to support the ends of the bar, which are formed so as to be retained in the grooves. The bar will now, if left to itself, begin to oscillate about its position of equilibrium, unless it happened to be placed at first in that position. But introduce friction, and the upper position of equilibrium alters its character: a small displacement will not destroy the equilibrium. This is the effect of friction, which affords certain limits within which there is always equilibrium. For none of these cases must the words stability and instability be used in such manner as to confuse their popular with their technical sense.

We have already [Solar System] pointed out what is meant by the stability of the solar system. When a system has a motion of a permanent character, it is stable if a small disturbance only produce oscillations in that motion, or make permanent alterations of too slight a character to allow the subsequent mutual actions of the parts to destroy the permanent character of the motion. Suppose a material body, for instance, to revolve about an axis passing through the centre of gravity unacted on by any forces except the weight of its parts. If this axis be one of the principal axes, the rotation on it is permanent, that is, the axis of rotation will continue unaltered, even though that axis be not fixed. The rotation however, though permanent, is not *stable* about more than two out of the three principal axes. Let the first rotation be established about the axis which has the greatest moment of rotation, or the least, and if a slight displacement or disturbance be given, which has the effect of producing a little alteration of the axis of rotation, that alteration will not increase indefinitely, but will only occasion a perpetual transmission of the rotation from axis to axis, all the lines lying near to the principal axis first mentioned. But if that axis be chosen about which the moment of inertia is neither greatest nor least, any disturbance, however slight, will continually remove the axis of rotation farther and farther from the first axis, near which it will not return until it has made a circuit about one of the other two principal axes.

For the mathematical part of this subject, so far as we give it, see Virtual Velocities.

STACHYS (from *σταχύς*, a spike), the name of a genus of plants belonging to the natural order Lamiaceæ, or Labiatæ. It has a 5-toothed, 10-ribbed, nearly equal, acuminate, subcampanulate calyx; a corolla with the tube as long as the calyx, or longer; upper lip erect, or spreading, a little arched; lower lip usually longer, spreading, and 3-lobed; the middle segment large, entire, or emarginate; four stamens; bifid style with stigmas at each apex; fruit an achenium. The species are very numerous, above 100 being enumerated. They are herbs or under-shrubs, with their flowers arranged in whorls. The majority of them are European plants.

S. betonica, common betony: stems erect, rather pilose; lower leaves on long petioles, and crenated; upper leaves sessile, toothed; uppermost ones linear, quite entire; whorls many-flowered; bracts ovate; corolla twice as long as the calyx. This species is the *Betonica officinalis* of Linnæus. It is now a species of the genus Stachys, but it was formerly a species of the genus Betonica; but the characters which constituted the difference between the latter and the former having been considered too trifling to constitute separate genera, the genus Betonica has been abolished by later botanists. The common betony is a native of Europe and some parts of Asia, inhabiting woods, heaths, and pastures. It is very plentiful in Great Britain. It was formerly much used in medicine, and is now a popular remedy for some complaints. When taken fresh it is said to possess intoxicating properties. The leaves have a rough bitter taste, and are slightly aromatic. The roots are nauseous and very bitter, and when taken, act as purgatives and emetics.

S. lanata, woolly woundwort: whole plant clothed with dense silky wool; leaves oblong, narrowed at both ends; floral leaves small, the upper ones of which are shorter than the whorls; whorls many-flowered; bracts linear-lanceolate, the same length as the calyx; calyx incurved, toothed; corolla woolly. This plant is a native of Europe, in the neighbourhood of the Mediterranean. Dr. Sibthorp found it in Laconia, where it is called *σταχος* by the modern Greeks. This plant is remarkable for its woolly covering, as well as the *S. Germanica* (German woundwort), on which account they have been introduced into our gardens. Many other species are covered with hairs so as to give them a powdery-looking woolly character, as the *S Alpina*, *S. Italica*, &c.

S. coccinea, scarlet hedge-nettle: stem erect, clothed with soft villi; herbaceous ovato-lanceolate petiolate leaves; flowers six in a whorl; corolla pubescent, three times as long as the tube. This is the most beautiful species of the genus, having large dark scarlet flowers an inch in length. It is a native of Chili and Peru. It must be cultivated as a greenhouse plant, and is readily increased by cuttings or parting its roots.

S. palustris, marsh-woundwort, or clown's all-heal: stems erect, pubescent, herbaceous; leaves subsessile, oblong, crenated, wrinkled, hispid; whorls with 6 or more flowers; calyx with lanceolate acute teeth; corolla twice as long as the calyx. It has pale purple flowers, with a variegated lower lip of the corolla. This plant is a native of Europe, Asia, and North America. It is abundant in watery places, by road sides, in meadows, and corn-fields in Great Britain. It is called clown's all-heal by Gerard. The young shoots and the roots also, when cooked, form an excellent esculent. On the farm it is a weed that should be well looked after, as it exhausts the soil and increases very rapidly.

S. sylvatica, the hedge-woundwort, is another common British species, differing from the last in having stalked leaves which are cordato-ovate shaped. It inhabits woods, hedges, and shady places. This herb is very pungent, and has an unpleasant fœtid smell.

S. Corsica, Corsican woundwort: procumbent, pilose; leaves with petioles; flowers in 2-4-flowered whorls; corolla twice as long as the calyx, lower lip large. This is a pretty little plant worthy of cultivation. It has downy, rosy-white, or pink flowers, which are large for the size of the plant. It is a native of corn-fields in Corsica and Sardinia.

S. lavandulæfolia, lavender-leaved woundwort: leaves of the stem oblong, lanceolate with petioles, floral leaves sessile; whorls 2-6 flowered; teeth of calyx longer than corolla. It is a native of the Caucasus, in dry stony places. It is shrubby in its habit, and is well adapted for rock-work.

The whole of the species are easily cultivated in common garden soil. The herbaceous sorts may be increased by dividing their roots; the shrubby sorts, by cuttings; annuals may be sown in spring in an open border.

STACHYTARPHA (from *στάχυς*, a spike, and *ταρφής*, dense), the name of a genus of plants belonging to the natural order Verbenaceæ. It is known by its tubular 4-toothed calyx; hypocrateriform unequal 5-cleft corolla with a curved tube; 4 stamens, 2 of which are fertile. The species are natives of South America and the West India Islands. Many of them have been described as Vervains, but they are distinct from that genus. They are herbaceous or shrubby, and many of them are handsome plants.

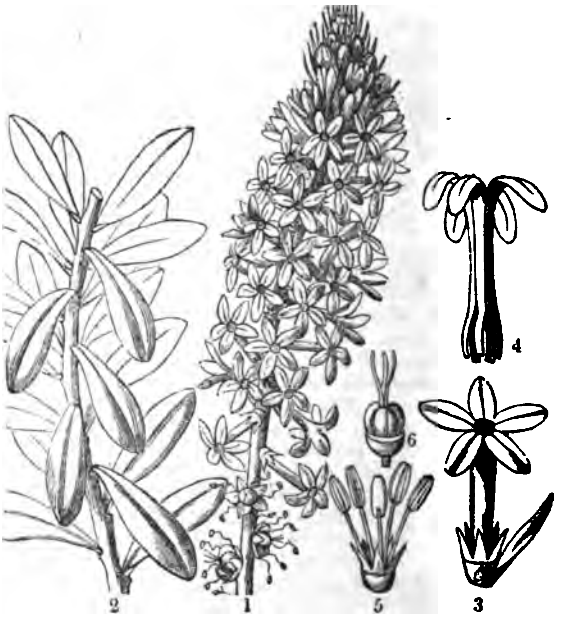
S. Jamaicensis, Jamaica Bastard Vervain, is an under-shrub, with scattered hairy branches; leaves nearly two inches long, oblong-ovate, coarsely and sharply serrated, quite entire at the base, with the midrib beset with hairs; the spike is dense, bearing flowers of a lilac colour, and having ovate bracts which are shorter than the calyx. This plant is a native of the West India Islands, and has there a reputation something like that which distinguished our common Vervain.

STACKHOUSE, THOMAS, born 1681, died 1752, a divine of the English church, and one of the first persons who wrote extensive works in theology for the booksellers, expressly for the purpose of sale among the less educated portions of the population. Of his birth, education, and early history, nothing appears to be known. The letters M.A. appear after his name on his monument, and in the title-pages of some of his books, but his name is not found in the lists of graduates of Oxford or Cambridge. We have his own authority for saying that he was in early life living at Amsterdam, and performing clerical duties there, but we look in vain in Mr. Stevens's work on the English and Scottish churches in Holland for any notice of him; and the first that is known of him when in England is, that he was curate at Richmond, as afterwards at Ealing and at Finchley, in all which places he was much respected. He continued a curate for the greater part of his life, and the utmost preferment which he obtained was the vicarage of Benham in Berkshire, which was given him in 1733, and where he died and was buried.

Various anonymous tracts have been attributed to him, and there are others to which his name is affixed that are supposed to be by other writers, but none of them are of sufficient importance to require more than this general notice. His first publication was on a subject which continued ever after to be a favourite one with him—the hardships of the inferior clergy, especially those in and about London. This appeared in the form of 'A Letter to a Right Reverend Prelate' in 1722. In the next year he published 'Memoirs of Bishop Atterbury,' and in 1729 appeared his 'Complete Body of Divinity,' in a folio volume. He engaged at this period in the controversy with the Freethinkers of the time, and in a manner to gain great credit. In 1731 he published 'Reflections on the Nature and Property of Language.' In 1732 he was engaged in an acrimonious dispute with a bookseller, for whom he had engaged to write a work, to be published in numbers, entitled 'A History of the Bible.' A full account of this affair is given in Nichols's 'Literary Anecdotes of the Eighteenth Century,' vol. ii., p. 394-398. The work appeared, and forms two volumes in folio. It embraces the whole of the Sacred History from the beginning to the establishment of Christianity, with maps, prints, and useful tables. In 1747 he published in folio 'A New and Practical Exposition of the Apostles' Creed.' There are other published writings of his not here particularly named. He lived a laborious and necessitous life, and just before his death he 'deplored his miserable condition in all the keen expressions of despair and bitter disappointment,' in a poem published in the year of his decease, which he entitled 'Vana Doctrinæ Emolumenta.'

STACKHOUSE, JOHN, principally known as a botanist, was the youngest son of William Stackhouse, a minister of the established church, and the nephew of Thomas Stackhouse. He pursued his studies at Oxford, and was made a fellow of Exeter college, which he resigned in 1763, and went to live at Bath, where he resided all his life. He employed the leisure which an independent fortune gave him in the pursuit of botany, and made many valuable contributions to that science. He was one of the earliest fellows of the Linnæan Society. His attention was principally directed to the study of Algæ. In 1801 he published his 'Nereis Britannica' in folio, a work containing descriptions in Latin and English of the Fuci, Algæ, and Confervæ growing in England, and illustrated with coloured plates. Many new species of marine Algæ were described in this work, and dissections given of some other species. Of this work a second edition appeared in quarto in 1816; the descriptions are entirely in Latin, and the plates uncoloured. In 1814 he published an edition of Theophrastus 'On Plants,' in two volumes, which was illustrated with plates, and contained a catalogue of the plants of Theophrastus, with a copious glossary and many valuable notes. In 1811 he published 'Illustrationes Theophrasti,' in which the plants of that author are arranged according to the Linnæan system, and the modern synonyms are given. He also published an essay on the Balsam and Myrrh trees, with remarks on the notices of them by modern travellers and antient writers, especially Theophrastus. He contributed two papers to the 'Linnæan Transactions,' one on the *Ulva punctata*, the other on the preparation of plants for herbaria. He died at Bath, in November, 1819.

STACKHOU'SIA, a small order of plants belonging to the syncarpous group of polypetalous Exogens. They are herbaceous plants, with simple, entire, alternate, sometimes minute leaves, with lateral very minute stipules. The flowers are arranged in spikes, each flower having three bracts. The calyx is 1-leaved, 5-cleft equal, tube inflated; petals 5, arising from the top of the tube of the calyx, the claws forming a tube which is longer than the calyx; stamens 5, arising from the throat of the calyx; ovary superior 3-5-lobed; fruit dry, with albuminous seeds and erect embryo. This order was constituted by Brown, and its nearest relations are with Celastraceæ and Euphorbiaceæ. From the first it differs in the possession of stipules, the cohesion of the petals, and the deep-lobed ovary; from the last, in the structure of their fruit, and in the position of their seeds. All the species are natives of New Holland. The only genus of the order at present is Stackhousia, which was named in honour of John Stackhouse.



Stackhousia monogyna.

1, Spike with flowers. 2; Cutting with leaves. 3, Calyx, corolla and bracts. 4, Petals, showing their union to form a tube. 5, Stamens arising from calyx. 6, Ovary and styles.

STADE, the capital of the duchy of Bremen in the kingdom of Hanover, is in 55° 36′ N. lat. and 9° 24′ E. long. It is situated in a marshy country on the banks of the river Schwinge (which is navigable at high-water), which falls into the Elbe about three miles below the town. Stade was formerly strongly fortified, but the works were blown up at the end of the eighteenth century. They have however since been repaired. Among the public buildings are three churches, in which there are some handsome monuments; a town-hall, a gymnasium, an orphan asylum, and a poorhouse. The town, with the suburbs, contains about 800 houses and 5500 inhabitants, who have manufactures of flannel, worsted stockings, hats, and lace. There are breweries and brandy distilleries, a cannon foundry, and a ropewalk. This town is the seat of the public offices for the provinces of Bremen and Verden. The foreign trade is not so considerable as it appears to have formerly been. The transit trade is of some importance: the exports are fat oxen, wooden wares, and stockings. Some vessels go every year to the Greenland whale-fishery, and also to the seal and herring fishery.

At the place where the Schwinge falls into the Elbe there is a fort with a garrison, called the Schwinger Schanze, off which a royal cutter of four or eight guns is constantly stationed, for the purpose of collecting the duties levied by the Hanoverian government on all vessels passing up or down the Elbe. The original duties, which were regulated by a treaty in 1691, were light, but have been greatly increased, and the Hanoverian government acknowledges that they now produce about 33,000*l.*, though it is stated by some that they yield as much as 45,000*l.* a-year. For this sum neither a light house nor other establishments advantageous to navigation are maintained. By the treaty of Vienna the navigation of all rivers from the sea to the highest navigable point is declared to be free of all imposts, except for the support of buoys, lights, or towing-paths; and the collection of the Stade duty is in direct contravention of this treaty. Negociations between England and Hanover are actually pending on the subject. The duties are rigorously collected, and the tariff embraces nearly seven thousand different articles. An erroneous insertion of 'cotton-twist' for 'cottons,' which made a difference of only seven shillings in the duty, subjected a ship on one occasion to 215*l.* fine and expenses. The average duty on each British ship which ascends to Hamburgh is about 18*l.*

STA'DIUM (*ὁ στάδιος* and *τὸ στάδιον*), the principal Greek measure of length, was equal to 600 Greek or 625 Roman feet, that is, to 606 feet 9 inches English. The Roman mile contained 8 stadia. The Roman writers often measure by stadia, chiefly in geographical and astronomical measurements. (Herod., ii. 149; Plin., *Hist. Nat.*, ii. 23 or 21; Columell., *Re. Rust.*, v. 1; Strabo, vii., p. 497.)

The standard length of this measure was the distance between the pillars at the two ends of the foot-race course at Olympia, which was itself called *stadium*, from its length, and this standard prevailed throughout Greece. Some writers have attempted to show that there were other stadia in use in Greece besides the Olympic. The only passages in which anything of the kind seems to be stated are one in Censorinus (*De Die Natali*, c. 13), which, as far as it can be understood, evidently contains some mistake; and another which is quoted by Aulus Gellius (i. 1) from Plutarch, but which speaks of the race-courses called stadia, not of the stadium as a measure.

The principal argument for a variety of stadia is that of Major Rennell (*Geog. of Herod.*, s. 2); namely, that when antient authors have stated the distances between known places, and a comparison is made between their statements and the actual distances, the distances stated by them are invariably found to be too great, never too small. Hence the conclusion is drawn that they used an itinerary stade shorter than the Olympic. If so, it is strange that the very writers who have left us these statements of distances have not said a word about the itinerary stade which they are supposed to have used, while several of them often speak of the Olympic stade as containing 600 Greek feet. But there is a very simple explanation of the difficulty, which is given by Ukert, in his *Geographie der Griechen und Römer* (i.; ii., p. 56, &c.). The common Greek method of reckoning distances, both by sea and land, was by computation, not by measurement. A journey or voyage took a certain number of days, and this number was reduced to stadia, by allowing a certain number of stadia to each day's journey. The number of stadia so allowed was computed on the supposition that circumstances were favourable to the traveller's progress; and therefore every impediment, such as wind, tide, currents, windings of the coast, a heavily laden or badly sailing ship, or any deviation from the shortest track by sea, and the corresponding hindrances by land, would all tend to increase the number of days which the journey took, and consequently the number of stadia which the distance was computed to contain. These circumstances, together with the fact that the Greek writers are by no means agreed as to the number of stadia contained in a day's journey, and other sources of inaccuracy which we know to have existed, furnish a satisfactory explanation of the discrepancies which we find in their statements of distances, both when compared with one another, and when compared with the actual fact, without there being any occasion to resort to the supposition of a stade different from the Olympic. Colonel Leake, who has recently investigated this subject (*On the Stade as a Linear Measure*, 'Journal of the Royal Geographical Society of London,' vol. ix., 1839), has also come to the conclusion 'that the stade, as a linear measure, had but one standard, namely, the length of the foot-race, or interval between the *ἀφετήρια* and *καμπτῆρ* in all the stadia of Greece, and which is very clearly defined as having contained 600 Greek feet.'

The calculations of Romé de l'Isle and Gosselin respecting the various stadia which they suppose to have been used in Greece depend entirely upon the improbable assumption that the Greek astronomers were acquainted with the true length of a great circle of the earth.

When we come however to writers as late as the third century of the Christian æra, we do find stadia of different lengths. Of these the chief are those of 7 and 7½ to the Roman mile. (Wurm, *De Pond.*, &c., § 58.)

The following table, from the Appendix to Hussey's *Antient Weights and Money*, represents the supposed varieties of the Greek stadium :—

	Yds.	Ft.	Inch.
Stade assigned to Aristotle's measurement of the earth's surface . . .	109	1	2·26992
Mean geographical stade, computed by Major Rennell	168	1	6
Olympic stade	202	0	9
Stade of 7½ to the Roman mile . .	215	2	2·4
Stade of 7 to the Roman mile . . .	231	0	5·124

2. The race-course for foot-races at Olympia was called stadium, as above mentioned, and the same name was applied to all other such courses.

The stadium consisted of a flat area, surrounded by raised seats, and was made either in a spot which had by nature the required shape, or in the side of a hill, or on a plain. In the last two cases the stadium was constructed by forming a mound of earth of the proper shape, and covering it with stone or marble for the seats. The second of these three forms was the most common. Of the third we have a fine example in the Panathenaic Stadium at Athens. [ATHENS.] The area of the stadium was oblong, terminating at one end in a semicircle. At the other end it was bounded by a wall, at the two extremities of which were the entrances, one on each side of the stadium. Here was the starting-place (*ἄφεσις, γραμμή, ὕσπληξ*, or *βαλβίς*), marked by a square pillar in the middle of the breadth of the area. Another such pillar was placed at the other end of the course, at the distance of a stadium from the former, and at or near the centre of the semicircular end of the area. This pillar marked the termination of the simple foot-race [OLYMPIC GAMES], but in the Diaulus the runners turned round it and went back to the starting-place; in the Dolichus they turned round both pillars several times, according to the number of stadia of which the course consisted. The end of the course was called *τέρμα, βατήρ, τέλος, καμπτήρ* and *νύσσα*. Halfway between these pillars stood a third. On the pillar at the starting-place was inscribed the word *ἀρίστευε* (*excel*); on the middle one, *σπεῦδε* (*hasten*); on the one at the goal, *κάμψον* (*turn*). The semicircular end of the area (*σφενδονή*) was thus not used in the foot-race. Here probably the other gymnastic contests took place; for though the stadium was originally intended only for the foot-race, yet as the other contests came to be added to the games, they also took place in the stadium, except the horse-races, for which a separate course was set apart, shaped like the stadium, but larger: this was called *ἱππόδρομος*.

Among the seats which surrounded the area, a conspicuous place, opposite to the goal, was set apart for the three Hellanodicae, who decided the contests, and who entered the stadium by a secret passage. Opposite to them, on the other side of the stadium, was an altar, on which the priestesses of Demeter Chamyne sat to view the games. The area was ornamented with several altars and statues.

The position of the stadium was sometimes, but not always, in connection with the gymnasium.

Under the Romans many of the Grecian stadia were modified so as to resemble the amphitheatre.

There still exist considerable ruins of stadia: among the most remarkable of which are those at Delphi, Athens, Messene, Ephesus, and Laodicea.

(Pausanias, ii. 27, 6; vi. 20, 5, 6; ix. 23, 1; Müller's *Archäologie der Kunst*, sec. 290; Krause, *Die Gymnastik und Agonistik der Hellenen*, i., p. 131, &c.)

STADTHOLDER (*Statthalter* in German, *Stadhouder* in Dutch) means lieutenant or governor. The appellative Statthalter is used in the cantons of German Switzerland to denote the civil officer who is next to the landamman or chief magistrate. In the federal republic of the Seven United Provinces of the Netherlands, the stadhouder was himself the first magistrate or president of the Union. When several of the towns of Holland revolted against the tyranny of the Duke of Alba, the lieutenant of King Philip of Spain, they chose for their governor William, prince of Orange, swearing allegiance to him as the king's stadhouder, thus implying that they had revolted against the Duke of Alba and not against King Philip. But it was not until after the death of William, in 1584, that the three united provinces of Holland, Zealand, and Utrecht agreed to have one stadhouder in common, and appointed to that office Maurice of Nassau, son of the deceased William. (Puffendorf.) From that time the stadhoudership continued in the house of Nassau till the death of William III. in 1702, when the male line of William I. becoming extinct, the office remained vacant, and was considered as tacitly abolished. But in 1747, after a struggle between the republican and the Orange parties, the latter, having triumphed, proclaimed William IV., of a collateral branch of the Nassau family, hereditary stadhouder of the Seven United Provinces. His son William V. was expelled by the French in 1795, and resigned the stadhoudership by treaty with France in 1802, since which the office has not been revived, the republic of the Netherlands having been transformed into a kingdom. [NASSAU, HOUSE OF; NETHERLANDS.]

STAEL, ANNE GERMAINE DE, born at Paris in 1768, was the only child of Necker, the wealthy Genevese banker, and afterwards minister of finance to Louis XVI. Her mother, a Swiss lady, was a woman of considerable acquirements, and her house was resorted to by the men of learning or of wit who lived in Paris. Madame Necker began very early to subject her daughter to a systematic and laborious course of study, until the physicians prescribed relaxation as absolutely necessary for her daughter's health. Mademoiselle Necker, being now left to follow her own taste, applied herself to literary composition, for which she had a natural facility. Her first essays were some tales and plays, which were soon forgotten. In 1788 she published a work of higher pretensions, 'Lettres sur les Ouvrages et le Caractère de J. J. Rousseau,' which began to attract public attention. About this time she was married, through her mother's management, to the Baron of Stael Holstein, the Swedish ambassador at Paris, a nobleman of high character and attainments, but disproportionately older than herself. This marriage however gave her rank and independence; and when the French Revolution broke out, and her parents had retired to Switzerland, the baron's diplomatic character was a protection to his household, and Madame de Stael remained at Paris through the first storms of that period. Her warm imagination was at first captivated by the bright prospects of a revolution which promised the reform of abuses, but her generous nature soon shrunk from the sight of the more frightful abuses which took the place of the old ones. She wrote several articles on the factious conduct of the various parties, and upon their total disregard of the true meaning of liberty. Madame de Stael felt for the oppressed, who were at that time the nobles, the priests, and the royal family. She interested herself especially for the royal family; and she even ventured to publish a defence of the Queen Marie Antoinette, then upon her trial, 'Réflexions sur le Procès de la Reine,' August, 1793. But the triumph of the terrorists drove her at last out of Paris, to seek refuge in other countries. After the fall of the terrorists Madame de Stael returned to Paris, where she became the leader of a distinguished circle of literary men and politicians. Being anxious for the preservation of something like order and individual security, she gave the support of her influence to the existing government of the executive directory. But that government, without morality, sincerity, or dignity, was dying a natural death, when Bonaparte, after his return from Egypt, extinguished it by a bold manœuvre, and established a military dictatorship in its place. Madame de Stael appears to have disliked and mistrusted Bonaparte from the first, and her salon became the opposition club of the time. She is said to have encouraged Benjamin Constant and other members of the tribunate in their opposition to the projects of law presented by the executive, and to have publicly applauded them for their independent speeches. When the concordat with the pope was under negotiation, Madame de Stael loudly expressed her disapprobation, professing to see in it a new device of Bonaparte's growing tyranny. About the same time, being on a visit to her friends in Switzerland, she was supposed to have encouraged her father to publish his last work, 'Dernières Vues de Politique et de Finance,' in which he descanted against the government of a single man. The work was forbidden in France. At last Bonaparte, first consul, sent Madame de Stael an order to quit Paris, and not to come within forty leagues of it. Strange as it may seem, Madame de Stael, wealthy and independent, was sorely grieved at this prohibition; and she and her friends exerted themselves, though in vain, to have the order recalled. Bonaparte is said to have replied, that he left the whole world open to Madame de Stael, except Paris, which he reserved to himself. (Thibaudeau; Las Cases.) For Madame de Stael however the salons of Paris were her own element; she felt the want of applause, and of literary and fashionable celebrity; for she had as much ambition as Bonaparte himself, though of a different and more innocuous kind. She went first to Switzerland, and then travelled through Italy, where she gathered materials for her 'Corinne,' which is a poetical description of Italy in the shape of a novel. The work was much admired: it is eloquent and impassioned; and the authoress has sketched with great truth many peculiarities of the Italian character and habits, which had been overlooked, or misrepresented or caricatured by other travellers. Madame de Stael had already published a novel in 1803, entitled 'Delphine,' which, though powerfully written, is a work of very questionable morality, and she felt herself obliged to write an apology for it in her 'Réflexions sur le But moral de Delphine.' 'Corinne' displays a purer morality, and produces a much more elevating impression on the mind. As a work of fiction however it is decidedly weak: the plot is defective in arrangement, and deficient in dramatic power. The authoress has endeavoured to embody in some of her characters the national characters of their respective countries; she has succeeded in some, and has certainly failed in others. But as a descriptive work, a work of glowing and impassioned eloquence, on some of the most interesting topics with which man is concerned, religion, poetry, the beauties of nature, history, and love, as a poetical picture of a most poetical country, 'Corinne' has the highest merits, and they are of a permanent character.

After having published her book upon Italy, Madame de Stael, still debarred from Paris salons and Paris society, proceeded to visit and study a very different country—Germany, and after her return she composed her work 'De l'Allemagne,' in which she described the feelings, the literature, and the habits of the German people. This work was printed at Paris in 1810. The authoress was not allowed to go to Paris herself, but she was residing either at her seat at Coppet on the banks of the lake of Geneva, or in some provincial town of France forty leagues from the capital. The MS. was submitted to the censors, according to the existing laws, and after several passages had been expunged the publication was authorised; 10,000 copies were struck off, when suddenly the whole stock was seized at the publisher's, by gendarmes sent by Savary, Napoleon's minister of police, and suppressed by his order. Madame de Stael, who was staying at Blois, received at the same time order to quit France immediately. She retired to Coppet in Switzerland, whence she remonstrated with Savary against this arbitrary proceeding, which was illegal even according to the new law of Napoleon, as the minister might have seized a work which he considered dangerous, even after the censors had permitted its being printed, but he had no right to destroy it, being bound to refer the matter to the council of state. (Thibaudeau, *Empire*, c. 69.) Madame de Stael understood or imagined that one reason for this severity was her having omitted to mention the name of the emperor Napoleon and his invincible armies, which, Savary said, had become so familiar with Germany. Madame de Stael wrote from Coppet to Savary, saying that she did not see how the emperor and his armies could be introduced with propriety in a work purely literary. Savary's answer is characteristic of the man and the times; and it was prefixed by Madame de Stael to a new edition of her work in 1813. 'You must not seek for a cause of the order which I have signified to you in the silence which you have kept respecting the emperor in your last work, for there was no place in it worthy of him. Your exile is a natural consequence of your constant behaviour for years past. I have thought that the air of France was not suitable to you, for we are not yet reduced so low as to seek for models among the nations which you admire. Your last work is not French; and I have stopped its publication. I regret the loss which the bookseller will suffer in consequence, but I could not allow it to appear.' Independently of Madame de Stael's political opposition to Napoleon's arbitrary government, there was a decided antipathy between her turn of mind and literary taste and that of France in her time. French literature ever since the time of Louis XIV. had become exclusive and intolerant; it looked down upon the literature of other countries as semi-barbarous, and the national vanity had raised round itself a kind of Chinese wall of pedantic criticism, which had withstood all the storms of political and religious change. It suited the policy and the taste of Napoleon to encourage this feeling of overweening vanity, for as France was to be, according to him, the mistress of all Europe, and was to dictate laws to all nations, it was proper that the language and literature of France should be considered superior to those of all other countries. Madame de Stael, by extolling the literary productions of the Germans and English, had run against all the predilections and aspirations of the French and of Napoleon; and therefore Savary said, and said truly at the time, that 'her work was not French.' In the end however her work has become French, and her example has had a most beneficial influence upon French literature.

Madame de Stael remained for a time at Coppet, closely watched, even on Swiss ground, by the omnipresent French police. She was forbidden to stir more than ten leagues from her residence in any direction, and her friends were prohibited from visiting her, but at last she contrived to escape from thraldom, and went to Russia on her way to England; for at that time a person from the Continent wishing to reach England must find his way to it through the extremities of Europe. She has given an account of her wanderings and the petty but galling persecution to which she was subject, in her 'Dix Années d'Exil,' a work which, bating some egotism and exaggeration, may be useful to those who wish to form an accurate idea of Napoleon and his principles of government.

During her residence at Coppet, Madame de Stael, who had been many years a widow, became acquainted with M. de Rocca, of an old family of Geneva, whom she married privately. He was also an author, and published a book on the French war in Spain.

In 1814, after Napoleon's abdication, Madame de Stael returned to Paris, where she, Benjamin Constant, and her other old friends belonged to what was called the Constitutional party, which supported the charter of Louis XVIII. and a bonâ fide representative government, in opposition to the Bonapartists, who were conspiring for Napoleon, to the old revolutionists, who still dreamt of a republic, and to the ultra royalists, who wished to restore the absolutism of the antient monarchy. The return of Napoleon from Elba decided the question for the moment. Madame de Stael remained at Paris, and, as well as Benjamin Constant, appeared to be reconciled to Napoleon, thinking that he must now accommodate himself to a constitutional system of government. After his second fall, she returned to Switzerland, and seemed to have weaned herself from active politics. She occupied herself with preparing her last work for the press, 'Considérations sur la Révolution Française,' published after her death, which took place July 14, 1817. She was buried in the family tomb at Coppet. Her son, the Baron de Stael, who died in 1827, made himself known in France, under the Restoration, by his philanthropy, his attachment to constitutional liberty, and by some works of unpretending merit; among others, his 'Lettres sur l'Angleterre,' published in 1825.

Madame de Stael's book on the French revolution is one among the crowd of works on that all important subject which deserves to go to posterity. The authoress, being the daughter of Necker, and personally acquainted in early youth with the principal characters of that great drama, was well qualified to record in her after-life the reminiscences of that singular period. In her work she lays bare without bias the springs of action of the different individuals, and exposes the whole internal working of the political machinery, which people from the outside could not accurately understand. She had been, in fact, 'behind the scenes,' and she was afterwards raised by experience above the vulgar admiration of the crude experiments of the pretended republicans of France. Still her work is not comprehensive; it wants unity of purpose; it is rather a commentary, a book of remarks on the French revolution, than a history of that great event. Her principal object, and it is on her part an amiable one, though somewhat egotistical, was to justify the political conduct of her father M. Necker, an honest but certainly not a first-rate statesman, and one who was totally unfit for the exigencies of the times. Yet in other respects her work has much merit; it is written in a temperate and impartial tone, it bends to none of the short-lived powers of the times, and it exhibits philosophical as well as political acuteness. 'If she had,' says her friend Benjamin Constant, 'painted individuals more frequently and more in detail, her work, though it might have ranked lower as a literary composition, would have gained in interest.' Some of her characters, especially of the earlier period of the revolution, such as Calonne, Brienne, Mirabeau, Pethion, are most graphically sketched.

Madame de Stael wrote several other works. That 'On the Influence of the Passions,' published in 1796, although it contains many acute remarks, partakes of the unsettled morality of the times, being written just after the period of the reign of terror. In it she reflects upon the fearful vision that had just passed, and this work ought to be read as an appendage to her later work on the French revolution. She wrote also 'Réflexions sur le Suicide;' 'Essai sur les Fictions;' and several tales and other minor compositions. She contributed a few articles to the 'Biographie Universelle,' among which is that on 'Aspasia.' Her works have been collected and published in 17 vols. 8vo., Paris, 1830. As a literary person she was the most distinguished woman of her age. She was open to the weaknesses of ambition, but she was always independent, honest, and sincere.

STAFF, in Music. The five parallel lines and the four spaces between the lines, on which notes and other musical characters are placed, are, collectively, called the *Staff.*

STAFF, MILITARY. In the British empire this consists, under the king and the general commanding-in-chief, of those general, field, and regimental officers to whom is confided the care of providing the means of rendering the military force of the nation efficient, of maintaining discipline in the army, and regulating the duties in every branch of the service.

Besides the commander-in-chief, his military secretaries and aides-de-camp, the general staff consists of the adjutant and quartermaster-generals, with their respective deputies, assistants, and deputy-assistants; the director-general of the medical department, and the chaplain-general of the forces. The staff of the Ordnance department consists of the master-general and lieutenant-general, with their deputies and assistants; the inspector of fortifications, and the director of the engineers. The head-quarters for the general staff are in London. There are also, for the several military districts into which Great Britain is divided, inspecting field-officers, assistant adjutants-general, and majors of brigade, together with the officers attached to the recruiting service. The head-quarters for Scotland are at Edinburgh. For Ireland, besides the lord-lieutenant and his aides-de-camp, the chiefs of the staff consist of a deputy-adjutant and a deputy-quartermaster-general, with their assistants. Their head-quarters are at Dublin; and there are, besides, the several officers for the military districts of that part of the empire. Lastly, in each of the colonies there is a staff graduated in accordance with the general staff of the army, and consisting of the general commanding, his aides-de-camp, military secretaries, and majors of brigade, an inspecting field-officer, a deputy-adjutant, and a deputy-quartermaster-general.

The adjutant-general of the army is charged with the duty of recruiting, clothing, and arming the troops, superintending their discipline, granting leave of absence, and discharging the men when the period of their service is expired. To the quartermaster-general is confided the duty of regulating the marches of the troops, providing the supplies of provisions, and assigning the quarters, or places of encampment.

All military commanders of territories or of bodies of troops in Great Britain, Ireland, or in foreign stations, transmit periodically to the adjutant general of the army circumstantial accounts of the state of the territory and of the troops which they command; and the reports are regularly submitted to the general commanding-in-chief.

The staff of a regiment consists of the adjutant, quartermaster, paymaster, chaplain, and surgeon.

The duties of a military staff, as a branch of tactics, may be said to have originated in modern Europe during the reign of Louis XIV., when armies of great numerical strength were opposed to each other. The difficulty of finding subsistence for such vast bodies of men induced the generals to form them into grand divisions, which were quartered in different parts of a country. The art of war then began to consist in a great measure in making combined movements of troops, and in the choice of strong positions; and the Maréchal de Luxembourg is said to have been chiefly distinguished for his skill in conducting the operations of warfare on this principle. Maréchal Puysegur, who began to serve in 1677, observes that before his time, except the rules of fortification, no theory or established principles relating to the art of war had been given; and he appears to have been the first who, by actual observations of a country, made himself acquainted with the facilities which it afforded for marching or encamping. He states that this duty had till then been omitted entirely or negligently performed, the knowledge of the roads and positions being obtained only from the reports of officers who had accidentally made observations, or from the accounts of the country-people; and he adds that often, when a march had commenced, or an encampment had been formed, the army was compelled to change its route or abandon the position on account of impediments in the one or the unfitness of the other.

The first establishment of a permanent military staff (état majeur, as it was called) was made in France in 1783, about the conclusion of the Revolutionary war between Great Britain and the United States of America. The officers who held the highest rank in it were considered as assistant-quartermaster-generals, and their deputies as captains. The first duties consisted in collecting the reports, the orders and instructions which had formerly passed between the generals of the French armies and the minister of war, together with the plans of the ground on which the most important actions had taken place; and from these documents it was endeavoured to acquire a knowledge of the causes of success or defeat as far as these depended on the dispositions of the troops and the nature of the ground. The persons who were allowed to enter the department of the état majeur were such as, to a knowledge of the general theory of military tactics, added that of topographical surveying, and who were skilful in the art of representing on a plan the features of ground so as to present to the eye at once a view of its capabilities as a military position, and of the facilities which it might afford for the march of troops with their artillery and stores.

About the year 1800 the British government first formed a particular school for the purpose of instructing officers in the art of surveying ground in connection with that part of tactics which relates to the choice of routes and of advantageous positions for troops. These officers were independent of the master-general of the ordnance, and served under the orders of the quartermaster-general or adjutant-general; they were called staff-officers, and were selected from the cavalry or infantry after having done duty with a regiment at least four years. They were first employed in Egypt, where they rendered considerable service; and the school was afterwards united to the Royal Military College, which had been then recently instituted for the instruction of cadets who were to serve in the cavalry or the infantry of the line. At that institution a limited number of officers, under the name of the senior department, continue to be instructed in the duties of the staff, and in the sciences connected with the military art.

During the war in Spain, from 1808 to 1813, the staff-officers were constantly employed, previously to a march or a retreat, in surveying the country at least one day's journey in front of the army. After the death of the duke of York, the staff corps ceased to be kept up, and for several years it was reduced to a single company, which was charged with the duty of repairing the military canal at Hythe. This company was afterwards incorporated with the corps of sappers and miners.

The duties of officers belonging to the quartermaster-general's staff are very different from those of the military engineers; the latter are employed in the construction of permanent fortifications, batteries, and field-works; while the former survey ground in order to discover roads, or sites for military positions, for fields of battle, or quarters for the troops. The education of a staff-officer is such as may qualify him for appreciating the military character of ground: for this purpose he learns to trace the directions of roads and the courses of rivers or streams; and in mountainous countries to distinguish the principal chains from their ramifications, to examine the entrances of gorges, and to determine the heights of eminences or the depths of ravines. He has besides, to acquire a facility in determining or estimating the resources of a district with respect to the means it affords of supplying provisions or quarters for the troops [RECONNOISSANCE.]

The staff-officer ought also to know how to correct the illusions to which the eye is subject in examining ground, from the different states of the air, and the number and nature of the objects which may intervene between himself and those whose positions are required. He ought to be able to estimate the number of men whom a visible tract of ground can contain, and to form a judgment concerning the dispositions and stratagems which it may permit an army to put in practice.

STAFFA. This small basaltic island, lying west of the larger trap masses of Mull, once difficult of access in open boats only, may now, during the summer, be visited in well-equipped steamers from Oban and Tobermorie, and on the same day the voyager may land on Iona.

Staffa is entirely composed of amorphous and pillared basalt: the pillars have in many parts of the rugged coast yielded to the action of the sea, and permitted the formation of caves, some of them uncommonly picturesque, which are generally arched over by what seems to be amorphous trap rock, but really is often prismatised in an irregular manner. The island has a very irregular and unequal surface, affording poor pasture. On this detached narrow surface are boulders of granite resembling the red rock of Ross in Mull.

Staffa, since it was almost discovered in 1772, by Sir Joseph Banks, who in his letter to Pennant notices very accurately the mineral structure and the picturesque caverns and cliffs, has been visited and described by many persons of eminence. M'Culloch (*Geology of the Scottish Isles*) has published very elegant drawings of Fingal's Cave and several other points of picturesque and geological interest, and two of the best prints which we have seen of Fingal's Cave are those engraved by direction of the late Thomas Allan, Esq., and published in the article 'Geology' of the *Encyclopædia Britannica*.

Skirting in a boat the coast of Staffa, the frequent caves and ranges of pillars, erect, or curved beneath a huge entablature of rock, and the regular pavement formed by the angular sections of the pillars, astonish the spectator.

The Boat-Cave, Mackinnon's or the Cormorant Cave (it is much frequented by these birds), and Fingal's Cave, may, in ordinary weather, be explored in a boat, and a landing may be effected on Buachaillé (Boo-cha-la), the Herdsman's Isle, which is remarkable for its arched columns of basalt.

Fingal's Cave may be entered on foot, on the south side, along a rugged pavement of pillar-tops. Looking out from near the extremity, the eye is delighted with the bright prospect of Iona, through the long dark vista of the cave; above, the roof is formed partly of pillar-sections, and partly of the already mentioned amorphous trap; the sides are straight vertical prisms of basalt, washed at their base by a deep and often tumultuous sea.

The following measures in this celebrated spot are taken from Sir J. Banks's letter already referred to:—

	Feet.	Inch.
Length of Fingal's Cave, from rock without	371	6
Length of Fingal's Cave, from pitch of the arch	250	0
Breadth of Fingal's Cave, at mouth . . .	53	7
Breadth of Fingal's Cave, at farther end .	20	0
Height of arch at mouth	117	6
Height of arch at end	70	0
Height of an outside pillar	39	6
Height of one at the north-west corner .	54	0
Depth of water at the mouth	18	0
Depth of water at the bottom of the cave .	9	0

Direction of the cave north-east by east (magnetic).

On a careful survey of the rocky cliffs of Staffa, we see that the basaltic mass may be considered in three parts—a subjacent amorphous and lava-like mass, 11, 17, or 20 feet exposed, on which (especially beyond the north-west side of Fingal's Cave), the pillars, 30, 50, 54, 55 feet high, rest, and these are covered by a seemingly amorphous but really irregularly prismatic entablature, 30, 50, and 66 feet in thickness (Banks's measures). The tops of the pillars are usually in a nearly regular plane declining to the south-east, and their bases are also in a surface nearly parallel. The section of the pillars is rarely triangular or quadrangular, generally pentagonal or hexagonal. Some of them are 2 feet in diameter, others as small as 1 foot, 9 inches, or even 6 inches. They are less regularly jointed than those of the Giant's

Causeway, and most frequently the joint surfaces are concave in the lower stone. Zeolitic minerals occur sparingly in the basalt and in the interstices of the pillars.

(Pennant's *Tour in Scotland*, including Banks's *Letter to Pennant*, 1772; Neceer, *Voyage en Ecosse*, 1821; M'Culloch's *Western Isles of Scotland*.)

STAFFORD, Duke of Buckingham. [BUCKINGHAM.]

STAFFORD, WILLIAM HOWARD, VISCOUNT, was the second surviving son of Thomas, twentieth earl of Arundel (the collector of the Arundelian Marbles), by his wife the lady Alathea Talbot, daughter of Gilbert, seventh earl of Shrewsbury: he was born on the 30th of November, 1612. He was thus uncle to Thomas, the twenty-second earl of Arundel, who was restored, after the return of Charles II., to the dukedom of Norfolk, which had been forfeited by his great-great-grandfather.

Burnet, who knew Lord Stafford in his last days, says, 'He was a weak but a fair-conditioned man; he was in ill terms with his nephew's family; and had been guilty of great vices in his youth, which had almost proved fatal to him.'

While he was known as Sir William Howard, K.B., he married Mary, sister of Henry, thirteenth Baron Stafford; which Henry died, unmarried, in 1637, when his barony descended to his distant relation Roger Stafford, a person who appears to have sunk to the lowest class of the people, though the great-grandson of the famous Edward Stafford, third duke of Buckingham, and also of Margaret Plantagenet, the unfortunate countess of Salisbury, and niece of King Edward IV. Roger's sister was married to a joiner at Newport, in Shropshire, and they had a son who lived in that town, following the trade of a cobbler. Nor had the elder branch of the family, in which the title remained for several generations, been always much more honourably matched: Roger's uncle, Edward, the eleventh lord, indeed married a daughter of the earl of Derby; but his son, Edward, the twelfth lord, chose to share his title with his mother's chambermaid; and from her, through a son, who died during the life of his father, were sprung the thirteenth baron, Henry, already mentioned, and his sister, who became the wife of Sir William Howard.

Upon the death of his brother-in-law, Sir William Howard immediately assumed, or at least claimed, the title of Baron Stafford, in right of his wife, a claim which, in any circumstances, certainly could not have been sustained at that day. But it was soon discovered, and admitted on all hands, that the true heir to the barony survived in the person of Roger Stafford, although he had hitherto gone by the name of Fludd or Floyd. Roger however was induced, no doubt for a consideration, to submit his title to the dignity, on the 5th of December, 1637, to the decision of the king, 'upon which submission,' it is stated, 'his majesty declared his royal pleasure that the said Roger Stafford, having no part of the inheritance of the said Lord Stafford, nor any other lands or means whatsoever, should make a resignation of all claims to the title of Lord Stafford, for his majesty to dispose of as he should see fit.' A deed of surrender was accordingly enrolled on the 7th of December, 1639; and, although such a resignation of a peerage has since been decided to be illegal, the king now considered himself at liberty to dispose of the dignity. On the 12th of September, 1640, Sir William Howard was created baron, and his wife baroness Stafford; and on the 11th of November following Lord Stafford was made a viscount, that being found to be the only way of giving him as high a precedency as the former barons. Roger is supposed to have died unmarried in the course of the same year.

Lord Stafford had been bred a strict Roman Catholic, and during the civil war he adhered to the royal side. After the Restoration, according to Burnet, 'he thought the king had not rewarded him for his former services as he had deserved; so he often voted against the court, and made great applications always to the earl of Shaftesbury. He was on no good terms with the duke [of York]; for the great consideration the court had of his nephew's family made him to be the most [more?] neglected.' He does not however appear to have ever made any figure in parliament down to the time when all the Roman Catholic peers, twenty-one in number (besides three who conformed), were excluded from the House by the act of the 30th of Char. II., st. 2, to which the royal assent was given on the 30th of November, 1678.

Under date of 18th June, 1670, Evelyn records in his 'Diary' that he met Lord Stafford at a dinner party at Goring House (the town residence of Lord Arlington); when, he says, 'Lord Stafford rose from table in some disorder because there were roses stuck about the fruit when the desert was set on the table, he having such an antipathy to them as once Lady St. Leger had; and to that degree that, as Sir Kenelm Digby tells us, laying but a rose upon her cheek when she was asleep, it raised a blister; but Sir Kenelm was a teller of strange things.

Lord Stafford is only remembered in history as the last and most distinguished of the numerous victims whose lives were sacrificed in the tragedy of the Popish Plot. [OATES, TITUS.] In his first examination before the Commons, on the 23rd of October, 1678, Oates mentioned Stafford as the person who had been appointed by the general of the Jesuits to the office of paymaster of the army. Two days after, Stafford rose in his place in the House of Lords, and stated that he was informed there was a warrant issued out from the lord chief justice of England to apprehend him, and submitted himself to their lordships' judgment. Burnet says, 'When Oates deposed first against him, he happened to be out of the way, and he kept out a day longer; but the day after he came in and delivered himself, which, considering the feebleness of his temper and the heat of that time, was thought a sign of innocence.' Before the House rose he intimated that he should surrender to the warrant; and after being consigned in the first instance to the prison of the King's Bench, he was ultimately, on the 30th, committed to the Tower, along with the other accused noblemen, the earl of Powis, and the Lords Petre Arundel, and Belasyse.

On the 5th of December, a message was brought from the Commons by Sir Scrope How, who informed their lordships that he was commanded to impeach Lord Stafford of high treason and other high crimes and misdemeanours. Three days after the earl of Essex laid before the house an information which had been sworn on the 24th before two magistrates of the county of Stafford by 'Stephen Dugdale, Gent., late servant of the Lord Aston, of Tixhall,' who asserted therein that in the beginning of September of the preceding year, he had been promised a large reward by Lord Stafford and a Jesuit of the name of Vrie or Evers, if he would join in a conspiracy to take the king's life. The prorogation of the parliament at the end of the month, and its dissolution a few weeks after, prevented any further proceedings being taken until after the assembling of the new parliament in the beginning of March, 1679. On the 18th of that month the lords' committee of privileges, to whom the question had been referred, reported their opinion 'that, in all cases of appeals and writs of error, they continue and are to be proceeded on *in statu quo*, as they stood at the commencement of the last parliament, without beginning *de novo*;' and on the following day the house, after debate, agreed to this report. The commons sent up their articles of impeachment against the five lords on the 7th of April; and on the 16th Lord Stafford put in his answer, in which he protested his entire innocence of the crimes laid to his charge. Another prorogation, followed by a dissolution, took place in the end of May; and the new parliament did not meet for the despatch of business till October, 1680. During all this time the accused lords had lain in the Tower; and meanwhile the plot had been propped up by the testimony of Bedloe, Dangerfield, Turberville, Denis, and other new witnesses. At last, on Tuesday, the 30th of November (his birth-day), Lord Stafford, selected, according to Sir John Reresby, as being 'deemed to be weaker than the other lords in the Tower,' was brought to the bar of the House of Lords, assembled as a court of justice in Westminster Hall, to take his trial, the lord chancellor, Lord Finch (afterwards earl of Nottingham), presiding as lord high steward. Reresby and Evelyn were both present, and have both given us an account of the scene. A singular circumstance mentioned by Evelyn is, that Stafford's two daughters, the marchioness of Winchester being one of them, were with him in his box, as well as the lieutenant of the Tower, the axe-bearer, and the guards.[*] He remarks also that just forty years before, when Lord Strafford was tried in the same place, the lord steward was the present prisoner's father (the late earl of Arundel). Reresby says it was the deepest solemnity he ever saw. Besides Oates and Dugdale, who repeated their former evidence with additions or variations, Turberville swore that Stafford had also offered him a reward to kill the king. The trial lasted seven days. Reresby says that the prisoner so far deceived those who counted upon a poor defence, 'as to plead his cause to a miracle.' Burnet also, who, we have seen, had no high opinion of Stafford's strength of mind, admits that he 'behaved himself during the whole time, and at the receiving his sentence, with much more constancy than was expected from him.' When the votes of their lordships were taken, on Tuesday, the 7th of December, 31 voted Not Guilty, and 55 Guilty. (*State Trials*, vii., 1293-1576.) Four of the Howards, his relations, namely, the earls of Carlisle, Berkshire, and Suffolk, and Lord Howard of Escrick, condemned him; the only one of his own family who voted for his acquittal was Lord Arundel (sitting as Lord Mowbray), the son of the duke of Norfolk.

---

[*] In the printed 'Diary' at this place (vol. i., p. 496, 4to edit.), the prisoner is by mistake called Lord Strafford throughout.

Within two days after his condemnation he sent for Burnet and the bishop of London, to whom he made the most solemn protestations of his innocence. 'I pressed him in several points of religion,' says Burnet, 'and urged several things which he said he had never heard before. He said these things on another occasion would have made some impression upon him; but he had now little time, therefore he would lose none in controversy: so I let that discourse fall. I talked to him of those preparations for death in which all Christians agree; he entertained these very seriously, much above what I expected from him.' However, he was desirous of saving his life, if it could be done; and he told Burnet, that if that would obtain his pardon, he could and would discover 'many other things that were more material than anything that was yet known, and for which the duke [of York] would never forgive him.' Upon this being reported to the House of Lords, he was immediately sent for; when 'he began,' says Burnet, 'with a long relation of their [the Catholics'] first consultations about the methods of bringing in their religion, which they all agreed could only be brought about by a toleration. He told them of the earl of Bristol's project; and went on to tell who had undertaken to procure the toleration for them; and then he named the earl of Shaftesbury. When he named him, he was ordered to withdraw; and the lords would hear no more from him.' It is pretty evident from all this that he really had nothing of any consequence to tell. 'He was sent back,' continues Burnet, 'to the Tower; and there he composed himself in the best way he could to suffer, which he did with a constant and undisturbed mind: he supped and slept well the night before his execution, and died without any show of fear or disorder. He denied all that the witnesses had sworn against him.' He was executed on Tower Hill on the morning of Wednesday the 29th of December. When his majesty's writ was found to remit all the rest of the sentence except the beheading, the two republican sheriffs, Bethel and Cornish, professed to feel scruples as to whether they were warranted in acting upon it; but the Commons at last stepped in and settled the matter by resolving 'That this House is content that the sheriffs of London and Middlesex do execute William, late Viscount Stafford, by severing his head from his body only.' Lord Russell is stated to have 'stickled for the severer mode of executing the sentence;' and it is said that when Charles, three years after, granted a similar commutation of punishment when his lordship was sent to the scaffold, his majesty observed, 'He shall find that I have the privilege which he was pleased to deny in the case of Lord Stafford.'

A bill to reverse the attainder of Lord Stafford passed the Lords in 1685, but did not obtain the assent of the Commons. In 1688 his widow was created by James II. countess of Stafford for life, and her eldest son Henry, earl of Stafford, with remainder to his brothers John and Francis, and their heirs male; but the earldom became extinct by the death of John Paul, the fourth earl, in 1762. In 1800 certain proceedings were instituted on behalf of Sir William Jerningham and the lady Anastasia Stafford Howard, daughter of William, second earl of Stafford, and great-granddaughter of the attainted lord (who died a nun at Paris in 1807, at the age of 85), as conjoint heirs, with a view of establishing the existence of the barony of Stafford, on the ground that (as above stated) it had been conferred not only upon Sir William Howard, but also upon his wife, and that therefore it descended to her heirs, notwithstanding the forfeiture of her husband. But this claim was not prosecuted. At length however on the 17th of June, 1824, an act of parliament was passed reversing the viscount's attainder; and the following year Sir George William Jerningham, Bart., was admitted to have established his claim as heir to the barony (which had been granted with remainder to the heirs of Sir William Howard and his wife), through their granddaughter Mary, who married Francis Plowden of Plowden, Esq., in the county of Salop, and was the maternal grandmother of Sir William Jerningham.

STAFFORD. [STAFFORDSHIRE.]

STAFFORDSHIRE, a midland county of England, bounded on the north-east by Derbyshire, on the east for a very short distance by Leicestershire, on the south-east by Warwickshire, on the south by Worcestershire, on the south-west and west by Shropshire, and on the north-west by Cheshire. The form of the county is irregular; its greatest length is from north to south, from Ax-edge Common, at the junction of the three counties, Cheshire, Derbyshire, and Staffordshire, to the neighbourhood of Bewdley (Worcestershire), 60 miles; the greatest breadth at right angles to the length, is from the junction of the Dove with the Trent, below Burton, to the neighbourhood of Market-Drayton (Shropshire), 38 miles. The southern border of the county is very intricate; the counties of Warwick, Worcester, Salop, and Stafford being very much complicated: a portion of Worcestershire, including the town of Dudley, is entirely insulated by Staffordshire, and a detached portion of Staffordshire is entirely surrounded by Worcestershire. The area of the county is estimated at 1184 square miles. The population at the time of the different enumerations was as follows:—1801, 239,153; 1811, 295,153; increase in ten years, 21 per cent.: 1821, 345,895; increase 17 per cent.: 1831, 410,512; increase 19 per cent: 1841, 510,206; increase 24·2 per cent. The last enumeration for 1831 (which we retain to facilitate comparison with counties previously described) gives 347 inhabitants to a square mile. In respect of size it is the eighteenth of the English counties, being smaller than Gloucestershire, but larger than the county of Durham. In amount of population (in 1831) it is the seventh, being next to Kent; and in density of population the fifth, being exceeded in this respect only by the metropolitan counties of Middlesex and Surrey, and the counties of Lancaster and Warwick. Stafford, the county town, is 125 miles north-west of the General Post-office, London, in a direct line; or 143 miles by the Birmingham and Grand Junction railways.

Surface and Geology.—The northern is the highest part of the county. It consists chiefly of wild moorlands, formed by long ridges extending from north-west to south-east, separated from each other by deep dells or by valleys watered by the tributaries of the Trent, and gradually subsiding towards the banks of that river. The principal summits are—Cloud-end, Biddulph Moor, Mow Cop (1091 feet above the level of the sea), Wicken Stones, Gun Moor, Bunster hill (given in Shaw's *History of Staffordshire* at 1200 feet), and High Roches, all in the northern part of the county toward the Cheshire border; Moredge, Caldon Low, Ecton hill, Ramshaw Rocks, Wever hill (1154 feet, as marked in Arrowsmith's 'Map of England;' or 1500 feet according to Shaw), and Swinecote or Swinscoe hill, are also in the northern part, but nearer to the Derbyshire side. On the eastern side of the county, between Abbots Bromley and Burton-upon-Trent, are the high grounds of Needwood Forest; and south of the Trent, toward the centre of the county, between Stafford and Litchfield, are the high grounds of Cannock Chase, one part of which (Castle Ring) is 715 feet high.

On the south-eastern border, between Walsall and Sutton Coldfield, is Bar Beacon, an elevation of 653 feet; and between Dudley and Hales Owen are the Rowley hills, given by Shaw at 900 feet. These Rowley hills are the prolongation of the heights which rise to the south-east of Wolverhampton, and skirt the valley through which the Birmingham Canal Navigations pass.

The western side of the county is occupied by a tract of high ground, which separates the waters that flow westward by the Severn into the Atlantic from those which flow eastward by the Trent and the Humber into the North Sea. Ashley heath, on this range of high land, has an elevation of 803 feet, as marked in the map to Priestley's 'Navigable Rivers.' The heights, where not otherwise expressed, are from the 'Ordance Survey.' Those from Shaw's 'Staffordshire' are probably much too great.

The lowest spots in the county are probably the bank of the Severn at Over Arley, at the south-west extremity of the county, and the bank of the Trent, at the junction of the Dove, on the eastern border. These are given by Shaw at 60 feet and 100 feet respectively above the level of the tide of the Thames at Brentford.

Nearly the whole of the county is included in the great red-marl or new red-sandstone district of central England. The northern part is indeed beyond the limit of this formation; and there are some insulated districts occupied by the coal-measures or other subjacent formations, which rise through the red-marl. The higher grounds of Needwood Forest and Cannock Chase, as well as those which separate the basin of the Trent from that of the Severn, consist of this (red marl) formation. Gypsum is quarried in Needwood Forest and in the adjacent part of the valley of the Dove. The pure white gypsum, or that slightly streaked with red, yields plaster of Paris, which is much used in the potteries for moulds; selected blocks are turned, or otherwise converted into ornamental articles. The commoner sorts are used for coarser purposes, as flooring, building walls, &c. Limestone is quarried near Newcastle, in the pottery district. Brine-springs abound near the Trent, particularly at Weston, near Stafford, where salt-works have been established. In the neighbourhood of Litchfield the red marl is covered by alluvial deposits of red sand or gravel.

The Dudley or South Staffordshire coal-field extends from Cannock Chase to the Worcestershire border near Stourbridge, about 20 miles in length from north by east to south by west; and from King's Swinford to Soho, near Birmingham, 10 miles in breadth from west to east. The dimensions indeed include not only the coal-field itself, but the Rowley hills, which are composed of transition and other rocks, by which it is intersected. These hills consist of two different formations: the north-western part, between Wolverhampton and Dudley, consists of four oblong insulated hills, all of transition limestone, in arched or saddle-shaped strata. Against the sides of these hills the coal-beds crop out, and become flatter as they recede from them. The millstone grit, carboniferous limestone, and old red-sandstone are not found in connection with this coal-field, but the coal measures rest immediately on a transition rock. The hills south-east of Dudley consist of one mass of basalt and amygdaloid, round which the coal-measures do not crop out, as round the limestone, but preserve their usual level in approaching it. The basalt is very pure, and is locally termed Rowley rag. It is quarried for mending the roads and paving the streets of Birmingham. It is supposed that this mass of trap rock is connected with a vast dyke penetrating the carboniferous strata, and overlying (as it is found to do) their edges. Trap rock (greenstone) is found in that part of the coal-field near Walsall; it is apparently part of a thick vertical greenstone dyke, with a wedge-shaped prolongation penetrating the adjacent carboniferous strata. The coal of the southern part of the Dudley field is distinguished by the occurrence of an extensive bed called the Main-coal, 30 feet thick, but this dips to the south, and crops out at Bilston. In the northern part of the field seams of coal are found four, six, and eight feet thick, which appear to be subjacent to the main coal. On the east side of the coal-field, near Walsall, the transition limestone again rises, and the carboniferous beds crop out against it. At Beaudesert, at the northern extremity of the field, cannel coal is obtained.

In the northern part of the county another coal-field (the Pottery coal-field) occurs, of triangular form. It extends from Lane-end in the Potteries to Congleton in Cheshire, where is the vertex of the triangle, 13 miles in length from south by east to north by west. Its greatest breadth, which is in the southern part, forming the base of the triangle, is 8 or 10 miles. A short distance to the east of this is the Cheadle coal-field, so called from the town of Cheadle, which lies near its south-western border. This small coal-field appears to be an insulated basin, the strata dipping towards Cheadle as a centre, and resting upon millstone grit. In the southern part, near Cheadle, the coals are thicker and of better quality than in the northern part of the field. From the dip and outcrop of the strata on the northern part of the Pottery coal-field, it appears to be also an insulated basin, but it is not ascertained whether on the south side the strata crop out so as to show this decisively; or whether they are terminated by a fault, or covered by the red-marl and other superior beds. There are thirty-two beds of coal in this field, generally from three to ten feet thick.

A prolongation of the South Lancashire coal-field extends into the northern part of the county about Flash, where are several coal-works. The Warwickshire coal-field just touches the border near Tamworth.

The coal-works of the county are very numerous and important; in the south they supply the iron and other hardware manufactures of Birmingham, Dudley, Wolverhampton, Wednesbury, Bilston, Walsall, &c.; and furnish fuel to the neighbouring counties to a considerable distance, and in the north they supply the fuel to the Pottery district. Perhaps the neighbourhood of Birmingham is the cheapest district for coals in England, and the consumption is prodigious. From their small value, they are worked in a very wasteful manner; one-third is left in the pit, as being too small to be worth the cost of removal, and is speedily destroyed by the weather; the pillars left standing probably amount to another third. Ironstone is abundant in the Dudley coal-field.

The high moorlands of the northern part of the county consist partly of millstone grit and shale; partly of carboniferous or mountain limestone. The millstone grit occupies the central and western portion, cropping out from beneath the Pottery and Cheadle and South Lancashire coal-fields, and overspreading the intervening country. The mountain limestone district comprehends the eastern moorlands, and extends across the upper valley of the Dove into Derbyshire. There are several lead-mines and copper-mines in this district.

Hydrography, Communications, &c.—The county belongs almost entirely to the basin of the Humber. The Trent, the most important tributary of that æstuary, rises from three springs near the northern border of the county, near Knypersley Hall; and runs in a southerly direction through the Potteries 12 miles, to Trentham, the seat of the Duke of Sutherland. From thence it runs 18 miles, still to the south-east, by Stone and Rugely, being joined above the latter by the river Sow. From Rugely the Trent bends eastward 10 miles to the junction of the Tame and the Mease, and then turning to the north-east runs 8 miles to Burton, where it becomes navigable; and 2 or 3 miles below Burton quits the county altogether. Its whole length in the county or upon the border (for from the junction of the Mease it is a border stream separating Derbyshire from Staffordshire) may be estimated at about 50 miles.

The principal tributaries of the Trent are the Lyme from Newcastle-under-Lyme, the Sow, the Blyth, the Tame, the Mease, and the Dove. The Lyme joins the Trent on the right bank, not far from its source. The Mease has only a part of its course on the border of the county.

The Sow rises about 5 or 6 miles north-west of Eccleshall, near the western border of the county, and flows to that town, near which it receives one or two tributary brooks; it then continues its course 3 or 4 miles to the junction of the Meese brook, which rises near the Sow, and has a course nearly parallel to it, but of rather greater length, and joins it on its left or north-east bank. From the junction of the Meese, the Sow flows, still south-east, 6 miles through the town of Stafford to the junction of the Penk, receiving by the way the Clanford brook on the right bank. The Penk, the most considerable affluent of the Sow, rises a little to the north-west of Wolverhampton, and flows 20 miles northward through Penkridge into the Sow, which it joins on the right bank. From the junction of the Penk, the Sow flows eastward 4 miles into the Trent, which it joins on the right bank. Its whole course is about 19 or 20 miles: it is not navigable.

The Blyth rises about four miles east of Hanley in the Potteries, and flows south-south east 23 or 24 miles into the Trent, which it joins on the left bank, 5 miles below Rugely.

The Tame rises in Essington-Wood, 4 miles north-west of Walsall, and flows 15 miles south-east, passing between Walsall and Wednesbury to Aston, a suburb of Birmingham, where it receives on the right bank the brook Rea, which flows through Birmingham itself. From the junction of the Rea the Tame flows eastward 8 miles, to the junction of the united streams of the Cole from Coleshill, 16 miles long, and the Blyth (about the same length) from Solihull, which join the Tame on the right bank. The Tame then turns northward and flows about 19 miles, by Tamworth, where it receives the Anker on the right bank, into the Trent, which it joins on the right bank; its whole course is about 42 miles· partly in Warwickshire, but chiefly in Staffordshire.

The Dove rises near the northern extremity of the county, and flows south-south-east by or near Longnor, Ashbourn (Derbyshire), and Uttoxeter, into the Trent below Burton, dividing through nearly its whole course the counties of Derby and Stafford: its length is nearly 45 miles. It is not navigable. The upper part of its course is through the beautiful scenery of Dovedale on the border of the Peak. It receives some tributaries, of which the Manifold and the Churnet belong to Staffordshire. The Manifold, about 9 miles from its source, sinks into the ground, and after a subterraneous course of 4 miles rises again near Ilam, a mile or two before its junction with the Dove; its tributary, the Hamps, sinks in like manner, and the junction of the two streams takes place underground. The length of the Churnet is about 25 miles; it rises on Biddulph Moor, 5 miles north-west of Leek, and soon after expands into a sheet of water or lake, from the lower end of which it continues its course by Leek, Cheddleton, Oakamoor, Alveton (or Alton), and Rocester, a little way below which it joins the Dove.

The western border of the county belongs to the basin of the Severn, which flows for about two miles across the south-western corner of the county, near Over Arley. About 14 miles of the course of the Stour (which rises near Hales Owen (Salop), and joins the Severn at Stourport) are on or within the southern border of the county, to which its tributary, the Smestow, which rises near Wolverhampton, wholly belongs. The Mees, which joins the Tern, an important affluent of the Severn, rises in Staffordshire. It passes through Aqualate Mere (*Aqua lata*, i.e. broad-water), a small lake about a mile long, and nearly half a mile wide, near Newport, in Salop.

The rivers abound with fish, such as pike, trout, grayling, chub, perch, &c. Salmon are caught in the Severn, and occasionally in the Trent; and there are a few instances on record of sturgeon being taken in the latter river.

The canals of this county are numerous. The most important is the Trent and Mersey, or, as it is sometimes called, the Grand Trunk canal. This canal, commencing in the Trent at the junction of the Derwent in Derbyshire, enters the county near the junction of the Trent and Dove, and follows the valley of the Trent through the heart of the county, to Stoke in the Potteries, from whence it continues its course north-west to the Mersey, at Runcorn Gap. About 50 miles of its course, including the Harecastle tunnel, 2880 yards long, on the summit-level between Burslem and Church Lawton in Cheshire, belong to Staffordshire. It passes near Burton-upon-Trent, where there is a cut to the river Trent, Rugeley, Stone, and Stoke, Hanley, and Burslem in the Potteries.

The Birmingham canal and the Birmingham and Liverpool Junction canal may be regarded as forming another important line, entering the county near Birmingham, and passing through the iron and coal district, by Dudley and Wolverhampton, and then running north-west into Shropshire. The length of this line may be estimated at about 32 miles. The first part of it, from Birmingham to the Staffordshire and Worcestershire canal, in the neighbourhood of Wolverhampton, is included in the Birmingham Canal Navigations (first act obtained A.D. 1766), and is remarkable for the great number of short cuts or branches to the coal-pits or iron-works of the district; there are longer branches to Wednesbury, almost useless from a part of it having fallen in, and to Wolverhampton. The first act for the Birmingham and Liverpool Junction canal, which commences in the Staffordshire and Worcestershire canal, was obtained A.D. 1826; and the canal was in course of execution at the publication (A.D. 1831) of Priestley's 'Historical Account of Navigable Rivers and Canals.'

These two main lines of canal navigation may be considered as belonging to the county at large: the following appertain to the coal and iron districts of South Staffordshire.

The Staffordshire and Worcestershire canal was executed under an act obtained A.D. 1766. It commences in the Severn at Stourport, and, after passing by a tunnel under the town of Kidderminster, it enters Staffordshire near the village of Whittington, follows the valleys of the Stour and the Smestow, passes near Wolverhampton, in the neighbourhood of which is its summit-level, and then follows the valleys of the Penk and the Sow, until it joins the Trent and Mersey canals, near the junction of the Sow and the Trent. Its length in this county is nearly 40 miles. It passes near the towns of Penkridge and Stafford; and intersects the line of the Birmingham canal and the Birmingham and Liverpool Junction canal, which both terminate in it about a mile from each other. The trade on this canal is very great: the iron and other hardwares of Birmingham, Dudley, Wolverhampton, and the neighbourhood, and the coals of the adjacent coal-field, are conveyed by it to the remoter parts of the county of Stafford, and to the counties o Worcester, Gloucester, and others adjacent to the Severn.

The Stourbridge canal (first act obtained A.D. 1776) commences in the above canal at Stewponey, and extends t the town of Stourport. This canal is short. The Dudley canal (first act A.D. 1776) commences in the Birmingham and Worcester canal (which, though not in this county, is connected with the Birmingham canal noticed above), and proceeds to Dudley. A part only of the line is in Staffordshire. A cut unites it with the Stourbridge canal, and consequently with the Staffordshire and Worcestershire canal.

The first part of the Coventry canal (first act A.D. 1768), viz. from its commencement in the Trent and Mersey canal at Fradley Heath to Fazeley near Tamworth, 11 miles in length, belongs to this county. At Fazeley it unites with the Birmingham and Fazeley canal (first act A.D. 1783), which forms a part of 'the Birmingham Canal Navigations,' and of which only a small part is in Staffordshire.

The Wyrley and Essington canal (first act 1792) consisted at first of a short line running south-south-east from Wyrley Bank to Birch Hill near Walsall; with a cut westward to the Birmingham canal near Wolverhampton. Subsequently (by act of 1794) another cut was made eastward to the Coventry canal between Fradley Heath and Fazeley: and these two cuts may now be regarded as constituting the principal line. There are one or two branches, the longest is to the lime-works at Hay Head near Walsall; and the extremities of the original main line are now virtually branches.

The Newport branch of the Birmingham and Liverpool Junction canal belongs partly to the west side of the county: it extends from the main line at Norbury near Eccleshall, by the town of Newport (Salop), to the Shrewsbury canal near Wellington (Salop). Its length is 10 miles, of which about 4 miles are in this county.

In the northern part of the county is the Caldon canal (acts obtained A.D. 1776-1802), which is a branch of the Trent and Mersey canal, extending from the main line at Hanley in the Potteries north-eastward to the neighbourhood of Leek, to which town there is a cut; and from thence south-eastward to Uttoxeter, in the valley of the Dove.

The Newcastle-under-Lyme (or Lyne) canal is a short canal from the Trent and Mersey canal at Stoke-upon-Trent to Newcastle-under-Lyme. The Gresley canal (private property) is another short canal, and extends from the Apedale coal-works to Newcastle-under-Lyme. The Newcastle-under-Lyme Junction canal unites these two. The act for the Gresley canal was obtained A.D. 1775, for the Newcastle canal A.D. 1795, and the Junction canal A.D. 1798.

There are several railways in the county. Some of those of earliest formation are connected with the canals above described, to which they convey coal or other minerals. The Grand Junction railway (from Birmingham to the Manchester and Liverpool railway at Newton) passes through the county from the neighbourhood of Birmingham, by or near the towns of Walsall, Bilston, Wolverhampton, Penkridge, and Stafford, and through the Potteries into Cheshire. About 50 miles of its length are in Staffordshire. This railway was constructed and is managed under acts obtained A.D. 1829 to 1840, and was opened throughout in July, 1837.

The Birmingham and Derby Junction railway crosses the east side of the county from the neighbourhood of Tamworth to the neighbourhood of Burton. The acts for this were obtained A.D. 1836 to 1840, and the line was in great part opened A.D. 1839. It is carried by a viaduct nearly a quarter of a mile long over the rivers Tame and Trent near their junction.

The Birmingham and Manchester railway (acts obtained 1837 and 1839) commences at Manchester, and was to have passed by a new line through the Potteries, but this part has been abandoned; and it is to unite with the Grand Junction line at Crew in Cheshire, so that as a distinct line it has no connection with Staffordshire.

The principal coach-road in the county is the parliamentary road from London to Holyhead, which enters Staffordshire at Soho, near Birmingham, and runs through Wednesbury, Bilston, and Wolverhampton, a few miles beyond which it enters Shropshire. The Chester and Holyhead road enters the county at Tamworth, and runs by Lichfield, Rugely, Wolseley Bridge, Stafford, Eccleshall, and Knighton, into Shropshire. The London and Liverpool road, branching from this at Wolseley Bridge, runs through Stone and Newcastle-under-Lyme into Cheshire. The road from London by Derby to Manchester crosses the northern part of the county through Leek. The road from Birmingham to Derby, part of the line which connects the south-western with the northern counties, passes through Lichfield and Burton-upon-Trent. All these, before the formation of railways, were mail-coach roads. Other roads are too numerous for notice.

On the whole, there is perhaps not one of the midland counties better provided with the means of communication than Staffordshire; and this is the more remarkable, as, with the exception of the Trent, and that only for a very few miles, it has not a single navigable river. All the means of communication, with this trifling exception, are works of art, and have been for the most part called forth by the mineral wealth of the county and its two great branches of manufacturing industry, the iron-manufacture of the south and the potteries of the north.

Agriculture.—The air of this county is sharp in comparison with those which are situated to the south of it, and at the same time the county is more subject to continued rains, which make the crops later and the harvest more precarious. The quantity of rain which falls in the neighbourhood of London during the year is equal to twenty or twenty-one inches on an average, but in Staffordshire the average is about thirty-six inches. From this it is apparent that the heavy soils, and those which are situated on impervious subsoils, require very complete draining before they can be made productive, whatever may be the natural fertility of the surface. The western parts of England are in general more rainy than the eastern; and in this respect Staffordshire must be reckoned with the former. One cause of this are the high lands which traverse the country, and arrest the vapours which blow from the Atlantic. The middle and southern portions of the county are comparatively flat, and have only gently undulating hills. This portion also contains the most fertile lands, and is in the best state of cultivation.

The county is estimated to include a surface of 780,800 acres, of which in round numbers about 150,000 are in roads, wastes, and woods. The remainder, or about 630,800, are productive as arable land or pasture, in which last must be included all the parks around the habitations of noblemen and gentlemen of fortune, of whom there are a considerable number in the county. The proportion of the arable land to the pasture is nearly as five to one. Of the first, two-fifths consist of clays and heavy loams; two-fifths of gravelly and sandy loams, and one-fifth of light gravel and sand, chiefly good turnip land, but not so productive of wheat. An excellent vein of marl lies near Stafford Castle and Eccleshall. The Trent traverses a great portion of the county, and receives the tributary streams of the Dove, which is noted for its fertile banks; it also receives the waters of numerous other streams which have been already mentioned. The Severn touches the southern part of the county, and receives the waters of the Stour and Smestall. There are rich meadows on the banks of all these streams.

There are estates in Staffordshire of all sizes, from that of the rich man with a rental of 10,000*l.* per annum and more, to the small yeoman who lives by the cultivation of a spot of ground which has been the property of his forefathers for many generations. The hired farms are likewise of all sizes. Leases of farms for fourteen and twenty-one years are common.

In the Agricultural Report of the county, published in 1796, it is stated that the large farmers use broad-wheeled waggons, in which six horses, harnessed two and two, draw a load of three or four tons. The improved roads now-a-days enable the farmer to draw by means of single-horse carts upwards of six tons, or double the old load, with the same number of horses.

The ploughs commonly used in Staffordshire are those which have two unequal wheels attached to the beam, and which are also known by the name of Rutland ploughs. They can be so adjusted that they require no ploughman to hold them, excepting when they are to be turned into a fresh furrow. Double ploughs, making two furrows at once, are likewise used where the soil is very light and loose. Other modern implements, such as scarifiers, drills, and horse-hoes, are introduced on the larger farms, especially those in the hands of proprietors and cultivated by experienced bailiffs.

The mode of cropping the land, which till of late partook of the old system of getting as many crops of corn as it was thought the land would yield, and then recruiting its exhausted powers by fallows or pasturing for several years, has now in a great measure been changed for the more rational plan of giving strength first, and keeping it up by judicious management, so as to have always abundant crops and a clean surface. Where turnips and green crops can be raised, which is now the case with almost every soil which is well drained, they form the basis of the system. The use of lime and marl, which becomes every year more common in this county, improves the texture; and crushed bone and other substances, which are of easy carriage and have a powerful effect on vegetation, produce good crops of turnips, and greatly economize the manure from the farm-yards.

The natural meadows along the banks of the rivers are rich and productive, being continually renovated by the depositions of fine mud in floods; but they have also the inconvenience of being sometimes flooded at a time when the grass is fit for the scythe or already cut, in which cases much loss is sustained. The Dove, which brings down from the hills many particles of calcareous matter, which it deposits where the banks are low and flat, is noted, as we observed before, for its rich meadows, which has given rise to a saying, 'rich as Dove;' and, 'In April Dove's flood is worth a king's good.' The finest natural grasses are found on its banks. When the waters of the Dove are diluted by other streams, the fertilizing effect of its floods diminishes.

There is not much land in this county devoted to the grazing of cattle, or to extensive dairies, but many fine beasts are fatted in stalls on turnips, hay, and oil-cake, chiefly for the sake of the manure. The breed most esteemed is that of the short-horns, and few others are to be met with on the principal farms. In an ox the propensity to fatten is the great desideratum, in a cow the richness and abundance of milk, and likewise the continuance of it in the cow till within a short time of calving. To unite these qualities in one animal, or in any breed, has been generally found a hopeless task; and the prudent dairyman seeks in his cows the points which denote good milkers, and not those that indicate a tendency to fatten. It is generally allowed that when the object is to rear an ox to fatten, the breed should differ from that which produces the best milch cow; no cow having yet been found to excel in both qualities of fattening readily and giving much rich milk. Experience teaches the dairyman what cows are most profitable on his pastures, and his principal care is to rear heifers from his best cows by a bull noted for producing good milkers. There are some excellent cows which it would be difficult to class with any particular breed; some have the horns long, some short, and some are without horns; but they all have deep chests, wide hips and flanks, large udders, and prominent milk-veins; a fine tail with a good brush of hair as the end, is a point usually looked for in a good cow.

The original Staffordshire sheep has been either superseded by more useful breeds, or has been changed and improved by crossing. Every breed is to be met with which is in any repute; and good farmers will vie with southern competitors in their Leicesters and South-downs. The number of sheep kept on the land under the present system is vastly greater than it was under the old, and while more corn is raised, more beef and mutton are also produced for the market.

The farm-horses in Staffordshire are active and strong, and in general well kept. The labourers are industrious, and where their employers take some pains to encourage good conduct, they are sober and honest. Whenever the farmer seems indifferent to the moral conduct of those who work for him, he can only expect to suffer in his interest from his own want of attention to this duty.

The Staffordshire hog of the old breed is coarser than the Berkshire or Essex, but much pains have been taken to introduce better pigs, and with considerable success. The

Chinese and Neapolitan breeds have, as elsewhere, been of great use in producing an animal that will fat readily, with small bone and compact form.

The principal fairs in Staffordshire are—

Abbots Bromley, Mar. 6, May 22, Sept. 4; Barton, May 3, Nov. 28; Betley, April 30, July 31, Oct. 29; Bilston, Whit-Mon., Mon. bef. Mich.; Brewood, May 9, Sept. 19; Burslem, Sat. bef. Shrove Tues., Easter or Whit Sun., Sat. on or after June 24, Sat. bef. Ember week, Dec. 26; Burton-upon-Trent, Feb. 2, Apr. 5, H. Thurs. Oct. 29, first Tues. in Sept. (cheese); Cannock, May 8, Aug. 24, Oct. 18; Cellar-head (near Leeke), May 6, Nov. 7; Cheadle, Jan. 7, Mar. 25, H. Thurs., July 4, Aug. 21, Oct. 18; Eccleshall, Th. bef. Mid Lent, H. Thurs., Aug. 16, first Frid. in Nov.; Fazeley, 2nd Mon. in Jan., Feb., Apr., Sept. Dec., third Mon. in July, Aug., Nov., last Mon. in May and June, Mar. 21, first Mon. after Old Mich.; Gnossall, May 7, Sept. 23; Hanley, Feb. 9, Mar. 30, May 18; cattle-market second Tuesday in every month; Hayward Heath, November 18; Holy Cross, Apr. 10, Sept. 11; Ipstones, Mar. 25, Nov 9; Kinfare, sec. Tues. in May and Dec.; Lane-end and Longton, Feb. 14, May 29, July 22, Nov. 1; Leek, W. bef. Feb. 13, W. in Easter-week, May 18, W. in Whits.-week, July 3, 28, W. after Oct. 10, Nov. 13, W. aft. Christmas-day, sec. Mon. in Mar. and Sept., third Mon. in Nov.; Lichfield, Ash Wed., May 12, Frid. in the week aft. St. Sim. and St. Jude; Frid. after Twelfth-Day; Longnor, Feb. 12, Apr. 2, May 4, 17, 21, Aug. 5, Oct. 8, Nov. 12; Newcastle, Feb. 11, Apr. 1, May 20, July 8, Sept. 16, Nov. 4; Newcastle-under-Line, Jan. 13, Feb. 10, Mar. 2, Mar. 30, Apr. 20, May 18, June 8, July 13, Aug. 10, Sept. 14, Oct. 12, Nov. 2, Dec. 7; Pattingham, Apr. 30; Penkridge, Apr. 30, Sept. 3, Oct. 10; Rugeley, third Thurs. in Apr., Oct. 21, sec. Tues. in Dec., June 2, and 3, 4, 5, 6 (horse-fair); Sandon, April 4, Nov. 14; Shenstone, last Mon. in Feb.; Stafford, Tues. bef. Shrove Tues., May 14, Sat. bef. St. Peter's day, June 29, July 10, Sept. 16, 17, 18, Dec. 4; Stone, Tues. aft. Mid-Lent, Shrove Tues., Whit-Tues., Aug. 5, 26, Tamworth, last Mon. in Jan., first Mon. in Mar., Apr. 5, May 4, July 26, first Mon. in Lent, Oct. 24, Dec. 15; Tutbury, Feb. 14, Aug. 15, Dec. 1; Uttoxeter, St. Magdelene's day, May 6, July 31, Sept. 1, 19, Nov. 11, 27; Walsall, Feb. 24, Tues. bef. Mich.; Wednesbury, May 6, Aug. 3; Woolverhampton, July 10; Yoxhall, Feb. 12, Oct. 18.

Divisions, Towns, &c.—Staffordshire is divided into five hundreds, as follows:—

Hundred.	Division.	Position.	Area. Acres.	Population. 1831.
Cuttlestone or Cuddleston	Eastern	Central	65,400	17,096
	Western	W.	40,100	9,822
Offelow or Offlow	Northern	E.	78,260	27,399
	Southern	S.E.	95,640	92,121
Pyrehill or Pirehill	Northern	N.W.	116,520	93,251
	Southern	Central	89,380	27,012
Seisdon	Northern	S.	42,050	86,530
	Southern	S.W.	39,330	10,761
Totmonslow	Northern	N.	93,920	22,853
	Southern	N.E.	75,690	23,667
			736,290	410,512

We have included the city of Lichfield in the northern division of Offlow hundred, the borough of Stafford in the southern division of Pyrehill, and the borough of Newcastle-under-Lyme in the northern division of the same hundred. The density of the population in the Potteries (Pyrehill hundred, northern division), and still more in the iron and coal districts of the south (Offlow hundred, southern division; and Seisdon hundred, northern division), is obvious at a glance. The population in these three divisions is very nearly 700 to a square mile; in the iron district, taken alone, it exceeds that; while in the agricultural districts it is only about 185 to a square mile.

Staffordshire contains the county town and borough of Stafford; the city of Lichfield; the old boroughs of Newcastle-under-Lyme, and Tamworth; and the new parliamentary boroughs of Stoke, Walsall, and Wolverhampton; and the market-towns of Bilston, Burslem (included in the borough of Stoke), Burton-upon-Trent, Cheadle, Eccleshall, Hanley, and Lane End, included in the new borough of Stoke, Leek, Longnor, Rugely, Stone, Tunstall (included in the borough of Stoke), Uttoxeter, and Wednesbury. Some of these are described elsewhere. [Bilston; Burslem; Burton; Lichfield; Newcastle under-Lyme; Stoke; Tamworth; Walsall; Wolverhampton.]

The town of Dudley, which was made a parliamentary borough by the Reform Act, is in an insulated part of Worcestershire, in the midst of the Staffordshire iron-district, to which virtually it belongs. [Dudley.]

Abbots Bromley, Betley, Brewood, Cannock, Penkridge, and Tutbury, were formerly market-towns.

Stafford is in the hundred of Pyrehill (southern division), on the north bank of the Sow. We are not aware that there is any historical notice of this place before the year 913, when Ethelfleda, 'lady of Mercia,' built a fort here to keep the Danes of the neighbourhood in check. (*Saxon Chronicle.*) The early history of the town is obscure. In 'Domesday it is mentioned under the names of Statford and Stadford, and is called a borough. There was a castle near it in the middle ages. In the civil war of Charles I. the Royalists, after the capture of Lichfield Close by the Parliamentarians, retired to Stafford; and an indecisive battle was fought at Hopton Heath, two or three miles from the town, March 19, 1643, in which the earl of Northampton, the Royalist commander, was killed. The town, which was walled, was subsequently taken by the Parliamentarians under Sir Wm. Brereton: the castle was also taken, but at a later period. The walls have been so entirely demolished, that no trace of them remains. The castle, which is a mile and a half south-west of the town, in Castle Church parish, has been rebuilt quite of late years, or is now rebuilding. The principal line of building in the town is formed of two streets, called Gate Street and Gaolgate Street, in which are two openings, Market Square and Gaol Square. The line is prolonged northward through what appears to have been a suburb, by Near and Far Foregate Streets; and southward by the suburb of Forebridge, separated from the town by the Sow. The town is well supplied with water, and the streets are paved and lighted under the provision of a local act, except some, which are exempt from the operation of the act, and are kept in repair by the corporation. The houses are in general well built, mostly of brick, roofed with slate. Over the Sow is a neat bridge. There is another bridge, called Broad Eye Bridge, west of the town. The county-hall is a spacious building of stone, occupying one side of the Market Square. The county gaol and house of correction and the county infirmary are on the north side of the town; and the county lunatic asylum is on the north-west side: the last is a spacious building, well adapted to the purposes of the establishment, which is admirably conducted. There are two churches. St. Mary's, formerly collegiate, is a large and fine cross-church, with an octagon tower at the intersection of the nave and transept: it consists of a nave and two aisles, a chancel with side aisles, and a transept, which is 100 feet long and 25 feet broad. Most of the piers and arches of the church are of early English date, or belong to an early period of the decorated English style: there are some good windows of the decorated period, but the east window and some others are of perpendicular character. The upper part of the tower is of late date. The church of St. Chad is smaller, and has a chancel of Norman architecture, with an east window of modern date, a modern nave, and a tower, between the nave and chancel, of perpendicular character. Owing to the friable nature of the stone, the ornamental work of this tower is going to decay. There is a Roman Catholic chapel in the suburb of Forebridge. and there are meeting-houses for Methodists of different connections, Independents, and Quakers.

The borough comprehends the parishes of St. Mary and St. Chad (which are united for secular purposes), and has an area of 2510 acres: the population, in 1831, was 6956. The suburb of Forebridge is in the parish of Castlechurch, in the eastern division of the hundred of Cuttlestone, which parish had, in 1831, a population of 1374; but what portion is to be assigned to Forebridge we have no means of ascertaining. The principal manufacture of the town is that of shoes, which, in 1831, employed 800 men: the shoes are chiefly for the London market or for exportation. A considerable quantity of leather is tanned in or round the town. The market is on Saturday; and there are five yearly fairs chiefly for horses and cattle. The Staffordshire and Worcestershire Canal and the Grand Junction Railway pass near the town.

The assizes and quarter-sessions for the county are held in the town; also the court of election for the members for the northern division of the county, for which it is also a polling-station.

Stafford has sent members to parliament since 23 Edward I. By the Boundary Act the suburb of Forebridge was added to the previously existing borough for parliamentary purposes. The number of voters in 1835-6 was 1271, viz. 421 ten-pound householders, and 850 freemen: in 1839-40 it was 1265, viz. 390 ten-pound householders, and 875 freemen. The corporation was dissolved by the result of some legal proceedings, A.D. 1826; but a new charter was speedily obtained, which is now (except where altered by the Municipal Reform Act) the governing charter. By the Municipal Reform Act the extended parliamentary boundary was adopted for municipal purposes, and the borough was divided into two wards: it has six aldermen and eighteen councillors, and a commission of the peace. The borough quarter-sessions and court of record have fallen into disuse, and there is no borough gaol: offenders are sent to the county for trial. Petty-sessions are however held.

The living of St. Mary's is a rectory, of the clear yearly value of 221*l.*, with a glebe-house: that of St. Chad is a perpetual curacy, of the clear yearly value of 85*l.*

There were in the borough, exclusive of the suburb of Forebridge, in 1833, five dame-schools, with about 80 children of both sexes; a well-endowed free grammar-school, with 16 boys; a national school, with 100 boys and 90 girls, and six other day-schools, with 133 boys and 58 girls; four boarding and day-schools, with 106 boys and 39 girls; and three Sunday-schools, with 711 children.

Cheadle is in the hundred of Totmonslow (southern division), 14 miles north-north-east of Stafford. It is called Cedla in 'Domesday.' The town is just within the moorland district of North Staffordshire, and is situated in the midst of hills, whose former barrenness has been covered by recent plantations of timber-trees. Several roads converge at the town, which is irregularly laid out, and consists of indifferently built houses. It is supplied with water from the Tean brook, which flows near it, and ultimately joins the Churnet. Close to the town, on the west and north-west, are hills which command a tolerably extensive prospect; and one of which, Monkhouse, affords a favourite walk. The church has suffered much from mutilation and alteration: the east end has been a good specimen of decorated English architecture; but the arch of the fine east window has been altered, and the tracery mutilated: there are some good windows of decorated character. There are places of worship for Roman Catholics, Wesleyan Methodists, Methodists of the New connection, and Independents. The area of the parish is 5730 acres: the population in 1831 was 4119, of which one-fourth or one-fifth was agricultural. Brass wire and tape are manufactured, and nearly 100 men were in 1831 employed in coal-mines in the parish. The market is on Friday, and there are four yearly fairs. The Caldon canal passes along the valley of the Churnet two or three miles east of the town, and a railroad has been made from the collieries in the immediate neighbourhood of the town to the canal. The living is a rectory in the archdeaconry of Stafford, in the diocese of Lichfield and Coventry, of the clear yearly value of 438*l.*, with a glebe-house: the rector presents to the perpetual curacy of Oakamoor chapel, which is a dependency of Cheadle. There were in the parish in 1835, one infant-school, partly supported by subscription, with 44 boys and 56 girls; a day-school, with a small endowment, with 40 boys and 20 girls; eleven other day-schools, with 189 boys and 171 girls; and five Sunday-schools, with 351 boys and 365 girls, besides 53 adults.

Eccleshall is in the northern division of Pyrehill hundred, 7 miles north-west of Stafford. The manor belonged antiently to the bishop of Lichfield, and is called Ecleshelle in 'Domesday,' where the owner is termed Episcopus de Cestre, Bishop of Chester, the see having been just before removed from Lichfield to Chester, where however it remained only a short time. The bishops had a mansion here, which in the reign of John was by the king's licence made an embattled castle. It was garrisoned by the Royalists in the civil wars of Charles I., and stood a siege before it was taken by the Parliamentarians: it was subsequently repaired, and is still the bishop's residence. The town is on a gently rising ground, on the south bank of the river Sow, and consists of well and regularly built houses. The church is a large antient building. There is an Independent meeting-house. The area of the parish is 20,930 acres, divided into twenty townships, and one chapelry (Chorlton): the population in 1831 was 4471: the town division contains 1850 acres, with a population in 1831 of 1285. The market is on Friday; and there are four yearly fairs for sheep, cattle, and horses. The living is a vicarage, of the clear yearly value of 170*l.*, with a glebe-house, in the archdeaconry of Stafford and diocese of Lichfield. There were in 1833, in the whole parish, eight day or boarding and day schools, with from 207 to 227 children of both sexes; besides a day and Sunday national school, with 221 children daily, and 297 on Sunday, and two Sunday-schools, with 72 children.

Hanley and Lane-End are noticed elsewhere. [Stoke.]

Leek is in the northern division of Totmonslow hundred, 23 miles north-north-east from Stafford. The town is pleasantly situated on an eminence the streets are well paved, and lighted with gas. The church, which stands on an eminence, is an old building, and has a tower with eight pinnacles. It contains, amid many alterations and additions, some antient work worthy of notice. There are places of worship for Quakers, Independents, and Wesleyan Methodists. The area of the parish, which extends into the southern division of the hundred, is 34,370 acres; the population, in 1831, was 10,780; the township of Leek and Lowe (in which the town stands) contained 6374 inhabitants. The chief manufacture of the town is of silk, especially ribands; 559 men were, in 1831, employed in manufactures, besides women and children. The Caldon Canal passes near the town, with which it communicates by a short cut. The market is on Wednesday, and there are seven yearly fairs, chiefly for cattle. The living is a vicarage, of the clear yearly value of 218*l.*, with a glebe-house; and the vicar presents to three of the four perpetual curacies of the chapels in the parish. There were, in 1833, in the township seventeen day or boarding and day schools (one of them having a school-house and a trifling endowment), with 244 boys and 171 girls; and five Sunday-schools, with 761 boys and 796 girls. There was antiently a Cistertian abbey, called Dieulacres, a short distance north of the town, the yearly revenues of which at the dissolution were 243*l.* 3*s.* 6*d.* gross, or 227*l.* 5*s.* clear. There are some remains of the buildings. Lord Chancellor Parker, first earl of Macclesfield, was a native of Leek.

Longnor is in the northern division of the hundred of Totmonslow, 33 miles north-north-east of Stafford, through Leek. The town is on the north-east bank of the river Manifold near its source, and is very small. It has a neat chapel, a stone edifice, with a lofty pinnacled tower, and a place of worship for Wesleyan Methodists. The chapelry of Longnor is a subdivision of the parish of Allstonefield, and has an area of 850 acres; the population, in 1831, was 429. There is a market on Tuesday, and there are eight yearly fairs. The perpetual curacy of the chapel is in the gift of the vicar of Allstonefield; its clear yearly value is 102*l.* The chapelry contained, in 1833, two dame-schools, with 40 children; one day-school, having a small endowment, with 30 children, chiefly boys; and one Sunday-school, with about 100 children.

Rugely is in the eastern division of Cuttlestone hundred, nine miles east-south-east from Stafford on the road to Lichfield. The town, which is near the north-eastern border of Cannock Chase, is irregularly laid out, but is remarkably clean and of respectable appearance; some of the streets of later formation are lined with houses of a superior character. The church has been rebuilt of late years, but the tower and chancel of the old church still remain: the chancel is used for a school room. There is an Independent meeting-house: and at Brereton, about a mile south-east of the town, is a Wesleyan chapel. The parish has an area of 7120 acres, with a population, in 1831, of 3165. There are some iron-works in the town, and at Brereton, in the parish, are some coal-pits. The market is on Tuesday, and there are three yearly fairs, one a large horse-fair, and another a large horse, cattle, and sheep fair. The Grand Trunk canal passes the town; and the Trent, which however is not here navigable, flows about a quarter of a mile to the north-east of it. There is a railroad from the Brereton coal-pits to the canal. The living is a vicarage, in the peculiar jurisdiction of the dean and chapter of Lichfield, of the clear yearly value of 213*l.*, with a glebe-house. There were in the parish, in 1833, two dame-schools, with 40 children; a well-endowed grammar-school with 48 boys; another school, with a small endowment, with 60 boys; a national school, and a charity school with 24 boys and 125 girls; six other day-schools, with 30 boys, 15 girls, and 64 children of sex not distinguished; two boarding and day schools, with 52 girls and 17 boys; and two Sunday-schools, with 210 children.

Stone is in the southern division of Pyrehill hundred, seven miles north by west of Stafford. There was a very antient monastery at this place, founded, it was said, by Wulfhere, king of Mercia, or his queen Ermenilda, in honour of his two sons, whom, before his own conversion, he had murdered for embracing Christianity. Wulfhere is said to have placed secular canons here; but these being dispersed, some nuns occupied the place, who were removed in the time of Henry I. to make room for some regular canons of St. Austin from Kenilworth Priory, to which this house was for a time a cell, but afterwards became independent. The yearly revenue at the dissolution was 129*l.* 2*s.* 11*d.* gross, or 119*l.* 14*s.* 11½*d.* clear. The town is on a rising ground on the left or north-eastern bank of the Trent, over which, on the Stafford road, there is a bridge; the principal street is along the road from London to Liverpool, and is paved. The church is a modern building at the south-east end of the town, and near it are some remains of the antient monastery. There are places of worship for Independents and Wesleyan Methodists. The parish, including the chapelry of Normicott, has an area of 20,030 acres; the population, in 1831, was 7808. The principal branch of industry is shoemaking, and there are some breweries and mills. The Grand Trunk canal passes near the town. The market is on Tuesday, and there are five great markets or fairs in the year. The living is a perpetual curacy of the clear yearly value of 214*l.*, with a glebe-house: there are three chapels in the parish. There were, in 1833, twenty day or boarding and day schools, with 425 boys, 301 girls, and 44 children of sex not stated; one of them was a national school, with 120 boys and 90 girls, and several of the others were assisted by endowment or contribution. There were also three Sunday-schools, with 355 boys and 306 girls.

Tunstall is described elsewhere. [STOKE-UPON-TRENT.]

Uttoxeter is in the southern division of Totmonslow hundred, 13 miles north-east from Stafford. The etymology of the name (which is popularly shortened in pronunciation into Uxeter) is uncertain; it is written Wotochshede in 'Domesday.' Uttoxeter stands on a rising ground near the river Dove, which here separates Staffordshire from Derbyshire, and is crossed by a handsome stone bridge. The town is irregularly laid out; the three principal streets meet in the market-place; the houses are generally well built. The church has been rebuilt of late years, but the lofty tower and spire of the former edifice remain: there are places of worship for Wesleyans, Baptists, Independents, and Quakers. The parish has an area of 8920 acres, and had, in 1831, a population of 4864. There are a number of iron-forges round the town, and the neighbourhood contains much fine grazing-land. The market is on Wednesday, and is well attended: there are several yearly fairs. The Caldon Canal ends at Uttoxeter. The living is a vicarage, of the clear yearly value of 136*l.*, with a glebe-house. There were in the parish, in 1833, a day and Sunday national school, with 80 boys and 56 girls in the week, and about 50 children in addition on Sundays; fourteen other day-schools, one of them having a small endowment, with 163 boys and 191 girls; and two Sunday-schools, with 143 boys and 137 girls.

Wednesbury (commonly pronounced Wodgebury) is in the southern division of Offlow hundred, 19 miles south-south-east from Stafford, in the centre of the four great towns, Birmingham and Wolverhampton, Walsall and Dudley. The name is supposed to incorporate that of the Saxon god Woden: the same element appears in Wednesfield in this neighbourhood. Ethelfleda, 'Lady of Mercia,' sister of Edward the Elder, built a castle here, A.D. 914. The town is called in 'Domesday' Wednesberie. It stands on the slope of a hill, and is irregularly laid out. The church occupies the summit of the hill, where Ethelfleda's castle formerly stood: it is a tolerably spacious building, consisting of a nave with side aisles, a chancel, a chapel on the south side at the eastern end of the nave, and a western tower. The east end of the chancel is a semi-octagon, and is, with most other parts of the church, of perpendicular character. The western tower is square, with four pinnacles, and a lofty octagonal spire: it has a peal of eight bells. There are some antient wooden seats, and a curious moveable wooden reading-desk in the church. There are places of worship for Independents, and for Wesleyan and Primitive Methodists. The area of the parish is 2190 acres: the population in 1831 was 8437. The town is in the heart of the coal and iron district; and a considerable manufacture is carried on of fire-arms, gas-pipes, chains, spades and shovels, locks and keys, hinges, bridle-bits, stirrup-irons, buckles, horse-shoes, coach-ironmongery, screws, files, edge-tools, and machinery. On a rivulet near the town are some corn-mills, and in the neighbourhood numerous coal-pits. There are several branches of the Birmingham canal navigations near the town. The market is on Friday, and there are two yearly fairs. The living is a vicarage, of the clear yearly value of 301*l.* There were in the parish, in 1833, three infant or dame schools, with 49 boys and 37 girls; seven day-schools, with 207 boys and 86 girls (one of these, with 110 children, was supported by private subscription); and four Sunday-schools, with 628 boys and 609 girls.

Abbots Bromley is in the southern division of Pirehill hundred, 12¼ miles east of Stafford, on the road from Uttoxeter to Lichfield. It consists chiefly of one long straggling street of tolerably neat houses, mostly built of brick. The church has been much modernized, but retains some antient portions of decorated English or perpendicular character, and a Norman doorway. The tower is surmounted by a lofty spire. There is an antient building formerly used as a market-house; but the market has been discontinued for several years. The area of the parish is 8360 acres; the population in 1831 was 1621, more than half agricultural. The shoe-manufacture, which was formerly carried on, has declined, but there is some malting carried on. There are a free-school and an almshouse in the village.

Betley is in the northern division of Pyrehill hundred, about 23 miles north-north-west of Stafford, through Stone and Newcastle. It is a neatly built place, in a cheerful situation. The market has been given up for several years, and the population of the whole parish (the area of which is 1480 acres) was, in 1831, only 870. There are considerable market-gardens round the village, from which Newcastle is supplied with vegetables. There are two national schools, one of them with a small endowment.

Brewood is the eastern division of Cuttlestone hundred, 10½ miles south-by-west of Stafford. The parish has an area of 11,950 acres; the population in 1831 was 3799. At that time 278 men were employed on the Birmingham and Liverpool canal, which passes close to the village; and 191 men in the manufacture of stock-locks. The village is neatly built, near the west or left bank of the river Penk. The market, which was on Friday, has been discontinued; but there is one yearly fair for cattle. The church has a fine spire, and some other parts of the building are in a good style. There are Independent and Wesleyan meeting-houses. There is a grammar-school with a good endowment. There was formerly a Benedictine nunnery here, the clear yearly revenue of which at the dissolution was 11*l.* 1*s.* 6*d.*

Cannock is in the eastern division of Cuttlestone hundred, about 9¼ miles south-south-east of Stafford. The parish has an area of 11,970 acres, with a population in 1831 of 3116; about 87 men were employed in coal-mines, and 71 in manufactures chiefly of edge-tools. Cannock is a small place, and the market has been for many years given up. It gives name to the adjacent extensive waste, Cannock Chase, formerly covered with oaks. Besides the parish-church there are places of worship for the Independents and Wesleyan Methodists. There are several schools in the parish: one a day-school with a small endowment; another a large national school, with a school-house a little out of the village on the Penkridge road.

Penkridge is in the eastern division of Cuttlestone hundred, 6 miles south of Stafford. Some antiquaries, among whom are Camden, have identified this town with the Pennocrucium of the Antonine Itinerary; others fix the site of Pennocrucium at or near Stretton, a township of Penkridge parish, near the line of Watling-Street. The names of Pennocrucium and Penkridge appear to embody the same element Penk, which is the name of the stream near which both Penkridge and Stretton stand. The village consists of two principal streets along the Wolverhampton and Cannock roads, leading down the bridge over the Penk, before reaching which they unite; the lower part of the village is subject to frequent inundations. The church is mostly of perpendicular character; but some parts are of older date, especially the east window, which is of decorated English character, and has fine tracery. The whole parish, with the townships of Hatherton and Kinvaston in Wolverhampton parish, comprehends an area of 18,020 acres, and extends into the western division of the hundred. The population in 1831 was 2991. The market, which was on Tuesday, is now given up. There are three yearly fairs: one of them a large cattle-fair, and another a large horse-fair. There is a national day and Sunday school, and several private day-schools.

Tutbury is in the northern division of Offlow hundred, about 22 miles east of Stafford through Uttoxeter, on the bank of the Dove, which separates Staffordshire from Derbyshire. There is said to have been a fortress here in the Saxon times: at any rate, one was occupied by Henry de Ferieres or Ferrars, to whom the Conqueror had granted large possessions in Staffordshire. The castle is mentioned in 'Domesday;' and Tutbury, there called Toteberie, is described as a borough with a market. This Henry founded a Benedictine or Cluniac monastery (authorities differ as to which it was), the possessions of which were largely augmented by his successors, and were valued at the dissolution at 244*l.* 16*s.* 8*d.* gross, or 199*l.* 14*s.* 10*d.* clear yearly value. Robert de Ferrars, earl of Derby, one of the descendants of Henry, having joined the earl of Leicester and the other insurgent barons in the war against Henry III., lost his castle of Tutbury, which was taken by Prince Edward; and, in consequence of his subsequent second rebellion, forfeited to the king, by whom it was bestowed on his son Edmund Crouchback. It was subsequently inherited by John of Gaunt, who rebuilt a great part of it, and lived here in great splendour. It was afterwards united with the duchy of Lancaster to the crown, and was one of the places of confinement of Mary Queen of Scots. In the great civil war it was held by the Royalists, and was not taken till the spring of 1646, soon after which it was in great part demolished. The honour of Tutbury comprehended several lordships, manors, towns, villages, and hamlets.

The village of Tutbury is on the slope of the hill that overhangs the valley of the Dove. The ruins of the castle are on the brow of the hill, and are sufficient to show its former magnitude: some parts are of perpendicular and others of earlier date. The 'church is the nave of a much larger building; the north arches are walled up, and the south wall of the south aisle is mostly of later date, with perpendicular windows; the present east end is the arch of the centre tower walled up, and part of the transept pier remains; the piers and arches are Norman, a simple and bold example. The west door, and the arch of a window over it, are very fine: the door is much enriched with beakhead, zigzag, and other Norman enrichments, and part of the arch is worked in gypsum, the ornaments very delicately cut, and retaining much of their original sharpness. The font is a good one, of perpendicular character, but mutilated. The church is a valuable Norman specimen.' (Rickman.) There is a low tower, chiefly of Norman character, at the south-west angle. There are places of worship for Independents and for different branches of the Methodists. The parish has an area of 4110 acres, with a population, in 1831, of 1553. Some cotton-spinning is carried on. The market, formerly on Tuesday, has been given up. There is an endowed school. Tutbury was remarkable for an antient and barbarous custom called 'bull-running,' which consisted of chasing a bull with a soaped tail, turned out antiently by the prior of Tutbury, and subsequently by the grantee of the priory lands. The custom has been abolished for several years. A somewhat similar custom has long existed at Stamford in Lincolnshire. [STAMFORD.] Tutbury was, early in the present century, the scene of a remarkable imposture: a woman of the name of Ann Moore professed to live with taking any nourishment. She was watched, but without being detected, and her profession of entire abstinence gained credit for six years. At length a stricter watch was kept, and at the end of nine days (April or May, 1813) she was obliged to acknowledge the imposition, and that she had occasionally taken food. The case was however remarkable for the small quantity of nourishment which was taken by her.

There are several villages in Staffordshire, especially in the iron-district, whose manufacturing importance entitles them to special notice.

Sedgley is in the northern division of Seisdon hundred, on the road from Wolverhampton to Dudley, about 3 miles from each: the parish is included in the parliamentary borough of Wolverhampton; it had in 1831 a population of 20,577. [WOLVERHAMPTON.]

West Bromwich is in the southern division of Offlow hundred, between Birmingham and Wednesbury, but nearer the latter. The church contains some good antient work. There are meeting-houses for Wesleyans and Independents. The parish has an area of 5380 acres, with a population, in 1831, of 15,327, of whom 1318 men were employed in the manufacture of iron for the forge or workshop, and above 1000 in coal-pits, or in other works connected with these great branches of industry. Sandwell park, one of the seats of the earl of Dartmouth, is near West Bromwich; it occupies the site of a small Benedictine priory. There were, in 1833, two national schools, an endowed day-school, a Catholic school partly supported by subscription, and several private schools.

Kingswinford, or more correctly King's Swinford (Swinford Regis) is in the northern division of Seisdon hundred; about 3 miles or 3½ miles from Stourbridge (Worcestershire), on the road to Wolverhampton. It belonged to the crown at the time of the Domesday Survey, hence its designation of King's Swinford. The old church has some antient portions deserving of notice; and there has been a new church built at Wordsley in the parish, about a mile and a half from the village. There is an Independent chapel at Brierley hill. There are some remains of a Roman camp in the parish; and Holbeach House, where the leaders in the Gunpowder plot were taken, is also in the parish. The area of the parish is 7130 acres: the population in 1831 was 15,156; of whom 500 men were employed in the manufacture of iron goods in great variety; 400 in coal and iron mines; and 1200 in labour of other kinds not agricultural. There were, in 1833, two subscription day and Sunday schools, beside a number of private day-schools and several Sunday-schools.

Tipton is in the southern division of Offlow hundred, about a mile and a half north-north-east of Dudley, in the heart of the iron and coal district. Its importance is quite of modern date, having advanced with those branches of industry to which its situation is adapted. There are numerous coal and iron works, which gave employment, in 1831, to 2200 men. The goods manufactured are similar to those made at Wednesbury. The population of the parish at that period was 14,951: the area of the parish is 3020 acres. Several branches of the Birmingham canal navigations pass through the parish. The old church having become dilapidated, a new church, a neat and commodious brick building, was some time since erected in its place, and the old one allowed to become a ruin; and within the last three or four years, an additional church has been completed. The Wesleyan Methodists and the Independents have each a chapel. There were in the parish, in 1833, six national schools, three for boys and three for girls, attended by nearly 900 children in the week, and by 200 in addition on Sunday. These schools were partly supported by endowment and subscription. There were several Sunday-schools, in which nearly 2200 children in addition were taught. Tipton is also called Tibbington.

Rowley-Regis is in the northern division of Seisdon hundren, about three miles south-east of Dudley. The church contains some good antient work; and there is a place of worship for Baptists. The area of the parish is 3670 acres; the population in 1831 was 7438, of whom 130 men were employed in coal-pits, and above 1000 men in iron-works and the connected branches of industry; the manufactures are similar to those of Wednesbury. There are two day-schools with small endowments, beside private and Sunday schools.

Darlaston is in the southern division of Offlow hundred, a mile and a half north-west of Wednesbury. It has coal-pits and iron-mines, and manufactures of hardware. There are a parish church, a brick building of the sixteenth century, and Independent and Wesleyan meeting-houses. A branch of the Birmingham canal navigations passes near the village. The parish has an area of 770 acres. The population in 1831 was 6647, of whom 673 men were employed in manufactures, chiefly or wholly of iron and hardwares, and 357 men in coal-pits and quarries. There are two national schools, which are partly supported by subscription. There is a township of Darlaston in the parish of Stone, which is sometimes confounded with this.

Handsworth is in the southern division of Offlow hundred, about two miles north-west of Birmingham. The church has been mostly rebuilt; only the tower and a small part of the wall of the antient edifice remain. In the church are monuments to Messrs. Boulton and Watt, the well-known manufacturers of Soho. Soho park and works are in this parish. The area of the parish is 7720 acres. The population in 1831 was 4944, of whom 112 men were engaged in manufactures. The Roman Catholic College of St. Mary Oscott is in the parish; and there are a charity-school and a national-school, besides several private schools. Harborne lies in the same division of the same hundred, and about the same distance as Handsworth south-west of Birmingham. The church is a modern building, but some of the antient buttresses and the tower of the older structure remain: the tower is of late perpendicular date. The parish, including the chapelry of Smethwick, has an area of 4000 acres: the population, in 1831, was 4227, of whom above 330 men were employed in manufactures.

Amblecoat, in the parish of Old Swinford (the greater part of which parish is in Worcestershire), close to Stourbridge; Clent, in a detached portion of the county, south of Stourbridge; Kinfare, west of the same town, Wombourne, and Tettenhall, all near the south-western border of the county, and in the hundred of Seisdon, participate more or less in the iron and hardware manufacture, which gave employment in them, in 1831, to 500 men.

Norton-in-the-Moors, in the neighbourhood of Burslem, participates in the coal-works and earthenware manufactures of the Pottery district. The parish has an area of 3940 acres: the population, in 1831, was 2407, of whom 40 were engaged in manufacture, and probably 200 in coal-pits. At Checkley, or rather at the hamlet of Tean in Checkley parish, two miles and a half south-east of Cheadle, on the road to Uttoxeter, is a considerable tape-manufactory: the population of the parish, in 1831, was 2247, of whom 106 men were employed in manufacture, and 42 in stone-quarries. Some cotton-spinning is carried on at Yoxall, near Burton-on-Trent.

Divisions for Ecclesiastical, Legal, and Parliamentary purposes.—The county of Stafford is in the diocese of Lichfield, and constitutes the archdeaconry of Stafford. It is divided into four rural deaneries, as follows:—

Deaneries.		Rectories.	Vicarages.	Perp. Curacies.	Chapelries.	Donatives.	Chapels not classified.	Total.
Lapley and Treisull	S.W.	10	10	24	3	0	4	51
Leeke and Alton, or Alveton . .	N.E.	9	9	19	0	2	0	39
Newcastle and Stone . . .	N.W.	15	13	36	5	0	0	69
Tamworth and Tutbury. . .	S.E.	13	15	34	4	0	0	66
		47	47	113	12	2	4	225

The number of benefices is somewhat less than appears from the above statement (which we borrow from Cox's 'Clergy List,' 1841), owing to some unions having been formed. The residence of the bishop of Lichfield is at Eccleshall.

Staffordshire is in the Oxford circuit: the assizes and quarter-sessions are held at Stafford, where is the county gaol and house of correction. It is said to be capable of holding 325 prisoners in separate cells, and 546 when more than one sleeps in a cell. (*Inspectors' of Prisons Third Report.*) This prison is conducted with care and judgment, and neatness and good order reign almost throughout. There are treadwheels for grinding corn, supplying the prison with water, and cleansing the prison drains; and beside this hard labour, several trades are carried on. (*Ibid.*) There is a county lunatic asylum at Stafford.

The number of representatives returned to parliament by the county and places within it was before the Reform Act ten:—viz. two knights of the shire, and two members each for the city of Lichfield and the boroughs of Newcastle-under-Lyme, Stafford, and Tamworth. By the Reform Act the county was formed into two divisions, and two mem allotted to each. The northern division contains the whole hundreds of Pyrehill and Totmonslow, and the northern division of the hundred of Offlow: the place of election is Stafford; and the polling-stations are Stafford, Leek, Newcastle-under-Lyme, Cheadle, and Abbots' Bromley. The southern division comprehends the southern division of Offlow hundred, and the whole hundreds of Cuttleston and Seisdon; the place of election is Lichfield, and the polling-stations are Lichfield, Walsall, Wolverhampton, Penkridge, and King's Swinford. Wolverhampton, Stoke-upon-Trent, and Walsall were made parliamentary boroughs; the first and second to return two members each, the last to return one member. The whole number of representatives sent from the district was thus increased from ten to seventeen.

The constituency at the two periods, 1835-6 and 1839-40, was as follows:—

	1835-36.	1839-40.
Staffordshire, North	17,154	10,020
.. South		8,469
Lichfield	914	876
Newcastle	1,003	1,031
Stafford	1,271	1,265
Stoke-upon-Trent . .	1,445	1,623
Tamworth	531	501
Walsall	679	837
Wolverhampton		2,643

History, Antiquities, &c.—In the earliest period of authentic history Staffordshire appears to have formed part of the territories of the Cornavii, or Carnabii. Under the Romans it was comprehended in the province of Flavia Cæsariensis. The antient roads, Watling Street, Ryknield Street, and the Via Devana (Deva or Chester road) crossed this county.

Watling Street entered it at Fazeley, near Tamworth, and ran west-north-west a little to the south of Cannock and Penkridge into Shropshire. The turnpike-road from London to Shrewsbury falls in with Watling-Street on Cannock Chase, and coincides with it through the remainder of its course in this county. The Roman towns of Etocetum and Pennocrucium were on this line of Watling street: the first was at Wall, about two miles south-south-west of Lichfield; the second probably near Stretton, in Penkridge parish, and two or three miles south-west of Penkridge village. At Wall, according to Shaw's account (*Hist. of Staffordshire*), are some remains of walls enclosing two acres of land, called the Castle Croft. Great quantities of foundation stones, pavements of Roman bricks, and other antiquities, have been dug up here. Wall is at the intersection of Ryknield and Watling streets. Pennocrucium we are inclined to fix on the river Penk, near Stretton; this position accords tolerably well with the distances in the Antonine Itinerary from Uriconium (Wroxeter, Salop) and Etocetum, and does not require the corrections which are necessary if Pennocrucium is fixed (as some have proposed) at Penkridge.

Ryknield-Street entered the county across the Dove near Burton, and ran south-west by Burton and Alrewas to Etocetum or Wall, where it crossed Watling-Street; and turning more towards the south, ran by Sutton-Park and Perry-barr common into Warwickshire and Worcestershire. The Ad Trivonam (On-Trent) of Richard of Cirencester, may be fixed between Branston and Burton-upon-Trent.

The Via Devana entered the county across the Trent near Ad Trivonam, and appears to have passed by Uttoxeter, and through the Pottery district into Cheshire. Chesterton, two miles north-west of Newcastle, was probably a Roman station; but we doubt whether it was the Mediolanum of Antoninus and Richard, as some have supposed. The name of Uttoxeter (compare Wroxeter and Exeter) would incline us to suppose that it had been the site of a Roman station, but the form in which the name appears in 'Domesday' (Wotachshede) is not favourable to the supposition.

A Roman road appears to have led from Watling-Street at Etocetum north-west through Chesterton, where it crossed the Via Devana into Cheshire. Another road, running westward from Little Chester, near Derby, crossed the Dove, and ran towards Cheadle: it probably joined the Via Devana.

There are traces of camps or other military works supposed to be Roman at Ashwood, near King's Swinford; at

Moreton, between Stafford and Aqualate Mere; at Oldbury, between Birmingham and Dudley; at Aldridge, between Sutton Coldfield and Walsall; and in Arley wood, near Over Arley on the Severn. Roman antiquities have been discovered in various places, especially a large quantity of silver coins at Rowley Regis. There are traces of a bank, ditch, and pallisade, running for a considerable distance northward from Etocetum or Wall.

There are some antient camps, of which it is doubtful if they are British, or belong to the Saxon or Danish periods. One of these, called Castle Old-ford or Old-fort, near Stonall, about four miles south of Lichfield, is very conspicuous. There are others in Beaudesert Park, near Rugely; on Abbots Castle hill, on the Shropshire border, between Wolverhampton and Bridgnorth; and at Barr Beacon, near Walsall. There are tumuli in various parts of the county, some of which are thought to be Roman.

On the conquest of South Britain by the Saxons, the county was included in the kingdom of Mercia, or of the Middle Angles.

When Oswio, of Northumbria, who had slain Penda and subdued Mercia (A.D. 655), granted part of that kingdom to Peada, son of Penda, the county was divided, Oswio retaining the part north of Trent, and resigning the rest to Peada. Under these princes the Christian religion was established in Mercia, and a bishop appointed. On the death of Peada (A.D. 656), Oswio resumed the whole; but when the Mercians rebelled, and chose Wulfhere for their king, they seem to have recovered Staffordshire. Wulfhere restored paganism, but being subsequently converted to Christianity, the bishopric of Mercia was re-established, and fixed at Lichfield. The antient camp at Berry-bank, near Stone, is traditionally said to have been the residence of Wulfhere. In the year 716, Osred, king of the Northumbrians, was slain in battle, at Mere (Hen. Hunt., lib. iv.), which some suppose to be Maer, between Newcastle-under-Lyme and Drayton. Other accounts [NORTHUMBERLAND, vol. xvi., p. 318] lead to the supposition that he died in battle against the Picts.

There are the traces of an antient camp or fort, called the Burgh or Braff, near Maer. It is to be observed that although Staffordshire was wholly included in the Mercian kingdom, in the wide application of that term, the part north of the Trent was comprehended in what was sometimes termed Southumbria (Matt. Westmonast.): the southern part appears to have been included in the territory of the Middle Angles. The Mercian kings appear often to have resided at Tamworth.

In the division of the island between the Saxons and Danes, in the time of Alfred, Staffordshire was partly included in the Danelagh or Danish territory, Watling Street being the boundary; but the whole was recovered by Alfred's successors.

In the wars of Edward the Elder, son of Alfred, with the Danes (A.D. 910), a battle was fought at Tettenhall Regis, near Wolverhampton, in which the Danes were beaten; and in the following year they sustained another great defeat at Wednesfield: two years after (A.D. 913) Ethelfleda, 'Lady of Mercia,' sister of Edward, built forts at Tamworth and Stafford; and next year one at Eadesbyrig, which some suppose to be Wednesbury. Ethelfleda died at Tamworth (A.D. 920), at which town Edward assumed the direct government of Mercia. The Saxon chronicle, in recording this event, calls Tamworth a burgh or borough. In the divisions of the kingdom between Edmund I. and Anlaf (A.D. 940-943), the county was divided between the Saxons and Danes, the part north of Watling-Street being assigned to the latter. In the war of Ethelred II. with the Danes (A.D. 1016), his son Edmund marched through the county, ravaging it as he went. Under Edward the Confessor there was an earl of Staffordshire. At what time the county was formed is not known; possibly when this part of Mercia came under the power of the West-Saxon kings. There are several camps which are supposed to be of Saxon or Danish origin.

In the reign of Henry I. Staffordshire was ravaged by Robert de Belesme, who supported the claim of Robert of Normandie to the crown. In the troubles of the reigns of John and Henry III., there is no record of any remarkable event connected with it; but in those of Edward II. the earls of Lancaster and Hereford, then in insurrection, were defeated by the king at Burton-upon-Trent. In the insurrection of the Percys against Henry IV. a sharp encounter took place near Mavesyn Ridware, on the banks of the Trent (A.D. 1403), between two Staffordshire knights and their retainers, who had embraced opposite sides. Sir William Handsacre, the insurgent commander, was defeated and slain, and the victor fell shortly after in the fight at Shrewsbury.

In the War of the Roses, the Yorkist earl of Salisbury, marching from the north towards London (A.D. 1459) with 5000 men, was intercepted at Blore Heath, on the western side of the county, between Drayton (Salop) and Eccleshall, by 10,000 Lancastrians under Lord Audley. The good generalship of Salisbury secured the victory: Lord Audley was killed, with all his chief officers and a fourth part of his army. A stone pedestal, surmounted by an antient wooden cross, marks the field of battle. Richard III. was with his army at Tamworth just before the battle of Bosworth Field (A.D. 1485).

The principal monuments of the middle ages are ecclesiastical. Lichfield Cathedral is the most important. Croxden Abbey, between Cheadle and Uttoxeter, is a fine ruin in a narrow valley watered by a small rivulet. The west end of the church, the south wall and transept, part of the cloister, the walls of the chapter-house, and some parts of the offices, may be traced. The general character of the architecture is early English.

Mary, queen of Scots, was imprisoned for some time, under the care of the earl of Shrewsbury, at Tutbury Castle; also at Chartley, from whence she was removed by Abbots Bromley and Burten to Fotheringhay in Northamptonshire. Holbeach House, where most of the Powder-Plot conspirators were taken or killed, is in Staffordshire, between Wolverhampton and Stourbridge.

In the great civil war the county generally embraced the side of the parliament, though several families sided with the Royalist party. Some Royalists, under the earl of Chesterfield, garrisoned Lichfield Cathedral and Close; but it was taken by the Parliamentarians, though with the loss of their general, Lord Brook (March, 1643). This post was retaken about a month after by Prince Rupert, who also took Burton: in the interval the Parliamentarians under Sir William Brereton and Sir John Gell had a severe but indecisive battle with the Royalists, at Hopton Heath, near Stafford. The Parliamentarians occupied the towns of Stafford and Wolverhampton, and subsequently took Eccleshall Castle, and took and demolished Stafford Castle. they also besieged Tutbury Castle, but without success. Their horse had the advantage in a skirmish near Leek, which was one of their posts; and in the latter part of 1643 they gained the victory in two skirmishes with Colonel Hastings, the Royalist commander, in this county. In 1645 the king with his army marched through Staffordshire before the battle of Naseby, and was in it again after the battle. He appears to have had at this time two garrisons in the county, Lichfield Close, and Tutbury. Dudley castle, in the insulated portion of Worcestershire, was also held by his adherents; but in the course of this or the following year these all surrendered. After the battle of Worcester (A.D. 1651), Charles II. was at Boscobel House in this county. In the rebellion of 1745 the Pretender's army was at Leek, while that of the duke of Cumberland occupied Stone.

(Shaw's *History of Staffordshire*; Rickman's *Gothic Architecture*; *Parliamentary Papers*; *Ordnance Survey*; *&c.*)

STATISTICS.

Population and Occupations.—The population is chiefly employed in trade and manufactures, little more than one-fifth being engaged in agriculture. Staffordshire was the seventh in the list of manufacturing counties in 1831, and ranked the thirty-sixth among the agricultural counties. At that period there were 3781 males aged 20 and upwards, occupiers of land, employing labourers; 3649 occupiers of land not employing labourers; 16,812 labourers employed in agriculture; 26,755 persons employed in manufactures; 24,766 employed in retail trades and handicrafts; 3569 capitalists, bankers, and members of the professions; 22,690 non-agricultural labourers; 1959 other males twenty years of age; 1959 male domestic servants; 12,739 female servants. The places in which manufacturing employment is chiefly carried on are given in the following extract from the 'Census of 1831:'—The southern part of the county of Stafford is eminent for its manufacturing industry in producing iron and hardware (of which iron is the material); the north-west part of the county produces earthenware from the potteries in such quantity and excellence, as to have acquired the distinctive appellation of Staffordshire

Ware. Both these manufactures are, comparatively speaking, of modern date; and in crossing the southern part of the county from Birmingham through Wolverhampton, the activity displayed in the coal-field between Wednesbury and Bilston, in the conversion of iron-ore, is concentrated beyond example. Eastward of this, at West Bromwich above 1000 men are employed in the further preparation of iron for the forge and the workshop; 2200 men are employed at Tipton, 1200 at Walsall and the foreign of Walsall, 740 at Willenhall, 157 at Wednesfield, 444 at Wednesbury, and 200 at Rowley-Regis, in making guns and other fire-arms, gas-tubes, chains, spades and shovels, locks and keys, hinges, bridle-bits, stirrup-irons, buckles, screws, files, edge-tools of all kinds, and in producing machinery; and at Smithwick and Handworth about 150 men are so employed. Wolverhampton, which besides its comprehensive business as the chief town of a manufacturing district, contains nearly 2000 men, who, in addition to the articles above mentioned, are employed in making domestic fire-arms, tinned and japanned iron-ware. Sedgley contains 500, and Kingswinford 200 manufacturers of the same kind; at Tettenhall more than 60, and at Brewood about 130 men are employed in the less refined manufacture of stock-locks. Darlaston contains nearly 500 men occupied in hardware workmanship; and in most of the places thus enumerated, as well as in many populous villages, the more domestic manufacture of iron nails furnishes employment to 2500 men and part of their families. The other important manufacture of Staffordshire, unrivalled in amount, but not surpassing in beauty and excellence the china-ware of Worcester, is spread over the vicinity of Newcastle-under-Line. Employed in this manufacture, Burslem contains 900 men and their families; Skelton a larger number, Longton and Lane-end nearly 1000; Parkhall 700; Hanley, 360; Fenton-Calvert, 300; Sneyd, 125: these places, including a few adjacent villages which partake of the earthenware manufacture, contain about 4400 men and their families so employed. In the town of Stafford 800 men are employed in shoe-making, and these, in so far as the article produced is not consumed in the town and neighbourhood, may properly be deemed manufacturers. Burton-upon-Trent and its suburb (Burton-Extra), Yoxall, and Tutbury, partake in a small degree of the cotton-spinning trade as well as that of hardware.

The population of Staffordshire, at the decennial periods when the census was taken, was as under;—

	Males.	Females.	Total	Increase per cent.
1801	118,698	120,455	239,153	..
1811	148,073	147,080	295,153	23·4
1821	171,668	169,372	341,040	17·1
1831	206,921	203,591	410,512	18·6
1841	258,729	251,477	510,206	24·2

While the population of England has increased 79·9 per cent. during the above forty years, that of Staffordshire has increased 113·3 per cent. The details of the census of 1841 are not yet fully published: but the number of houses was: —97,676 inhabited; 5455 uninhabited; and 899 building.

The population, &c. of each hundred and borough, as taken in 1831, was as follows:—

HUNDREDS, BOROUGHS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of persons.	Males twenty years of age.
Cuttlestone, E. & W. .	5,050	5,532	14	167	2.649	1,744	1,139	13,950	12,968	26,918	7,706
Offlow, N. & S. . . .	21,076	22,327	176	1,248	4,419	13,018	4,890	57,816	55,205	113,021	27,586
Pirehill, N. & S. . .	20,319	22,047	140	813	4,973	11,179	5,895	52,584	52,531	105,115	25,746
Seisdon, N. & S.. . .	18,565	19,910	149	1,265	1,925	10,648	7,337	49,106	48,185	97,291	23,747
Totmonslow, N. & S. .	8,959	9,289	58	495	3,853	3,840	1,596	23,091	23,429	46,520	11,276
Lichfield, City	1,286	1,505	5	28	257	707	541	2,984	3,515	6,499	1,630
Newcastle-under-Lyne, Borough	1,578	1,676	12	21	1	1,587	88	3,831	4,361	8,192	2,051
Stafford, Borough . .	1,216	1,307	19	51	79	925	303	3,559	3,397	6,956	1,896
Total	78,049	83,593	573	4,088	18,156	43,648	21,789	206,921	203,591	410,512	101,632

County Expenses, Crime, &c.—Sums expended for the relief of the poor:—1748-49-50 (annual average), 9812*l.*; 1776, 32,088*l.*; 1783-84-85 (average), 40,964*l.* The sums expended at the four dates of

	£.		*s.*	*d.*	
1801 were	83,411,	being	6	11	for each inhabitant.
1811 . .	124,765	„	8	5	„
1821 . .	133,702	„	7	10	„
1831 . .	132,887	„	6	5	„

And in each of the following years ending 25th March, the expenditure was as under:—

1835.	1836.	1837.	1838.	1839.	1840.
£104,245	£92,176	£83,817	£81,183	£82,971	£92,835

The expenditure in the last of the above years would average about 3*s.* 8½*d.* for each inhabitant, which is much lower than for the whole of England and Wales. The expenditure for the year ending 25th March, 1834, was 120,512*l.* The saving effected between that year and 1840 amounted to 42,934*l.*, or 29 per cent.; namely, under the head of relief and maintenance, 27,677*l.*, or 23 per cent.; in suits of law, &c., 5021*l.*. or 73 per cent.; and in miscellaneous expenses, 10,236*l.*, or 49 per cent. The number of poor-law unions is 16, comprising a population of 404,141, according to the census of 1831: there are 22 parishes with a population of 6371, which are not in any union. The number of paupers relieved during the quarter ending Lady-day, 1840, was 19,047 (3777 in-door, and 15,270 out-door), being 5 per cent. of the population, the proportion for England being 8·6 per cent. The illegitimate births in 1830 were 736, or 1 in 17; in England 1 in 20. Bastard children chargeable on the poors'-rate in 1835-6, 2255, or 1 in 182;—in England 1 to 215. Lunatics and idiots chargeable on the same fund in 1836, 261, or 1 in 1573:—in England 1 in 1033. Proportion per cent. of persons married under 21 years of age in 1840, 13·4;—in England and Wales, 9·6 for the two sexes.

The annual value of real property in the county assessed to the property-tax in 1815, was 1,150,284*l.* The sum raised for poor-rate, county-rate, and other local purposes, for the year ending 25th March, 1833, was 175,591*l.*, levied upon the under-mentioned descriptions of property:—

On land . . .	£100,439
Dwelling-houses . .	48,804
Mills, factories, &c. . .	11,739
Manorial profits, navigation, &c. .	14,607
Total	£175,591

The amount expended was—

For the relief of the poor . . .	£124,870
In suits of law, removal of paupers, &c. .	8,400
For other purposes	44,312
Total money expended	£177,583

The county expenditure in 1834, exclusive of that for the relief of the poor, was 15,938*l.* disbursed as follows:—

Bridges, building, repairs, &c. .	£1,442
Gaols, houses of correction, and maintaining prisoners	4,469
Shire-hall and courts of justice, building, repairs, &c. . . .	240
Lunatic asylums . .	12

Prosecutions	4,237
Clerk of the peace	1,054
Conveyance of prisoners before trial	918
Conveyance of transports	550
Vagrants, apprehending and conveying	806
Constables, high and special	213
Coroner	571
Miscellaneous	1,423
Total	£15,938

The county-rate levied at different periods during the last half-century, and the principal disbursements, so far as they can be made out, are shown in the following table:—

	1801. £	1811. £	1821. £	1831. £	1838. £
Income	13,218	19,568	28,004	24,062	18,367
Expenditure:—					
Bridges	4,297	7,471	1,989	8,765	638
Gaols	102	129	1,459	704	190
Prisoners' maintenance	2,534	2,372	4,638	7,230	1,005
Prosecutions	618	854	2,382	6,220	6,308
Constables and vagrants	474	526	1,368	2,344	...

In 1839 the length of streets and highways in the county, and the expenditure thereon, were as under:—

		Miles.
Streets and roads repaired under local acts		30
Turnpike roads		601
All other highways		2,347
		2,980
Amount of rates levied		£23,138
Expended in repairs of highways	£22,127	
Law and other expenses	410	
Total expenditure		22,537

The number of turnpike trusts in the county in 1839 was 47; income from tolls, 54,648*l.*; from parish compositions, in lieu of statute duty, 212*l.*; and the total income (including 278*l.* borrowed) was 58,128*l.*; the total expenditure for the same year being 59,752*l.* The assets, including arrears of income, amounted to 16,293*l.*; the debts to 217,264*l.* In 1836 the debt was equal to 4·43 years of the annual income;—the proportion for England being 4·56 years; the proportion of unpaid interest to the total debt was 20 per cent., the average for England being 12 per cent.

In 1839 the church rates levied amounted to 8,503*l.*; and with 4772*l.* derived from other sources, were applied to defray expenses connected with the established church: in 1832 the sum derived from 'other sources' included 475*l.* from estates and rent charges. The sum expended for the purposes of the establishment amounted to 12,614*l.* in 1839, out of which sum 6695*l.* were for repairs of churches.

Crime.—Number of persons charged with criminal offences in the four septennial periods ending 1819, 1826, 1833, and 1840:—

	1813-19.	1820-26.	1827-33.	1834-40.
Total of each septennial period	1,907	2,295	4,415	5,330
Annual average	272	327	630	790

The numbers committed, convicted, and acquitted in each year from 1834 to 1839 were as under:—

	1834.	1835.	1836.	1837.	1838.	1839.	1840.
Committed	649	715	636	909	768	930	923
Convicted	412	452	395	601	539	589	666
Acquitted	237	263	241	308	229	341	257

In 1834 the proportion of persons committed, to the total population of the county, was 1 in 633; and in 1840, allowing for the increase of population, 1 in about 541.

Of 923 criminal offenders tried at the assizes and sessions in Staffordshire in 1840, there were 68 charged with offences against the person; 80 with offences against property committed with violence; 715 (including 572 cases of simple larceny) with offences against property committed without violence; 13 with malicious offences against property; 10 for forgery and uttering base coin; and 37 for various misdemeanors, including 29 for riot and breach of the peace. Above seventy per cent. of the offences were those against property committed without violence; and above sixty-one per cent. were cases of simple larceny. Sentence of death was recorded in 8 cases; in 2 execution took place, and in the other 6 the sentence was commuted. Of 666 offenders convicted, including the 8 above-mentioned cases, 20 were transported for life; 1 for above 15 years; 32 for periods varying from 10 to 15 years; 44 from 7 to 10 years; 70 for 7 years, making in all 167 offenders transported; 6 were imprisoned for above 2 years; 9 for a term exceeding twelve months; 61 for above 6 months; and 395 for 6 months and under; and 26 were whipped, fined, or discharged on sureties. The acquittals were 257 in number; in 10 cases there was no prosecution; in 71 no bill was found; and 176 persons were found not guilty on trial. Of the total number committed 783 were males and 140 females: 216 males and 55 females could neither read nor write; 443 males and 169 females could read, or read and write imperfectly; 98 males and 8 females could read and write well; 7 males and 1 female were persons who had received superior instruction; and the state of instruction of 19 males and 7 females was not ascertained. On an average of several years the proportion of uninstructed criminals in this county was 84·9 per cent.; of those instructed 15·1 per cent.;—the average of the former for England and Wales being 89·3 per cent.

Savings' Banks.—There are 18 of these institutions in the county; and the number of depositors and amount of deposits on the 20th of November in each of the following years, was as under:—

	1833.	1836.	1837.	1838.	1839.	1840.
No. of depositors	8,058	10,212	10,296	11,512	11,911	12,509
Am. of deposits	£250,617	£313,073	£311,723	£345,457	£355,870	£369,151

The various sums placed in the savings' banks in 1830, 1834, and 1839, were distributed as follows:—

	1830.		1834.		1839.[1]	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	3,762	£27,106	4,376	£32,391	6,450	£47,084
,, 50	2,183	65,532	2,504	79,699	3,318	101,225
,, 100	925	66,013	1,005	68,696	1,371	95,121
,, 150	390	38,391	360	43,718	479	57,825
,, 200	129	21,980	130	31,555	245	41,287
Above ,, 200	67	15,831	46	11,778	53	13,323
	7,387	234,848	8,477	£267,832	11,911	355,870

The deposits of 235 friendly societies, not reckoned above, amounted in 1840 to 48,498*l.*; and 10,200*l.* were invested by 176 charitable institutions.

The state of the election franchise in 1839-40 is shown in the following table:—

	N. div.	S. div.	Total.
Freeholders of every class	7,181	6,416	13,597
Copyholders and customary tenants	382	449	831
Leaseholders for life or for a term	122	197	319
50*l.* tenants at will	2,227	1,171	3,398
Trustees and mortgagees	15	54	69
Qualified by offices	9	12	21
Joint and duplicate qualifications	84	170	254
	10,020	8,469	18,489

Education.—Summary of the Returns made to Parliament in 1833:—

	Schools.	Scholars.	Total.
Infant schools	65		
Number of children at such schools; ages from 2 to 7 years:—			
Males		744	
Females		882	
Sex not specified		746	
			2,372
Daily schools	847		
Number of children at such schools; ages from 4 to 14 years:—			
Males		15,820	
Females		12,199	
Sex not specified		5,319	
			33,338
Schools	912		
Total of children under daily instruction			35,710
Sunday schools	388		
Number of children at such schools; ages from 4 to 15 years:—			
Males		23,601	
Females		22,492	
Sex not specified		7,064	
			53,157

The number of children in Staffordshire in 1833, between the ages of 2 and 15, may be taken at about 100,000. Seven Sunday-schools, attended by 301 children, are returned from places where there are no other schools; but in every other case the children have also the opportunity of attending daily schools, but to what extent they do so cannot be ascertained. Seventy-nine schools, attended by 7081 children, are both daily and Sunday schools, and duplicate returns are known to be thus far created. It is probable that less than one half of the children between the ages of 2 and 15 were under instruction in the county in 1833. Fifty boarding-schools are included in the number of daily schools given above.

The proportion of persons who attested their marriages by marks instead of writing their names, was, in 1839-40, 43 per cent. for men and 61 per cent. for women, the mean proportion being 52 per cent., while for England and Wales it is 42.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	..	..	1	80	48	925	16	367
Daily Schools	124	6487	47	3,191	615	17,955	61	6705
Sunday Schools	16	858	339	4,463	..	..	33	3834
Total...	140	7345	387	50,736	663	18,800	110	11,906

The Schools established by Dissenters, included in the above statement, are—

		Scholars.
Infant-schools . . .	2, containing	180
Daily-schools	29, .	1,899
Sunday-schools . . .	142,	23,959

The schools established since 1818 are—

Infant and other daily schools .	423, containing	20,145
Sunday-schools . .	238, .	36,839

Lending libraries are attached to 59 schools.

STAG. [Deer.]

STAGE-CARRIAGE, is defined by the act of 2 and 3 Wm. IV., c. 120, as a carriage of any construction for conveying passengers for hire to or from any place in Great Britain, which shall travel at the rate of not less than three miles in the hour and be impelled by animal power, provided each passenger pay a distinct fare for his place therein. Railway carriages and vehicles moved by steam are excluded from, &c. In 1799 the act of Parliament was passed (19 Geo. III., c. 51) which first imposed a duty on hired carriages of any description. This duty has at times been variously regulated, and is now by the above act (amended by 3 and 4 Wm. IV., c. 48) settled. By these acts any person above 21 years of age can keep or employ a stage-carriage, on obtaining a licence so to do from two or more commissioners of stamps, to be renewed yearly, and the amount of duty payable on every such licence is computed upon the number of miles such carriage is authorized by the licence to travel in the day, week, or month, as the case may be. This duty may be compounded for. Every stage-carriage is to have a numbered plate affixed to it, a licence is necessary for every pair of plates, and the number of passengers each carriage is allowed to carry is stated in the licence. These regulations are applicable to all such carriages throughout the country, and include the more recently introduced conveyance termed an omnibus, a word in no way recognised by the legislature. The conduct of the stage-carriages which are employed in London and within ten miles of the General Post-Office, is further regulated by the 1 and 2 Vic., c. 79, in which they are directed to be called 'metropolitan stage-carriages,' and by which, besides the rules applicable by the other acts to these conveyances as stage-carriages, other enactments are made as to the stamp-office plates, &c. It also empowers the secretary of state to appoint a registrar of metropolitan stage-carriages, whose office is to issue the licence which the commissioners of stamps are authorised to grant to drivers and conductors of these carriages, to whom this act more particularly relates. These licences the registrar may grant to any person above 16 years of age who can produce certificates of his ability to drive, and of good character. The licence is renewable yearly, and with it is given an abstract of the laws and penalties to which the receiver is amenable, and a numbered ticket, the latter of which it is his duty to keep about his person and not to transfer or lend. These particulars are entered in a book kept by the registrar fo the purpose, and they are receivable as evidence at law.

The word omnibus as applied to a carriage is borrowed from the French. They were at first confined to London, and ran to and from the extreme points of the city and its suburbs, through the principal leading thoroughfares, charging for each passenger, whether he travelled the whole or any portion of the distance, the sum of one shilling, which was soon reduced to sixpence, at which price it now remains through the metropolis. The convenience of the size and form of these vehicles, heavy as they are in draught, and weighing 15 or 20 cwt., caused their early adoption in the provincial towns, and they are now common throughout the country, and come under the general denomination of stage-carriages. In the principal lines of the metropolitan carriages, as the road from Paddington or from Westminster to the Bank, and frequently farther, the average number of trips each vehicle takes per day is five; and the amount of fares received by each in the course of the day is considered to be about 2*l.* The driver and the conductor receive about one guinea a week each. The duty is calculated in the proportion of so much per mile according to the number of passengers the carriage may be licensed to carry, but as the great majority are capable of holding 14 or 16, on which number the duty is about 2½*d.* a mile, the daily duty payable to government is very considerable. The number of miles which they journey in London, as the frequency of their trips is only limited by the will of the proprietors, some of whom possess 50 or 60 carriages, is ascertained by persons stationed in various parts of the metropolis in the great thoroughfares, to check their running and mark the number of each carriage as it passes. (2 and 3 Wm. IV., c. 120; 3 and 4 Wm. IV., c. 48; 1 and 2 Vic., c. 79.)

STAGE-COACH. [Coach.]

STAGGERS. [Horse.]

STA'GMARIA, a genus of the natural family of plants called Terebinthaceæ from many of them producing a turpentine-like exudation. It was named by Mr. W. Jack, assistant-surgeon in the East India Company's service, and author of 'Malayan Miscellanies,' from the Greek word *stagmus* (*στάγμα*), 'a dropping fluid.' The tree *S. verniciflua*, which is the Arbor vernicis of Rumphius, and the Kayo Rangas of the Malays, is full of acrid resinous juice, and is a native of the Eastern Islands, but not very abundant in Sumatra, though occasionally found in the neighbourhood of rivers.

The calyx is tubular, with the limb irregularly ruptured, deciduous. Petals 5, longer than the calyx, obtuse, spreading, subreflexed. Stamens 5, alternating with, but inserted above, the petals into the stipe-like torus. Filaments filiform, equal to the petals in length. Anthers oblong. Ovary stipitate, 3-lobed, lobes one-seeded, 1-2 of which are usually abortive. Styles 1-3, terminating the lobes of the ovary. Stigmas obtuse. Berry kidney-shaped, furrowed, one seeded, with a warty rind. Embryo exalbuminous, erect, cotyledons united; radicle incurved. The genus is nearly allied to Rhus, but besides the difference indicated in the above character, it has simple leaves, which are without stipules.

The wood of the tree is of a fine dark colour towards the centre. The bark exudes a resin which is extremely acrid, causing excoriation and blisters when applied to the skin; in this, as well as in becoming black when exposed to the air, it resembles the Melanorrhæa, Cashew-nut tree, poison oak, and many others of the Terebinthaceæ. According to Rumphius, this tree yields the celebrated Japan lacquer or varnish, and he considers it the same with that of Siam and Tonquin. Loureiro however represents the latter to be the produce of an Augeia. Mr. Jack says the varnish of Siam and Cochinchina is probably the best, but that of Celebes and of Java, which is the produce of this tree, is also employed for the same purposes, and cannot be much inferior, as it bears an equally high price. Rumphius says the exhalations of this tree are considered noxious, and the people of Macassar, and of other parts of Celebes in particular, entertain such dread of it, that they dare not remain long under it, much less repose under its shade. As however it furnishes the celebrated varnish, the Chinese and Tonkinese boldly repair to the tree, but employ caution in collecting the resin. This they do by inserting into the trunks two pieces of bamboo, sharpened at their points, in such a manner as to penetrate the bark in a somewhat oblique direction. These remain all night, and are extracted before sunrise the next morning, the trees yielding no juice during the day. This fluid resin bears a high price, being sold in Tonkin and Camboja for 30, 50, or 60 dollars, the pecul of about 133 pounds, but in many of the provinces of China for 200 or 300 dollars.

The varnish is prepared for use by boiling it with an equal weight of the oil of Tang-yhu, which is a Chinese tree allied to the Mimusops Elengi, from whose fruit an oil is prepared. The proportions are varied according to the purposes for which the varnish is required. Sometimes dry pigments are added for the sake of red or other colours. The Japanese are the most skilful in preparing and ornamenting all kinds of work with this varnish, and their black lacquered works are conveyed to all parts of the world. (Jack's *Malayan Miscellany*, No. 3, reprinted by Sir W. Hooker.)

STAHL, GEORGE ERNEST, one of the most celebrated physicians of the last century, was born at Anspach in 1660. He studied medicine at Jena, took his degree of doctor there in 1683, and at once began to deliver lectures. In 1687 the duke of Weimar made him his physician; and in 1694, at the instance of Hoffman, he was appointed to a professorship of medicine, anatomy, and chemistry in the university of Halle, then recently established. He taught there for twenty-two years, and upon being appointed physician to the king of Prussia, went to Berlin, where he died in 1734.

The system of medicine which Stahl taught, and on which were founded the principles and practice of his numerous school, may be regarded as produced from a combination of the physiology of Van Helmont, which he learnt at Jena from G. W. Wedel, with the doctrines of Descartes respecting the agency of immaterial principles upon inert matter. In his life [HELMONT, VAN] it has been shown what Van Helmont taught on the nature and operations of an Archæus, as a principle resident in the living body and governing all its actions. Stahl supposed a like influence to be exercised by what he called the *anima*, an immaterial principle which (as far as can be ascertained in the obscurity in which his style of writing has involved his meaning) he seems to have regarded as identical with the soul, and as capable of acting both with consciousness, in the operations of the mind, and unconsciously, in the government of the processes in the living body. He held that this anima first forms for itself the body; and then, abhorring the destruction of that which it has formed, directs all the processes of the organization so as to evade death. For this purpose, it guides them to resist putrefaction, and to expel through the appropriate organs the effete particles and morbid substances accidentally introduced; it directs the repair of all injuries, and, in ordinary nutrition, maintains the due form and composition of the tissues. For this last process (as an example of its agency in all the rest) he supposes the anima to have knowledge (independently of the consciousness of the animal in which it works) of the necessary composition of every part of the body and of the materials to be given to each, and to have power to guide aright all the acts necessary to the required end. These acts, he considered, are effected by what he named tonic vital movements, that is, movements of alternate tension and relaxation, dependent on a property of *tone* resident in all the soft tissues of the body, and by which, under the influence of the anima, each part directs the movements of the fluid in its vessels or its parenchyma.

Disturbances of the government of the anima and of this property of tone constituted the chief elements in Stahl's pathology: and the signs of disease were regarded by him as indications of the efforts of the anima to remove the source of the malady and to preserve the body, either by means of extraordinary tonic movements, or sometimes by the most violent spasms and convulsions. He held that one of the commonest sources of disease was plethora, either local or general; and for this, the hemorrhages from different organs at different periods of life were regarded as the remedies employed by the anima. Especially, he applied these notions to the vena porta, in which, from the slowness of the circulation in it, plethora was thought peculiarly apt to occur; and to this condition he mainly attributed hypochondria, melancholy, gout, calculus, and hæmorrhoids; so that it came to be an aphorism of his school, 'Vena porta, porta malorum.' Fevers in general he considered to be the results of the anima endeavouring by the local tonic actions to expel some morbid matter; and their fatality, like that of most other diseases, he ascribed to the morbid matter being too abundant or the tonic powers too weak for its expulsion.

Stahl's therapeutics corresponded closely with his theory of disease. His principles of treatment were to aid the beneficial efforts of the anima and to remove the obstacles to its action. His remedies were few and simple, consisting chiefly of bleeding for the relief of plethora, and of mild evacuant medicines.

Medical science owes much of its progress to the energy and acuteness with which Stahl aided in overturning the notion which, before his time, was generally prevalent in the schools, that the simple laws of chemistry or of mechanics were all on which the phenomena of the living body depended, and in drawing attention to the body as an organism governed by peculiar laws, and having all its healthy processes adapted to one final purpose, namely, the preservation of the whole by the different actions of its parts. He rushed indeed into an extreme opposite to that of his immediate predecessors; for he treated with all the bitter sarcasm and morose contempt of his naturally stern temper every endeavour to apply any other science, even anatomy, in the study of medicine; and he mystified the principle which he supposed to rule the organism: but still he gave the turn towards truth, by following which his successors were gradually brought to a more just appreciation of the complexity of the forces which are in operation in the living body, and of the share which each of them has in each of its processes. His hypothesis of an *anima* has been ridiculed; yet, with another name, it is that which is adopted in nearly all the physiology of the present day: the *vital principle* and the *nature* of the majority of modern medical writers differ in little more than name from the *anima*, the *archæus*, and the *φύσις* of Hippocrates: the common hypothesis involved in all is that of an immaterial principle resident in the living body, and governing *with reason* all the processes in it for the final purpose of preserving life. Though the hypothesis be false, the medical sciences have made great progress through being pursued in the spirit which it suggests; and to this progress no man's labours have contributed more than those of Stahl.

Though Stahl despised chemistry in its attempted application to medicine, we owe to him an important step in the advancement of that science. Taking up the crude opinions of Becker, as he did those of Van Helmont, he became the inventor of the theory of Phlogiston, which for many years had such influence in chemistry, and in the working out of which, though it was based in error, so many important truths were ascertained. [BECKER; PHLOGISTON.]

Haller, in his 'Bibliotheca Medicinæ Practicæ,' tom. iii., p. 577, gives a list, collated by J. C. Gœtz, of 250 medical works written or superintended and edited by Stahl. That in which his medical doctrines are most completely taught is entitled 'Theoria Medica vera Physiologiam et Pathologiam tanquam Doctrinæ Medicæ partes contemplativas e Naturæ et Artis veris Fundamentis intaminata Ratione et inconcussa Experientia sistens.' It was published by him in 1707 and 1708. All the peculiarities of his system however are discernible in his inaugural thesis 'De Sanguificatione,' Jenæ, 1684. His chemical works were comparatively few: he first proposed the phlogistic theory in 1697, in his 'Zymotechnia Fundamentalis.' The best brief account of his doctrines is in Haller, and in Sprengel, *Histoire de la Medicine*, tom. v.

STAINES. [MIDDLESEX.]

STAIR, LORD. [DALRYMPLE.]

STAIRCASE. This is an indispensable part of the interior of buildings which consist of more than a ground-floor, and stairs of some sort must have always been employed wherever there were upper rooms, or even to obtain access to the terraced roofs which are used in the East. But we are altogether ignorant of the character of antient staircases. Vitruvius—who touches upon so many matters that are very remotely connected with his subject—gives no information about staircases; neither has much light been thrown upon the subject by the discoveries at Pompeii. Scarcely any indications even of upper floors to the houses have there been found, and what few traces of staircases, or rather of stairs, remain, show them to have been exceedingly incommodious, fitted only for obtaining access to an upper loft, or to the roof, and not at all adapted for constant communication between dwelling apartments on different floors. It may therefore very safely be taken for granted—at least until some direct evidence to the contrary shall be found—that the houses of the antients were in this, as well as in many other respects, greatly inferior to our own, and had nothing whatever corresponding to the modern staircase. Nearly the same may be said with respect to the antient domestic architecture of our own country, where, even in residences of the highest class, the staircases were generally very confined—placed within turrets, and exceedingly steep and narrow—narrow not only as regards the actual width of passage up and down, but the diameter or space occupied by the whole, there being no *well*, or central opening, but the steps winding around a solid newel so that in ascending or descending a person is continually revolving,—without any 'foot paces' for resting upon, and cannot see whether he will encounter any one else. *Turnpike* was a term formerly applied to staircases of this kind; also *Vise*, from their spiral or screw-like shape, whence the more modern appellation of *Corkscrew* stairs, corresponding with the Italian *Scala alla Lumaca*, or *Scala alla Chiocciola*, with the French *Escalier à Limaçon*, and the German *Wendeltreppe*.

It was not till about the time of Elizabeth that staircases began to be planned more commodiously in this country, and made a decorative feature in the interior of a mansion. But though they were greatly improved, the flights being made wider, and the steps parallel to each other, with intermediate landings or resting-places between the several flights, and although considerable decoration was bestowed upon them, the walls being pannelled, and the parapet of the stairs formed either by richly carved balusters, or open fretwork, frequently with heraldic figures of animals on the pedestals at the angles of the different flights—the staircase itself was usually enclosed within a comparatively small area, so as to admit of no general view of the whole of it, there being very little open space, or *well*, as it is termed; sometimes none at all. The staircases at Aldermaston, Berks, Crewe Hall, Cheshire, and Knowle, Kent, may be taken as examples of the kind. At a later period, staircases in mansions of a superior class were made disproportionably spacious, being upon a scale as to size with which the apartments themselves were not at all in keeping.

The planning of a staircase is generally considered one of the most difficult matters in internal architecture, and it is certainly one that requires great consideration. Yet there is no particular difficulty, except where, as is generally the case in moderate-sized houses, the architect is cramped for room; more especially if, while restricted in that respect, the ascent from one floor to another is greater than usual. The number of stairs and the space required for the convenient arrangement of them, are easily estimated when the height of the ascent from one floor to another is given, and the dimensions are determined for the risers and treads. Stairs are technically described as consisting of *Risers* and *Treads*, the former being the fronts or heights of the steps, and the other their flat surfaces or breadths. Stairs are further distinguished as being *Flyers*, those which ascend straightforward; and *Winders*, which having their treads triangular, coming quite to a point at their ends next balusters, afford no footing there, and ought consequently to be avoided whenever it is at all practicable to do so. A *Flight* is a consecutive series of stairs in the same direction, or between one *Quarter-space* or *Half-space* (*Palier de repos*) and another, which last are short intermediate landings, serving to lessen the fatigue of a continuous ascent, by subdividing it into shorter flights. For the area containing, or rather constituting, the staircase itself, we have no distinct term in addition to the general one, similar to the French *Cage*, the Italian *Gabbia*, and the German *Treppenhaus*.

We proceed to notice the most convenient proportions of the stairs themselves as to height and breadth for their length. As to the breadth of the flights, that is comparatively arbitrary: it should never be much less than four feet, so as to allow two persons to pass, except in back-staircases; but it may be as much more as the space will permit, or the effect aimed at in the design may require. The best general and what may be considered standard proportions, are 6 inches for the risers and 12 inches for the treads; though from 6½ to 7 inches may be allowed for the former, and only 10 for the latter, in secondary staircases. In those of a very superior kind, on the contrary, the risers do not exceed 5 or even 4 inches (less height than which last would be more fatiguing than convenient), and their treads are then made from 14 to 16 inches. The height therefore to the landing of the floor to be reached being given, it is easy to calculate either how many risers of a certain number of inches will be required; or what must be the dimensions of the risers and treads, in order to ascend within the space allowed. Supposing the first-mentioned height to be 14 feet, and the risers six inches, two risers will be equivalent to one foot of ascent, and consequently twenty-eight risers will be required, or twenty-seven treads, the upper landing being the tread to the last riser. In such case, hardly less than an area of 20 by 8 feet, on the level of the upper floor, would be sufficient for the staircase, unless there were winders instead of quarter-spaces, or of a single half-space between the two flights. The number of risers required is ascertained by reducing the given altitude of ascent to inches, and dividing it by the height of the risers thus, taking the altitude as before (14 feet), and the risers at 5 inches, there must either be 33 risers a trifle more than 5 inches each, or 34 a trifle less.

Palladio, and others following him, have laid it down that the staircase ought to be seen immediately on entering a building; but it is impossible to establish any positive rule for what must depend upon particular circumstances, and this is by no means the best as a general rule. In a public building or place where strangers go in and out without inquiry, it may be desirable that the staircase should present itself at once; but certainly this is not the case in private mansions. On the contrary, it is in every respect better that the staircase should be kept out of view until the first vestibule has been passed through, and that it should be placed as remote from the entrance into the house as the plan will admit, both in order that the approach to it may be lengthened, and that, in case it has any architectural pretensions at all, it may strike the more by not coming into view at once. At all events, only the lower part of the staircase—no more than is sufficient to indicate its situation—should be visible from the entrance, otherwise it will be inconveniently exposed; and if there are doors to several rooms on the upper landing, persons passing from one to the other would be seen from the hall. It is therefore a great error to place the staircase, as is sometimes done, in the first or entrance hall of a mansion, because, in addition to the inconvenience just pointed out, such hall must be made the height of two floors, and consequently, if otherwise suitably proportioned to such height, it will be the most spacious and loftiest room, and so far be attended by a degree of effect which, instead of being afterwards increased or kept up, is greatly diminished. Such arrangement also cuts off the communication above between the rooms on one side of the hall and those on the other, except there is a gallery or continuation of the landing carried over the entrance.

Even when kept apart from the entrance-hall or other vestibule, a staircase will always be sufficiently striking in proportion to the rest of a house, because it will produce greater architectural effect, and be loftier than the rooms themselves. We are now speaking only of what is usually termed a 'grand staircase,' leading up no higher than the principal floor, so that the whole of the space from the level of the landing is perfectly clear, and there are no flights leading up higher, for if there were, the space over head would appear encumbered and confused. There is in fact no part of an interior which accommodates itself more readily to architectural character and display, or which admits of greater variety of design both as to plan, section, and decoration, than a staircase of the kind just referred to. If the house itself be not upon a very large scale, there is danger of doing here rather too much than too little. In regard to altitude, there will here always be greater magnitude than elsewhere; if therefore corresponding magnitude of area be given to it, the staircase will overpower everything else, cause the rooms to appear small by comparison, and appear in itself too large for the house. It is therefore desirable to make the area, at least the visible area of the staircase, rather less than more than that of any of the principal rooms. It is also rather a solecism to affect magnitude of space in other respects corresponding to that of height. While it serves as a contrast to the apartments, loftiness or excess of height, as compared with length and breadth, is as much an appropriate characteristic of a staircase as it is of a tower. Its altitude therefore from the bottom of the first flight to the ceiling, may very properly be made between two or three times the breadth. Accordingly it will be found expedient to enclose the landing, if continued quite round the staircase, not merely by a screen of columns, but in such manner as to shut it out from view, with only partial openings at intervals, in order to avoid too much spaciousness on that level, and to keep the *cage* of the same size from bottom to top. Of such staircase upon a large scale there is an example at Taymouth Castle, the seat of the marquis of Breadalbane, which is about 40 feet square by 100 feet in height, with an upper corridor surrounding it, with open arches.

One of the most simple and effective yet least common arrangements of a staircase, is that which may be described by the term *Avenue staircase*, the stairs being continued in a straight line, though broken by *spaces* into a succession of flights, within what would else be a level corridor or gallery; and occupying its entire width. There is something particularly noble and majestic in a staircase of this kind, for although it may be narrow, considered as a gallery, it looks unusually spacious as a staircase, the *flight* itself being wider than those of staircases placed within a much larger area. Besides which, the whole is more regularly disposed, and forms a more striking piece of perspective. Still simple as such plan is in itself, it is by no means adapted to general application, because, although it requires only moderate width, it requires considerable length, short flights, and ample spaces between them, and stairs with low risers and broad treads; otherwise the descent as viewed from above, being in a straight line, looks precipitous, or at least has no dignity of appearance. Another circumstance which limits a staircase of this kind to particular cases, is, that in order for it to produce proper effect, the height to be ascended should be very moderate, hardly more than seven or eight feet; for else, the space at the foot of the stairs looks confined, and the upper flights scarcely show themselves from that station. Hence, though it may be referred to as an instance of an avenue staircase, the one leading to the keep or round tower at Windsor Castle is more remarkable than beautiful or grand, leaving decoration out of the question; the altitude ascended being so very great. Sir John Soane has given some ideas of the kind in his designs for a 'Scala Regia'—a favourite subject with him; and he executed such a staircase, though upon a more limited scale, for the royal entrance to the House of Lords. The width of that staircase is only 10 feet, by 49 in extreme length, and the ascent 9 feet. Though not free from little conceits, the whole has considerable effect, as may be judged from the perspective view of it in vol. i. of the 'Public Buildings of London,' by W. H. Leeds, which also contains a longitudinal section of it. The staircase of the Chamber of Peers at Paris, designed by Percier and Fontaine, is another example of the kind upon a larger scale, but not the very best, for the ascent is so great, that the columns on its sides, on the same level as the landing, look quite insignificant. That at Covent-Garden Theatre also belongs to the same class, although it differs from the preceding in being extended in the upper part by the landing being continued along its sides as a gallery divided from it by columns; the ascent is about 10 feet, in two flights. The National Gallery, again, affords instances of a different modification of the same arrangement, half the ascent being by an external flight in the vestibule, the remainder by another within the corridor leading from it; and though not exactly suited for such a building, the idea is pleasing in itself and would produce a striking effect in one of less pretension.

In public edifices or large mansions, whatever be the plan of the principal staircase, it is generally *branched*, that is, there is first a wide central flight, and then two other narrower ones branching off from it one on each side, either at right angles to it or as return flights parallel to it; and it is hardly necessary to observe that in all such staircases the *foot-spaces* are large, and that there are no winders. The staircase at Goldsmiths' Hall, which is parted off from the vestibule by a glazed screen, is an example of more than ordinary splendour, being lighted by a dome. The branching flights at right angles to the first, lead to a landing on each side, which has a double screen of Corinthian columns, so that the view across from side to side, in the upper part, is unusually rich. At Buckingham Palace, there is first a very wide flight, entered from between columns, branching off right and left in curved flights, the cage, which is about 36 by 26 feet, being curved elliptically on those sides or ends. In this example, the stairs rest upon a graduated podium or wall enclosing the space immediately beneath, which serves as a private passage behind; a mode frequently adopted in similar cases, being one which contributes to solidity and nobleness of appearance, and prevents that mass of shadow beneath the stairs which gives a gloom to the lower part of the staircase.

Instead of there being a central flight below, the ascent frequently begins on each side, and is carried up in one or more flights to the common landing where both branches terminate; from which point the stairs are sometimes continued, returning in an upper central flight which is carried across an arch thrown from that landing or half-space, to a higher landing. Staircases of this kind, which may be termed *bridge* staircases, occur in the Custom-house and the Auction Mart. Their effect, however is not good, because the upper suspended flight or *bridge* darkens the lower part of the staircase, and has a strangely awkward cumbersome appearance when viewed from that station. At the best therefore they are suitable only for places of evening resort, where they can be lit up below as well as above.

The staircase of the Fitzwilliam Museum, Cambridge, claims notice, not only on account of the richness of the general design, but of some peculiarities in its arrangement. Strictly speaking however, this example can hardly be given as that of a staircase, according to the usual meaning of the term, the stairs being mere flights of steps in the entrance hall. That in the centre is a broad descending one, leading down to the libraries, which are on a lower level than the hall; and on each side of it is a rather narrower ascending flight to the spacious landing carried around three sides of the hall, and serving as a statue gallery. Though the lower area is only 32 by 26 feet, consequently that of the floor very much less, owing to the space occupied by the flights of steps, that of the upper part on the level of the landing is 68 by 44 feet, the landing itself being about 17 feet wide. In some degree similar in plan, although very different in design, is the hall at Holkham, the seat of the Earl of Leicester, which has a noble flight of steps within a recess or tribune enclosed by columns which are continued along the sides of the hall.

The grand-staircase of the Reform Club-house, London, is an example, somewhat unusual in this country, though common enough in Italy, of what may be called an *enclosed* staircase; the flights are shut up between walls, and consequently there is no open *well*, nor can the whole be seen at one view. A plan of this kind therefore differs from the avenue staircase, merely in not being carried straightforward, but either returning in a parallel flight from the half-space or first landing, or having the second flight at right angles with the first. The last is the case at the Reform Club-house, where the staircase consists of three enclosed flights, the last being a return one to the first, and landing upon the gallery around the upper part of the inner hall or saloon. That at Burleigh too is similarly planned. The same mode may be adopted for circular or semicircular as well as rectangular plans; and one advantage attending it is, that while the ascent itself is as spacious and commodious as if the whole were entirely open, there may be a secondary staircase for servants, shut up within the larger one.

Though Milizia objects to them as inconvenient, circular and semicircular staircases, and such also as are partly rectangular and partly semicircular, being curved in the latter form at one or both ends, are very beautiful, at least capable of being rendered so; neither is the inconvenience alleged against them one of any moment, because though all the stairs are winders, the diameter of the staircase itself may be such, that the treads may be 10 inches wide at their ends next the balusters or open part of the staircase, and the whole ascent be completed in half a revolution or semicircle; whereas in a narrow newel staircase of the kind two or more revolutions will be required.

The architectural effect of a staircase will greatly depend upon the mode of lighting it. Where it is carried up only one floor, the best mode is to light it entirely from above, either through a dome or lantern in the ceiling, or by making the upper part of the walls just beneath the ceiling a continued lantern. If there are windows on the landings of the several flights, the effect will be improved by their being filled with stained glass, especially if towards a back court; or, if a conservatory can be carried out on the level of the first landing, so as to show itself through glazed folding-doors, a very pleasing and cheerful effect is obtained, even though the conservatory itself should be hardly more than a glazed viranda. As to material, stone is greatly preferable to wood for stairs, if only on account of greater security in case of fire; in lieu of stone, cast-iron may be employed. Marble is very rarely used for stairs in this country, and whenever it is, it should be left unpolished on the treads, or it would be dangerous to descend them. The same remark applies to stairs of wainscot, unless they are carpeted nearly their entire width.

STALACTITE and STALAGMITE. Stalactitic carbonate of lime occurs chiefly in long masses suspended from the roofs of caverns in limestone rocks. Stalactites appear to be continually forming; water containing carbonate of lime held in solution by carbonic acid, trickling through crevices in the roofs of the caverns, gradually during its exposure to the air loses its carbonic acid, and consequently deposits its carbonate of lime; the water passing over the portion first deposited gradually adds to it, and eventually gives the carbonate of lime its great length and stalactitic character. The flatter deposits, called *stalagmites*, are formed on the floor of the cavern by the water there depositing that portion of its carbonate of lime which is not separated during the formation of the stalactite. Stalactitic carbonate of lime is met with in the veins of lead-ore in Durham and Northumberland. Caverns are sometimes nearly filled with these deposits, which in some cases are of very large dimensions; the most remarkable instances of their occurrence in Britain are in the cavern at Castleton in Derbyshire, and Macallaster Cave in the Isle of Skye: the grotto of Antiparos in the Archipelago, the Woodman's Cave in the Harz in Germany, and that of Auxelle in France, are striking instances of their formation in other countries.

Besides the occurrence of this variety of carbonate of lime in the stalactitic form, it is sometimes met with reniform and tabular, and in other imitative shapes. The fracture is sometimes perfectly lamellar, occasionally fibrous, the fibres diverging from a centre, with a pearly or silky lustre, and sometimes resinous or waxy. The colour varies from white to greyish, brown, red, and yellowish white. Opaque, but frequently translucent.

The *Oriental alabaster*, much employed by the antients in statuary and the formation of vases, appears to be of stalactitic origin.

STALAGMITES (from σταλαγμός, a dropping), the name of a genus of plants belonging to the natural order Clusiaceæ or Guttiferæ. It has polygamous or bisexual flowers; 4-5 sepals, which are persistent and bractless; 5 petals alternating with the sepals; 4-5 united stamens, the bundles flat, elongated, and divided at the apex into several short antheriferous portions opposite to the petals, and alternating with 5 large truncated glands; the anthers are 2-celled, bursting longitudinally; the ovary is 3-5-celled, with 1 ovule in each cell; stigma 3-5-lobed; and fruit a berry. The species are trees natives of the East Indies and Ceylon, and belong to the family which produces the gamboge of commerce. Dr. Wight states that one of the species, the *S. ovifolia*, which is a native of Ceylon, yields a true gamboge, which is employed in commerce. It is known by its oval shining leaves, its lateral fascicled flowers, male and hermaphrodite mixed. Its anthers are arranged in 6 or 8 bundles, and it possesses a 3-celled 1-3 seeded ovary.

STALBRIDGE. [DORSETSHIRE.]

STALL-FEEDING. The feeding of cattle in stalls for the purpose of fatting them more readily than by simple grazing, and at a time when they cannot get fat on pastures, as a regular part of the process of husbandry, is comparatively modern. In former times cattle were slaughtered in October and November, which latter, in most languages derived from the Teutonic, is called *Slaughter-month*, there being no possibility of buying fresh meat of any degree of fatness during winter, and salt meat was the food of all classes in that season. But now the process of fatting cattle goes on without interruption during the whole year, and fat beasts come as regularly to market in winter as in summer. Stall-feeding is now the principal means by which oxen and cows are rendered fit for the market.

It has been observed, in the article SOILING, that one object of that system was to save the waste of food which is occasioned by the treading of cattle in pastures, and by their choosing the sweetest grasses to the neglect of the coarser. The principal object however is to save the manure, which in the pastures goes to waste, but in the yards or stall is all preserved. In stall-feeding another object is looked to, that of increasing the substance of the animal, especially the fat; and to do this judiciously and with profit requires much experience and attention. It has been proved that animals require a certain portion of meat and drink to keep them alive, and that this quantity, in the same species, is in general in proportion to the weight of the animal. If an animal has his exact ration of food, he will continue in health, but he will not increase in weight: in this case therefore it only produces a certain portion of manure, which is not equivalent to the food consumed. If a larger quantity be given, the animal, if in health, will increase in weight, and the more food he has, within a certain limit, the faster will be this increase: but there is a point where increase stops; and if by any means the animal is induced to take more, his stomach will be deranged, and he will become diseased, and occasion loss by over-feeding. It is consequently of great importance to the stall-feeder to ascertain what is the exact quantity of food which it will be most profitable to give to a stall-fed animal. Experience alone can teach this; but some rules may be given which will enable any one who wishes to stall-feed cattle not greatly to err in his mode of feeding, and soon to find out what is the most profitable course to pursue. For this purpose it is essential that after having ascertained by experiment the quantity of food which will give the greatest increase of flesh per week on a certain weight of beasts when put up to fatten, all the food given to the cattle be carefully weighed, and no more be given in any day than is needful. The quality of the food should also be attended to; for a truss of fine well-made clover, lucern, or sainfoin hay, may contain double the nourishment of another truss of coarse marsh hay. The best kind of food should always be reserved for fatting cattle. Roots are excellent helps; but roots alone are too watery, and must be corrected by dry food, such as straw cut into chaff, or good hay, and especially farinaceous food, whether it be corn ground or bruised, or oil-cake after the oil has been expressed. By a judicious mixture of food a much greater increase of flesh may be produced than by an irregular mode of feeding, however good the quality or abundant the quantity given may be. To overfeed is as unprofitable as to starve a beast, and produces similar effects. It is of great importance that the cattle should be fed with great punctuality, at certain hours during the day, and that the troughs should be cleared of all the remains of food which they do not eat at each time of feeding. Rest and sleep are great aids to digestion, and a little gentle exercise after sleep prepares the stomach for a fresh supply of food. Air also is highly conducive to health; and hence those beasts which are allowed to move about in a loose stall, or a small yard protected from the rain and wind, thrive better in general than those which are tied up. It is the practice of many good feeders to put oxen in pairs in small stalls, partly open, so that they may be in the air, or under shelter, as they prefer; and the finest oxen, if not the fattest, are prepared for the market in this way. Experience shows that all domestic animals like company, and that they are more contented and quiet when they have a companion than when they are alone. This is the reason why they are put up in pairs. Whatever promotes the health and comfort of the animal will be most profitable to the feeder. When a beast has acquired a certain degree of fatness, it is a nice point to decide whether it would be best to send him to market or continue to feed him. This is often decided by mere caprice or fancy; but if the food has been weighed, and the weekly increase of the beast is noted, which is best done by weighing, but may nearly be guessed by measuring, it becomes a mere question in arithmetic to determine whether his increase pays for his food and attendance; if it does not, there is a loss in keeping him; and if a lean animal put in his stead would increase faster on the same food, every day he is kept there is a loss of the difference between the increase of the two. The pride of producing a wonderful animal at a fair or show may be dearly paid for, and must be put down to the account of luxuries, such as keeping hunters or racehorses.

The most profitable food for fattening cattle is, in general, the produce of the farm: the expense of all purchased food is increased by the profit of the dealer and the carriage of it. And the only compensation for this additional cost may be in increasing the manure, where the straw and roots of the farm are deficient: in that case oil-cake, or even corn, may be purchased with advantage, since by means of the manure crops may be raised which without it must fail. The stalling of cattle, as well as the fatting of pigs, is in many situations the best means of carrying the produce of the farm to market. An ox can be driven many miles, whilst the food he has consumed would not repay the carriage, and all the manure would be lost, and must be purchased at a great expense, if it can be had at all. If a farmer can feed cattle, so as to pay him a fair market-price for the food consumed, and something for the risk of accidental loss, he may be well contented to have the manure for his trouble: few stall-feeders get more than this in the long run.

STAMENS, in Botany, the organs which constitute the last whorl but one of the series which form the flower in plants, the pistil with its parts forming the last or innermost whorl. These organs were called by the older botanists *Apices*, and by English writers Chives. They constitute the male organs of the flower, and are formed principally of cellular tissue. They are composed in most cases of three parts: 1, the filament, a long slender organ, on the summit of which is placed—2, the anther, which is a little case, mostly double, containing—3, the pollen, which is composed of little grains constituting the fructifying influence of the plant. [ANTHER; POLLEN.]

The stamen in theoretical botany is considered, as well as the other parts of the flower, a modification of the leaf. Although its form, structure, and functions differ so much from the leaf, it is not difficult to point out the series of modifications by which the one is converted into the other. In many plants the leaves cannot be distinguished near the flowers from the bracts, and these again cannot be distinguished from the sepals forming the calyx; whilst the calyx often insensibly passes into the corolla, and parts of flowers are often seen possessing both the characters of sepals and petals. In the case of the white water-lily, a good example is offered of the passage of petals into stamens, thus completing the series of changes from leaves to stamens. In this plant, a gradual contraction of the inner petals is seen to take place at their upper parts, the cellular tissue becomes coloured, and partakes of the character of pollen-grains, and these changes become more and more decided till the whorl of stamens is fully established in the centre of the plant. Many other plants might be cited as affording examples of the same changes, as *Calycanthus*, *Illicium*, &c. These changes occur naturally in the above plants, but a more decided exemplification of the conversion of these organs will be found in what are called monstrous or double flowers, which are the result of cultivation. If for instance a garden-rose is taken, it will be found that the natural position of the stamens in this flower is occupied by petals, and in many the character of half-stamen and half-petal may be clearly seen. In other double flowers the same backward change may be observed of petals into sepals, and so on.

In the change that has thus taken place of the leaf into the stamen, the filament of the latter represents the midrib of the former, whilst the anther and its pollen are modifications of the lamina and cellular tissue of the leaf. It is well known that the cellular tissue of the upper and under surface of the leaf differ very considerably, and it is to these parts that the anterior and posterior cells of the anther are analogous. On this point Schleiden has proposed the question as to whether there is any corresponding difference in the character of the pollen in the anterior and posterior cells; whether they both possess the power of fructifying; and whether in diœcious plants it might not be ascertained that the one produced pollen grains that would engender male embryos, and the other grains that would produce female embryos.

In their normal position in the flower the first row of stamens are always alternate with the petals; and as these organs are alternate with the sepals, the stamens are opposite the latter. If there is a second row of stamens, they will be alternate with the first, and thus of course opposite the petals. It however frequently happens, as in the primrose, that there is only one row of stamens, and yet opposite the petals. In such cases the anomaly is accounted for by supposing that the first row has not been developed, and consequently the second stand in their original position, that is, alternate with the aborted row. When there are only five petals and ten stamens, as in Silene, the latter are supposed to form a double row.

The stamens are said to arise from various parts of the flower, and according to the part of the flower from which they arise terms have been applied to express this origin, which are of great importance in systematic botany. When the stamens arise from (or, as it is often expressed, are inserted into) the calyx or corolla, they are said to be *perigynous*; when they arise from under the pistil or ovary, *hypogynous*; when from the pistil itself, *epigynous*. The classes and subclasses of the natural system of Jussieu are subdivided according to the existence of these distinctions in the families of plants. The above terms however must not be supposed to express the fact that the stamens do really originate in the parts from which they are said to arise or are inserted into. The fact is, the stamens always arise from a point in the axis of the flower between the petals and ovary; and when attached to these or other parts, it must only be looked upon as an adhesion of one organ to another. Thus when it is said that the stamens are inserted into the calyx of the flower of the apple, it is meant that they adhere to the calyx up to a certain point, from whence they appear to arise. The same must be said of their connection with other parts.

The *filament* of the stamen is the representative of the petiole or midrib of the leaf, and in structure and function resembles that organ, and is not any more essential to the existence of the stamen than the petiole is to the leaf. It is composed of very delicate cellular and woody tissue, with which are intermixed a few bundles of spiral vessels. It is mostly filiform and cylindrical in shape, and in most instances without colour. In some plants, as the Canna, and in the whole of Zingiberaceæ, the filaments are hardly distinguishable from petals except in the possession of anthers at their apex.

The filaments are often combined into a single mass, the anthers being separate; when this is the case, they are said to form a brotherhood, and the term *adelphia* is applied to them. When there is only one such combination, the stamens are said to be *monadelphous*, as in geranium; when there are two such unions, or even if only one stamen is separated from the rest, they are called *diadelphous*, as in Fumaria, Vicia, Lathyrus, &c.; when there are more than two, as in Hypericum and Melaleuca, they are *polyadelphous*. The filaments are sometimes of different lengths; when two are tall and two are short, as is seen in the whole of the natural family Lamiaceæ, they are called *didynamous*; if four are long and two are short, as is seen in the family of Cruciferæ, they are *tetradynamous*.

The number of stamens in flowers is expressed by a Greek numeral being prefixed to the word *androus*: thus flowers with one stamen are *monandrous*; with two stamens, *diandrous*; with three stamens, *triandrous*, and so on.

It was on the number of stamens, and their arrangement and relations, that Linnæus founded the classes of his celebrated sexual or artificial system of the arrangement of plants. [SYSTEM, SEXUAL.]

For the function of the stamens, see ANTHER; POLLEN; IMPREGNATION; STIGMA.

STAMFORD, or **STANFORD**, a parliamentary borough in the wapentake of Ness, in the county of Lincoln, 80 miles from the General Post-Office, London, in a direct line north by west, or 90 miles by the road through Hatfield, Baldock, Biggleswade, and Norman Cross.

Stamford is said to have been a British town before the Roman invasion; and it is an antient fable that the British king Bladud established a university here which lasted till the time of Austin, the apostle of the Anglo-Saxons. Authentic history is however silent about the place till the troubled period succeeding the Roman dominion, when the Picts and Scots were defeated here by the Britons and their Saxon allies, A.D. 449. (Hen. Hunt., lib. ii.) It is again mentioned in a grant made (A.D. 656) by Wulfhere, king of Mercia, to the Abbey of Medeshamsted, or Medhamsted (now Peterborough), recorded in the Saxon Chronicle. The genuineness of this deed is however questioned by Peck. In the reign of Edward the Elder (A.D. 922) the part of Stamford south of the Welland was fortified by the Saxons, and the Danes, who occupied the northern part of the town, submitted. The town was one of the five Danish burghs which connected their Northumbrian and East Anglian possessions. It was again reduced by the Danes, or ceded to them; and recovered by Edmund I., A.D. 942. Stamford is noticed in a charter of Edgar to Medeshamsted (*Sax. Chron.*, A.D. 963) as a market-town. It submitted to Sweyn, king of Denmark, in his invasion, A.D. 1013, but was recovered soon after by Ethelred II. In Domesday Book, Stamford, there called Stanford, is styled a king's borough, and is described as having six wards, five in Lincolnshire and one in Hantune or Northamptonshire.

In the reign of Stephen, the king had a meeting at Stamford, A.D. 1140, with Ranulph or Ralph, earl of Chester, with a view to conclude a peace. In 1190 the Jews of Stamford, who appear to have been tolerably numerous and wealthy, were plundered, and many of them slain by those who had enlisted for the crusade. Their synagogue at Stamford, 'with its noble library,' was profaned and sold at the time of their expulsion by Edward I., A.D. 1290.* In the commencement of the civil war of John, A.D. 1215, the barons assembled here to oppose the king, and John was himself at Stamford a little before his death. In the early part of the reign of Henry III., Richard, earl of Cornwall. the king's brother, assembled a considerable body at Stamford of discontented barons and their retainers, who required the king to restore the two charters (Magna Charta and the Charta de Foresta): but the confederacy was dissolved by the moderation of the king and his promise to govern according to the laws of the realm. One of the crosses which marked the resting-places of Queen Eleanor's body, was erected at Stamford: it was utterly demolished in the civil troubles of Charles I. Several parliaments and councils were held at Stamford in the middle ages. The town was at this time fortified with walls and towers in which were seven principal and two postern gates: there was also a castle, demolished in the time of Richard III. There were sixteen parish churches in the town and suburbs, and religious houses were numerous: there were priories for Carmelite, Franciscan, Dominican, and Austin friars (two in or near the town), and Benedictine monks (at St. Leonard's, just out of the town to the east); also several 'halls' or monastic schools. On occasion of some discontent at Oxford, a number of the students retired here (A.D. 1333), and were not induced to return without great difficulty.

The town was taken by the Lancastrian army raised in the North by Queen Margaret (A.D. 1461); and as the townsmen were generally Yorkists, was given up to devastation. Six churches appear to have been destroyed at this time; four others were subsequently removed, and six still remain; five in the old borough, and one in Stamford Baron, on the south side of the Welland. The battle of Lose-Coat-field [LINCOLNSHIRE, vol. xiv., p. 15] was fought not far from Stamford, A.D. 1462. There were some troubles raised here by the Royalists A.D. 1648; and a riot was raised by the high-church party in 1714, in which the Presbyterian meeting-house was destroyed.

The town stands partly on the north side of the Welland, in the county of Lincoln, and partly on the south side, in the parish of St. Martin, Stamford Baron, in the liberty of Peterborough, in the county of Northampton. The old borough of Stamford, which did not include the latter part, has an area of 1860 acres, with a population in 1831 of 5837; the parish of St. Martin, Stamford-Baron, from which the late additions to the borough are taken, has an area of 2170 acres, with a population of 1274; together 4030 acres, and 7111 inhabitants. The two parts are united by an antient stone bridge of five arches. The streets are irregularly laid out, and paved and lighted with gas: the town is well supplied with water. The houses are chiefly built of freestone from the quarries of Ketton and Barnoak, and slated. All Saints church consists of a nave with two aisles, and a chancel with one aisle, at the end of the south aisle of the nave. Most of the interior, and the lower part of the exterior of this church, are of early English architecture; the tower, spire, and two porches are of perpendicular character: there is a fine perpendicular pannelled font. St. George's is a large plain building, retaining, amidst many alterations, some old portions, principally perpendicular; it consists of a nave, with side aisles, chancel, and western tower: there are some portions of antient stained glass. St. John the Baptist's is chiefly of perpendicular character, with a fine wooden roof and wooden screen-work; it has a nave and chancel, each with side aisles; a neat embattled tower and pinnacles; and a handsome south porch. St. Mary's is one of the finest churches in the town; it consists of a nave with two aisles, and a chancel with one; and a western tower and spire. The tower and spire, with some other parts, are of early English architecture; but a large portion of the church is of perpendicular character: it has some rich chapels and an antient canopied altar tomb. St. Michael's church has been much altered and modernized. St. Martin's church, Stamford Baron, south of the Welland, is a fine specimen of late perpendicular architecture: the piers and arches are very light and lofty, and there is a good south porch. It contains the monument of the great Lord Burghley. Part of the nave of the conventual church of the Benedictine priory of St. Leonard's (sometimes called St. Leonard's Hospital) is still standing, and is used as a barn: the architecture is mixed, being Norman in its form and early English in its details. The west gate of the Carmelite or White Friary is still entire, just outside the town on the north-east side; it is a good decorated English composition, of about the time of Edward III. Near it are part of a wall and a postern or back gateway of the Grey or Franciscan Friary. The grammar-school is part of the old church of St. Paul: it is partly of Norman, partly of early English architecture, with some later windows inserted: near it is a Norman gateway, antiently belonging to Brazen-Nose College, one of the monastic schools, and now forming an entrance into a garden. There are a small Norman doorway near the bridge, and a doorway in an old wall near the river, probably belonging to the castle. Brown's hospital has some portions of good late perpendicular character; Burghley hospital, in St. Martin's, Stamford Baron, is of the Elizabethan period. Of more recent date are the town-hall, the gaol, the theatre, a market for butcher's meat, butter, and fish; and the Catholic, Wesleyan, and Independent chapels. The infirmary for Stamford and the county of Rutland is a neat modern building in the Gothic style.

The trade of the place is considerable, and consists chiefly in the supply of the surrounding agricultural district: silk-throwing was carried on a few years since, but is now given up; considerable business in malting is done: the markets are on Monday and Friday, the latter is a considerable corn-market: there are seven yearly fairs. The Welland, or rather a lateral cut to the natural bed of the river, is navigable up to the town for boats and small barges.

The institutions for benevolent and literary purposes, and for amusement, are tolerably numerous. Besides the infirmary and Brown and Burghley's hospitals, there are several ranges of alms-houses, or, as they are locally termed, 'Callises;' a Bible society, a savings' bank, a library and reading-room, a theatre, and cold baths. Races are held; and a barbarous custom of bull-hunting, or, as it is locally termed, 'bull-running,' has been (unless quite lately put down) kept up yearly for several centuries. A similar custom prevailed at Tutbury [STAFFORDSHIRE], but is now suppressed. One newspaper, the 'Stamford Mercury,' is published in the town: it has been established considerably more than a century.

Stamford was a borough before the Conquest. By the Boundary Act a part of the parish of St. Martin, Stamford Baron, was added for parliamentary, and subsequently, by the Municipal Corporations' Reform Act, for municipal purposes. It is divided into two wards, and has six aldermen and eighteen councillors. Quarter-sessions are held, and there is a court of record. The borough returned members as early as 23 Edward I.: it sends two now: the number of voters in 1835-6 was 755; in 1839-40, 679.

The living of All Saints is a vicarage, united with the rectory of St. Peter's, of the clear yearly value of 431*l*., with a glebe-house; the living of St. George's (united with St. Paul's) is a rectory, of the clear yearly value of 124*l*., with a glebe-house; the living of St. John the Baptist's (united with St. Clement's) is a rectory, of the clear yearly value of 167*l*., with a glebe-house; the living of St. Mary's is a rectory, of the clear yearly value of 87*l*.; the living of St. Michael's (united with St. Andrew's and St. Stephen's) is a rectory, of the clear yearly value of 136*l*.; and the living of St. Martin's, Stamford Baron, is a vicarage, of the clear yearly value of 98*l*., with a glebe-house. The last is in the archdeaconry of Northampton and diocese of Peterborough: the rest are in the archdeaconry and diocese of Lincoln.

There were, in 1833, in the old borough, and in the parish of St. Martin, a grammar-school, well endowed, with 5 boys; an endowed day-school called 'the Blue-coat school,' with 80 boys; two day and Sunday schools, endowed by what is called Wells's Charity, with 56 boys and 46 girls; a national school, with 118 girls; an infant-school, with about 90 or 100 children, boys and girls; two other day-schools with small endowments, with from 44 to 54 boys and 16 girls: 22 other day or boarding schools, with 82 boys, 203 girls, and 314 to 334 children of sex not stated; and 3 Sunday-schools, with 156 boys and 126 girls.

---

* This incident deserves notice as connected with the cultivation of Hebrew literature in England. Many of the books belonging to the libraries of the Synagogues of Stamford and Huntingdon were purchased by Gregory of Huntingdon, a monk of Ramsey abbey, and a diligent student of the antient languages. The books thus purchased formed a valuable part of the library at Ramsey.

(Peck's *Antiquarian Annals of Stamford;* Harrod's *Antiquities and present State of Stamford;* Drakard's *History of Stamford;* Allen's *History of the County of Lincoln; Parliamentary Papers.*)

STAMMER. The terms stammer and stutter are synonymously adopted to denote that involuntary interruption of utterance arising from difficulty and often total inability to pronounce certain syllables, the speech apparatus being frequently affected with spasm in the effort to speak.

In some stammerers the spasm consists of involuntary movements similar to *chorea* (St. Vitus's dance), which occasionally affects other than the speech muscles. Stammer with this spasm distorts the utterance by an involuntary repetition of some part of the syllable, as ge-ge-ge-good de-de-de-day. The repetitions may or may not be vocal. In other stammerers the spasm consists of involuntary immobility, similar to *tetanus* (lock-jaw), commonly of the form termed *trismus*, in which the mouth is closed, and the jaw cannot move to open it; and sometimes of the form termed *anti-trismus*, in which the mouth is open, and the jaw is equally incapable of moving to shut it. Stammer with this spasm distorts the utterance by an involuntary extension of some part of the syllable, as l——augh, where the *l* is much prolonged.

In the looseness of language resulting from inexact knowledge, all kinds of difficult and defective utterance are misnamed stammer, as the difficult utterance of the intoxicated, the faltering utterance of the paralytic, the imperfect utterance of deep emotion, as of fear, the defective utterance of malformed organs of speech, and the hesitation in discourse when the suitable word fails to present itself to a speaker's mind. Such affections of the utterance however are distinct from stammer, for

1. The stammerer's inability to pronounce words remains during health, soberness, calmness of mind, and also when the appropriate words occur to him.

2. The stammerer feels his difficulty of utterance essentially to consist in a refusal of some part of the speech apparatus to obey his will.

3. The stammerer's utmost efforts to force out any difficult word commonly excite spasm, and increase it if it previously existed.

4. The stammerer's inability to speak is intermittent: the same syllable is not always equally difficult to utter, and is sometimes uttered with ease.

Those circumstances will distinguish stammer from the misnamed stammer of paralysis, intoxication, &c.

Now to understand the nature of stammering, it is necessary to know the audibility and mechanism of utterance, which may be thus briefly described:—

The voice is produced in the larynx [LARYNX], whence it issues into the pharynx. [PHARYNX.] The pharynx opens into the nose and into the mouth; and by means of a curtain valve, named the *velum pendulum palati*, we can direct the issue of breath through the mouth or the nose, or through both mouth and nose at once. The voice is produced in the larynx, an audible sound, which may possess the distinctions of song-notes (musical sounds), as those of pitch, loudness, and quality [ACOUSTICS; MUSIC], or it may possess the peculiar conditions of those distinctions which constitute speech-notes. [ELOCUTION.] In the pharynx and mouth the volume of voice is magnified, and its quality is modified.

The elementary sounds of which speech is composed are further modifications of the voice, apart from and added to its pitch, loudness, and quality; and are produced in the mouth, pharynx, and nose. The popular classification of these sounds into vowels and consonants is adopted from its convenience. The vowel sounds of the English language are represented by the vowel letters in the following words: *a*ll, *a*rm, *a*n, *a*le, *e*nd, *ee*l, h*er*, *i*sle, *i*n, *o*ld, *oo*ze, *o*n, *u*s, c*u*be, p*u*ll, *ou*r, and *oi*l. The vowels are of two kinds, viz.:

1. Those which present a uniform sound, and thence are named monophthongs, as *oo* of the word *oo*ze, in which it will be observed on verification that the cavity and aperture of the mouth remain the same during the whole time of uttering the vowel. The monophthongs are contained in the following examples: *e*nd, *ee*l, h*er*, *i*n, and *oo*ze.

2. Those which present a complex sound, in which the sound is ever varying from the initial to the final point, as in the *a* of the word *a*le, in which it will be observed on verification that the cavity and aperture of the mouth gradually change their forms from the initial to the final sound of the vowel. The *a* of *a*le ends in *ee* of *ee*l. From the circumstance of the initial and final parts of the vowel presenting different sounds, it is termed a diphthong. The diphthongs of the English languarge may be conveniently classified by the similarity of their final sounds:

1st class of diphthongs end in a well defined *ee* of *ee*l.	*a*le, the final sound is *ee* of *ee*l.
	*i*sle, ...
	*oi*l, ...
2nd class of diphthongs end in a well defined *oo* of *oo*ze.	*o*ld, the final sound is *oo* of *oo*ze
	c*u*be, ...
	*ou*r, ...
3rd class of diphthongs end in an obscure and faint *e* of h*er*.	*a*ll, the final sound is *e* of h*er*.
	*a*rm, ...
	*a*n, ...
	*o*n, ...
	*u*s, ...
	p*u*ll, ...

The above table may be thus verified. Slowly drawl the vowel, making the final part as loud as the initial; preserve the mouth's position which moulded the final part of the diphthong *after* the cessation of voice, and then a new issue of voice through that adjustment of the mouth will produce the diphthong's final sound as a distinct monophthong.

The consonants are conveniently classed into those with and those without voice. The voice consonant sounds of the language are represented by the consonant letters in the following words: e*bb*, a*dd*, e*gg*, a*ll*, a*m*, a*n*, *r*ed, *v*ow, *w*e, *y*ou, *z*one, si*ng*, a*z*ure, *th*en, *j*ew. It will be observed on verification that these consonants have each voice throughout their duration, and that each as a separate sound can be prolonged to the utmost limit of the breath, except *b*, *d*, *g*, and *j*, which only admit of slight extension.

The voiceless consonants are represented by the consonant letters in the following words: u*p*, a*t*, ar*k*, i*f*, *h*ope, *q*uit, *s*oon, *ch*ip, *sh*in, *th*in, *wh*en. It will be observed on verification that these consonants have no voice throughout their duration; that they each have breath-sound, similar to a whisper, except *p*, *t*, *k*, which are perfectly mute; and that the remainder, except *ch*, *q*, and *wh*, can be indefinitely prolonged.

It is necessary however for our purpose to examine the whole of the consonants from another point of view. The consonants, like the vowels, are monophthongal and diphthongal. It will be observed on verification that one adjustment of the mouth, and one sound throughout, are characteristics in the mechanism and audibility of the following consonants:—e*bb*, a*dd*, e*gg*, a*ll*, a*m*, a*n*, si*ng*, *v*ow, *z*one, a*z*ure, *th*en; and of u*p*, a*t*, ar*k*, i*f*, *h*ope, *s*oon, a*sh*, *th*in, which are therefore named monophthongal consonants. It will be observed on verification that a complex sound and a change in the mouth's adjustment are characteristics of the following: *r*ed, *w*e, *y*ou, *j*ew; and of *q*ueen, *ch*in, *wh*en, which are thence named diphthongal consonants.

These elementary sounds of speech are the materials of the language. The utterance of these sounds is technically termed enunciation; their junction together to form syllables is termed articulation, of which there are three kinds viz.:—

1. A vowel preceding a consonant, as *eat* = *ee* t.
2. A consonant „ vowel „ fee = f-ee.
3. „ „ consonant „ bl = b-l.

In articulating those sounds it will be observed, 1st, that the mouth changes its adjustment for the second sound while voice is flowing through it; 2nd, that in the first example the mouth gradually closes, in order to produce the consonant; and, 3rd, that in the second example the mouth gradually opens to produce the vowel.

Observation and experiment concur to prove that the production of voice is an acoustic phenomenon depending on mechanical principles similar to those which regulate the production of sound from an inanimate instrument; for it is now agreed that the upward current of air passing through the larynx produces an effect on the vocal ligaments precisely similar to what it would if the larynx were *cæteris paribus* an inanimate mechanism. The voluntary power over the larynx adjusts it *to be acted on* by the current of air, and thus the voice is to be regarded partly as a mechanical and partly as a physiological result.

Observation and experiment concur to prove that the modification of voice into speech is also an acoustic phenomenon depending on principles similar to those which regulate the modification of sound by an inanimate instrument; for it is now agreed that the modification of voice into speech in passing through the variable cavity of the pharynx, mouth, and nose, produces an effect precisely similar to what would be produced if the variable cavity were *cæteris paribus* an inanimate mechanism.

Thus both in voice and speech the production and modification of vocal sound depend on the laws of acoustics, while the adjustments of the various parts of the apparatus which produce and modify the voice depend on voluntary muscular movement. The one is mechanical, the other physiological.[*]

It is familiarly known that the movement of every organ is effected by muscular contraction; that both voluntary and involuntary contraction of the muscles depend on the nerves; that all voluntary contraction is regulated by the brain; and also that the voluntary contraction of one muscle is accompanied by an adjusted voluntary relaxation of its antagonist muscle.

The speech-apparatus may be considered as consisting of the lungs or bellows, which can send a current of air through the trachea or windpipe to the larynx, which is situated on its summit.

In the larynx this current of air can be vocalized into song, or into speech-sounds, at will, which, on passing through the variable cavity, consisting of the mouth, pharynx, and nose, can be further modified into speech. Thus the speech-apparatus, as a whole machine, consists of the respiratory, the vocal, and the enunciative organs.

Variable cavity.
Larynx.
Trachea or Windpipe.
Lungs or Bellows.

The respiratory apparatus consists of the chest, the lungs, and the air-passages. The respiratory movements are involuntary and periodic; the inspiration of breath alternates with its expiration; and in both acts the breath flows in a continuous stream. There is a periodic action of the inspiratory muscles, but whether their action alternates with an action of the expiratory muscles, or simply with the spontaneous return of the parts by their elasticity and gravity, is yet undetermined. The muscular actions during the tranquil respiration of repose appear to be limited to periodic inspiratory movements.

The movements of respiration include the motions of the diaphragm, the abdominal and thoracic muscles, and those of the larynx, which dilate and contract the aperture of the glottis. The nerves engaged in these movements are the phrenic, the spinal accessory, the vagus, many of the spinal nerves, and the portio dura of the seventh. The will can influence and somewhat modify the movements of respiration; thus we can prolong or shorten the duration of an inspiration, and we can delay or hasten to begin one. We have similar control over the expiration of the breath; and we have power also to limit, or nearly so, the movements of respiration to sub-groups of muscles: thus we can breathe by the diaphragm alone, or by the ribs alone.

Sir Charles Bell, in the 'Philosophical Transactions,' 1832, has shown how the respiratory muscles can be changed at will into voluntary muscles by means of the thyro-arytenoid muscles, as when a sailor leaning his breast over a yard-arm can raise himself and perform various acts by aid of the inspiratory muscles, which for a time he causes to act under the will. It is however during speech and song that the respiratory apparatus is most completely placed under control. Indeed in the act of vocalizing, whether for speech or song, the involuntary is almost superseded by the voluntary act of respiration. The will gives a different play to the chest. We breathe less by the diaphragm and more by the ribs; we shorten the duration of the inspiration and completely change the character of the expiration. A person about to speak is observed to take a voluntary inspiration, which elevates the chest, draws the abdomen flatter, and frequently also raises the shoulders.

There are two modes of involuntary respiration: in the one, the breath issues in one continuous unbroken stream, as in the ordinary breathing of unruffled tranquillity, which by some emotions is hurried and involuntarily vocalized, producing sighs, groans, &c.; in the other mode the stream of breath is interrupted so that it issues in detached portions, which during some emotions is also involuntarily vocalized, producing laughter, crying, &c.

The will has power to produce voluntary expirations in both modes. The unbroken stream is termed the exhausting breath, which is often required for a long-drawn note in song. The broken stream is termed the holding breath, which is constantly required in lengths suitably adjusted to the demands of the syllables as they occur in speech. The beauties of utterance and the economy of muscular exertion which result from a dexterous use of the holding breath in public reading and speaking would require much space to describe.

The machinery of respiration, of vocalization, and of enunciation, together constitute the speech-apparatus. The various muscles subservient to those separate acts associate their functions to adjust and give play to the speech apparatus as a united whole—as a machine for the production of speech. Thus to pronounce an elementary sound, as the *ee* of the word eel, the muscles of speech (consisting of the respiratory, the vocal, and the enunciative) act in simultaneous association to produce the proper adjustment of the speech-apparatus. There are near fifty distinct elementary sounds in the English language, and hence as many different adjustments of the speech-apparatus are required for their utterance. And to pronounce a word consisting of several elementary sounds articulated together, as the word *steam* (which consists of the elements *s*, *t*, *ea*=*ee* of eel, and *m*), the simultaneous group of associated muscular movements required for each element must succeed each other in one syllabic impulse. Now it will be observed that in adjusting the speech-apparatus from a previous state of rest to pronounce any given element, the muscles have a certain movement to perform, but the movement is somewhat different when they have to readjust the speech-apparatus from a previous adjustment. This fact may be verified in pronouncing the *ee* of *eel* by itself as a distinct syllable, and afterwards the word *steam*, where the same vowel follows a *t*, from which adjustment that for the *ee* has to be made. The general conditions of respiration, vocalization, enunciation, and articulation, under which stammer occurs, are subjoined.

I. Respiration. 1. Most stammerers manage their respiration badly, although nearly all can speak freely in a whisper. 2. They feel that they have insufficient breath to speak. This sensation however arises less from an insufficiency than from attempting to speak on an involuntary inspiration. The breath is expired to be vocalized by the voluntary action of the ribs, which mechanically contract the chest's cavity. The ribs however cannot accomplish this when they are in the position in which an involuntary inspiration leaves them; they must be raised to that position to which a voluntary inspiration carries them, before they can act with mechanical effect on the chest to expire a holding breath for the purpose of conversation. 3. With the sensation of insufficiency of breath, some feel also a pain at the pit of the stomach. This pain is connected with attempting to speak on an involuntary inspiration, and its severity is commonly increased by struggling to speak.

II. Vocalization.—1. *Song-voice.* The song condition of voice seldom presents any difficulty to stammerers. The writer of this article has seen only three cases of stammer in the song-voice; and it is familiarly known that stammerers, when struggling with a difficult word, are sometimes advised *to sing it.*

2. *Speech-voice.*—The distinguishing features of this voice are described in the article Elocution. Stammer occurs in all parts of the speech-note, more frequently however in the middle than towards the end, but most commonly at the initial.

3. *Pitch of Voice.*—Changes of pitch, whether concrete or discrete (slide or skip), through narrow intervals of the scale, present difficulties which wider changes of pitch do not. Stammerers can mostly declaim, if they cannot converse or quietly read; and it is well known that wider intervals of pitch occur in declamation than in ordinary conversation.

4. *Loudness of Voice.*—When the loudness of the speech

---

[*] It is a curious fact that mechanicians constructed speaking machines to imitate the human voice and speech long before philosophers had determined how far speech is a mechanical result. It is more curious that the mechanician Kempeler excludes acoustics in his definition of a vowel, which he entirely deduces from the organs of the human mouth, thus forgetful alike of the circumstance that parrots can utter words, and that his own mechanism uttered certain vowels.

note is of the form of the musical *diminuendo*, which begins abruptly and gradually diminishes in loudness, as thus figured >, a difficulty is presented to the stammerer which does not occur if the form be the musical *crescendo*, where the note begins feebly, and gradually increases in loudness, as thus figured <.

5. *Quality of Voice.*—The conversation tone presents a greater difficulty than the falsetto, or than the full enriched voice of epic declamation.

6. *Quantity or Duration of Syllables.*—Short and inextensible syllables present a greater difficulty than the long and extensible.

7. *Accent.*—The unaccented syllables of discourse seldom offer any difficulty to stammerers. The element, or combination of elements, which is difficult to utter with accent, is easy to utter without accent. The accent given by stress is infinitely more difficult than that given by extended duration.

8. *Rhythmus.*—The measured movement of verse is easier for the stammerer than the unmeasured movement of prose and conversation.

III. ENUNCIATION.—Syllables are of two kinds, viz.:—

1. Those composed of one elementary sound.
2. Those composed of more than one elementary sound.

1. *Vowels.*—A vowel alone may constitute an accented syllable, and even a whole word, of which the pronoun *I* and the article *a* are familiar examples. Stammer often occurs on such syllables. The diphthongal vowels present less difficulty than the monophthongal; and the long much less than the short vowels.

2. *Consonants.*—A consonant alone never constitutes a syllable; and when two or more are combined together without a vowel to form one, such occur only as unaccented final syllables of words. The stammerer's difficulty is less to utter the elementary sounds singly than to articulate them so as to form syllables.

IV. ARTICULATION.—As before stated, the elementary sounds are articulated in three orders of succession:—

1. The vowel followed by a consonant.
2. The consonant followed by a vowel.
3. The consonant followed by a consonant.

Stammer occurs in each of these modes of articulation. There is seldom any difficulty to articulate two consonants together; some however is felt in postfixing a consonant to a vowel, and the greatest is felt in adding a vowel to a consonant. Of this latter class there is most stammer when the consonant is *p*, *t*, *k*, or their voice correlatives *b*, *d*, *g*, especially if they precede a short vowel, as in the examples pit, top, king, bud, dot, get.

To these general conditions of voice and speech under which stammer occurs, may be added other conditions, as

SEX.—The great majority of stammerers are of the male sex.

AGE.—Few stammer from their early infancy; children commonly speak freely until about five years of age. An occasional difficulty is first observed, which becomes more frequent up to the tenth year, when it is commonly at its maximum; although the spasm frequently increases in severity up to manhood. In the decline of life sometimes the stammer spontaneously diminishes, and it has been known to entirely disappear. The voices of childhood and old age differ in several respects from that of the intermediate period of life. A comparison of these voices with the above-described vocal conditions of stammer will account for the occasional spontaneous disappearance of stammer in old age.

Voice of Childhood.—The speech melody of infancy is set in a high pitch, which often runs into the falsetto, and is much intersected with wide intervals both concrete and discrete. The loudness is chiefly of the *crescendo* form on long whining quantities.

Voice of Old Age.—The speech melody often falls into the tremulous scale, the rate of utterance is slow, steady, and uniform. The loudness not often of the *diminuendo* form, and is on extended quantities. The accent is given to syllables by quantity rather than by stress, deliberate pauses are made, and the whole style is marked by the self-possession of experienced age conversing with a consciousness of superiority, if in nought else, in a longer reach of memory.

TEMPERATURE.—Sudden changes, especially from a high to a low temperature, commonly increase a stammer. The cold of travelling outside a coach in winter also increases it. It is well known that cold produces involuntary movements in chattering of the teeth and shivering of the whole body; hence the effect of cold on the stammerer's speech is what we are prepared to expect; it lessens his voluntary power over his speech-apparatus, and thus increases his stammer.

Stammerers have a greater difficulty in conveying new information than in uttering what they are aware is known to the hearer.

We now proceed to describe the varieties of stammer.

Voice stammer is of two kinds.

i. Difficulty to produce voice.

ii. Difficulty to produce voice in quantities adjusted to the syllable's demands.

i. Difficulty to produce voice.

1 *Variety.*—That difficulty which arises from ill regulated respiration, in which the effort to vocalize is accompanied with a feeling of insufficiency of breath. The stammer arises from an attempt to speak on an involuntary inspiration, when from mechanical considerations alone we know that the ribs cannot much control the chest to regulate the issue of breath to the larynx. A holding breath cannot be maintained on an involuntary inspiration, and therefore voluntary respiration for speech must always begin with an inspiration of breath.

The physiology of this stammer indicates a discipline for its removal. The organs of respiration must be drilled to rightly change the involuntary act of respiration to the voluntary, which, with a course of rhythmus, will effect a permanent cure.

2 *Variety.*—That difficulty to produce voice which is occasioned by an involuntary closure of the glottis. In this variety of stammer, instead of the larynx receiving the adjustment for vocalization in ready obedience to the will, the glottis suddenly closes, either by an involuntary associate movement, or by a tetanic spasm, probably in most cases by the latter. Some years since, Dr. Arnott pointed out the nature and means to cure it. His remedy consists in keeping open the glottis, by issuing a drone sound, such as the *e* of the word berry, before beginning to speak, and in joining this prefixed drone to the words. See his 'Elements of Physics,' vol. i., p. 603, et seq. Dr. Arnott's remedy however has fallen in repute, probably from the subjoined circumstances:

1. It has been indiscriminately applied to remedy all varieties of stammer.
2. Where applicable, the principle has not been fully carried out as a discipline to the glottis. And
3. From neglect to accompany the special training of the glottis with a general rhythmical training of the whole speech-apparatus.

3 *Variety.*—That difficulty to produce voice which is occasioned by an involuntary twitching of the glottis similar to chorea. The larynx obediently receives the vocalizing adjustment, but so soon as the current of breath presses against the vocal cords, they involuntarily start from the adjustment with a sudden twitching, as if the glottal muscles were seized with St. Vitus's dance, which occasions several short sounds to be jerked out similar to those of loud laughter. This spasm is sometimes so soon excited as to preclude vocalization, when only short iterations of breath are audible. The glottis must be disciplined on sounds of the *crescendo* form of loudness in a low pitch, and proceed gradually from the song-voice to that of speech. Respiration and speech-voice training will follow, accompanied with general rythmic discipline to the whole speech-apparatus for reading and speaking both verse and prose.

ii. Difficulty to produce voice in quantities adjusted to the syllables' demands.

In this stammer the difficulty is not to produce voice, but to control its quantities. Vocalization freely takes place, but the event of two or three short or accented syllables following near together throws the glottal muscles into choreal spasm. And in most cases there is an occasional want of harmony between the actions of the expiratory muscles of the chest and those of the larynx, so that the holding breath is not fully under control. There appear to be two causes in operation to produce this stammer, viz. a tendency to spasm in the larynx, and a defect in the power to associate the movements of the chest muscles with those of the larynx. The principles of discipline for the spasm will be similar to the preceding variety of stammer; while a distinct discipline must be projected to acquire a higher degree of associating power, the nature of this special discipline will depend on the nature of the defect, which should however be accompanied with a general training to associate all the muscles in action

Speech stammer is of two kinds.

i. Enunciative, or difficulty to produce the elementary sounds.

ii. Articulative, or difficulty to join them together.

i. Enunciative Stammer.

1. *On the Vowels.*—The difficulty of uttering a monophthongal vowel is a voice stammer, it being an absence of voluntary control over the vocalization of the breath. The difficulty of uttering a diphthongal vowel may be either a voice or a speech stammer, and is often a combination of both. When the difficulty is to produce voice to begin the vowel, the stammer is vocal; and when the difficulty is to change the adjustment from that for the initial, to that for the final sound of the diphthong, it is a speech stammer. Three diphthongs end in *ee* of eel, viz. ale, isle, oil. Now to produce this final sound, the mouth's cavity and aperture are contracted by raising the lower jaw, and bringing the lips parallel to each other; which adjustment is effected by the masseter, the labial, and their groups of muscles, including their antagonists. These are disobedient to the will, so that the stammerer finds himself unable to control the jaw and the lips. Three diphthongs end in *oo* of *ooze*, viz. old, *cube*, *our*. Now to produce this final sound, the aperture of the mouth is contracted by pursing together the lips, while the lower jaw is sufficiently depressed to allow free egress to the voice; which adjustment is effected by the orbicular muscle of the lips with its group, including their antagonists, while the masseter and its antagonists hold the jaw in its required place. The stammerer finds himself unable to control the lips while he holds the jaw. The remaining diphthongs are less marked, and as diphthongs never present a difficulty to the stammerer.

2. *On the Consonants.*—The difficulty to utter a monophthongal consonant is a voice stammer, it being an absence of voluntary control over the vocalization of the breath. The difficulty to utter a diphthongal consonant may be either a voice or a speech stammer, and is often a combination of both. When the difficulty is to produce voice to begin the consonant, the stammer is vocal; and when the difficulty is to change the adjustment from that for the initial to that for the final sound of the consonant, it is a speech stammer. The diphthongal consonants are, r, w, y, j, q, ch, wh. In producing these sounds the stammerer's difficulty consists, in the r, to vibrate the tongue; in the w, to move the lips while depressing the jaw; in the y, to control the lips; in the j, to move the tongue while depressing the jaw; in the q, to separate the soft palate and root of the tongue along with the lips' movement; the ch and wh respectively present similar difficulties to the j and w.

Stammer on the single elementary sounds of speech can be permanently remedied only by a systematic training of the disobedient organ which occasions it. The organ must be disciplined to perform the necessary movements under all conditions of voice, which, accompanied with a general training of the whole apparatus of speech, conducted on rhythmical principles, will effectually remove the stammer.

ii. Articulative Stammer.

Stammer occurs in all three modes of articulation, viz.:

1. A consonant followed by a vowel, as *bee.*
2. A vowel followed by a consonant, as *ebb.*
3. A consonant followed by another consonant, as *bl* of the word *bled.*

i. *A Consonant followed by a Vowel.*—This class of difficulties in articulation, is occasioned by an inability to change the consonant adjustment of the mouth to that for the vowel. There are three varieties of difficulty of this class.

1 *Variety.*—The adjustment of the mouth for the consonant is found, on attempting to change it for the vowel, to be immovably fixed as if by tetanic spasm. This occasions an undue extension of the consonant: thus the word *laugh* is distorted into *l—augh*, from inability to move the tongue at will. It is remarkable, that until the attempt to move the tongue is made, there is no consciousness of its being involuntarily fixed.

2 *Variety.*—The attempt to change the adjustment produces a twitching similar to chorea. Thus, to illustrate the effect on the same word *laugh*, the tongue's tip involuntarily slaps against the palate, producing a repetition of the consonant, which occasions the word to be distorted into *l-l-l-laugh.*

An involuntary repetition of this consonant may however occur without spasmodic twitching of the tongue. An instance lately occurred, in the practice of the writer, in which, without retraction of the tongue's tip from the palate, the *l* was iterated. On examination it was found to be occasioned by a voice stammer, the third variety of the first kind of voice stammer.

Such cases indicate the necessity of correctly ascertaining what part of the speech-apparatus produces the stammer, in order to adapt a special discipline to train it to perform its necessary movements readily.

The initial consonant is often voluntarily repeated, in a new attempt to utter a syllable, which may be mistaken for this variety of stammer.

3 *Variety.*—The attempt to change the adjustment produces an involuntary associate movement of some portion of the speech-apparatus, occasioning a syllabic sound to be uttered, in place of the required vowel. Thus, in attempting to pronounce the word *laugh*, the *l* is freely produced, but suddenly the syllable *fit* is involuntarily jerked out, perhaps more than once, when the whole word *laugh* is at last pronounced.

The involuntary associate movements are commonly similar in the same person, and consequently the involuntary syllabic sound is similar, but different persons present varieties of movement, and thence of involuntary syllables; thus one iterates the syllable *fit*, another *gub*, a third *dup*. a fourth *bed*, or *bet*, &c.

ii. *A Vowel followed by a Consonant.*—This class of difficulties in articulation is occasioned by an inability to change the vowel adjustment of the mouth to that which is required for the consonant. Nearly all stammerers can freely join a consonant to an initial vowel, but many find a difficulty in postfixing a consonant to a vowel which is already articulated to an initial consonant, as in the word *better*, where the stammer occurs in articulating the *t* to the *e* of the first syllable, which it distorts into *be-t.*

This stammer most frequently occurs when the consonant to be articulated to the vowel requires a movement of the tongue's tip for its formation, as the s, t, l, d, r, n, zh, sh, j, ch, and th, in such words as master, latter, willing, reader, which are respectively distorted to ma-ster, la-tter, wi-lling, rea-der. In some cases the tongue appears fixed as by lockjaw, and resists attempts to move it; while in others the impulse of the will appears not to reach it. This stammer occurs most in dissyllabic words; the consonant, and with it the succeeding syllable, is often produced by a kind of hiccup after an involuntary prolongation of the vowel.

iii. *A Consonant followed by another Consonant.*—This class of difficulties in articulation is occasioned by an inability to change one consonant adjustment to that for another. It occurs amongst the initial consonants of a syllable, frequently prolonging both; thus distorting the word slay into s-l-ay. Sometimes the difficulty is to control the tongue's movements, as in the syllables *pray, bleed, clip*, and frequently the difficulty is to control the movement of the lips, as in the words *small, speak*, &c.

Stammer on articulating the elementary sounds of speech to form syllables, can be permanently remedied only by a systematic training of the disobedient organs to perform their required movements for the several adjustments of the mouth which are necessary to articulation. The training must be general and special. The general is a rhythmic training of the whole speech-apparatus; and the special is a training of the disobedient organ to perform its various movements in articulation, under, 1st, all conditions of voice; 2nd, in all sequences of elementary combinations; and 3rd, under varied conditions of mind and external circumstances. The mode and order of application of these principles of training will depend on the vocal and general conditions under which the stammerer can freely speak.

This brief analytic statement of the different kinds of stammer illustrates the position that stammer is a consequence of inability to make the muscular movements which are necessary to utterance.

Writers have misled themselves by assuming that all stammering depends on one cause. There are advocates for mental, for organic, and for mechanical causes. Those who believe in a mental cause however differ in opinion: thus, one refers the defect to indecision; another to absence of mind; and another to confusion of ideas, or to loss of presence of mind. The advocates for an organic cause differ also: thus, one refers *it* to weakness of the muscles engaged in utterance; another to confusion of the speech-apparatus by the too rapid irradiation of will to it; while others adopt the term *nervous*, as if it indicated a special cause. Those who advocate a mechanical cause are no less at variance: as one refers it to irregular teeth; another to too large a tongue; and another to the obstruction which enlarged tonsils and uvula occasion.

These, and similar conjectures, will be cleared away, and the inquiry will be narrowed, by stating what does not produce stammering, that is to say, does not cause the inability to produce, control, and associate the muscular movements of utterance. The familiar circumstances: 1, Of stammerers speaking freely under certain states of mind, and in certain conditions of voice; 2, Of the stammer sometimes entirely disappearing for a few hours or even days; for stammer is popularly known to be intermittent, though not periodically so; 3, Of its being increased by certain states of mind and conditions of voice; and 4, Of its being diminished also by certain other states of mind and conditions of voice. All these circumstances concur to prove, first, that stammering is not caused by any fixed ill constitution of mind, or weakness of will; and, secondly, that it is not caused by any structural defect in the brain, the nerves, or the muscles; for a structural defect would *always* produce an imperfect action.[*]

These circumstances, together with the fact of the numerous cures effected by the late Mr. Thelwall, and by the author of this article, with no other means than training the speech-apparatus, firmly establish the truth that the cause of stammering is entirely functional.

Our analytic description of stammering reveals three functional causes of inability to control the muscular movements which are required for utterance, viz.:—

I. Spasm, both of the tetanus and chorea forms. All muscles are liable to spasm. Spasm of the larynx, the tongue, the lips, and the masseter muscle, are each sources of stammering.

II. Defect in the associating power, which combines the voluntary movements of different organs in one simultaneous act, or in an allied succession of acts. Defective association of vocalization with respiration will occasion stammer; for perfect association of the voluntary movements of the larynx with those of the chest are required in utterance. The movements of the larynx and chest are effected by means of the laryngeal, the recurrent, and the expiratory nerves.

Some stammerers can associate these movements with facility, but stammer from inability to associate with them the movements of the jaw and lips, whose movements are effected by means of the third trunk of the fifth pair of nerves. And other stammerers who can associate these movements, are unable to associate with them the movements of the tongue, which are effected by the eighth and ninth pairs of nerves, and they stammer in consequence.

III. Involuntary associate movements; as after mimicing a stammerer it has been found that those muscular movements, which in the mimicry were *voluntarily* associated with the proper movements of utterance, have suddenly become linked to them so firmly in allied motion, that he is unable to dissociate them, and an actual stammer results. Thus those movements which were voluntary in the mimicry are now (in accordance with an ill understood law of nervous action) excited independently of or even contrary to the will, by the voluntary impulse which is directed to effect the proper movements of utterance.

Some movements spontaneously ally themselves with others, as those of the corresponding parts of the two sides of the body. Many persons without conscious imitation are prone to establish involuntary associate movements. And apart from all imitation, involuntary movements associate themselves in allied series with the voluntary movements; whence the origin of awkward habits. This peculiarity of disposition is often the precursor of stammering. Persons thus sensitive may acquire the habit of stammering after a conversation with a stammerer. It is stammering which originates in this cause only which can be accurately termed a habit.

The great distinction between functional derangement and vicious structures (whether arising from original formation or from organic disease) is both broad and clear. Thus the three causes of stammer above stated are functional.

The adoption of appropriate remedies for stammering then will depend on the following conditions, viz.:—1, On the part of the speech-apparatus which is affected; 2, On the cause producing the stammer; and 3, On the vocal and other conditions under which the utterance is least affected.

The principles dependent on the first condition were incidentally stated in the description of the varieties of stammer. The principles dependent on the second condition are subjoined; and the details in carrying out these combined principles depend on the third condition.

I. *Spasm.*—The great object to be effected is to enable vocalization and utterance to take place without (the impulse of the will) throwing the part into spasm. The value of voluntary periodic movements in allaying spasm of the speech-apparatus is immense, as is seen in its enabling spasmodic stammerers to sing and to read smooth verse with facility. The suggestion offered by this fact should be well followed out. Let the respiration of utterance be strictly periodic, it will then be a voluntary act, and let the voluntary act always begin with an inspiration of the breath. Mark time with the hand and foot, march in time, count time both verbally and mentally, in short periodicize every moment of body and mind, in harmony with all the varieties of English versification. The rhythmus of blank verse, of prose, and of conversation will follow. The speech-apparatus should be disciplined by going through a course of rhythmical training for the voice, such as is laid down in Cull's 'Discourse on Public Reading.'

II. *Defect in the associating power.*—The great object to be effected is to obtain control over two or more voluntary movements so as to combine them, both simultaneously and in those allied successions which are required in utterance. The stammerer must be trained to accomplish the several movements of utterance, on principles similar to those adopted to train a musical pupil. At first the piano-forte student exerts a distinct impulse of the will for each separate movement of each finger. He in time becomes a musician, and is now scarcely conscious of exercising the will to effect the movements in playing the piano. He now learns to sing; and rightly conceiving the note for the voice, he would sing it, but is unable to connect the piano accompaniment with it. His mind is absorbed in the song-note, and the instrument halts; he therefore gives more attention to the piano, and now his voice halts. His difficulty is to control two distinct sets of voluntary movements (that of the hands and that of the voice) in one combined act of accompanying his own voice. As each note of the music is read, it becomes an incitement to move this or that finger; each note of the song line becomes an incitement to adjust the larynx to intonate it; and each word of the song becomes an incitement to adjust the speech-apparatus for its utterance. The pupil is trained in various combinations of these movements, from the simplest to the most complex, so that they immediately follow his perception of the music, in allied and simultaneous groups. And when these perceptions are firmly fixed in the mind, so as to be recalled at will (remembered), the act of memory will incite the movements in similar groups.

He who has failed spontaneously to acquire the perfect association of the voluntary movements which are required in utterance, and who in consequence stammers, must be systematically taught to acquire it. When he is able to associate the voluntary movements in all the necessary groups by means of perceptions, that is to say, by *reading* what he utters, he may be unable to reproduce the movements by the mere incitement of memory, but able again to do so by recurring to his book. When however he can accomplish this, he may be unable to take part in a conversation;

---

[*] Medical men have lately drawn public attention to stammering in announcing its cure by surgical operation. The remedy proposed by one surgeon is the removal of part of the tongue; that of another is the division of of the frænum and hyo-glossi muscles; and that of a third is to excise the uvula and tonsils. Now enlarged tonsils and uvulæ exist; large tongues also, and tongues bound down by the frænum and the hyo-glossi muscles, without the co-existence of stammer, and the writer of this article states both advisedly and emphatically that very few stammerers have any deviation from the ordinary structure and condition of mouth. He has witnessed these operations, and his observations coincide with the statements of the medical journals on their utter want of success; and also on the danger of at least one of them.

The medico-chirurgical reviewer of Dieffenbach's memoir on excising part of the tongue, condemned it, and thought it necessary to caution his readers 'not to allow their minds to be too much influenced by the reports of *immediate* success after the operations,' and adds a note on the 'foolish practice of reporting cases of surgical operations almost immediately after their performance, and often before their ultimate results can be known,' and which he reprehends as 'only worthy of an advertising quack.' (*Med. Chir. Rev.*, July, 1841.)

for if he thinks on a subject, and endeavours to express his ideas in suitable language, while he yet requires concentrated attention to control the movements of utterance, he will falter somewhere; either in the language, if his attention be given to the utterance; or in the utterance, if the attention be given to the language. Training and practice will be required to cultivate the power of associating together the movements of utterance, while the mind is occupied in giving language to its ideas. It is common, even after the patient can converse with facility, for the stammer to recur from any confusion of mind, as a sudden noise, or an unexpected visitor. This will require a special training, while the patient is cautiously brought within the influence of the disturbing force.

III. *Involuntary associate movement.*—The great object to be effected is to break the association, and thus insulate the proper movements of speech from all associate movements. In making one voluntary movement an awkward person makes several others which are involuntary: thus many persons move the head and loll out the tongue while writing, many musicians have ungainly habits associated with their performance, and the ill habits of orators is a common theme of censure. By discipline these ill habits can be dissociated from the necessary movements.

Some movements have a great tendency to accompany others, as one finger that of another. Instrumental musicians offer excellent examples of the power of insulating the movements of each finger from that of the rest. By training they acquire rapidity, exactness, and decision in the movements of each finger, along with the ability to associate those movements in every possible permutation, without the intrusion of an involuntary movement. A training of the speech-apparatus on similar principles is followed by similar results. The elementary sounds of the language, in the several conditions of voice, must be systematically persevered in, under the guiding voice and the watchful ear of an experienced tutor.

The great principle which governs the construction of details, in carrying out the foregoing views, is to advance from the simple to the complex, basing the whole on that vocal condition which is most free from stammer.

The attentive reader will see that it is impossible to state more than general principles of the discipline to which the speech-apparatus must be subjected, to remedy the various kinds of stammer. He will also remark that active and accurate observation, combined with continuous exercise of mind, in adapting the instruction and training to the peculiarities of the case, is required in the tutor; and that much depends on the stammerer. On him alone depends a persevering exercise of his speech-apparatus in the projected discipline; and on him alone depends that concentration of his own mind, in watching for the occasions to apply the knowledge and power which he daily acquires; and for these acts of his own mind nothing whatever can be substituted.

It is difficult to obtain accurate statistics of stammering. Dr. Colombat estimates the proportion in France to be 1 to every 5397 inhabitants. The author of this article estimates a higher proportion in Great Britain, viz. 1 to every 3500. Of stammerers the writer's practice has shown only 13 per cent. to be females.

The writer's object has been to give an accurate statement of the facts of stammering, and the principles which he has found successful in its treatment. The reader may consult with advantage Thelwall's *Letter to Clive on Stammering*; Dr. Arnott's *Physics*; Cull's *Observations on Impediments of Speech*; and Cull's *Stammering Considered*.

STAMPS, STAMP ACTS. Stamps are impressions made upon paper or parchment by the government or its officers for the purposes of revenue. They always denote the price of the particular stamp, or in other words, the tax levied upon a particular instrument stamped, and sometimes they denote the nature of the instrument itself. If the instrument is written upon paper, the stamp is impressed in relief upon the paper itself; but to a parchment instrument the stamp is attached by paste and a small piece of lead which itself forms part of the impression. These stamps are easily forged, and at various times forgeries of them upon a large scale have been discovered. The punishment for the forgery of stamps was made a capital offence by the Act of William and Mary, and continued so until the year 1830 (11 Geo. IV. & 1 Wm. IV., c. 66), when it was punished by transportation.

In France stamps are used both for the authentication of instruments and as a source of revenue: thus they constitute a large part of the income of the municipality of Paris.

The stamp tax was first introduced into this country in the reign of William and Mary (5 W. & M., c. 21), such an impost having previously existed in Holland. The Act 5 W. & M., c. 21, imposes stamps upon grants from the crown, diplomas, contracts, probates of wills and letters of administration, and upon all writs, proceedings, and records in courts of law and equity; it does not however seem to impose stamps upon deeds, unless these are enrolled in the courts at Westminster or other courts of record. Two years afterwards however, conveyances, deeds, and leases were subjected to the stamp duty, and by a series of Acts in the succeeding reigns every instrument recording a transaction between two individuals was subjected to a stamp duty before it could be used in a court of justice. By the 38 Geo. III., chap. 78, a stamp duty is imposed on newspapers, and by a subsequent Act inventories and appraisements are required to be stamped. Legacies too are largely taxed by means of stamped receipts. Stamps are also used as a convenient method of imposing a tax upon a particular class of persons. thus, articles of apprenticeship are subject to duty, and articles of clerkship to a solicitor to no less a tax than 120*l*. Solicitors and conveyancers are required to take out annually a certificate, stamped either with 12*l*., 8*l*., or 6*l*., according to circumstances. Before a person commences practice as a physician, an advocate, a barrister at law, or an attorney, he must pay a tax varying from 50*l*. to 10*l*., under the form of a stamp upon an admission. Notaries public, bankers, pawnbrokers, and others must obtain a yearly licence in order to exercise their callings.

It is only possible thus generally to point out the nature of the things subject to stamps, as the schedule to the act 55 Geo. III., c. 124, which consolidates all the previous acts, occupies nearly 100 octavo pages. Since the year 1815 the stamp duties have been mitigated. The 5 Geo. IV., c. 41, exempts law proceedings from stamps; and the stamps upon newspapers were reduced from fourpence to a penny by 6 & 7 Wm. IV., c. 76 (1836), that duty exempting the paper from postage.

In order to protect the revenue, the stamp acts usually impose a penalty upon any fradulent evasion of their provisions; and the 44 Geo. III., c. 98, enacts that the proceedings shall be in the name of the attorney-general in England, or king's advocate in Scotland, and that the penalty shall go entirely to the crown.

But besides these penalties, the acts render an unstamped instrument invalid, and in order to increase the revenue they multiply the number of instruments to authenticate any transaction. Hence the Stamp Acts have given rise to many questions in courts of law as to the amount of stamps required by particular instruments, the nature of those stamps, the effect which the insufficiency or erroneous nature of the stamp may produce upon the instrument, and the use which may be made in a court of justice of a paper not stamped, but nevertheless unquestionably recording a particular fact.

The courts of law have usually interpreted the Stamp Acts with the same strictness with which penal statutes are interpreted, giving to exemptions as large an extension as the words will admit. On the other hand, feeling it a duty to enforce the payment of this branch of the revenue, judges oppose the admission of an instrument so constructed as to evade the payment of the stamp duty.

The main rule in the levying of these duties is that each distinct transaction between separate parties, recorded by a written instrument, shall have a separate stamp attached to it. Thus, when separate houses are let to separate tenants with distinct rents, each demise will require a separate stamp, although all are engrossed on the same parchment; but if two demises of the same estate, or even of separate estates, are made, although to separate persons, if the one demise is dependent upon the other, and the two form only one transaction, the instrument making the demises will be subject to only a single stamp. An indorsement of new terms upon an agreement already stamped, requires a fresh stamp, or cannot be admitted as evidence; and a document which has been already used, but which is wanted for a fresh purpose, must be restamped: thus, before the repeal of the duties on law proceedings, an affidavit used in one stage of a cause, before a judge in chambers, was required to be resworn and restamped for the hearing in court. A series of letters forming together the evidence of an agreement require only a single stamp.

An agreement not under seal may be stamped within twenty-one days after it has been signed; but in all other cases the instrument must be written upon paper previously stamped; nor will the attaching a blank piece of paper properly stamped to the instrument already executed render the latter admissible as evidence in a court of law We shall presently mention the penalties by payment of which the severity of these provisions may be mitigated. The value of spoilt stamps, if claimed within twelve months, may be recovered, provided the absence of all fraud is established on oath.

If the court has sufficient evidence that an instrument has been properly stamped, but has been lost, or is withheld by the opposite party, it will receive an unstamped copy as evidence. Again; if a debt which has been contracted under a written agreement can be established by parole evidence, so that the existence of the agreement shall not come under the notice of the court, the plaintiff may recover without production of the agreement; but if the existence of the written agreement appears from the testimony of the plaintiff's witnesses, or from some condition coming into question which necessarily implies the existence of a written instrument, then the agreement must be produced as the best evidence; and the plaintiff cannot recover unless it is duly stamped. Nevertheless an unstamped instrument, such as a receipt or a signed account, may be used by a witness to refresh his memory as to the amounts paid in his presence or acknowledged in his presence to have been received; the case resting in such instances not on the document, but on the testimony of the witness.

An unstamped instrument, though an insufficient foundation for proceedings at law, may be used as evidence to defeat fraud, and with certain limitations to establish a criminal charge. Thus where an unstamped agreement contained matter not requiring a stamp, it was used as evidence of that matter, although invalid as evidence of the terms of the agreement. An indictment for forgery likewise may be maintained although the instrument forged may be invalid for want of a proper stamp; but such an invalid instrument is not sufficient to support an indictment for larceny.

Originally a stamp was invalid if the denomination was erroneous, although the amount paid was correct; but by the 55 Geo. III., wrong stamps, if of sufficient value, are rendered valid, unless upon the face of them they are appropriated to a different instrument from that to which they are attached. In this case the stamp is forfeited, but the instrument may be re-stamped upon payment of the penalty; by a previous act (37 Geo. III., c. 127, s. 2) any instrument, excepting bills and promissory notes, is allowed to be stamped upon payment of the duty, and a penalty of 10*l.* (or if it is a deed, 10*l.* for each skin); if it is brought to be stamped within a twelvemonth after its execution, the commissioners are allowed to remit the penalty (44 Geo. III., c. 19). Thus even during a trial an instrument may be stamped so as to render it admissible; but as this is rarely possible, it has been suggested that an officer of the court ought to be enabled to affix the proper stamp and levy the penalty; so that justice may not be defeated, or at least deferred from the want of this formal circumstance.

The general principle which regulates the courts in the interpretation of the Stamp Acts is, that on the one hand fraudulent evasion of the stamp duties shall be punished by forfeiture of all benefit from the document which ought to have been stamped; and, on the other hand, that a just claim shall not be evaded or a fraud be effected because the just claimant has unintentionally violated the stamp laws.

The stamp duties and the custody of the dies are placed under the superintendence of commissioners appointed under the great seal; to whom has also been recently entrusted the general management of the taxes. They transact their business in Somerset House, London. It may not be out of place to remark that the endeavour to impose stamp duties upon our American colonies in 1765, was one of the proximate causes of the American revolution.

The law respecting stamps, and a reference to the principal cases cited, will be found in Chitty's *Practical Treatise on the Stamp Laws*. That work has been mainly used for this article.

STANDARD MEASURE, WEIGHT, &c. In this article we separate from the general subject of Weights and Measures those preliminary considerations which refer to the manner in which weights and measures are verified and preserved, so far as they can be entered upon in a work partly of reference, partly of general information. We do not pretend to complete a scientific account, but shall be satisfied with preparing the unpractised reader to look with some degree of interest on the sources of more elaborate information to which we shall refer.

We should direct the mathematical reader to the first part of the article Ratio for the reason of the necessity of such an article as the present one; but it is sufficiently obvious, without deep consideration, that magnitudes in general cannot be described in words without reference to some other magnitudes supposed to be known. To this there is one case of exception well adapted to strengthen the rule, that of angular magnitude. An angle is a magnitude: it may grow visibly greater or less. One side of an angle remaining fixed, an alteration of the magnitude of the angle alters the direction of the other side. But direction cannot be varied without end; for if the moveable side of the angle should set out from the fixed side, and revolve, so as to make a continually increasing angle, a certain amount of change (a whole revolution) would bring the direction of the moving line again into coincidence with that of the fixed line. A whole revolution then is a permanent angular unit which cannot be misunderstood by any one who can think clearly about the magnitude in question; and a given fraction of a revolution, described in simple numbers, means the same thing everywhere, and is everywhere understood in the same sense. Give two workmen, in different countries, directions to place two bars at an angle of ·1672 of a revolution, and their angles would be sure to coincide; or if not, the error would be a consequence of want of skill, of power to do what was required, not of a complete conception of the thing required. But send to all the countries in Europe a description of a length or a weight, without reference to any other length or weight, more than can be contained in verbal description, and require the production of an equal length or weight:—No possible description could be given: there is no length or weight which has limits so perceptible (like those of a whole revolution in angular measure) that full description can be given by drawing upon ideas which we are sure the persons addressed will already possess: there is no natural unit of length or weight; and consequently it is beyond the power of any two persons, whatever their qualifications may be, to talk to each other about the magnitude of lengths or weights until some one length and some one weight have been agreed upon between them as standard references.

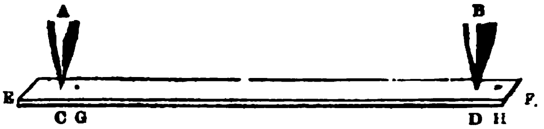
The common purposes of life require a continual reference to lengths and weights which it is intended shall be always the same, but as to which it is sufficient that they should be very nearly the same. Nature continually presents resemblances between the lengths and weights of similar things. As to lengths, for instance, the corresponding parts of different human bodies are so nearly of the same length, that, throughout the same country at least, there could never be wanting a sufficient mode of laying down a length from description, as long as a well proportioned man, neither very tall nor very short, was to be found. The foot, the cubit, the palm, the digit, the fathom, &c., differ so little in different persons, that the occurrence of these words as measures of length is no ways surprising; and when we come to that state of society in which an attempt is made to establish a uniform measure, independent of the slight variations which exist between one person and another, we might expect to see, as we do see, these names preserved to denote conventional lengths, originally derived from the human body, but fixed, or attempted to be fixed, by law.

Measures are wanted for two distinct objects, the commercial and the scientific. The wants of natural philosophy have grown up within the last two centuries; while so early as Magna Charta it was one of the concessions to the grievances of the subject that there should be one weight and one measure throughout the land. But though a few acts of parliament were sufficient, in process of time, substantially to establish the political rights which that charter was intended to grant, hundreds of them, down to the present time, have been ineffectual in producing the use of one weight and one measure. Some of these we shall afterwards refer to [**Weights**, &c.]: in the meanwhile we have here only to state that, as may be supposed, this unity was for commercial, not scientific, purposes; and that the resemblance of natural objects was supposed to be a sufficient reliance for obtaining it. Some of the old statutes expressly make the inch to be the length of three barleycorns, placed end to end, round and dry, from the middle of the ear. Standards were made, no doubt, from this definition; or at least it was supposed that if the existing standard should be lost, the barleycorns would enable its restoration to be effected. Our readers may smile at what they think so rude a contrivance; but the same principle, carried a little further, might be made very efficient in preserving a measure. Suppose, for example, that the government were now to think it desirable to recover the three-barleycorn inch, or at least to invent one which should be capable of being recovered. They would put together not three barleycorns, but three thousand, or thirty thousand; or many different collections of three thousand or more. The average inch deduced from these would be capable of being recovered at any time from the same grain grown in the same soil. A commercial standard might be easily recovered from many different modes of proceeding: for example, the *average* height of the barometer at a given place throughout any period of five years is so nearly the same from one five years to another, that a commercial standard might be sufficiently well obtained from it. It would be of little consequence if the yard were wrongly recovered by one-hundredth or even one-tenth of an inch, in any matter of buying and selling.

It is the *scientific* standard at which the government has been aiming during the last century. The object here is, first, to measure the old standards to the utmost accuracy of which our senses, assisted by microscopes, are capable; secondly, to discover the means of reconstructing a lost standard. In the more delicate operations of natural philosophy and astronomy, our knowledge cannot go down to posterity, unless they know within the thousandth of an inch what it is that we call a yard. The public at large has never understood the reason why so much trouble has been taken; and perhaps the members of different administrations, while trusting such investigations to men of science, and relying on them for the whole conduct of the matter, may have wondered at the great difficulty which there seemed to be in the way of furnishing the shopkeepers of all generations with yard measures and pound weights of the same values. It is our principal object in this article to endeavour to point out the nature of these difficulties, and the extent to which they have been overcome: it being remembered however that the object is scientific, not commercial, and that the standard of length is chosen as the most important illustration.

To elucidate the *principle* merely of the manner in which scales are compared, we must first show how it is that very small lengths can be measured. A screw can be very accurately constructed, say with threads one-twentieth of an inch apart: if this screw be the axis of a circular plate, which turns with it, and the edge of the plate be divided into 100 parts, each of these parts will be very perceptible, if the plate be three-quarters of an inch or more in diameter, and it will not be difficult to estimate the half or quarter of one of the divisions. Let there be an index attached to the frame, which does not move with the screw, by which it may be seen, when the plate (and with it the screw) is turned, how many divisions it is turned through. Now since a whole turn of the screw moves the end of it forward through one-twentieth of an inch, a motion of the plate which passes one of the divisions over the index, or the hundredth part of a turn, sends the end of the screw forward through only one two-thousandth of an inch, and a quarter of a division answers to one eight-thousandth of an inch. Suppose a couple of such screws, each of which is attached to a pointer, as in the following diagram, in which the pointers only are inserted, and one of the scales which are to be compared; the screws which move the pointers, and all the frame-work, being omitted. Observe also that this is not the apparatus employed, but only a convenient illustration of it.

It is supposed that A and B can be moved, by the screw motion, in such manner that a motion so small as the eight-thousandth of an inch may be given to either. The scale at present used is E F, on which are two points, C and D, which are, or are supposed to be, exactly a yard asunder.



Let the screws be moved until the ends of the pointers, which all but touch the scale, are exactly over C and D: then if the scale be removed, the length CD is retained in the distance between the points of the pointers. Now let another scale be introduced, and let its points be brought as near as may be, conveniently, to the pointers: it is supposed that the distances CD and GH are very nearly equal, for workmen used to the construction of mathematical instruments never fail in making two yard measures agree within a fiftieth of an inch. Perhaps the reader will say the point G might be brought *exactly* under the pointer A and then the pointer B alone would show whether the present scale is shorter or longer than its predecessor: but as the pointer is much less cumbrous than the scale, it is easier and safer to put the scale in a convenient position than to attempt to place it in one exactly given. This being done, move the pointer A from C to G, and observe how many turns, or how much of a turn, of the screw, is required to do it: say it makes 87½ divisions of the plate pass the index. Also move the pointer B from D to H, which makes, say, 97¾ divisions of the plate pass the index. Now we obviously have

$$GH = CD + DH - CG;$$

and since DH is longer than CG, it appears that GH exceeds CD by the excess of DH over CG, answering to 97¾ − 87½, or 10¼ divisions of the plate, being 10¼ times the two-thousandth of an inch, or ·005125 of an inch. This experiment may be repeated any number of times, and, as may be expected, the results will not agree, since it is not to be supposed that any two persons, or the same person at two different times, will agree in their estimation of exact coincidence between the pointers and the ends of the scales. As in other cases, the averaging of the discordant results will bring out the truth very nearly.

The difference between the apparatus which was actually used in the latest experiments and that above described was as follows. The pointers were **Micrometer*** microscopes, in which the intersection of two fine spider-threads, placed at the focus, was the point which was made, by a slow screw motion, to coincide with the centre of the (magnified) dot (or line) which formed the extremity of the scale. The micrometer head (the circular plate of the preceding illustration) was divided into 100 parts, each of which was found to be equivalent to one 20,000th of an inch; or a whole turn of the screw altered the position of the intersection of the spider's webs by one 200th of an inch. The magnifying power used was about 27 times in linear dimension. It was attempted, in each experiment, to estimate tenths of the divisions of the micrometer-head, or to attain† the 200,000th part of an inch. The apparatus is described in Mr. Baily's 'Report to the Royal Astronomical Society on their Standard Scale' (published in the ninth volume of their Memoirs), from which much of the present article is taken.

The first attempts to be scientific in matters of measurement made in this country date from the beginning of the seventeenth century. Previously to this time men of information probably believed that the Roman and English foot were the same, and that the pound troy was deducible from the Roman Libra. Bishop Tonstal, in his Arithmetic (1522), where he only treats what is necessary for common life, 'ad vitam communem transigendam necessaria,' cites Columella on measures of length, and deduces the system of coinage from Budæus on the Roman As. The other writers of the same century pass over the mode of obtaining measures, as if it were perfectly fixed, and generally refer to the three-barleycorn inch as a standard. In the early part of the seventeenth century we find Oughtred ('Circles of Proportion,' pp. 55-57) referring to actual measures of the content of the gallon made by the celebrated Briggs, and also by one William Twine, but taking the Roman foot as 'very little less if not exactly the same' as the English foot. Later in the century Dr. Wybard ('Tactometria,' p. 268, published in 1650) gives an account of experiments at which he was present, for the determination of the same gallon; and later still, in 1688, we have the experiment with the same object [Gallon], at which Flamsteed and Halley were present, which is referred to in the Report of the Committee of the House of Commons in 1758. As far as measurements are concerned, had it not been for Greaves [Greaves, John], we might have summed up the efforts of the seventeenth century by saying they were mostly directed to finding, within one, how many cubic inches there were in the several gallons. Greaves first directed attention to the difference between the Roman foot and the English, by tolerably accurate determinations of the former [Weights and Measures]: he also attempted the investigation of the Roman weights, and must be considered as the earliest of the scientific metrologists. He was followed by Dr. Bernard [Bernard, Edward], whose treatise on antient weights and measures (1685 and 1688) must have given a great impetus to the spirit of comparison. A work of this kind soon shows its consequences; Jeake's 'Arithmetic' (folio, 1696) contains a hundred pages on the subject. Towards the end of the century the measures of Auzout and Picard awakened attention to the comparison of standards in France. Both countries were thus prepared to desire some information from each other on the subject of their measures; and a communication took place in 1742 between the Royal Society and the Academy of Sciences for an interchange of standards. Then, for the first time, as far as we can learn, a yard was taken off on a brass rod from a standard kept in the Tower of London (which we believe is not now in existence). But the legal standard, usually so considered, was one which was kept at the Exchequer; there was another at the Guildhall, and another in the possession of the Clockmakers' company. When these came to be compared with one another and with the Exchequer standard by Graham (who also laid down an Exchequer yard on the same brass rod), it appeared that the shortest and the longest differed by seven-hundredths of an inch, a little more than the height of an *o* or an *a* in this work. But had the difference been greater, it would not have mattered much, considering the way in which standards were to be used. In our own day, after nearly a century of communication between statesmen and philosophers on the subject of a uniform measure, Mr. Baily visited the Exchequer standard (from which the copies we shall presently mention were made, and his account (Report above cited, p. 146) is as follows: 'Since the preceding sheets were printed I have had an opportunity of seeing this curious instrument, of which it is impossible at the present day to speak too much in derision or contempt. A common kitchen poker, filed at the ends in the rudest manner by the most bungling workman, would make as good a standard. It has been broken asunder, and the two pieces have been dovetailed together; but so badly that the joint is nearly as loose as that of a pair of tongs. The date of this fracture I could not ascertain, it having occurred beyond the memory or knowledge of any of the officers at the Exchequer. And yet, till within the last ten years, to the disgrace of this country, copies of this measure have been circulated all over Europe and America, with a parchment document accompanying them (charged with a stamp that costs 3*l.* 10*s.*, exclusive of official fees), certifying that they are true copies of the English *standard*.'

---

* The principle is the same as that of the beam-compasses, and the apparatus might be called microscopic beam-compasses, or beam-microscopes.

† Every attempt at measurement strives to be ready for more than there is any reasonable hope of attaining. It is certainly not likely, at present, that even the mean of a large number of measures would settle the question within so small a quantity; but if ever the day shall arrive when the 200,000th of an inch is attainable, the previous attempts to obtain it will point out the causes of their own failure, and probably be a source of information.

In 1758 a committee of the House of Commons began to investigate this subject, and was followed by another in 1759: both committees made full Reports. Both committees caused to be made, by Bird, a copy of the Royal Society's (or Graham's) copy of the Exchequer standard, and these copies, which remained in the official possession of the Speaker of the House of Commons, were called Bird's parliamentary standards of 1758 and 1760: it should be stated however that the latter was only a copy of the former. The Reports were agreed to by the House; a bill was brought in, according to their recommendation, namely, that Bird's standard of 1758 should be the national standard; but it was not carried through. A committee, appointed in 1790, did nothing; and the matter was thus abandoned. Private individuals and scientific societies began to provide themselves with standards; Sir G. Shuckburgh (*Phil. Trans.*, 1798) had one made by Troughton which he compared with the parliamentary standards and others. Troughton made one for himself, and first introduced the micrometer microscopes into the comparisons; this last was made from one which Bird had made for the then assay-master of the Mint. Another was made for General Roy, and was used by him in the great survey; another, Bird's own private property, was in existence. Thus matters went on until the year 1814, when the House of Commons again appointed a committee to consider the subject.

In the meanwhile however experimental philosophy had made great advances, and investigators began to look more at the successes of the past than at the new difficulties which those very successes had opened into view. As soon as the measurements of the earth began to be attended with some success, the French proposed a standard measure which should be the ten-millionth part of a quarter of the meridian; which last they hoped, by their great survey, to ascertain so exactly that no future measurement should make even a microscopic alteration of their new *mètre*. In England the pendulum began to be considered a perfect instrument; and the second being determined invariably by the motion of the earth, it was thought that the length of the seconds' pendulum in a given latitude would be an invariable quantity which could always be recovered. The committee of 1814, on the evidence of Playfair and Wollaston, recommended that Bird's standard of 1758 should be the one adopted, and gave it as their opinion that the length of a second's pendulum in the latitude of London is 39·13047 inches, of which the above-named standard yard contains 36. Playfair and Wollaston hinted at the necessity of verifying this number, but the committee take it for granted, and assert that any expert watchmaker can make a seconds' pendulum, without stating how that pendulum is afterwards to be measured, nor at what temperature, pressure, &c. it is to be swung. They also state that a cubic foot of pure water at 56½° Fahrenheit weighs exactly 1000 ounces avoirdupois, as the connecting link between measures of weight and capacity. No bill was brought in in consequence of this Report.

In 1819 the Prince Regent appointed a commission composed of Sir J. Banks, Sir G. Clerk, Davies Gilbert, Wollaston, Young, and Kater. This commission made three Reports, dated June 24, 1819, July 13, 1820, and March 31, 1821. In the first (we confine ourselves to matters affecting the standards) the standard yard recommended is that on the scale used by General Roy in the measurement of his Hounslow Heath base, and it was the opinion of the reporters that the mean solar seconds' pendulum in London, at the level of the sea, in a vacuum, and at 62° of Fahrenheit, was 39·1372 inches of this scale. They also take 19 cubic inches of distilled water at 50° to be exactly 10 ounces troy. In the second Report, they announce that an error has been discovered in their standard, and they propose that Bird's parliamentary scale of 1760 shall be the standard, the seconds' pendulum being 39·13929 inches. In the third Report, they announce, by new experiments, that a cubic inch of distilled water at 62° is 252·72 grains of the standard pound of 1758, when weighed in a vacuum. The House of Commons again appointed a committee in 1821, to which these Reports were submitted: this committee agreed with the commissioners, and a bill was introduced in 1823. A petition from the Chamber of Commerce at Glasgow to the House of Lords occasioned an investigation in that House also; Dr. Kelly, one of the witnesses before the committee, called attention to the known effects of variety of attraction on the pendulum, as shown by Captain Kater's own observations, and to the insufficient manner in which the level of the sea was known: and his opinion was that of few others at the time, though now nearly universally received, namely, that 'nature seems to refuse invariable standards; for, as science advances, difficulties are found to multiply, or at least they become more perceptible, and some appear insuperable.' The House of Lords adjourned the question over till 1824; when the act 5 Geo. IV., c. 74, was passed, from which extracts will presently be made. This act was to take effect May 1, 1825, but in the March of that year 6 Geo. IV., c. 12, was passed, deferring the operation of the preceding act till January 1, 1826. This last act took effect, and nothing has since been done as to the standards; there was an inquiry before the House of Commons in 1834, which ended in the statute of 4 and 5 Wm. IV., c. 49, and another inquiry before the same House in 1835, which ended in 5 and 6 Wm. IV., c. 63, repealing the former act and substituting new provisions

These last acts however contain nothing with reference to the standards, except the following excellent wind-up of the chequered and ill understood legislation upon weights and measures. The Houses of parliament were burnt in 1834, and with them Bird's standards of 1758 and 1760 (the last *the* standard). Nevertheless 5 and 6 Wm. IV., c. 63, passed after the fire, takes no notice of the destruction of the standard, but refers to it as still in existence. Seven years have since elapsed, but we are not aware of the legislature having yet swung the pendulum to recover the lost measure.

As to the standards, the act prescribes as follows:—

1. The straight line or distance between the centres of the two points in the gold studs in the straight brass rod now in the custody of the clerk of the House of Commons, whereon the words and figures 'Standard yard, 1760' are engraved, shall be the original and genuine standard of that measure of length or lineal extension called a yard . . . the brass being at the temperature of sixty-two degrees of Fahrenheit's thermometer..... The act goes on in many words to say that the pendulum vibrating seconds of mean time in the latitude of London* in a vacuum at the level of the sea is 39·1393 inches of the said standard.

2. The standard brass weight of one pound troy weight, made in the year 1758, now in the custody of the clerk of the House of Commons, shall be the original and genuine standard measure of weight. . . . The act goes on to say that the cubic inch of distilled water, weighed in air by brass weights, at 62° of Fahrenheit, the barometer being at 30 inches, is equal to 252·458 grains.

It happened fortunately for the scientific standard, that about the year 1832 the council of the Royal Astronomical Society caused a scale to be constructed for themselves, and obtained permission of the Speaker of the House of Commons to compare it with Bird's two standards, which was done in the beginning of 1834, by a much more extensive set of experiments than had ever been made before for a like purpose, conducted chiefly by Mr. Baily and the late Lieutenant Murphy. This is now, in fact, the standard scale of the country; or, at least, the only measure from which the standard scale can be deduced. The manner of conducting the comparisons has already been slightly described; we shall now proceed (from the Report already quoted) to give some account of the difficulties which were found in the way of measurement, and of the results.

This scale is a cylindrical tube of brass 68 inches long, 1·12 inches and ·74 inches in exterior and interior diameter. Three thermometers are immoveably inserted into its length, and the ends are stopped by brass plugs. Two parallel lines (·09 of an inch apart) are drawn in the upper surface; and, commencing 1¼ inches from one end, at the distance of every foot, a palladium pin is inserted in the tube, between those lines; on each of which pins, at proper distances, a fine line is cut to designate the length of a foot. The first foot is similarly divided into inches and tenths; and the middle foot (there being five in all) is bisected. The three middle feet constituted the yard which was used in the comparisons. It was found that any constraint, however slight, affected the expansion and contraction of the bar; even the friction arising from its first supports, which were lined with baize: it was therefore found necessary to support it, when under the microscopes, on friction-rollers: and care was taken that these should always be placed under the same points of the tube. To give an idea of the power of the mode of comparison, it was found, by fourteen experiments agreeing very well with each other, that the middle yard was shortened ·48 of one of the divisions of the micrometer-head (described at the beginning of the article), or ·000024 of an inch, by nothing but removing the plugs from the end of the tube.

Nothing can be known of such a bar as a scientific standard until the rate at which it expands by the action of heat is determined. By a mean of six experiments, taken with the tube at the freezing and boiling temperatures, it was found that every addition of 1° of Fahrenheit to the temperature lengthened the centre yard by ·000377 of an inch, or 7·6 divisions of the micrometer-head.

The instrument being placed ready for observation, and two scales being put down for comparison, one observer may bring both the micrometers to the ends of one scale, or one observer may be placed at one end, and another at the other. In the latter case, a new cause of error enters, of which it is impossible to give any account, though a remedy may be provided. It is not true that two persons, though using exactly the same instrument, and noting the same phenomenon under the same circumstances, will note it exactly in the same way. When one observer made (as he thought) the coincidence of the intersection of the micrometer-wires with the dot or line at the end of a scale, another, looking into the microscope, would seldom or never agree with the former that the coincidence was exactly made, but would turn the micrometer-head three or four divisions, one way or the other, before he (the second) could be satisfied that the coincidence was perfect. This difference of the manner of observing, arising from the peculiar habits of vision and judgment of the observers themselves, has received the name of the *personal equation*, and its amount, as between any pair of observers, can be ascertained by experiment. If one observer made the coincidences at both ends, it would matter nothing what his manner of observing was, since, however much he might differ from absolute correctness (be that what it may), he would differ by the same amount at both ends, and the length of the scale would not be affected. If, when two observers are employed, they make a given number of comparisons, and then change places and make the same number, the mean of all their observations will be unaffected by their mode of observing, since, if the scale be made too long in the first set, it will be made as much too short in the other, and vice versâ. Some of the personal equation might arise from the curious figures which the dots of the old scales (into which beam-compasses had been inserted) presented when viewed under the microscope. Bird's standard of 1758, for instance, had pear-shaped holes at its extremities, the centres of which no two persons could agree upon.

The following results will give a notion of the degree of accuracy obtained in the workmanship of scales. The Astronomical Society's scale was compared with the Imperial standard (Bird's of 1760); the Royal Society's scale of 1742, having two scales in it marked E and Exch.; a scale called Aubert's, the prototype of one which was used in the Indian survey by Lambton; one which had been used by Sir G. Shuckburgh; one belonging to the town of Aberdeen; one belonging to Mr. T. Jones; and four new ones made after the model of the Society's scale, one for the Danish government, one for the Russian government, one retained for himself by Mr. Simms the constructor, and one for Mr. Baily. Calling the middle yard of the Astronomical Society's scale 36 inches, the different scales are as follows, each from the mean of many observations:—

Scale.		Standard portion.	Mean inches of Ast. Soc. scale.
Astron. Soc.	. .	centre yard.	36·000000
Danish	. . .	do.	35·999758
Russian	. . .	do.	36·000050
Simms's	. . .	do.	35·999903
Baily's	. . .	do.	35·999949
Aberdeen	. . .	do.	35·998615
Jones's	. . .	do.	35·999802
Aubert's	. . .	0 in.—36 in.	35·998447
Shuckburgh	. .	0 in.—36 in.	36·000185
Do.	. .	10 in.—46 in.	35·999921
Royal Society	. .	line E.	36·001473
Do.	. .	line Exch.	35·993684
Imperial standard of Bird's of 1760		. . . . . .	35·999624

Temperature is not here alluded to, it being presumed of course that the effect of temperature upon the *difference* of two scales is inappreciable; thus the Astronomical Society's standard being ·000376 longer than the Imperial standard, and the standard temperature being 62°, the length of the former standard, observed at 62°, and diminished by ·000376 of an inch, will give the true standard of the law.

It is believed, after all, that the Imperial standard is about one 140th of an inch longer than the old standard of the country, but this matters nothing to the scientific part of the question; for all the scales which have been used in trigonometrical surveys have now been diligently compared with the Astronomical Society's scale, and are therefore known, independently of the national standard, as long as the latter scale exists. The only thing to be feared is the loss of this last-mentioned standard; the government might keep it, but cannot be trusted to use it; the Society, which knows how to use it, has no place of perfect security in which to keep it. That the government knows and ca nothing about the standards is obvious from the legislation which has taken place since the legal standard was destroyed; and it would not do to let the nation possess a scientific record of the first importance to be broken by Exchequer officers, or altered in length by a blow given for the purpose of impressing a government stamp.

---

* The latitude of London was rather a vague phrase for legislation which could not let 'length' pass without the explanation 'lineal extension.'

We shall not here enter into the various modes used by Sir G. Shuckburgh, and subsequently by Captain Kater, for the determination of the standard of weight. An old standard pound exists in the Exchequer, from which in 1758 a copy was made for the committee of the House of Commons. This last, as we have seen, has been declared the standard; and was never recovered from the ruins of the late House of Commons. The original standard of weight, as prescribed in a statute of 51 Hen. III., called *Assiza Panis et Cervisiæ*, was that an English penny called the sterling, round without clipping, should weight 32 grains of wheat, well dried and gathered out of the middle of the ear; and that 20 pence should make an ounce, and 12 ounces a pound.

It is understood that a commission of men of science was appointed by the late administration to consider further on any alterations which might appear advisable, and that this commission will soon make its report. We sincerely hope that no important change will ever again be attempted until the public is ripe for the introduction of a purely decimal system. Nothing would be so easy a preliminary to the attainment of this great object as the decimalization of the coinage, which, it is the opinion of many, both men of science and men of business, might be brought about with great ease and little temporary confusion. The French decimal system was for a long time a failure, owing to the universality and suddenness of the attempted change; but if a commencement were made with the coinage (and our coinage is nearly decimal already, though few people know it), there would in a few years be an outcry for the assimilation of weights and measures to the money, arising from the advantage which would be felt in the simplification of all the money rules of arithmetic.

Since writing this article, we have seen the Report above alluded to, being 'Report of the Commissioners appointed to consider the steps to be taken for the Restoration of the Standards of Weight and Measure, 1841.' The commission was appointed in May, 1838; and its members were MM. Baily, Bethune, Davies Gilbert (who died during the inquiry), Lefevre, Lubbock, Peacock, Sheepshanks, and (after his return to England) Herschel. The Report, which is long, is accompanied by extracts from various kinds of evidence oral and written. After reciting that the standard yard was rendered absolutely useless by the fire at the House of Commons, and that the standard troy pound was altogether missing, the commissioners begin by recommending the total disuse of all attempts to procure a natural standard, and the return to the old plan of standards manufactured in metal; that four copies of the best existing representations of the old standards should be made, and carefully compared; that one of these copies should be hermetically sealed, and imbedded in the masonry of some public building, marked by an inscription, and only to be opened by Act of Parliament; that the standard of capacity be defined by that of weight, not by that of length; that various precautions, minutely named, be taken for the preservation and safe custody of the others; that the averdupois pound, and not the troy, be the standard; that the government purchase all the known copies of the old standards which have been noted in scientific operations; that no circumstance would contribute so much to the introduction of a decimal scale in weights and measures as the *establishment of a decimal coinage*, which is strongly recommended; that the old Gunter's chain be preserved in the measurement of land; that a measure of 1000 or 2000 yards receive a name, and be used coordinately with the mile, with a view to the gradual disuse of the latter; &c.

STANDARDS are those trees or shrubs which stand singly without being attached to any wall or support. In gardening and planting they are distinguished into three kinds, the full standard, the half standard, and the dwarf standard. The full standards are trees whose stems are suffered to grow seven or eight feet or more without allowing side branches to be developed, but at this point are allowed to spread in all directions. In this way most fruit-trees, with the exception of the vine, may be grown, though many of those of the almond tribe, as the peach, apricot, &c., are best grown against a wall. The various kinds of apple, pear, and plum trees are grown as full standards. In fruit-trees the primary branch or stem is often cut off at a certain height for the purpose of favouring the lateral growth; but in forest-trees grown for the sake of timber or for ornament, this treatment is never resorted to.

Half standards are those plants which are allowed to run up three or four feet and then permitted to branch out. The height at which it is desired a tree should branch out may be frequently secured by cutting off the lower branches up to that point, or by cutting down the primary branch and allowing the highest lateral branches to develope themselves Many shrubs grow naturally in this manner, and when fruit-trees are grown in this way, it is done as a matter of convenience for gathering the fruit, or ensuring their growth under particular circumstances.

Dwarf standards are those plants whose stems are only allowed to reach a height of one or two feet before they are permitted to branch, and this object is effected in the same manner as in the last. All kinds of fruit-trees, as apple, pear, plum, and cherry trees, may be grown as dwarf standards, but these trees do not bear so good fruit under such treatment as when allowed to grow as half or full standards. Gooseberry and currant trees are best treated in this way, and when care is taken to thin them well, they produce by far the finest fruit when grown as dwarf standards of about a foot high. It is in this way that the fruit of the gooseberry has been brought to so great perfection in the county of Lancashire. Many shrubs may be trained as dwarf standards, although in most instances they are more ornamental when allowed to grow as bushes with several stems direct from the ground.

STANHOPE, GEORGE, D.D., born 1660, died 1728 a dignitary of the English church, who in his life-time was regarded as an honour and ornament to the church by his rational piety and eminent charity, united with the manners of an accomplished gentleman; and whose writings, partly original and partly translated, continue to be prized as amongst the most valuable practical works which the divines of the church have provided for the edification of its members. He belonged to a family several branches of which have been enobled, and was the son and grandson of clergymen who had been harshly treated when Puritanism was in the ascendant. His father had the living of Hartshorne, in Derbyshire, where he was born. He had his earlier education in schools in the country, but was afterwards at Eton, from whence he passed to King's College, Cambridge. He had the living of Tewing, but resided for the greater part of his life on his vicarage of Lewisham, to which he was presented in 1689, by Lord Dartmouth, to whose son he had been tutor. He gave up Tewing in 1703, on being presented to the vicarage of Deptford St. Nicholas. He commenced D.D. in 1697. In 1701 he was appointed dean of Canterbury. This was the highest preferment he enjoyed, but it was understood that he would have been made bishop of Ely by the Tory Ministry of the latter years of Queen Anne, had the see fallen vacant only a few weeks sooner than happened to be the case. He was chaplain to King William and Queen Anne, and had a share in the education of the duke of Gloucester, the heir presumptive to the crown. He was a celebrated preacher, and a very influential person in all affairs relating to the church.

His principal work is his 'Paraphrase and Comment on the Epistles and Gospels as they are read in the Book of Common Prayer.' This was written originally for the special use of the duke of Gloucester. It is a large work, forming four octavo volumes, and has gone through at least nine editions. Of his other practical writings the chief characteristic is this, that they are, if not direct translations of antient authors chiefly Christian, adaptations of their sentiments to the use of members of the English reformed church. Thus we have his 'Morals of Epictetus;' the 'Christian Pattern, by Thomas à Kempis, with Prayers and Meditations for the Sick annexed;' the 'Meditations of Marcus Aurelius Antoninus;' the 'Christian Directory,' written originally by the Jesuit Parsons; 'Pious Breathings,' from the works of Saint Augustin, with select Contemplations from Saint Anselm and Saint Bernard. To these are to be added a translation of Charron's 'Three Books of Wisdom' and of the Maxims of Rochefoucault. He printed also various Sermons, including a set of Discourses at Boyle's Lectures. His translation of the 'Devotions' of Bishop Andrews, written originally in Greek, was not published till after his death. He was buried in the church at Lewisham.

STANHOPE, JAMES STANHOPE, EARL, was the eldest or only son of the Hon. Alexander Stanhope, second son of Philip Stanhope, first earl of Chesterfield. His mother was Katherine, daughter of Arnold Burghill, Esq., of Thingehill, in Herefordshire; and he was born in 1673. His father, who lived till 1707, was employed as envoy by King William to Spain in 1699, and to the Hague in 1700 (during the negotiation of the Partition Treaties), and again by Queen Anne to the Hague in 1702. Young Stanhope accompanied his father to Spain; and, after spending a year or two in that country, made the tour of France and Italy.

He first carried arms under the duke of Savoy (Victor Amadeus II.), and then under King William, in Flanders, in the war carried on against France by the Grand Alliance, which was terminated by the peace of Ryswick, in 1697. Young as he was, William was so much struck with his spirit and talent, that in 1694 he gave him a captain's commission in the foot-guards, with the rank of lieutenant-colonel. He was wounded at the siege of Namur in 1695.

He appears to have been first returned to parliament for the borough of Cockermouth, at the general election after the accession of Anne, in September, 1702; and he continued to be a member of the House of Commons from this time till his elevation to the peerage; having been returned again for Cockermouth in 1705, 1707, 1708, and 1710, for Wendover in 1714, for Cockermouth in 1715, and lastly for Newport in the Isle of Wight, in April, 1717, after having vacated his seat by taking office.[*]

For some years however he appears to have taken little or no part in the proceedings of the House; it is not till the year 1713 that his name occurs in the reports of the debates; and indeed he was all this time chiefly employed in quite another field. In 1702 he went as a volunteer on the expedition to Cadiz, so disgracefully misconducted under the command of Admiral Sir George Rooke; and in 1703 he proceeded to Portugal, and, having been made a brigadier-general in 1704, served under the duke of Schomberg in the still more unsuccessful operations carried on in that country, till he was forced to surrender with his regiment at discretion. But soon after, having probably been exchanged, we find him serving again under the earl of Peterborough, in whose brilliant Spanish campaign of the year 1705 he greatly distinguished himself. After the capture of Barcelona (at which he was present), in September of that year, he was sent home with despatches from Charles III.; and early in 1706 he was sent back by Queen Anne as envoy extraordinary to his Spanish majesty. In 1707 he was made major-general.; and in 1708 he was appointed commander-in-chief of the British forces in Spain.[†] That same year he projected and accomplished the capture of Port Mahon and the reduction of the island of Minorca. In 1710 he gained the battles of Almanara (17th July) and Saragossa (9th August); but on the 27th of November following, he and the forces under his command, amounting to 2000 men, being surprised and attacked by the duke of Vendôme at Brihuega, were, after a gallant defence, forced to surrender themselves prisoners of war.

This terminated his military career. Tindal (iv. 213) says that he was detained in confinement throughout the winter of 1710-11, and 'till all the prisoners on both sides were released,' that is, till the end of the war; but it appears that he was one of the managers for the Commons on the trial of Sacheverell, in the beginning of the year 1710; and he is expressly stated to have distinguished himself in a very particular manner on that occasion before the lords in Westminster Hall. (See his speech in *State Trials*, xv. 126-134.) As soon as he got home, he had begun to take an active part in politics on the side of the Whig party, to which he had always adhered. One of the first objects against which his friends and he directed their attacks was the commercial treaty with France. Besides his exertions in the House, Tindal says that Stanhope was one of a number of gentlemen (Walpole among them) who attacked the proposed treaty through the press in several excellent pieces; and the editor of the collection of papers called the 'British Merchant,' the publication of which is believed to have chiefly prevented the ratification of the treaty, declares that the great patrons of that work were Stanhope and Charles Montagu (afterwards earl of Halifax). 'When our trade was just expiring in the late reign,' says this writer, in his preface to the republication of the papers, 'General Stanhope came into the House of Commons, as a vote was ready to pass for taking off the duties on French wines for two months, by which our treaty with Portugal would have been instantly broken, by which we should have lost above a million sterling per annum, and have reduced several hundred thousand families to the parish for subsistence. But he opposed the vote, began the debate, and brought them to consent that our merchants should first be heard before it passed.' This appears to have been on the 14th of May, 1713, when, according to the 'Parliamentary History,' the general made a long speech, the first made by him of which any note has been preserved. We find him afterwards, in the same session, moving an address to the queen (which was carried), to beseech her to use her influence with the duke of Lorraine and all other princes in amity with her, to prevent them from giving shelter to the Pretender.

On the accession of George I., Stanhope received the reward of his abilities and his party zeal, by being immediately taken into favour and office. On the 24th of September, 1714, he was appointed one of the principal secretaries of state, Viscount Townshend being the other. Stanhope and Walpole now became the ministerial leaders in the House of Commons; and in that capacity the former, in the next session, impeached two of the late Tory ministers, the duke of Ormond and the earl of Strafford (who had been plenipotentiary to the United Provinces at the negotiation of the treaty of Utrecht).

But it was not long before intrigue and disunion crept in among the knot of attached friends who had thus obtained possession of the government. Stanhope is said to have been indebted for his appointment as secretary of state mainly to Horace Walpole (Sir Robert's younger brother), who was brother-in-law and confidential secretary to Townshend, and who recommended him to that lord, to whom the king had left the selection of his colleague: 'Stanhope himself,' Coxe tells us, on the information of Lord Orford, 'had made no application for the office of secretary. His frequent residence in camps, and skill in the profession of arms, rendered him, in his own opinion, more fit for a military than a civil station; and when Walpole proposed it, he considered the offer as a matter of raillery, and applied his hand to his sword. It was not till after much persuasion, and the most solemn assurances that his compliance would materially contribute to the security of the new administration, that he was induced to accept the post.' (*Memoirs of Walpole*, i. 96.) Walpole, who had been long on terms of the most intimate friendship with Stanhope, in seconding his brother's recommendation of the latter to Townshend, had, to use Coxe's expression, 'answered for his integrity as for his own.' But from the first there had been a latent rivalry between Townshend and the ambitious earl of Sunderland, who had been very ill-pleased with the office of lord-lieutenant of Ireland, a sort of banishment, as he considered it, to which he had been appointed on the formation of the new government, and was not much better satisfied with that of lord privy seal, to which he had been since transferred—holding, in fact, as he did, that he ought to have been at the head of the administration. When the king went over to Hanover, in the summer of 1716, Stanhope was sent with him, specially charged by his colleagues to protect their royal master (and themselves) against the intrigues of Sunderland, who, under the pretext of ill health had also sought the Continent. But the end was that Sunderland managed to gain over both his Majesty and Stanhope; and that, after much correspondence and negotiation the details of which may be read in Coxe, Townshend was dismissed from his secretaryship, with an offer of the Irish lieutenancy, which he at first refused, and then accepted, to be turned out of it after only a few weeks' possession. Even Coxe however, who takes an unfavourable view of Stanhope's conduct in this affair, admits that 'he did not yield to the suggestions of Sunderland from venal or ambitious motives,' but rather from a conviction that Townshend and Walpole were really pursuing an objectionable course of policy. All the changes consequent upon this commotion were not completed till about the middle of April, 1717, when the cabinet was at last reconstructed by Sunderland being made secretary of state, with Addison for his colleague; and Stanhope taking the post of first lord of the treasury, along with that of chancellor of the exchequer. Even this however was only an interim arrangement: in July following Stanhope was removed to the House of Lords, by being created Baron Stanhope, of Elvaston, and Viscount Stanhope, of Mahon in the island of Minorca; and in March, 1718, he took the office of secretary, and Sunderland that of first lord of the treasury, Mr. Aislabie being appointed chancellor of the exchequer. A few weeks after Stanhope was made an earl by the title of Earl Stanhope: that same year he proceeded first to Paris and thence to Madrid, to endeavour to avert hostilities with Spain, an attempt in which he did not succeed; and he was afterwards more than once employed in similar negotiations abroad, being apparently the member of the cabinet who was considered to be best acquainted with foreign countries and foreign politics. His death was very sudden, and accordant in the circumstances of it with his constitutionally warm and sensitive temper, and with the impetuous bearing of the camp, which he had never altogether shaken off. In the course of the discussions on the South Sea Company affair, which so unhappily involved some of the leading members of the government, the duke of Wharton had, on the 4th of February, 1721, delivered some severe remarks in the House of Lords, comparing the conduct of ministers to that of Sejanus, who had made the reign of Tiberius hateful to the old Romans. Stanhope, in rising to reply, spoke with such vehemence in vindication of himself and his colleagues, that he burst a blood-vessel, and died the next day. 'May it be eternally remembered,' says the writer of the preface to the 'British Merchant,' 'to the immortal honour of Earl Stanhope, that he died poorer in the king's service than he came into it. Walsingham, the great Walsingham, died poor; but the great Stanhope ived in the time of South Sea temptations.'

---

[*] We collect the latter returns from Beatson's 'Chronological Register.' The list of the House of Commons in George I.'s first parliament, given in the 'Parliamentary History,' does not contain Stanhope's name.

[†] Tindal ('History,' iv. 58) asserts that in 1707-8 the parliament passed 'A Bill to discharge the Clans of Scotland from their Vassalage to their Heads who should take up arms against the Queen;' and he adds, 'This bill was chiefly owing to Major General Stanhope and Sir David Dalrymple: but, the enemy not landing in Scotland, the bill had no effect.' We cannot discover any act to this effect among the printed statutes.

This eminent person has the reputation, among his other accomplishments, of having been well acquainted with ancient literature; and some evidence of his research into Roman history remains in a correspondence between his ordship and the Abbé Vertot on the constitution of the Roman senate, which was printed the same year in which he died: 'Memorial to the Abbé Vertot concerning the Constitution of the Roman Senate, with the Abbé's Answer,' London, 1721, 4to., commented upon by Hooke, in his 'Obervations on the Roman Senate,' 8vo., 1758.

He married Lucy, daughter of Thomas Pitt, Esq., goveror of Madras, the grandfather of the first Lord Chatham; nd his titles have descended to his great grandson, the resent Earl Stanhope. In addition to Coxe and the older writers, the 'History of England from the Peace of Utrecht,' y his descendant Lord Mahon, may be consulted for the atter part of his political course.

STANHOPE, CHARLES, EARL, a nobleman remarkble for the eccentricity of his character, and for his talents, was born in August, 1753. He was the eldest son of Philip, he second earl Stanhope, and his mother was lady Grisel Hamilton, granddaughter of the earl of Haddington. On he death of his father, in 1786, he succeeded to the peerage. He was twice married, and his first wife was lady Hester itt, the eldest daughter of the first earl of Chatham. By his lady he had three daughters, of whom the eldest, lady Hester Stanhope, quitting her family and connections in urope, retired to Syria, in which country, after a residence f several years, she died. After the death of his first wife, e married, in 1781, Louisa, daughter of Mr. Henry Grenlle, and a relative of the Marquis of Buckingham; and by his lady he had three sons, of whom the eldest is the preent Earl.

It is to his mechanical inventions that Earl Stanhope rincipally owes his celebrity. He conferred on mankind n important benefit by the invention of the press which oes by his name. [Printing-Press.] He also made some mprovements in the process of stereotype printing; in the onstruction of locks for canals; and among the lighter eforts of his mind may be ranked the invention of an ingenious machine for performing arithmetical operations.

During great part of his life he had studied the action of he electric fluid; and in 1779 he made public his theory f what is called the returning stroke. He imagined that when a large cloud is charged with electricity, it displaces a considerable portion of that fluid from the stratum of air in its neighbourhood; and he considered that, on the discharge of the cloud, the electric matter returns into the portion of the atmosphere from which it had been driven. By this theory he was able to explain in a satisfactory manner the cause of the death (in Berwickshire) of a man and two horses by lightning, at a time when the only thunder-cloud from which a discharge could have taken place was at the distance of several miles from the spot. (*Phil. Tr.*, 1787.)

Earl Stanhope was a decided opponent of the ministry of the day; and probably, if he were living in the present times, he would be considered as a radical Whig. Full of enthusiasm for the improvement of social institutions, he looked with complacency on the great French revolution, which he considered as an important step towards the attainment of that end; but he is said to have carried out his principles beyond the point to which men of his own party were prepared to follow him. He wrote a reply to Mr. Burke's 'Reflections on the Revolution in France;' a refutation of a 'Plan for a Sinking Fund,' which had been proposed by Dr. Price; and an 'Essay on Juries.' He died in 1816.

STANHOPE, P. D. [Chesterfield, Earl of.]

STANHOPE. [Durham.]

STANISLAUS LESZCZYNSKI (commonly written *Leczinski*), king of Poland, and duke of Lorraine, was the last branch of one of the most antient and distinguished families in Poland. As a proof of the consideration which that family enjoyed, not only in their own country, but even abroad, we may quote the words of a known Bohemian writer of the seventeenth century, the Jesuit Balbirnus, who says, in his 'Epitome Rerum Bohemicarum,' lib. ii., cap. 7, 'Qui Leszczynsciorum genus ignorat, Poloniam ignorat, triumphalis familia, ex qua tot duces, tot senatus decora, tot antistites et archiepiscopos numerare licet.'

The origin of that house may be said to be coeval with that of the Polish state, as its founder in Poland, a Bohemian of note, is supposed to have arrived in that country with the Bohemian princess Dombrowka, who was married in 965 to Mieczyslav, duke of Poland, who established the Christian religion in his dominions. From that time this family continued to occupy the high dignities of the church, and important offices in the state, but the name of Leszczynski seems to have been assumed by them early in the fourteenth century from the estate of Lessno.* Venceslav Leszczynski distinguished himself at the council of Constance, 1415, by his exertions in behalf of Huss, in which he was joined by all the Poles present at that council, who made on that occasion common cause with the Bohemians. It seems that the Leszczynskis had, like many other powerful families in Poland, embraced the opinions of Huss, and they were amongst the first of those who declared themselves in favour of the Reformation in Poland. A Leszczynski of the name of Raphael may be said to have given the signal of an open revolt against the Roman Catholic church, at the diet of 1552, by refusing to kneel and even to uncover himself at the celebration of high mass, in the presence of the king and the assembled states, before the opening of the diet. His conduct was tacitly approved of by the Chamber of Nuncios (House of Commons), which elected him marshal or president of the diet. The Leszczynskis also did much for the advance of learning in their country, which they particularly promoted by the establishment of a high school on their estate of Leszno or Lissa. [Polish Literature.] They passed to the Roman Catholic church in the second part of the seventeenth century, but they continued to protect against all oppression the Protestant inhabitants of their estates.

The subject of the present article, born in 1677, was son of Raphael Leszczynski, grand treasurer of Poland. He was highly gifted by nature, and received a very superior education. He was elevated to the dignity of a palatine of Posen at the early age of twenty-three. When Charles XII. of Sweden had expelled from the throne of Poland Augustus II., elector of Saxony, he wished to put one of the sons of John Sobieski in his place; but two of them, James and Constantine, were seized at a hunting-party, and confined in a Saxon fortress by the order of Augustus, and the younger of them, Alexander, refused the crown. Leszczynski was sent as a deputy from the diet to Charles, in order to consult about the election of a new king. A conversation which he had on that occasion with the Swedish king prepossessed the latter so much in favour of Leszczynski, that he recommended him to the assembled diet as a candidate for the throne, a recommendation which, under the existing circumstances, was equal to an order, and could not be disregarded. Leszczynski was therefore elected king, and crowned with his wife, born in Opalinski, in 1705. Between his election and coronation he had experienced a temporary reverse, and was nearly taken by the troops of Augustus, who surprised Warsaw at the time when Charles XII. was in the south of Poland. Stanislaus was obliged to fly with his family in great haste from the capital, and his daughter Maria, who became afterwards queen to Louis XV. of France, was nearly lost in the confusion of the flight, and was found in the stable of a village inn.

---

* The nobles of Poland began to assume their present names only about the fourteenth century, deriving them generally from some estate which they possessed, with the addition of the syllable *ski*, which answers to the English *'s* appended at the end of the word, instead of prefixing the *of*. Formerly they took the name of their escutcheons, which have their peculiar appellations in Poland, and generally several families have the same escutcheon, having a common origin.

The arms of Charles XII. soon compelled Augustus to abandon his temporary advantages, and to sign an abdication of the crown, and Stanislaus appeared to be firmly seated on the throne of his country. But the reverse of Pultawa changed the state of affairs, and Augustus, having entered Poland with a Saxon army, resumed the throne without opposition. Stanislaus retired to the Swedish dominions, and afterwards went to Turkey, in order to induce Charles XII. to accede to a peace of which his own abdication was one of the principal conditions. He was arrested by the Turkish authorities, but treated with the honours due to his station. After some time he was permitted to depart, and he retired to the principality of Deuxponts, which was the family estate of Charles XII., and the revenues of which were assigned by him to Stanislaus. He remained there with his family for many years, and fixed his residence after the death of Charles XII. in Alsatia. His daughter Maria became queen of France in 1723, a circumstance which improved his position. In 1733, after the death of Augustus II., he was elected for the second time king of Poland; but the influence of Russia and Austria opposed to him Augustus III. of Saxony, who was elected by a small minority, but supported by a Saxon and Russian army. Stanislaus was obliged to leave Warsaw, and to retire to Danzig, where he was besieged by Russian and Saxon troops. A small French force, which came by sea to his assistance, was obliged to surrender to the besiegers, after having landed and made an unsuccessful attack on the Russian lines. Stanislaus left Danzig in disguise, and escaped from his enemies. An account of his escape, written by himself, is one of the most romantic incidents either in history or biography, and equals, if not surpasses, the interest of the adventures of prince Charles Edward Stuart after the battle of Culloden. By the treaty of Vienna (1736) between Austria and France, Stanislaus was invested for his life with the possessions of the duchies of Lorraine and Bar, retaining the title of king of Poland. He devoted himself entirely to the welfare of his new subjects and to literary pursuits. He patronized literature with great zeal, nor did he forget his native land, which he served most effectually by educating a great number of his countrymen at Luneville. He died in 1766, at the age of 89, in consequence of an accident, his clothes having taken fire when he was standing near a chimney. He was so much burnt that he died in a short time. He left some productions in Polish and French. Those in French appeared in 4 vols. at Paris, in 1765, under the title of 'Œuvres du Philosophe Bienfaisant.'

STANISLAUS PONIATOWSKI, the last king of Poland. The family of Poniatowski does not belong to the number of those houses which, having acquired by favourable circumstances great influence in that country, directed the affairs of Poland, and formed a powerful aristocracy. When Stanislaus was elevated to the throne, some of his flatterers endeavoured to deduce his pedigree from the Torellis of Italy, on account of the similarity of the escutcheons of the last-named family with that of the Poniatowskis, which represents a young bull. These genealogical pretensions have not found much credit, nor do they seem to have been countenanced by the king whose family they were intended to elevate. All that we know about the ancestors of the last king of Poland is, that his grandfather Francis Poniatowski was a gentleman of small fortune, who had served for some time in the army, and it is supposed that he died as the steward of an estate belonging to Prince Lubomirski. It was a common occurrence in Poland for the poorer nobles to serve the richer, and this was not considered derogatory to their rank. The rich nobles maintained their influence by means of their numerous noble dependents, who had equal rights with themselves, and whose votes at the elections supported their interests. The patrons rewarded the devotion of their clients by promoting their welfare in every way, and particularly by educating the children of the most favoured clients with their own. This custom was productive of excellent results, and by affording to many poor nobles the advantages of a good education, rendered them fit for the service of their country. It was in that manner that Stanislaus, son of the above-mentioned Francis Poniatowski, born in 1675, received an excellent education, which he completed at the university of Paris. [PONIATOWSKI.]

STANISLAUS AUGUSTUS, the last Polish king, was the third son of Count Stanislaus Poniatowski. He was born in 1732, at Wolczyn, an estate in Lithuania, and received a most careful education. He was of an exceedingly prepossessing exterior; and he was well informed and highly accomplished, having improved the advantages received from his education by his subsequent travels in the principal parts of Europe. Sir Hanbury Williams, who was English envoy in Poland, became very intimate with the princes Czartoryski, uncles of Poniatowski, and took a particular liking to this young nobleman. He persuaded Poniatowski to accompany him to St. Petersburg, where he was appointed British minister, and facilitated his *liaison* with the grand-duchess of Russia, afterwards Catherine II. This circumstance, and the influence of the Czartoryskis, prevented the appointment of Poniatowski as Polish ambassador at St. Petersburg, where he continued his intrigue with the grand-duchess.

The election of Poniatowski to the throne of Poland, the salutary reforms introduced at the same time into the constitution of the country by the Czartoryskis, and the abolition of those reforms by the influence of Russia, are described in the article on the history of Poland, as well as the subsequent events of this reign. The great progress which public education, learning, and literature made in Poland during the same reign, and owing to the patronage of Stanislaus, are likewise delineated in the article on the Polish literature [SLAVONIAN LITERATURE]; we have therefore only to mention some particulars of his life and family.

When the final dismemberment of Poland was effected, Stanislaus retired for some time to the town of Grodno in Lithuania, where he signed the abdication of his throne; a step which he is said to have been induced to adopt by the promise of the payment of his private debts. He was then transferred to St. Petersburg, and a large pension was assigned him by the emperor Paul, who treated him with great kindness in many respects, but subjected him to the humiliation of assisting at his coronation at Moscow. He died at St. Petersburg in 1798, and was buried in the Roman Catholic church of that capital.

Stanislaus Poniatowski had four brothers: 1, Casimir, born 1721, who was grand-chamberlain of Poland. 2, Francis, born 1723, who had entered the church, but died young. 3, Andrew, born 1734, died 1773, a lieutenant-general in the Austrian service. Michael George, born 1736, died 1794, archbishop of Gniesno and primate of Poland. There were also too sisters, Louisa, born 1728, married to Zamoyski, palatine of Podolia; and Isabella, born 1730, married to Branicki, castellan of Cracow, and the last scion of an illustrious house. This family was invested with the princely title at the coronation of Stanislaus.

The family Poniatowski rose to great distinction in a short time, but it soon passed away, and became extinct. The last of that family was Prince Stanislaus Poniatowski, son of Prince Casimir, the grand-chamberlain, and who died in 1833 at Florence, after having lived for many years in Italy. The last of the Poniatowskis who supported the honour of that name, and whose chivalrous death at the battle of Leipzig, 1813, gave a new eclat to this family, was Prince Joseph, son of Andrew and Countess Kinsky, born 1763. [PONIATOWSKI, PRINCE JOSEPH.]

STANLEY, THOMAS, was born in 1625, at Cumberlow in Hertfordshire. His father, Sir Thomas Stanley who was connected with the noble family of the earls of Derby, had his son Thomas, during the first fourteen years, educated in his own house in Cumberlow-green, under the tuition of Fairfax, the translator of Tasso. He applied himself with great zeal not only to the study of the antient languages, but also acquired great facility in reading French, Italian, and Spanish. In 1639 he was accompanied by his tutor to Cambridge, where he entered Pembroke Hall, and continuing his studies with the same ardour, soon distinguished himself among his fellow students. In 1641 he obtained at Cambridge the degree of MA., which, according to the register of the university of Oxford, he had obtained in the latter place a year earlier. But it is not known whether he ever studied at Oxford. Some of his biographers state that after the year 1641 he travelled for some time on the Continent, while others are not only silent upon this point, but expressly affirm that while his family during the civil commotions in England took refuge in France, Thomas alone remained behind, and took up his residence in London in the Middle Temple, where he formed an intimate friendship with Edward Sherburne, afterwards Sir Edward Sherburne. In his new place of residence Stanley devoted his time partly to his professional pursuits, but more especially to the study of the antients. The first time that he made his appearance as an author was in 1649, with a volume of Poems and Translations, which has subsequently been often reprinted.. The volume contains some English and Latin original poems, together with translations from Greek poets. About the same time he translated several French, Italian, and Spanish poems into English. It must have been as early as this time that his chief attention was directed to one of the two great works to which he owed his reputation,—we allude to his 'History of Philosophy,' the first edition of which appeared in three parts from 1655 to 1662, folio, and was dedicated to his uncle John Marsham, to whom the author attributes the merit of having designed the work. The title is, 'The History of Philosophy, containing the Lives, Opinions, Actions, and Discourses of the Philosophers of every Sect.' A second edition appeared in 1687, folio; a third in 1701, folio; and the fourth and last, London, 1743, 4to. The work was translated into Latin by Gothofredus Olearius, Lips., 1711, 4to., with numerous additions and corrections. The latter part of the original, containing the 'History of the Chaldaic Philosophy,' was translated into Latin by Leclerc in 1690, and is contained in vol. ii. of his 'Opera Philosophica.' Stanley's 'History of Philosophy' was certainly at the time a great production, which excelled all that had been done before him in this department; but it is nevertheless only a storehouse of facts and materials diligently collected, and as such it is still a useful book. In every other respect it has been superseded by later works on the same subject.

After the completion of his 'History of Philosophy,' Stanley devoted most of his time to the study of the Greek poets, more especially to Æschylus. In 1663 (some editions bear on the title-page the date 1664) he published the tragedies of Æschylus, with a Latin translation, an explanatory commentary, the Greek scholia, and the fragments, in one vol. folio. This edition, though one of the best that had then appeared, has no great critical value. It was afterwards reprinted, with some alterations, by De Pauw, Hague, 1745, 4to.; and with some improvements by S. Butler, Cambridge, 1809, &c. After the publication of his Æschylus, Stanley began an extensive commentary on Æschylus. This work, on which he spent the greater part of the last years of his life, has never been published. The manuscript, consisting of eight volumes folio, is preserved in the public library at Cambridge. There are also some other works, chiefly commentaries on antient authors, which are ascribed to him, and have never yet been printed.

Stanley appears to have continued the practice of the legal profession, but he can never have devoted much time to it. He is said to have been a man of great benevolence and integrity. He died in London on the 12th of April, 1678, and was buried in the church of St. Martin's-in-the-Fields.

See the memoir of Stanley by Sir Egerton Brydges, prefixed to his edition of Stanley's Poems (London, 1814 and 1815); and William Wotton's Latin Eulogium on Stanley. in his *Scævolæ Sammarthani Elogia Gallorum Sæculo XVI. Illustrium. præfationem præmisit Ch. A Heumannus; subjunctum est, quod primum nunc editur Guilielmi Wottoni Elogium Thomae Stanleii*, p. 307, &c.

STANLEY, JOHN, bachelor in music, a composer and organist of no inconsiderable celebrity during the latter half of the last century, was born in 1713. Two years after his birth he became blind, owing to an accident, a circumstance which renders the progress and success of his professional life highly interesting, if not almost marvellous though certainly there are a few other instances on record of as great attainments in persons suffering under a similar privation, among whom Blacklock the poet and Saunderson the mathematician are striking examples. At the age of seven he began to learn music, as an amusement, in which he was instructed by Reading (composer of 'Dulce Domum'), one of the disciples of Dr. Blow, and evinced such extraordinary aptitude for the art, that what his father intended as some alleviation of a grievous calamity, was soon converted into a profession, and the sightless boy became the pupil of one of our great church composers, Dr. Greene, under whom he made such rapid, such astonishing advances, that at the age of eleven he was appointed organist of All-Hallows, Bread Street, and at thirteen was elected to a similar situation in St. Andrews, Holborn, though he had many able competitors. In 1734 the benchers of the Middle Temple chose him as one of their organists, and the two latter places he held till his decease. On the death of Dr. Boyce, in 1779, Mr. Stanley succeeded him as Master of the King's Band, and regularly discharged the duties of the office by setting to music the two odes annually produced by the poet-laureate, which were performed at the drawing-rooms held at St. James's on New-Year's day and the king's birth-day. During many years Mr. Stanley carried on the Lent oratorios at Drury Lane theatre; first in conjunction with Mr. Smith, Handel's successor in those performances, and next with Mr. Linley. [LINLEY.] These he conducted in person, accompanying all the songs, choruses, &c. with an accuracy that the ablest musician, in full possession of the sense of vision, could not have exceeded. It is therefore almost superfluous to say that his memory was of the most extraordinary kind, many instances of which are still related, as well as of the additional strength which his other senses gained, apparently as a compensation for the loss of that important one which he had to deplore.

Mr. Stanley died in 1786. His compositions, all of which were published during his life, were numerous, and chiefly of the vocal kind; but he wrote many voluntaries for the organ, which long continued exceedingly popular. These, as well as his cantatas, songs, &c., were widely circulated, and not only spread his fame throughout the two kingdoms, but proved the source of much profit to the author: pleasing in melody, and easy to execute, they were generally admired, but are deficient in some of those qualities which are required in works of lasting reputation.

STANNARY, from the Latin *Stannum*, 'tin.' This term sometime denotes a tin-mine, sometimes the collective tin-mines of a district, sometimes the royal rights in respect of tin-mines within such district. But it is more commonly used as including, by one general designation, the tin-mines within a particular district, the tinners employed in working them, and the customs and privileges attached to the mines, and to those employed in digging and purifying tin.

The great stannaries of England are those of Devon and Cornwall, of which the stannary of Cornwall, particularly in modern times, is by far the more important.

The stannary of Cornwall, and also that of Devon, were granted by Edward III. to the Black Prince, upon the creation of the duchy of Cornwall, and are perpetually incorporated with that duchy. [WALES, PRINCE OF.] In general both stannaries are under one duchy-officer, called the lord warden of the stannaries, with a separate vice-warden for each county. The stannary of Cornwall is subdivided into the stannary of Blackmore, in the eastern parts of the county, and the stannaries of Tywarnhaile, Penwith, and Helston, in the west.

All tin in Cornwall and Devon, whoever might be the owner of the land, appears to have formerly belonged to the king, by a usage peculiar to these counties; the general prerogative of the crown extending only to mines of gold or silver, or other mines in which the value of the gold or silver exceeds that of the inferior or base metal with which it is combined. (12 Coke's *Rep.*, 9.)

King John, in 1201, granted a charter to his tinners in Cornwall and Devonshire, authorising them to dig tin and turves to melt the tin anywhere in the moors and in the fees of bishops, abbots, and earls, as they had been used and accustomed. (Madox, *Exch.*, 279 t, 283 l.) This charter was confirmed by Edward I., Richard II., and Henry IV.

The privilege of entering the lands of strangers for the purpose of mining, conferred, or rather recognized, by the charter of John, is not peculiar to this country. Thus, by an edict of Charles VI. of France, of 30th May, 1413, power is given to all miners and others to search for and open mines wherever they may expect to find them, giving security to the owner to make him satisfaction, according to a valuation to be made *au dit de deux prud'hommes*. This satisfaction was afterwards declared to be merely the value of the land, &c. taken, without reference to the mines. (Mathieu, *Code des Mines*, &c., 11, 45, 107.)

In Cornwall the right of digging in other men's land is now regulated by a peculiar usage, called the custom of *bounding*. This custom attaches only to such land as now is or antiently was *wastrel*, that is, land open or uninclosed. The mode of acquiring a right to *tin-bounds* is this: an agent goes on the spot to be bounded, and digs up the turf or surface, making little pits at the four corners towards the east, west, north, and south, of a reasonable extent; and the area or space within the four corners will be the contents of the bounds. Having made these corners, the agent describes on paper the situation of the bounds, states the day when, and the person by whom, they were marked out or cut, and makes a declaration for whose use this was done, expressing therein that the spot was free of all lawful bounds. At the next stannary court he procures this description to be put on parchment, when a first proclamation is made of it in open court, the parchment or paper being stuck up in a conspicuous place in the court, and a minute of the transaction is made by the steward in the regular court paper. On the next court day, three weeks afterwards, a second proclamation is in like manner made, and so also at the third court; when, if there be no successful opposition, judgment is given, and a writ of possession issues to the bailiff of the stannary, who delivers possession accordingly. In this mode the bound-owner acquires a right to search for and take all the tin he can find, paying the lord of the soil one-fifteenth, or to permit others to do so; and to resist all who attempt to interrupt him. The bounds must be renewed annually, by a bounder employed on behalf of the bound-owner, or the lord may re-enter.

As part of the stannary rights, the duke of Cornwall, as grantee of the crown, has or had the pre-emption of tin throughout the county, a privilege supposed to have been reserved to the crown out of an original right of property in tin-mines, but which in modern times is never exercised.

Formerly for the redressing of grievances and the general regulation of the stannaries, representative assemblies of the tinners were summoned both in Devonshire [LYDFORD] and in Cornwall. These assemblies were called parliaments, or convocations, of tinners, and were summoned by the lord warden of the stannaries, under a writ, issued by the duke of Cornwall, or by the king, when there was no duke, authorizing and requiring him so to do. The last convocation was held in 1752. (*Appendix* to the case of Rowe *v.* Brenton; 3 Manning and Ryland's *Reports*.)

The duties payable to the duke of Cornwall on the stamping or coinage of tin were abolished by 1 & 2 Vict., c. 120.

The new modelling of the stannary courts under 6 & 7 Wm. IV., c. 106, has been already noticed under CORNWALL. Since that article was printed further regulations for these courts have been introduced by 2 & 3 Vict., c. 58.

STANSTEAD. [ESSEX.]

STANZA (*Stance*, in French) an Italian word which means room or dwelling-place, is used in poetry to designate certain parts or divisions of a poem, each forming a complete period within itself, and consisting of a number of lines regularly adjusted to each other, and containing every variation of measure or rhyme which is to be found in the whole poem. There is a great variety of stanzas in the poetry of modern languages, according to the rhythm and structure of the poem. There is the terzina of three lines, used chiefly by the Italians and Spaniards for satires, elegies, and descriptive poetry; the quartetto (quatrain, in French) of four lines, used in didactic poems; the sestina, 'sixain,' of six lines, used in lyric poetry; the ottava, consisting of eight lines, uses in epics, &c. Each of these is susceptible of various combinations of measure and rhyme. [LYRICS.]

STAPEL, JOHN BODÆUS A, a Dutch physician, and distinguished as a botanist. He was born at Amsterdam in the beginning of the seventeenth century, where his father Engelbert Stapel practised as a physician. He finished his education at the university of Leyden, where, under the tuition of Vorstius, he acquired a taste for botany; and, in conjunction with this science, he applied himself to the study of the Greek language for the purpose of publishing a complete edition of the botanical works of Theophrastus. In the midst however of his studies and preparations for his great work, he died at an early age in 1636. He left materials enough for his father to publish an edition of the ten books of Theophrastus, 'De Historia Plantarum.' This work was published at Amsterdam in 1644, and exhibits great industry, being perhaps one of the most laborious editions of Theophrastus ever published. Under the head of each plant he has given all that has been said upon it by Dioscorides, Pliny, and other writers. In addition to plants known to the antients, he has given descriptions of new ones from America and the Cape of Good Hope. Among the latter is a species belonging to the genus which Linnæus has consecrated to his name and called *Stapelia*. The original plant was called by Stapel *Fritillaria crassa*. He had made preparations for an edition of Theophrastus, '*Αἴτια Φυτικά*,' or 'De Causis Plantarum;' but his papers were not sufficiently forward for publication. He was a botanist of great promise, and his early death was much lamented by his contemporaries. (*Biog. Univ.*)

STAPE'LIA, the name of an extensive and curious genus of African plants, given to it by Linnæus in honour of John Bodæus a Stapel. This genus belongs to the natural order Asclepiadaceæ, and possesses the following characters: corolla rotate, 5-cleft, fleshy, in the inside of which is a double nectary, consisting of two rows of leaves, the inner leaves, of which there are five, are subulate; the outer leaves are broader and undivided; the anthers are simple at top; the pollen masses are fixed by their base, having one of their edges cartilaginous and pellucid; follicles two, smooth; seeds numerous, comose. Most of the species of this genus are natives of the Cape of Good Hope. They are succulent plants without leaves, frequently covered over with dark tubercles, giving them a very grotesque appearance. From uncertain points of their succulent stems large flowers expand themselves, exhibiting a variety of colours, and marked in the most grotesque manner. In most instances the flowers give off very unpleasant odours, which have been compared to carrion, rotten cheese, putrid water, and other unpleasant smelling substances. These odours however have not prevented their being very generally cultivated on account of their singular and beautiful flowers. The genus is at present imperfectly understood, and many species that were originally referred to Stapelia are now placed under a variety of other genera, as *Podanthes*, *Tridentea*, *Orbea*, *Piaranthus*, *Huernia*, &c. The great diversity in the form, colour, size, and structure of the flowers of these plants, have afforded the means of distinguishing a large number of species, but the whole have a family likeness which is possessed by few genera. We shall therefore only give two or three examples.

S. hirsuta, hairy Stapelia, or Carrion-flower: corolla with the segments villously ciliated with white hairs, and the base villous from red hairs, the segments ovate, acute, and transversely corrugated; segments of outer whorl of nectary acute, lanceolate, of the inner spreading. The stem is angular and erect, the flowers appearing at its base. The corolla is very large, of a dark chocolate-crimson colour, streaked with yellow, the marginal fringe resembles a grey fur; the nectaries are red. The whole flower is the size of a French rose. The smell of this plant is so like that of carrion, that flesh-flies deposit their ova in the flower, and when the maggots are produced they are starved for the want of food. Sir John Hill wrote an essay to prove that the fly which attacked these plants was a peculiar species, whose larvæ lived on the flower, which seems to have been an error of observation, but for which Fabricius, the entomologist, spoke of him as '*damnandæ memoriæ Johannes Hill.*' This plant is a native of the Cape, and is one of the earliest species brought to Europe by the Dutch.

S. pulvinata, Cushion-flowered Stapelia, has a procumbent stem, with quadrangular erect branches, at the base of which the flowers appear; the segments of the corolla are roundish, wrinkled transversely, ciliated, bottom of corolla elevated, covered with hairs. This is the most elegant of the species, and, notwithstanding its unpleasant odour, the Dutch natives of the Cape call it the Arabian

Rose. The corolla is very large, and its segments are of a deep violet colour, variegated with whitish transverse wrinkles, and red at the bottom.

S. Gordoni, Gordon's Stapelia: stem with square branches and tubercles ending in a spine; corolla orbicular, slightly 5-cleft, segments broad, roundish, acuminated. It has erect long follicles which are solitary, and thus form an exception to the rest of the genus. The flowers are very large, almost 3 inches in diameter, of a brownish-yellow colour with a whitish centre; the segments of the nectary are black in the middle and white on the edges.

In the cultivation of this and the allied genera, the soil best suited for them is a mixture of loam, sand, lime, or brick rubbish. If placed in a better soil, they become luxuriant and are exposed to rotting, especially if they are supplied with too much water. They may be increased by cuttings, which should be allowed to dry for ten days or a fortnight after they are cut, before they are planted, which should be done in separate pots. Water should be very sparingly given to these plants, they require none in winter, and in summer a little increase should be given them during flowering.

STAPES. [EAR.]

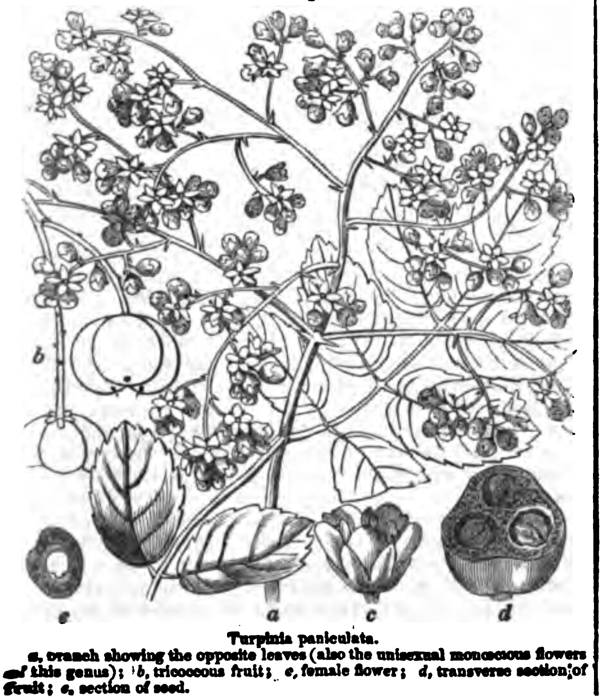
STAPHISAIN, a substance discovered by Couerbe on the *Delphinium Staphisagria*. It is solid at common temperatures, of a light yellowish colour, melts at about 392° Fahr., and at a higher temperature is decomposed, yielding much charcoal and ammoniacal vapour. The taste of this substance is extremely acrid, and water, though it takes up only a very small portion of it, acquires an acrid taste. Dilute acids dissolve, but do not appear to form salts with staphisain, and therefore, although in its composition it greatly resembles the vegetable alkalis, it does not possess their power of forming salts.

By the action of nitric acid when heated, staphisain loses its peculiar properties, and is converted into a yellowish resin; chlorine, when heated to about 300° Fahr., deepens the colour, renders it very brittle, and deprives it of its acrid taste.

According to Couerbe, it consists of very nearly—

Hydrogen . .	8·67	23	equivalents.
Carbon . . .	73·89	32	„
Oxygen . . .	12·09	4	„
Azote . . .	5·35	1	„
	100·		

STAPHYLEA'CEÆ, a small natural order of plants belonging to the syncarpous group of polypetalous Exogens. They are shrubs with opposite pinnate leaves, having both common and partial petioles, and the flowers arranged in terminal stalked racemes. The calyx has five sepals, which are imbricated in æstivation; petals five; stamens five, alternate with the petals, perigynous; ovary 2- or 3-celled seated on a disk; fruit membranous or fleshy, frequently deformed by the abortion of some of its parts; exalbuminous, roundish, ascending seeds, with a bony testa, large hilum, and thick cotyledons. There are only three genera and ten species belonging to this order, which are inhabitants of the warmer and temperate parts of the earth. Only one species, the Staphylea pinnata, is found in Europe. This order was separated by Lindley from the order Celastraceæ, with which it is most nearly allied, but from which it is distinguished by its opposite pinnated stipulate leaves. One of the genera, *Turpinia*, has unisexual flowers. The species do not possess active properties. The seeds of all contain a mild oil, which may be expressed.



Turpinia paniculata.

a, branch showing the opposite leaves (also the unisexual monœcious flowers of this genus); b, tricoccous fruit; c, female flower; d, transverse section of fruit; e, section of seed.

STAPHYLEA (from σταφυλή, a bunch of grapes), the name of a genus of plants, the type of the natural order Staphyleaceæ. It has a coloured 5-parted calyx, with an urceolate disk at the base; five upright petals; five stamens standing round the disk; an ovary with from two to three styles, with a small stigma; a membranaceous swelled capsule with two or three cells, and one or two seeds in each. This genus has six species, of which one is a native of Europe, one of North America, one of Japan, two of Jamaica, one of Peru, and one of the Himalaya.

S. pinnata, common bladder-nut, is known by its pinnated leaves, petioles without glands, two styles, and bladdered capsules. It is a native of woods and thickets in the middle and south of Europe. It is admitted into the 'British Flora,' on the ground of its occurring occasionally in hedges and thickets in Yorkshire. It is frequently planted in shrubberies as an ornamental shrub, for which it is well adapted. It has a firm white wood, which adapts it well for various kinds of turning. The seeds are eatable, and act as a mild aperient: this arises probably from the oil they contain. The flower-buds, when gathered young, are pickled and eaten as capers.

S. trifolia, three-leaved bladder-nut, is characterised by its ternate leaves, and its petals longer than the calyx. It is the species of North America, where it is found on dry hills in rocky situations from New York to North Carolina. It is also frequently cultivated as an ornamental shrub, and its wood and seeds may be used for the same purpose as the last.

In the cultivation of these plants they may be increased by seeds, suckers, and cuttings. The seeds should be sown in the autumn, about an inch in depth; and the following spring or autumn the larger plants may be placed out in nursery-rows, about two feet apart. Suckers may be cut off early in the spring or autumn, and placed out in rows at once. Cuttings should be made in autumn, and planted in a shady border: they may be planted out in rows the following autumn. The cuttings should be taken from the preceding year's shoots at the part nearest the stem.

S. Emodi is an Indian species: it was found by Dr. Royle in the Himalayas, at an elevation of 7000 feet. (Royle's *Ill. Him. Bot.*, p. 166.)

STAPHYLO'MA (from σταφυλή, a grape, to which some forms of the disease bear a very distant resemblance) is an affection in which some part of the eyeball is protruded beyond its natural position. It may exist in either the cornea or the sclerotica [EYE], and, according to its seat, is named S. corneæ or S. scleroticæ. It is most frequent in the former, and may arise from any cause by which the texture of the cornea is so weakened as not to be able to resist the ordinary force by which the fluids behind it are secreted, or (which is perhaps more common), from an ulceration of the cornea, which is first filled up by the adhesion of the iris and a newly-produced tissue, and is then distended. In either case the cornea is generally of a dull pearl-white hue and opaque, so that the loss of sight is complete and irremediable. Its treatment, of which the main object is to prevent the increase of the protrusion, and to relieve the pain to which the distension of the diseased parts gives rise, must vary with the circumstances of each case: the extreme measure is the removal of the protruded portion of the cornea.

Staphyloma may affect that part of the sclerotica which is near the cornea at the same time that it occurs in the latter. When it occurs in the sclerotica alone, it is usually the result of some morbid growth or of some fluid effusion within the eyeball behind the lens.

STAPLE, 'anciently written *estaple*, cometh,' says Lord Coke, 'of the French word *estape*, which signifies a mart or market. It appears to have been used to indicate those marts both in this country and at Bruges, Antwerp, Calais, &c on the Continent, where the principal products of a country were sold. Probably in the first instance these were held at such places as possessed some conveniences of situation for the purpose. Afterwards they appear to have been confirmed, or others appointed for the purpose by the authorities of the country. In England this was done by the king (2 Edw. III., c. 9). All merchandize sold for the purpose of exportation was compelled either to be sold at the staple, or afterwards brought there before exportation. This was done with the double view of accommodating the foreign merchants, and also enabling the duties on exportation to be more conveniently and certainly collected. Afterwards the word staple was applied to the merchandize itself which was sold at the staple. The staple merchandize of England at these early times, when little manufacture was carried on here, is said by Lord Coke to have been wool, woolfells or sheepskins, leather, lead, and tin. Incident to the staple was a court called 'the court of the mayor of the staple.' This court was held for the convenience of the merchants, both native and foreign, attending the staple. It was of great antiquity; the date of its commencement does not appear to have been certainly known. Many early enactments exist regulating the proceedings at the staple and the court held there. Most of these were passed during the reigns of the two Edwards, the first and the third of that name. These kings appear to have been extremely anxious to facilitate and encourage foreign commerce in this kingdom; and by these statutes great immunities and privileges are given, especially to foreign, but also to native merchants attending the staple. The first enactment of importance is called the statute of merchants, or the statute of Acton-Burnel, and was passed in the 11th year of Edw. I., A.D. 1283. By virtue of it a merchant might cause his debtor to come before the mayor of the staple and make a recognizance acknowledging his debt, and the day when the payment of it was due. This was entered on a roll with the seal of the debtor and of the king attached; the roll was made double, one part was given to the debtor, the other was to be used for the purpose of enforcing payment to the creditor. If the debtor did not discharge the debt within a quarter of a year after the day mentioned by the sale of his lands and goods, all his lands and goods were to be delivered to the creditor, to be held by him until the debt was paid. By this process the creditor became possessed of an estate of freehold in the lands, defeasible by the payment of the debt. And if the land was held over that period by the creditor, the debtor was entitled to a scire facias [SCIRE FACIAS] to recover his land. But the statute more expressly directed to this subject was passed in the 27th year of Edw. III., cap. 8, and is entitled the statute of staple. One object of it was to remove the staple, previously held at Calais, to various towns in England, Wales, and Ireland, which are appointed by the statute itself. It is interesting to be able to ascertain what towns at that period were thought of sufficient commercial importance to have a staple assigned to them. Those chosen in England were Neof-Chastell sur Tyne (Newcastle-on-Tyne), Everwyk, or Deverwyk (Eboracum, York); Nicole, or Nichole (Lincoln); Norwich, Westminstre, Canterbiers (Canterbury); Cicestre (Chichester); Wincestre (Winchester); Excestre (Exeter); and Bristut (Bristol); in Wales, Karmardyne (Carmarthen); in Ireland, Develin (Dublin), Waterford, Corke, and Drouzda (Drogheda).

The staple merchandize named in this statute consists of those already mentioned, with the exception of tin. Wool and lead were directed to be weighed there, and the wool sealed. Each staple town had a port assigned to it, at which the staple goods brought to the town were exported, and where the duties were paid; and it is remarkable that at this period, so far was the policy of the navigation laws from being acted on, that the whole of the exportation was to be carried on by the foreign merchants only. Native merchants were prohibited on pain of felony from exporting any of the staple commodities. The boundaries of the staple were the walls of the town in which it was held; where it was held in an unwalled town, they were the same as those of the town itself. The boundaries of the staple at Westminster began at Temple Bar and extended to Tothill. All persons attending the staple were exempt from purveyance. Matters connected with it were not subject to the cognizance of the king's courts, and the king's officers were prohibited from interfering in places where the staple was held. The court consisted of a mayor, who was to be acquainted with the law merchant, and was elected every year by the merchants attending the staple, both native and foreign; he was attended by two constables, also elected by the merchants, and who held their office for life. Two alien merchants, one, as the statute says, 'towards the north,' probably a German, 'the other towards the south,' Italian, were to be chosen to be associate in judgment with the mayor and constables, and also six mediators of questions between buyers and sellers. Of these six persons, two were to be Germans, two Lombards, and two English. Correctors also, as well of strangers as of natives, were to be appointed, having knowledge of several trades, to record the bargains which were made by such persons as desired to have their assistance for that purpose. A variety of other officers, porters, packers, winders, workers, and other labourers of wool, were also to be appointed. Some lord, or other person of influence, was also to be associated to the mayor of the staple to advise and also to assist him with force where necessary. In matters of doubt reference was to be had to the privy council. The mayors, sheriffs, and bailiffs of the towns where the staple was held, or there adjoining, were also to attend the mayor and ministers of the staple to execute their commands. Complaints against the mayors were to be redressed by the chancellor and others of the privy council. A prison also was to be provided for the use of the staple, and the mayor and constables had power given them to keep the peace, and to arrest and imprison, their authority extending throughout the town in which the staple was held and the suburbs of it.

The law administered in the court of the staple, so far as regarded all matters connected with the staple, was the law merchant, and not the common law of the land, nor the custom of the place. But pleas of land, matters of felony, and maiming were to be determined by the common law, and for this purpose the mayor of the staple and other suitable persons were to be assigned as justices. An option was also given to the plaintiff even in matters regarding the staple to bring his suit in the courts of common law if he preferred doing so. In all cases justice was to be done without delay. If both parties in a suit were foreigners, all the jury were to be foreigners. If one party was native, the other foreign, the jury was to be half native, half foreign. Each staple was required to provide a seal; and a power similar to that already conferred by the statute of merchants was given to the mayor and one of the constables, to take recognizances of debts to be sealed by the seal of the staple. In London this authority was given to the chief justices, or, out of term, to the mayor and the recorder. The provisions of this statute were however more extensive and stringent than those of the statute of merchants. The delay of a quarter of a year after the time assigned for payment was taken away, and the mayor had power to arrest and imprison the debtor upon non-payment at the end of the time assigned. The debtor was to remain imprisoned until the debt was paid. It would appear that the clergy at this period were not restricted from trading, for there is a provision that if the debtor was an ecclesiastic, his person was to be free from arrest. The mayor had power immediately to seize the goods of the debtor within the staple, and to sell them or assign them to the creditor. If the debtor was not to be found within the staple, nor his goods of sufficient value, it was the duty of the mayor to certify the matter under the staple seal to the chancellor, who thereupon was to issue a writ to arrest the debtor without fail wherever he might be, and also to seize all his lands, tenements, and chattels throughout the kingdom. Upon these execution was to be done in the manner provided for by the statute merchant. The statute contains various other enactments relating to the internal regulations of the staple. It was made highly penal to create any disturbance within it. The rents of houses were to be fixed, &c.

A variety of other statutes were passed in the same and succeeding reigns, in some respects confirming, in others altering the provisions of the leading statute. As commerce became more extended, the staples appear to have fallen into disuse. Lord Coke, a great worshipper of antiquity, complains that in his time the staple had become a shadow. we have only now, he says, stapulam umbratilem, whereas formerly it was said that wealth followed the staple. The practice however of taking recognizances by statute staple, from the many advantages attending them, long continued. (11 Edw. I.; 27 Edw. III., caps. 1, 3, to 6, 8, 9; 2 *Inst.*, 322; *Com. Dig.*, tit. 'Stat. Staple;' 2 Saund. by Wms., 69; Reeves' *Hist. Eng. Law*, v. 2, pp. 161, 393.)

STAR, DOUBLE STAR, CLUSTER OF STARS, NEBULA. We distinguish the stars from the planets in much the same way as our ancestors did before us, though there is hardly one point of difference which is now left to its full extent. A contemporary of the publication of the 'Principia' (1687), engaged in writing an article like the present, would have stated that the only notion out of which antiquity described a star, was derived from its fixedness in the heavens; to which he would have added that these stars present no appearance of systematic arrangement, that their distance is too great to be measured, and that they exert no sensible attraction on the solar system. Not one point of this is now left except the last; the speculation described in MILKY WAY gives a high probability to the theory that the universe is a collection of vast systems of stars; observations of double stars have rendered it certain that many organized systems, regulated by mutual attraction, exist in space, besides our solar system; it is fully established that numbers of stars, once called fixed, have slow motion of their own in the heavens; and in one instance at least there is no room left for doubt that [PARALLAX OF THE FIXED STARS] the distance of one of the stars has been approximately ascertained. That no discoverable effect of attraction upon our system can be traced, is the only point in which the stellar astronomy of our own day coincides to the full extent with that of the time of Newton.

The apparent motions of the stars are first to be cleared of the effects of PRECESSION AND NUTATION, and also of ABERRATION, which depend on motions of our earth, as well as of the grand diurnal revolution. From the REFRACTION of our atmosphere, and from the various casualties to which the rays of light are subject in passing through it, proceed, besides the increase of apparent altitude alluded to in the article cited, a great many varieties of colour and general appearance, particularly that decided size which most of the stars appear to have. A good telescope reduces this phenomenon very much, in favourable states of the atmosphere; but even these instruments are not so perfect as to show the stars to be what there is no doubt they ought to be, mere luminous points. If the apparent diameter of 61 Cygni, the earth's atmosphere being entirely removed, were only one-third of a second, or one-thirtieth of that of Venus when smallest, it is now known that the diameter of that star must be equal to that of the earth's orbit.

Independently of relative position, the stars are distinguished by their colour and quantity of light, on which last in a great degree depends their apparent magnitude. A casual observer would hardly think that there was any difference of colour between one and another; but a little practice shows that a tinge of one or another colour predominates a little in the nearly white light which all the stars have in common; and a good telescope gives some stars an appearance which observers have not scrupled to call 'blood-red.' And when the two stars of a close double star are together in the field of a telescope, it most frequently happens that each star differs sensibly in colour from the other. But when we look at a star, we must remember that we see only the result of the treatment which its light has received from the atmosphere; and with a telescope the matter is in some respects worse, for there is no object glass which forms anything like a real image. 'When we look at a bright star,' says Sir John Herschel, 'through a very good telescope with a low magnifying power, its appearance is that of a condensed brilliant mass of light, of which it is impossible to discern the shape for the brightness; and which, let the goodness of the telescope be what it will, is seldom free from some small ragged appendages or rays. But when we apply a magnifying power from 200 to 300, the star is then seen (in favourable circumstances of tranquil atmosphere, uniform temperature, &c.) as a perfectly round well-defined planetary disc, surrounded by two, three, or more alternately dark and bright rings, which, if examined attentively, are seen to be slightly coloured at their borders. They succeed each other nearly at equal intervals round the central disc, and are usually much better seen, and more regularly and perfectly formed, in refracting than in reflecting telescopes. The central disc too is much larger in the former than in the latter description of telescope. These discs were first noticed by Sir William Herschel, who first applied sufficiently high magnifying powers to telescopes to render them visible. They are not the real bodies of the stars, which are infinitely too remote to be ever visible with any magnifiers we can apply; but *spurious* or unreal images, resulting from optical causes, which are still to a certain degree obscure.' The various appearances of stars, as seen in telescopes, particularly the resolution of stars which appear single into two or more, render them excellent objects, when classified, for the examination of the power and goodness of these instruments. Such a classification was made by Sir J. Herschel (*Mem. Astron. Soc.*); and the paper is reprinted at the end of the explanation (published separately) of the maps of the stars published by the Society for the Diffusion of Useful Knowledge.

The magnitude of a star is a notion formed by observers as to the apparent quantity of light which comes from them, on which they are divided into classes. Those which are visible to the naked eye are usually divided into six magnitudes, which, according to W. Herschel, emit quantities of light which are (roughly) in about the proportions of the numbers 100, 25, 12, 6, 2, and 1. But though practical astronomers are tolerably well agreed as to the mode of naming most of the principal stars in respect of magnitude, there are many about which they differ, and some as to which it is tolerably well known that the order of magnitude which adherence to old catalogues still procures for them, is not that which would have been given had they been new stars named in our day. The magnitudes of stars are in fact rather indeterminate after the first and second An astronomer would hardly say that an appearance was like a star of the 'first or second' magnitude; the difference of the two is too well established, though as to the fainter stars of the first magnitude, and the brighter ones of the second, there may be little to choose between them. But it is very common to speak of an appearance as being of the 'second or third,' 'third or fourth,' &c. magnitude, showing that the distinction between one magnitude and the next is not then very prominent. Sir John Herschel and Professor Struve, the two most assiduous observers of small magnitudes, usually differ (*Mem. Astron. Soc.*, vol. iii., p. 180) about a magnitude in their estimation of one star with another from and below Struve's fourth or Herschel's fifth magnitude, down to Struve's twelfth or Herschel's thirteenth. When therefore the reader, who is no astronomer, hears of the constant reference to stars of all magnitudes down to the sixteenth, he must look upon it as a rough mode of estimating the relative brilliancies of the stars, in which a numerical nomenclature is far from being held to imply numerical accuracy. Of late years it has been much the custom to invent intermediate magnitudes, as the 2·3 or 2½ magnitude. This must be held to denote merely something between the second and third magnitude. Sir J. Herschel has recently distinguished between intermediate magnitudes, as follows:—The symbol 4·5 denotes a star nearer to the fourth than the fifth magnitude, and 5·4 one nearer to the fifth than the fourth.

Some stars (perhaps all) are variable in their magnitudes, and with periodical regularity, which is perhaps to be attributed to the effect of revolution round their axes; it being imaginable that different parts of a star should give different kinds or quantities of light, either or both. In some of these stars, long repetition of observations has determined the period of all the changes almost to a minute. The following table (*Cab. Cycl.* 'Astronomy') shows the best authenticated variable stars: there are others which are strongly suspected—*a* Cassiopeiæ for example:—

Of these the most remarkable are those which (for a time) disappear altogether. The *permanent* disappearance of stars occurs every now and then, though there may in most cases be a question whether the star itself which has disappeared ever existed otherwise than as a wrong entry in a catalogue. There are however a few instances in which a sudden appearance of a new star is recorded, followed, after a time, by its disappearance. Such a phenomenon made an astronomer, it is said, of Hipparchus; and certainly the star which appeared in Cassiopeia in 1572 was the introduction of Tycho Brahé to the character of a public astronomer. [BRAHE, TYCHO.] Tycho Brahé himself thought, from historical evidence, that a star had appeared in Cassiopeia in 945 and 1264, that of his own time being in 1572, from which, if the historical evidence be correct, a new star might be expected to appear in that constellation in 1872 or thereabouts. But on examining his evidence, we find it exceedingly vague and deficient in antiquity. (*Comp. to Maps* *of the Stars*, p. 86.) The isolated phenomena connected with stars, as to their appearance and changes of appearance, are probably very numerous, and would require the assiduous attention of many observers. This is peculiarly the ground for the private observer; the public one is fully occupied in determining the places of the stars and planets for the wants of navigation and the advancement of our knowledge of the system of the universe. There does not exist any great work of detail on the phenomena of the sidereal heavens, but the inquirer must learn for himself from the original writings of those who have been most familiar with the actual appearances of the stars. The papers of W. Herschel [Herschel], in the Philosophical Transactions, would be the first preliminary study for any one who is desirous of adding his contribution to the knowledge of the simple phenomena of the heavenly bodies.

Star.		Period.			Variation of Magnitude.	Discoverers.	Date.
		days.	h.	m.			
β	Persei	2	20	48	2 to 4	Goodricke Palitzch	1782 1783
δ	Cephei	5	8	37	3·4 to 5	Goodricke	1784
β	Lyræ	6	9	0	3 to 4·5	Goodricke	1784
η	Antinoi	7	4	15	3·4 to 4·5	Pigott	1784
α	Herculis	60	6	0	3 to 4	W. Herschel	1796
*	Serpentis	180	.	.	7? to disapp.	Harding	1826
R.A.	15h. 41m.						
P.D.	74° 15′						
ο	Ceti	334	.	.	2 to disapp.	Fabricius	1596
χ	Cygni	396	21	0	6 to 11	Kirch	1687
367	(Bode) Hydræ	494	.	.	4 to 10	Maraldi	1704
34	Cygni	18 years			6 to disapp.	Janson	1600
420	(Mayer) Leonis	Many years			7 to disapp.	Koch	1782
κ	Sagittarii	Ditto			3 to 6	Halley	1676
ψ	Leonis	Ditto			6 to disapp.	Montanari	1667

Leaving the general appearances of the stars, and referring to Milky Way for the most probable view of the primary groups of the universe, we come to the consideration of the circumstances out of which any future knowledge of these bodies will most probably be drawn. When observations of a star, made at two different periods, have been cleared of the effects of aberration and refraction, the only difference between the two places ought to be that due to precession and nutation, and any change of place which is not deducible from the latter is either error of observation, some unknown motion of the earth, or motion proper to the star. If the first be impossible or exceedingly unlikely, and if the same sort of discrepancy is found not to affect other stars, so that the second is not admissible, there remains only the third supposition. For example, there is a large number of stars which certainly have a slight apparent motion not attributable either to precession or nutation. It might first strike an investigator that this change might arise from a motion of the solar system in space, the effects of which might be perceptible on some stars and not on the rest, on account of the much greater nearness of the former to our system. If the motion of the solar system were the cause, it is obvious that the stars towards which we are moving would appear to open and recede from each other, while those which we are leaving would appear to approach each other. No such things take place; there is no part of the heavens in which the unexplained motions cause uniform increases or uniform diminutions of distance. All other solutions of the difficulty, which depend on the earth or solar system, are found equally inefficient; and there remains only the supposition that a great many stars, perhaps all, are actually in motion. It has been reasonably supposed that those which have most motion are comparatively near to the earth, and when it was requisite to choose a double star for the determination of the question of Parallax, 61 Cygni was selected, as being a star with a large proper motion; in fact, its right ascension alters yearly 5″·46, and its declination 3″·19. The experiment turned out favourably, and the parallax was discovered, and with it (roughly) the distance of the star from the solar system. And though light takes more than ten years to travel from this star to the earth, at the rate of two hundred thousand miles a second, yet so far from this being anything enormous, it rather cuts down the idea which was entertained of the distance of these bodies. The absence of all parallax, in spite of repeated efforts to obtain it, made many speculations upon the possibility of the nearest starlight being hundreds of years in reaching us. Among other stars which have a decided proper motion, we may notice Sirius, Procyon, 61 Virginis, α Bootis, A Ophiuchi, p Ophiuchi, and μ Cassiopeiæ.

The particular objects which are seen in the heavens are *stars*, simple points of light, and *nebulæ*, patches of an appearance of cloudy light. Single stars, under the telescope, very frequently become double, triple, quadruple, or even a large cluster; nebulæ are in some cases found to consist entirely of stars, but many remain which either are not composed of stars, or will not show themselves as such to the power of our present telescopes. It is necessary to say, in speaking of double stars, that they have been long known to exist, and that scores of observers have been diligently employed upon them during the last century and a quarter. So slowly however does the knowledge of the heavens expand itself, that in our own day, and within these four years, a periodical critic, in a learned review, quizzed the idea of there being such things as double stars, thinking he had got hold of a most amusing mistake of some writer in the Library of Useful Knowledge, and little dreaming that himself was destined to be handed down as a specimen of the ignorance which was possible in the middle of the nineteenth century upon a point on which metrical observations had been made from the time of Bradley.

When two stars are so close together that the naked eye shows them only as one, it is possible that the coincidence may be merely optical: that is, that the lines of their directions may be so close as to make an apparent coincidence, such as takes place between the sun and moon in an eclipse of the former, though the real distances may be very great. Such optical coincidence is suspected in various double stars, but only a long course of observation can settle the suspicion in either way. But it is now found that many double stars are connected with each other by the law of gravitation, each revolving in an ellipse about their common centre of gravity, and showing every evidence of each being retained by the other, according to the Newtonian law of gravitation. The following stars, γ Leonis, ε Bootis, ζ Herculis, δ Serpentis, and γ Virginis, were made out to be revolving double stars, by W. Herschel, in 1803; he had been examining these pairs under the idea of detecting the parallax from them, and in so doing he recognised their changes of relative position. Since that time, Castor, ξ Ursæ, 70 Ophiuchi, σ Coronæ, η Coronæ, ξ Bootis, η Cassiopeiæ, δ Cygni, μ Bootis, ε (4) and ε (5) Lyræ, λ Ophiuchi, μ Draconis, ζ Aquarii, ζ Cancri, and others, have been added to the list. The periods of revolution of several have been determined, ranging from 43 to 1200 years, and the other elements of several orbits have been established. The star η Coronæ has completed a revolution since it was first observed; but the triumph of prediction is the star γ Virginis. The two individuals composing this *binary** star, and which, at their greatest distance, are nearly 10″ apart, were computed by Sir J. Herschel as being to come to their nearest approach about the middle of 1834 or beginning of 1835. The whole time of revolution is upwards of 900 years, and the component stars had been gradually nearing each other since 17 when they were more than 7″ apart. In his paper on the orbits of binary stars (*Mem. Astron. Soc.*, vol. vii.), written in 1831, Sir J. Herschel says, 'These elements are extremely remarkable. If they be correct, the latter end of the year 1833, or the beginning of the year 1834' (subsequent observations made the correction above noted), 'will witness one of the most striking phenomena which sidereal astronomy has yet afforded, viz. the perihelion passage of one star round another, with the immense angular velocity of between 60° and 70° per annum, this is to say, of a degree in five days. As the two stars will then however be within little more than half a second of each other, and as they are both large and nearly equal, none but the very finest telescopes will have any chance of this magnificent phenomenon.' Towards the end of 1835 the stars were found, by observations in England, to be united so closely that good telescopes would no longer show them separate. And a letter from Sir J. Herschel (dated from the Cape of Good Hope, in February, 1836, printed in the monthly notice of the Astronomical Society for June 10th of the same year), runs as follows: 'γ Virginis is at this time, to all appearance, a single star. I have tormented it, under favourable circumstances, with the highest powers I can apply to my telescopes, consistently with seeing a well defined disc, till my patience has been exhausted; and that lately, on several occasions, whenever the definition of the stars generally, in that quarter of the heavens, would allow of observing with any chance of success: but have not been able to procure any decisive symptom of its consisting of two individuals. On the 17th instant, being a night of uncommonly good definition for the season, I turned the twenty-feet reflector, as a preliminary trial, on γ Centauri, which was seen double, without difficulty, under a power of 320, and with the whole aperture open; and afterwards on Saturn, which was also seen with uncommon distinctness. It was then directed to γ Virginis, and the night being farther advanced, the air tranquil, and vision much improved, I fully expected to have been enabled to divide it, at least with the aid of a diminished triangular aperture, and all the magnifying power the night would bear. I was however disappointed. It bore a magnifying power of 480 with sufficient distinctness, but without indicating the slighest elongation, or giving any symptom of its being otherwise than a single star. Had the centres of the two stars been only half a second asunder, I think I could not have failed to see a division between them.' It had been predicted that there would be half a second between the stars when at their nearest; it turned out that there was no perceptible distance, or that the stars seemed united. Before the time of Newton it would have taken thousands of years of observation to make as good a prediction as was procured from one single century.

---

* A star is called *double* when the two components are too close to be seen by the naked eye; it becomes *binary* when they are discovered to be connected by gravitation.

Before Sir J. Herschel's letter arrived in England, Captain Smyth had most distinctly announced that he could not separate the two stars of γ Virginis, under favourable circumstances, and with magnifying powers of from 240 to 1200. The following is the result of that gentleman's observations, the angle of position meaning the angle made by the line joining the two stars with the direction of diurnal rotation at the meridian; and 1831, 38 meaning the time when 38-hundredths of the year 1831 had elapsed, and so on.

Epoch of Observation.	Angle of Position.	Distance of the Stars.	Epoch of Observation.	Angle of Position.	Distance of the Stars.
1831, 38	77° 54′	1″·65	1836, 15	. .	round
1832, 40	71° 26′	1″·14	1836, 25	. .	blotty
1833, 23	63° 38′	not obs.	1836, 30	350° 56′	elongated
1833, 44	62° 43′	1″·31	1836, 39	348° 39′	elongated
1834, 20	48° 49′	1″·02	1837, 21	265° 27′	0″·60*
1834, 39	45° 29′	0″·85	1838, 28	235° 41′	0″·85
1835, 40	14° 59′	0″·50*	1839, 40	217° 12′	1″·00
1836, 06	. .	round			

The very great increase of angular motion as the one star approached to its nearest point to the other (called its *periastre*), was at last more than 30° in a year. the *greatest* rate given by Sir J. Herschel, mentioned above, continuing of course only a short time. This great point, the revolution of the individuals of a double star about each other, according to the Newtonian law of gravitation, is now therefore well ascertained by the verification of predictions founded upon that law, the most decisive of astronomical tests. Thousands of stars have been well ascertained to be double, and in all probability the determination of their orbits will go on until the research loses its interest, and the orbital motion is reasonably inferred to be a rule without exception. A list of writings on double stars will be found in the appendix to the Explanation of the Society's Maps of the Stars already cited.

It is as difficult to say where the subject of nebulæ should begin as it is impossible to prophesy where it will end. Clusters of stars, which are visibly clusters to the naked eye, are found in different parts of the heavens, of which we suppose it must be assumed that they belong to the great stratum in which our system is situated. [MILKY WAY.] There are clusters of stars which are not such to the naked eye, but take that character in telescopes of the most moderate power; there are others again, of more and more difficulty, or requiring better and better telescopes to resolve them into clusters, some of which are visible to the naked eye as nebulæ, or slight cloudy patches of light. Many of them, when resolved into clusters, exhibit their thousands and millions of stars, increased in closeness and collective effect from the borders to the centre. Lastly, there are nebulous appearances which remain nebulous under the best telescopes yet constructed; but whether these are really clouds of luminous matter, or whether better telescopes would resolve them also into stars, is of course undecided. The most complete list of these objects is the great catalogue of Sir John Herschel, published in the Philosophical Transactions in 1833, embracing all that can be seen in our latitude. The author of this catalogue spent some years at the Cape of Good Hope in making a survey of the southern hemisphere, the results of which are not yet published. Hardly anything in fact is known of the telescopic objects of the southern parts of the heavens, or of the telescopic appearance of remarkable visible objects: for example, there is no account of the celebrated *Nubeculæ* (*major* and *minor*), two very large patches of *Milky Way* not far from the south pole.

William Herschel's subdivision of these objects is into—1, *Clusters*, subdivided into globular and irregular; 2, *Resolvable Nebulæ*, suspected of being one day reducible to clusters by better telescopes; 3, *Nebulæ*, which give no appearance of stars; 4, *Planetary Nebulæ*, with round discs and equable light; 5, *Stellar Nebulæ*, round, with increasing brilliancy towards the centre; 6, *Nebulous Stars*, sharp and brilliant stars surrounded by discs of faint light. But this is only a first approximation to a classification. Sir John Herschel has added *annular nebulæ*, presenting the appearance of a ring; *long nebulæ*, presenting the appearance of elongated ellipses of light; *double nebulæ*, or nebulæ very close together in the manner of double stars. He has also remarked the frequent occurrence of stars very near to planetary nebulæ, which he suspects to be real satellites.

When the elder Herschel began his observations, the idea entertained of the stellar universe was that of stars distributed in numbers throughout, if not infinite space, at least an extent which, compared with our own system, might justify such a mode of speaking. The observations of the MILKY WAY, and HERSCHEL'S theory of it, give the notion that many nebulæ may be such strata of stars as that one in which we are placed: perhaps at such a distance that the whole of our system, to the farthest boundary of the Milky Way, may be seen from thence as nothing but a minute telescopic nebula. In our day, when the proper use of words is comparatively well understood, we are prepared to extend the meaning of the word *universe* to any necessary point, and the farther discovery leads us, the more are we prepared to admit into the universe. But if, having a notion of the universe as an enormous extent of stars, and afterwards learning that our cluster, which we supposed to be the whole, proves to be only one of many, we were to follow an antient practice, we should call such a cluster a universe, and say that there are many universes. And this mode of speaking is a very intelligible one; if we adopt it, we may thus express the following well grounded conjectures (but of course only as strong conjectures) which arise from the appearances of clusters and nebulæ.

1. Clusters and Nebulæ. The universe, properly speaking, contains many universal systems, or minor universes, at distances so great from each other, that what an antient astronomer might have supposed to be the whole length of tenanted space sinks into nothing as compared with the distance between two such minor universes or stellar systems.

2. Double Stars. It was formerly thought reasonable to suppose that each star was the sun of a solar system. To this it must now be added, that we have suns revolving

* Estimated.

round each other each probably attended by its planetary system; and in the case of triple and multiple stars, three or more suns.

3. Double Nebulæ. Should it be discovered, as is by no means unlikely, that the component individuals revolve round each other, there may be stellar systems each revolving round the other; each a universe according to antient notions.

4. Planetary Nebulæ. There is reason to doubt that these bodies are composed of stars: but if not, they are masses of some material, each of the extent of a universe according to antient notions, attended perhaps by satellite stars.

The number of stellar dispositions seems to be very varied, if appearances may be relied on; and the modes in which the mutual attractions are prevented from causing the universal destruction of any system are wholly beyond conjecture. On this point Sir J. Herschel remarks: 'If a nebula be nothing more than a cluster of discrete stars (as we have every reason to believe, at least in the generality of cases), no pressure can be propagated through it; and its equilibrium, or, to speak more correctly, the permanence of its form, must be maintained in a way totally different. It must rather be conceived as a quiescent form, comprising within its limits an indefinite multitude of individual constituents, which, for ought we can tell, may be moving one among the other, each animated by its own inherent projectile force, and deflected into an orbit more or less complicated, by the influence of that law of internal gravitation which may result from the compounded attractions of all its parts. I have shown elsewhere' (Sir J. H. here refers to his Astronomy, in the Cabinet Cyclopædia, p. 415), 'how a quiescent spherical form may subsist as the bounding outline of an immense number of equal stars uniformly distributed through its extent, each of which individually attracts all the others with a force inversely as the square of the distance, and whose united attractions compose an internal force on each, directly proportional to the distance from the centre of the sphere. In such a state of things each star might describe an ellipse in any plane, and in any direction in that plane, about the common centre, without the possibility of collision; but the sphere, regarded as a whole, would have no rotation about any axis. If the form be not spherical, and the distribution of the stars not homogeneous, the dynamical relations become too complicated to be distinctly apprehended; yet we may still conceive that something of an analogous result may subsist, and that both the external form and the internal density may be maintained (at least under certain conditions) for the mass as a quiescent whole, while all its elements are in a state of unceasing transfer and interchange.'

In the articles CONSTELLATION, CATALOGUE, &c., we have given some slight idea of the state of sidereal astronomy as to designation and nomenclature. The boundaries of the constellations are so ill defined, the ways in which the descriptions of catalogues clash with each other are so numerous, and the points on each of which there should be, and is not, common consent, increase so fast, that unless a remedy be applied, a limit can be foreseen to the diffusion, and perhaps even to the progress, of sidereal astronomy. One constellation will sometimes contain an isolated portion of another, just as a county or diocese sometimes actually surrounds a parish which belongs to another. Stars occur under different names; some catalogue-stars have never existed, or owe their creation to a wrong entry or a mistake in reading an instrument. Constellations are recognised by some astronomers and not by others, while the same names are repeated in different parts of the heavens. These defects are most conspicuous in the southern hemisphere. Some disposition to search for a remedy begins at length to be exhibited. In a communication lately made to the Astronomical Society, Sir J. Herschel has proposed a plan for a reconstruction of the southern hemisphere, with a proposal that the same thing should be done for the northern. This paper sets forth the defects of the present system, and we extract the description of the disadvantages which that system imposes on such observers as many of our readers may be, or may think of becoming.

'There is however another and a very important class of observers to whom the present system of constellations, and the actual state of the charts generally accessible, is a real and most serious grievance; I mean those who devote their attention to the physical departments of practical astronomy, such as require a perfect familiarity with the aspect of the heavens, as seen by the naked eye in the open air, whether for the purpose of pointing reflecting or other telescopes not mounted meridionally or equatorially, to particular objects (such as double stars, nebulæ, &c.), or for that of photometrical determinations, and for the investigation of variable or periodic stars. These last are subjects of great and growing interest; and there is, I think, no exaggeration in declaring it *impossible* to go fully into them under the present system of nomenclature and distribution. The constellations are so numerous, and of such excessive inequality in extent—their boundaries interlock and interlace one another in a manner so capricious, and so impossible to follow out by the eye among the stars, that, if only for this reason, the map has to be referred to at every instant; and where, as is the case with every map I have ever used, *the leading stars in the map are not those which catch the eye by their brightness in the heavens*, there arises a necessity of alternately poring over the maps by candle-light, and rushing out into the darkness to compare the impression (usually a most erroneous one) left on the memory by such inspection with the reality as exhibited in the sky; a necessity not only fatal to all delicacy of vision, but actually injurious in a high degree to the organ itself; producing a painful irritation when pursued some hours in succession, which continues long after the exciting cause has ceased. The loss of valuable time moreover so arising is deplorable; and the want of satisfactory agreement in the result of successive nights' observations proves but too distinctly the influence of such unfavourable circumstances; while, in addition to these sources of annoyance, the mistakes arising from confusion of nomenclature have still to be guarded against with anxious vigilance. Considerable experience in this line enables me to say that I know of no class of astronomical observations more painful, laborious, and unsatisfactory; while on the other hand, with reformed constellations and charts adapted to the object in view, I am equally prepared to say that hardly any would prove more agreeable, easy, and popular. What is worst about the present system is, that all its difficulties and annoyances have to be undergone by every new observer, and by each at every resumption of his observations, after the lapse of any considerable interval of time; it being not merely familiarity with the heavens, but also with all the caprices, uncertainties, and errors of our artificial systems of representing them, which is required of him.'

It is obvious enough, to any one acquainted with the heavens, that no reformation of the constellations would be endurable, except one which made the boundaries of the new constellations to be parallels and secondaries to the equator, or parts of them. The only question is, whether the whole of the sphere should be mapped out in a regular manner, or whether constellations should be of different extents of right ascension and declination, so as always to enclose all the stars of a remarkable group in the same constellation. The latter plan is proposed in the paper from which we have cited. The subject is one which must undergo a good deal of discussion before any plan is fixed upon, and it will be long before the new mode is familiar to any but astronomers.

For maps of the stars we know of none which are better for the ordinary reader than the smaller set published by the Society for the Diffusion of Useful Knowledge. The gnomonic projection on which they are made, and which is explained in the accompanying treatise, has its disadvantages, as has every other; but for representing the whole heavens in few maps, we know of none superior to it. The PLANISPHERE combines some of the advantages of a map with some of those of a globe; but there is of course nothing comparable to the globe itself. An ingenious, and, considering its construction, by no means an expensive apparatus, was recently invented by Mt. Winter (and sold by Cary), of which we are credibly assured the results are useful in obtaining a knowledge of the stars. A hollow twelve-inch globe is *pierced* for stars, and a lamp is placed inside the globe. Through the holes in which the globe is pierced the light of the lamp is thrown on a hollow hemisphere of paper or calico of from four to six feet diameter, allowing from ten to twenty persons to see the representation of the starry heavens which obviously results. The visible hemisphere may thus be made apparent for any latitude and any time of day.

STAR-CHAMBER. The Star-Chamber is said to have been in early times one of the apartments of the kings palace at Westminster allotted for the dispatch of public business. The Painted Chamber, the White Chamber, and the Chambre Markolph, were occupied by the triers and receivers of petitions, and the king's council held its sittings in the Camera Stellata, or Chambre des Estoylles, which was so called probably from some remarkable feature in its architecture or embellishment. According to Sir Thomas Smith's conjecture, 'either because it was full of windows, or because at the first all the roofe thereof was decked with images or starres gilded.' (*Commonwealth of England*, book iii., cap. 4.) Sir William Blackstone proposes a conjecture that the Chamber received its name from its having been a place of deposit for the contracts of the Jews, called 'Itarrs,' under an ordinance of Richard I. (Blackstone's 'Commentaries,' vol. iv., p. 266, note.) Whatever may be the etymology of the term, there can be little doubt that the court of Star-Chamber derived its name from the place in which it was holden. 'The lords sitting in the Star-Chamber' is used as a well known phrase in records of the time of Edward III., and the name became permanently attached to the jurisdiction, and continued long after the local situation of the court was changed.

The judicature of the court of Star-Chamber appears to have originated in the exercise of a criminal and civil jurisdiction by the king's council, or by that section of it which Lord Hale calls the *Consilium Ordinarium*, in order to distinguish it from the *Privy Council*, who were the deliberative advisers of the crown. (Hale's *Jurisdiction of the Lords' House*, chap. v.; Palgrave's *Essay on the Original Authority of the King's Council.*) This exercise of jurisdiction by the king's council was considered as an encroachment upon the common law, and being the subject of frequent complaint by the Commons, was greatly abridged by several acts of parliament in the reign of Edward III. It was discouraged also by the common-law judges, although they were usually members of the council; and from the oint operation of these and some other causes the power of the Consilium Regis as a court of justice had materially declined previously to the reign of Henry VII., although, as Lord Hale observes, there remain 'some straggling footsteps of their proceedings' till near that time. The statute of the 3 Henry VII., c. 1, empowered the chancellor, treasurer, and keeper of the privy-seal, or any two of them, calling to them a bishop and temporal lord of the council and the two chief justices, or two other justices in their absence (to whom the president of the council was added by stat. 21 Henry VIII., c. 20), upon bill or information exhibited to the lord chancellor or any other, against any person for maintenance, giving of liveries, and retainers by indentures or promises, or other embraceries, untrue demeanings of sheriffs in making panels and other untrue eturns, for taking of money by juries, or for great riots or unlawful assemblies, to call the offenders before them and xamine them, and punish them according to their demerits. The object and effect of this enactment are extremely doubtful. It appears to have been the opinion of the courts f law at the time the statute was passed that it established new jurisdiction entirely distinct from the ordinary jurisdiction of the council; for five years afterwards, in the eighth ear of Henry VII., it was resolved by all the judges, according to the plain words of the law, that the only judges of the court under the statute were the lord chancellor, the treasurer, and the keeper of the privy-seal, the bishop and temporal lord being merely 'called to them' as assistants or assessors, and not as constituent members of the court. *Year Book*, 8 Hen. VII., 13, pl. 7.) This view of the effect of the statute is confirmed by the fact that, more than forty ears afterwards, the president of the council was expressly dded to the judges of the court by the stat. 21 Henry VIII., 20; 'a decisive proof,' as Mr. Hallam observes, 'that it then existed as a tribunal perfectly distinct from the council itself.' (*Constitutional History*, vol. i., p. 70.) And this writer concludes a careful examination of the subject by the following propositions: '1. The court erected by the statute of 3 Henry VII. was not the court of Star-Chamber. This court by statute subsisted in full force till beyond the middle of Henry VIII.'s reign, but not long afterwards ent into disuse. 3. The Court of Star-Chamber was the d *concilium ordinarium*, against whose jurisdiction many atutes had been enacted from the time of Edward III. 4. No part of the jurisdiction exercised by the Star-Chamber could be maintained on the authority of the statute of Henry VII.' In the first of these propositions, Mr. Hallam is confirmed by Hudson, in his 'Treatise of the Court of Star-Chamber.' (*Collectanea Juridica*, vol. ii., p. 50.) On the other hand, both Lord Coke and Lord Hale consider the statute of Henry VII. as having merely introduced a modification of the antient jurisdiction. The former calls the above resolution of the common-law judges 'a sudden opinion,' and says it is 'contrary to law and continual experience.' And he contends that the statute did not create a new court, but was merely declaratory of the mode of proceeding in an antient court, previously known and recognised. (*Fourth Institute*, p. 62.) Lord Hale also speaks of the 'erection of the court of Star-Chamber by the stat. 3 Henry VII.' and says it 'was a kind of re-modelling of the *consilium regis*.' (*Jurisdiction of the Lords' House*, chap. v., p. 35.) However this may have been, there is no doubt that, previously to the time of Coke, this court, whether distinct, or only a modification of the antient jurisdiction, had again merged in the general jurisdiction of the lords of the council so completely as to justify his statement that the opinion expressed in the judicial resolution was 'contrary to continual experience.' Sir Thomas Smith, who wrote his 'Treatise on the Commonwealth of England' in the year 1565, makes no mention of a limited court, though he treats particularly of the court of Star-Chamber, and says that the judges were the lord chancellor, the lord treasurer, all the king's council, and all peers of the realm; and he ascribes the merit of having renewed the vigour of the court to Cardinal Wolsey. At the beginning of the reign of Elizabeth therefore, the court of Star-Chamber was unquestionably in full operation, in the form in which it was known in the succeeding reigns; and at this period, before it had degenerated into a mere engine of state, it was by no means destitute of utility. It was the only court in the land in which great and powerful offenders had no means of setting at defiance the administration of justice or corrupting its course. And during the reign of Elizabeth, when the jurisdiction of the Star-Chamber had reached its maturity, it seems, except in political cases, to have been administered with wisdom and discretion. (Palgrave's *Essay on the King's Council*, p. 105.)

The proceedings in the Court of Star-Chamber were by information, or bill and answer; interrogatories in writing were also exhibited to the defendant and witnesses, which were answered on oath. The attorney-general had the power of exhibiting ex-officio informations; as had also the king's almoner to recover deodands and goods of a felo-de-se, which were supposed to go in support of the king's alms. In cases of confession by accused persons, the information and proceedings were oral; and hence arose one of the most oppressive abuses of the court in political prosecutions. The proceeding by written information and interrogatories was tedious and troublesome, often involving much nicety in pleading, and always requiring a degree of precision in setting forth the accusation, which was embarrassing in a state prosecution. It was with a view to these difficulties that Lord Bacon discouraged the king from adopting this mode of proceeding in the matter of the pursuevants, saying that 'the Star Chamber without confession was long seas.' (Bacon's *Works*, vol. iii., p. 372.) In political charges therefore the attorney-general derived a great advantage over the accused by proceeding *ore tenus*. The consequence was, that no pains were spared to procure confessions, and pressure of every kind, including torture, was unscrupulously applied. According to the laws of the court, no person could be orally charged, unless he acknowledged his confession at the bar, 'freely and voluntarily, without constraint.' (Hudson's *Treatise of the Court of Star-Chamber.*) But this check upon confessions improperly obtained seems to have been much neglected in practice during the later periods of the history of this court. 'Therein,' says Hudson, writing in the reign of James I., 'there is sometimes dangerous excess; for whereas the delinquent confesseth the offence *sub modo*, the same is strained against him to his great disadvantage. Sometimes many circumstances are pressed and urged to aggravate the matters which are not confessed by the delinquent; which surely ought not to be urged, but what he did freely confess, and in the same manner. And happy were it if these might be restrained within their limits, for that this course of proceeding is an exuberancy of prerogative, and therefore great reason to keep it within the circumference of its own orb.' Upon admissions of immaterial circumstances thus aggravated and distorted into confessions of guilt, the Earl of Northumberland was prosecuted *ore tenus*, in the Star-Chamber, for being privy to the Gunpowder Plot, and was sentenced to pay a fine of 30,000*l.* and to be imprisoned for life; 'but by what rule,' says Hudson (*Coll.-Jurid.*, vol. ii., p. 63), 'that sentence was, I know not, for it was *ore tenus*, and yet not upon confession.' And it frequently happened during the last century of the existence of the Star-Chamber, that enormous fines, imprisonments for life or during the king's pleasure, banishment, mutilation, and every variation of punishment short of death were inflicted by a court composed of members of the king's council, upon a mere oral proceeding, without hearing the accused, without a written charge or record of any kind, and without appeal.

The judges of the Court of Star-Chamber were the lord chancellor or lord keeper, who presided, and when the voices were equal gave a casting vote, the lord treasurer, the lord privy seal, and the president of the council, who were members of the court, *ex officio*, probably by usage since the statute of 3 Henry VII. In addition to these were associated, in early periods of the history of the court, any peers of the realm who chose to attend. According to Sir Thomas Smith, the judges in his time were the 'lord chancellor, the lord treasurer, all the king's majesty's council, and the barons of this land.' (*Commonwealth of England*, b. iii., c. 5.) Hudson states that the number of attendant judges 'in the reigns of Henry VII. and Henry VIII. have been well near to forty: at some one time thirty; in the reign of Queen Elizabeth often times, but now (*i.e.* in the time of James I.) much lessened, since the barons and earls, not being privy councillors, have forborne their attendance.' He further states, that 'in the times of Henry VII. and Henry VIII. the court was most commonly frequented by seven or eight bishops and prelates every sitting-day;' and adds, 'that in those times, the fines trenched not to the destruction of the offender's estate, and utter ruin of him and his prosperity, as now they do, but to his correction and amendment, the clergy's song being of mercy.' (*Coll. Jurid.*, vol. ii., p. 36.) The settled course during the latter part of the reign of Elizabeth and the reigns of James I. and Charles I., seems to have been to admit only such peers as judges of the court as were members of the privy council.

The civil jurisdiction of the Star-Chamber comprehended mercantile controversies between English and foreign merchants, testamentary causes, and differences between the heads and commonalty of corporations, both lay and spiritual. The court also disposed of the claims of the king's almoner to deodands, as above referred to, and also such claims as were made by subjects to deodands and *catalla felonum* by virtue of charters from the crown. The criminal jurisdiction of the court was very extensive. If the king chose to remit the capital punishment, the court had jurisdiction to punish as crimes even treason, murder, and felony. Under the comprehensive name of contempts of the king's authority, all offences against the state were included. Forgery, perjury, riots, maintenance, embracery, fraud, libels, conspiracy, and false accusation, misconduct by judges, justices of the peace, sheriffs, jurors, and other persons connected with the administration of justice, were all punishable in the Star-Chamber.

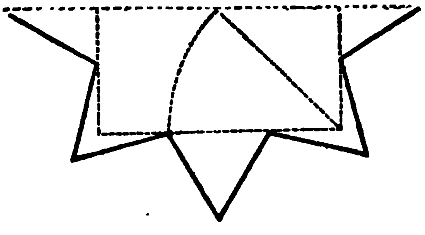
The Court of Star-Chamber was also occasionally used for declaring to the people occurrences of state. Thus in the times of Henry VII. and Henry VIII., the marriages and births of the king's children were here solemnly published; in like manner Queen Mary's marriage to Philip of Spain, the imputed treasonable practices of the Queen of Scots, and the particulars of the Earl of Essex's tumult, were officially declared in the Star-Chamber. It was also usual for the judges of assize previously to their circuits to repair to the Star-Chamber and there to receive from the court directions respecting the enforcement or restraint of penal laws. Numerous instances of this unwarrantable interference with the administration of the criminal law occur with reference to the statutes against recusants in the reigns of Elizabeth and James I.

A court of criminal judicature, composed of the immediate agents of prerogative, possessing a jurisdiction very extensive, and at the same time imperfectly defined, and authorized to inflict any amount of punishment short of death, must, even when best administered, have always been viewed with apprehension and distrust; and accordingly in the earlier periods of its history we find constant remonstrances by the Commons against its encroachments. As civilization, knowledge, and power increased among the people, the jurisdiction of the lords of the council became more odious and intolerable. Unfortunately, too, the court of Star-Chamber, which at one time appears to have been serviceable in the manner described by Sir Thomas Smith, 'as bridling such stout noblemen or gentlemen which would offer wrong by force to any manner of men, and could not be content to demand or defend the right by order of law,' degenerated in the reigns of James I. and Charles I. into a mere engine of state, and was employed as one of the main instruments for the assertion of prerogative pretension and the enforcement of illegal taxation. 'Having extended their jurisdiction,' says Clarendon, 'from riots, perjury, and the most notorious misdemeanours, to the asserting of all proclamations and orders of state; to the vindicating illegal commissions and grants of monopolies, no man could hope to be longer free from the inquisition of that court, than he resolved to submit to those and the like extraordinary courses.' (*History of the Rebellion*, book iii.) A measure which was introduced into the House of Commons in the last parliament of Charles I., to limit and regulate the authority of this court, terminated in a proposal for its entire abolition, which was eventually adopted without opposition in both Houses. The statute 16 Car. I., c. 10, after reciting Magna Charta and several early statutes in support of the ordinary system of judicature by the common law, goes on to state that 'the judges of the Star-Chamber had not kept themselves within the points limited by the statute 3 Henry VII., but had undertaken to punish where no law warranted, and to make decrees having no such authority, and to inflict heavier punishments than by any law was warranted; and that the proceedings, censures, and decrees of that court had by experience been found to be an intolerable burthen to the subjects, and the means to introduce an arbitrary power and government.' The statute then enacts, 'that the said court called the Star-Chamber, and all jurisdiction, power, and authority belonging unto or exercised in the same court, or by any of the judges, officers, or ministers thereof, should be clearly and absolutely dissolved, taken away, and determined, and that all statutes giving such jurisdiction should be repealed.'

STAR FORT, a kind of redoubt enclosing an area, and having its lines of rampart or parapet disposed, on the plan, in directions making with each other angles which are alternately salient and re-entering, as a star is usually represented. This construction is adopted when the work is intended to contain, for some time, the stores of an army, or to secure some important part of the position which the army occupies. The magistral line of the work may be traced by first laying down a polygonal figure, regular or irregular, as the ground may permit, and then upon each of its sides forming an equilateral triangle: the interior capacity and the quantity of fire will evidently be increased as the polygon has a greater number of sides, but the importance of the work is seldom so great as to render it necessary to form it on a polygon superior to a hexagon or an octagon; and the latter polygon, while it admits of being easily traced, allows the re-entering angles between the sides of the triangles to have a degree of obtuseness sufficient to avoid the risk that the defenders of the faces on each side of such an angle might fire upon one another. As soldiers are supposed to fire nearly perpendicularly to the face of the parapet behind which they stand, a greater obtuseness would cause the lines of fire to diverge so far from the direction of the adjacent face as to prevent the ditch of the latter from being effectually flanked.

A star-fort on an octagon may, if the ground is level, be traced by laying down a square, and, upon the middle of each of its sides, an equilateral triangle, whose base is one third of the length of such side; or, more regularly, by transferring half the diagonal of the square to each side from the four angles; the distances between the extremities of these half diagonals are the sides of an equilateral octagon, and upon these sides equilateral triangles may be formed. The subjoined cut represents the magistral line of half a star-fort with eight points, constructed in this manner. If the polygon had more than twelve sides, the re-entering angles would be acute; and, agreeably to the above supposition concerning the direction in which soldiers fire, the defenders on the adjacent faces might annoy one another.

That the fire of musketry may be sufficiently effective, it is considered proper that the lengths of the several should not be less than thirty yards; and a star-fort whose faces are of much greater length is capable of containing a garrison more numerous than that which would be required for the end proposed by such a work. A star-fort with six or eight points has a great advantage over a simple redoubt, though its construction is less simple: the crossing fires from the faces seriously impede the advance of the enemy towards the salient points; and the assailants, in passing the ditch, are completely exposed to the view of the defenders.



During the Seven Years' war, the king of Prussia's intrenched camp at Jauernick contained a star-fort on a rising ground in its centre, from whence the movements of the Austrians could be observed; and in this work the king's tent was pitched. The position taken up on the Nivelle by Marshal Soult, while the British army was acting in the south of France (1813), was protected by a strong star-fort: the work was constructed on a terrace below the summit of a mountain called the Smaller Rhune, and was intended to defend the entrance of a ravine. A platform below the summit of a ridge of high ground near the Bidassoa was, in like manner, fortified by a star-fort. (Napier's *History*, vol. vi.)

STAR-FISH. [ASTERIAS; STELLIRIDIANS.]

STARCH (called also *farina* and *fæculum*) is a proximate principle of plants, being chiefly found in the seeds of the larger grasses, or cereal grains, such as wheat; of many leguminous plants, such as peas and beans; and in the tubers of potatoes, and those of the New Holland Orchidaceæ (Lindley, in *Trans. Linn. Soc.*, vol. xviii., p. 426), and in the rhizomes of maranta, curcuma, zingiber, and several others; sometimes, but rarely, in the wood or bark of trees; and occasionally in the leaves of different plants. In all these instances it is associated with other principles, which are either employed along with it, or separated by different processes, according to the use intended to be made of it. In wheat it is associated with variable proportions of gluten, sugar, and gum; in potatoes, chiefly with gum and sugar. It is mostly lodged in the cells of the cellular tissue, and consists of granules, always white, generally of a roundish and seldom of an angular figure. The granules differ in size, often in the same seed, being generally smallest near the circumference. They differ also in different plants; and a table of their relative size has been constructed by Raspail (*Organic Chemistry*), chiefly with a view to distinguish the presence of one kind used to adulterate another. This test is not easy of application, as it requires a familiarity with microscopes and micrometers; and is moreover not to be implicitly relied upon, as the age of the plant, as well as the situation of the part from which they have been obtained, influences their size. The form of the granules, which is definite in each tribe, like the blood-discs in each tribe of animals, would be a more certain criterion, were not the difficulties of its application as great.

The granules are lodged mostly in the cells or compartments of the cellular tissue; and each granule consists of a membrane (beautifully marked, in some plants, such as the potato, with concentric circles: see Link, *Anatomisch-Botanische Abbildungen*, tafl. xvi., *fig.* 1), containing a transparent colourless material resembling gum. The membrane is insoluble in cold water or alcohol, but soluble in water of the temperature of 160° Fahr. In the process of germination of seeds, and the sprouting of potatoes and other tubers, the membrane is ruptured by the development of a principle termed *diastase*, and the contents rendered available for the growth of the plant.

The insolubility of the membrane in cold water affords a means of separating the starch from the gluten in wheat-flour, and from the fibrous matter in potatoes and other tubers. Wheat-flour is formed into a paste with water, and then kneaded under a stream of water so long as the water runs off of a milky appearance; what remains behind is chiefly gluten, while the water has carried off the starch suspended in it; and gum, sugar, and some phosphatic salts, either dissolved or suspended in it. The water charged with these matters is permitted to stand for a few days in summer, but for a week or two in winter, to allow the acetous fermentation to occur, by which the sugar and other principles are got rid of. The acid liquor termed *sours* is drawn off, and the starch thrown upon sieves, and washed; the bran and other impurities are retained on the sieves, while the starch is carried forward into large vessels called *frames*. In these the starch subsides, and the water, which has become perceptibly sour, drawn off, and the *slimes* removed. The starch is then washed, passed through a sieve, and finally allowed to subside. Thus purified it is put into boxes lined with canvass and perforated with holes, by which the superfluous water escapes. Afterwards it is cut into squares, put on bricks, and exposed to the heat of an oven, where it splits into irregular prisms. When free from any artificial admixture, it is perfectly white, and termed *white* or French starch; but in general azure (smalt) or indigo is added, when it is employed for stiffening linen, to which it imparts a more agreeable hue than the dull white of that material.

Starch, when pure, is nearly devoid of odour and taste, and is possessed of demulcent properties when boiled in water, with which it forms a hydrate of a jelly-like character. Its insipidity however hinders it from being very digestible in this state, or even when kneaded with cold water, and exposed to heat, to form biscuits. Its digestibility is greatly increased by fermentation, and hence bread or rusks are much more suitable to invalids than any unfermented preparations of flour. The best bread is formed by flour which contains the greatest proportion of gluten. The relative proportions of starch and gluten differ not only in the different cereal grains, but in the same species or variety, according to the season when they are sown, or the manure which has been applied to the land. Spring-sown wheat yields in the 100 parts—starch 70 parts, gluten 24; while autumn-sown wheat yields—starch 77 parts, gluten 19. (Davy, *Agricultural Chemistry*, p. 135 and 142.) The proportion of gluten is larger when the ground is manured with human urine, and as gluten is a compound of carbon, oxygen, hydrogen, and nitrogen, it is natural to expect that the application of so highly nitrogenous a liquid as human urine should furnish a larger produce. Nitrate of soda, or for some soils nitrate of potash (saltpetre), as manures, increase the quantity of gluten and albumen, another nitrogenous constituent of wheat, as well as the absolute quantity of produce per acre of hay and straw. The flour is of a superior quality for making bread, and absorbs more water, yielding a larger and more digestible bread from the same quantity of flour. (Daubeny's *Three Lectures on Agriculture*, p. 73 and 76.) Were a scientific system of agriculture to prevail in this country, one kind of wheat, treated with proper manure, would be raised and sold exclusively to the starch-manufacturer; while another kind, treated with its proper manures, would be raised for and sold only to the baker.

Starch exists in larger proportion in Carolina rice than in any other grain. As this, from the small portion of gluten which it contains (not more than 3½ per cent.), is not well suited to form bread, it would be well to use it for the manufacture of starch, and leave wheat to be consumed as bread.

Potatoes yield the purest starch, and it is procured with great ease, by simply rasping down the potatoes over a sieve, and passing a current of water over the raspings. The water passes through the sieve milky with the starch. By rest the starch subsides; it is then two or three times washed with pure water, and afterwards allowed to dry. The quantity of starch varies with the kind of potato used, the mode of cultivation, the time of setting, and, above all, the time of year when the process is applied. Potatoes in general afford from one-fifth to one-seventh of their weight of dry starch. (Davy's *Agricultural Chemistry*, p. 133.) The quantity of starch is at its maximum in the winter months, but as soon as the potato begins to sprout, the starch lessens, as does also the proportion of nitrogen, so that its nutritive properties are impaired. If however the process of isolating the starch be followed in the winter months, the result is, a sixth portion of the weight of the potatoes employed, in a condition fit not only for immediate use, but of easy transport, and capable of preservation for years. 'To those who live solely or even principally on potatoes, it must be of immense importance to have the nutritious part preserved when it is in the greatest perfection, instead of leaving it exposed to injury, decomposition, and decay.' (*On the Culture and Uses of Potatoes*, by Sir John Sinclair.)

Starch is most extensively used in the arts, but it is little employed in medicine, except for its demulcent properties, and as a vehicle for opiate injections. Patent white starch should alone be used in such a case. Starch forms with iodine a beautiful blue compound (iodide of starch); hence iodine is commonly employed as a test of the presence of starch. Raspail thinks that the blue colouring principle is of a volatile nature; and this is very probable, because a cold iodide of starch becomes colourless on the addition of boiling water. The blue colour is also destroyed by alkalis. It is of importance to bear in mind, that many vegetable substances, particularly such as contain gum and starch, render the tincture of guaiac blue; but starch is always precipitated from its watery solution by the addition of alcohol; while guaiacum is precipitated from its alcoholic solution by the addition of water.

STARGARD, or NEW STARGARD, is a city in the Prussian government of Stettin, in the province of Pomerania. It was formerly the capital of the government, and is now the capital of the circle of Saats. It is situated in 53° 20′ N. lat. and 15° 20′ E. long., in a fertile and pleasant country, on the left bank of the navigable river Ihna, which flows through one of its suburbs, and falls into the Oder about 20 miles below the town. It is one of the best towns in Pomerania; is surrounded with a wall, and has three gates and three posterns. With the three small suburbs it has about 12,000 inhabitants, who have manufactures of woollens, linen, hats, stockings, leather, soap, tobacco, and also breweries and distilleries. There are in the town four churches, a gymnasium, an orphan asylum, three poor-houses, seven hospitals, and several schools, among which is a school for the education of land-surveyors, a provincial horticultural school, and a school for the instruction of mechanics. It is the seat of several public offices; among others, of the provincial board of the general commission for regulating the relations of the landlords and peasants, and the division of the commons in Pomerania. There are six annual horse and cattle fairs, two wool-fairs, one linen and two general fairs. The town has a good export trade in the productions of the country, especially corn, which goes down the Ihna to the Oder, and so to the Baltic.

STARGARD, a lordship, now called the *Duchy of Mecklenburg Strelitz*, is the most considerable of the two provinces of the grand-duchy of the same name, having an area of 630 square miles, with 70,000 inhabitants. There are eight towns, including Strelitz, the capital.

STARGARD (called *Old Stargard*) is a small town with about 1000 inhabitants.

STARK, WILLIAM, M.D., was born at Birmingham, in 1740, and educated for the medical profession, first at Glasgow, and then successively at Edinburgh, London, and Leyden, at which last place he took his degree in 1767. Returning to London in 1769, he commenced, chiefly at the recommendation of Sir John Pringle and Dr. Franklin, the course of experiments on diet, of which the termination, rather than the scientific results, has rendered him celebrated. To ascertain the effects of different quantities and kinds of food upon the human economy, he confined himself for periods of from four to fourteen days to certain articles of diet, and carefully registered the influence which they seemed to exercise on the several functions of the body. He began, for instance, with bread and water; then he added to them, in succeeding periods, sugar, olive-oil, and milk; then he took different kinds of animal food, and each in different quantities. His last plan (when his previous experiments had already rather disturbed his health) was to try the effects of a diet of bread or flour, with honey and infusion of tea or rosemary. After continuing this for ten days, it brought on diarrhœa and considerable weakness, and to remedy the former he immediately adopted a diet consisting exclusively of bread, cheese, and infusion of rosemary. This produced a totally opposite state of the intestines, and was speedily followed by a condition of low fever, with great disturbance of the general health, and inflammation of the glands of the small intestines, of which, after five days' severe illness, he died.

The termination of Dr. Stark's labours, within seven months of their commencement, is the more melancholy for the few results to which they led. Had he been able to continue them for as many years, it is probable they might have led to some valuable conclusions; though indeed they were but roughly conducted, and open to all the fallacies of experiments performed on one person for the purpose of ascertaining rules to be applied to all. His works were published by Dr. J. Carmichael Smyth, in 1788 (in one vol. 4to., London): they include the 'Journal of his Experiments,' and his 'Clinical and Anatomical Observations,' which, though few, give proof of much acuteness in the study of disease. Had their author's judgment equalled his devotion to the cause of science, he might well have been expected to rise to the highest eminence in medicine.

STARKENBURG. [HESSE DARMSTADT.]

STARLING. [STURNIDÆ.]

STARS, DOUBLE. [STAR.]

STARS AND NEBULÆ. [STAR.]

STASZIC, STANISLAV, president of the Polish Royal Society of Arts, and a distinguished patriot and philanthropist, was born in November, 1755, at Pila, of which place both his grandfather and father had been burgomaster. After studying at Göttingen and Leipzig, he passed two years at Paris, where he applied himself very sedulously to natural history and physics, and became acquainted with Buffon, D'Alembert, Raynal, and other eminent men. On leaving France, he made a tour through Switzerland, Italy, and Sicily, chiefly for the purpose of studying the geology of those countries. Furnished with considerable acquisitions in various departments of science, he returned to his native land, with the hope that his talents would procure for him some distinction and favour; but meeting with only coolness and indifference, which grieved him more on the account of his countrymen than on his own, he withdrew from society, devoting himself entirely to study, to the exercise of private benevolence, exhortation, and advice in his immediate sphere. Notwithstanding his numerous bounties to others, he was so frugal in all that concerned himself as to be enabled to amass a very considerable capital, with which he purchased an estate, of which he made grants to several families, among whom he parcelled it out. Although he never took an active part in public affairs, he was always ready to aid with his pen the best interests of his country. Among his writings of a political or statistical character, are his 'Warnings for Poland,' 'Statistics of Poland,' and the 'Political Balance of Europe;' to which may be added his 'Geography of the Carpathian Mountains,' and his 'Reflections on the Life of the Chancellor Andrew Zamoiski,' with which distinguished and enlightened patriot Staszic had for some time lived in daily and familiar intercourse, having been preceptor to his sons shortly after his return from abroad. Of purely literary productions he left but few, and even those were chiefly translations, viz. a prose version of Homer, Buffon's 'Epochs of Nature,' and Racine's poem on Religion, which last he translated at the age of fifteen.

More in compliance with the earnest desire of his mother than with his own inclination, Staszic had taken holy orders, and therefore exemplary as the general tenour of his conduct was, he did not display any great religious zeal, with the want of which he was accordingly reproached by his enemies, yet there is no reason whatever for suspecting him of religious indifference; and most assuredly his personal virtues were of the highest kind, and his patriotism of the noblest stamp. He died January 20th, 1806; and, in addition to the disposal of his estate at Rubieszow, as before mentioned, left considerable bequests to various public institutions and churches, including 200,000 zlots to the Hospital of Jesus, 100,000 to the Chemical Institute, and 45,000 to the Institute for the Deaf and Dumb at Warsaw.

STATE. [SOVEREIGNTY.]

STATEN ISLAND. [NEW YORK.]

STATER (*στατήρ, a standard* of value), or *Chrysus* (*χρυσοῦς, gold money*), was the name of a Greek gold coin, which, after being used from a very early period in some states, became, in the time of Philip II. and Alexander the Great, the general gold currency of Greece.

It is said to have been first coined in Lydia, to which the origin of silver money also is attributed by an antient tradition. (Herod., i. 94.) The stater of Croesus seems to have been the first gold money seen in Greece. (Herod., i. 54.) No undoubted specimen of this Lydian stater is in existence. According to Böckh, it was formed of the pale gold or electrum (¾ gold and ¼ silver) contained in the sands of the Pactolus.

Of the better known gold coins, most were on the same standard of weight as the Attic drachma, the Attic silver having at a very early period obtained a general circulation throughout Greece, and being reckoned extremely pure. The stater was generally equal in weight to two drachmæ, and in value to twenty. This was the case with the Macedonian stater, which the influence of Philip and Alexander brought into general circulation in Greece, and which continued to be coined by the later Macedonian kings after the same standard, or very nearly so. Many specimens of it exist.

The average weight of the staters of Philip and Alexander is a little under 133 grains. An assay of a stater of Alexander, made for Mr. Hussey, gave 115 grains of fine gold and 18 of silver, with no alloy. The silver here ought not to be reckoned as an alloy, and therefore the coin is equivalent to 133 grains of fine gold. Our sovereign contains 113·12 grains of fine gold. Therefore this stater was worth $\frac{133}{113 \cdot 12}$ of a sovereign, or a very little more than 1*l.* 3*s.* 6*d.* If we calculate its value by the number of drachmæ it was worth, we find it only 16*s.* 3*d.* The reason of this is that silver was much dearer in antient times than it is now. The higher value of the stater is the true one, as no material change has occurred in the value of gold.

In the states of Greece Proper the chief standards of money followed were those of Athens and Ægina. In both, the principal denominations of money were coined in silver, and it does not appear that the Æginetan system contained any gold coin.

At Athens there seems to have been no gold money in the flourishing times of the republic, if we except a coinage mentioned by the Scholiast to Aristophanes (*Frogs*, v. 719), which was of a very base gold, as is evident from the expressions used to describe it by Aristophanes (he calls it *τὸ καινὸν χρυσίον*, 'the new gold money,' v. 719, and directly afterwards *πονηρὰ χαλκία*, 'vile copper coins,' v. 724), and appears plainly to have been a solitary issue, put forth to meet the exigencies of the state; for it was in the year before the battle of Ægospotami, and the gold for the coins was obtained by melting down the statues of Victory. With this one exception, there is no mention of gold money by Athenian writers before the time of Philip, unless when they are speaking, as they frequently do, of foreign gold; and even this appears to have been scarce. There are also collateral arguments which go to prove that Athens had no gold currency of her own at the period named. There are however a few Attic gold coins in existence, but only about a dozen. Of these, three, which there is every reason to suppose genuine, are in the British Museum, and one in the Hunterian Museum at Glasgow. Their weights agree exactly with the Attic standard, being respectively 132·3, 132·7, 132·6, and 132·75 grains, or on the average 132·5875 grains, which is only about half a grain less than the Attic didrachm. The character of the impression is exactly like that of the old Attic silver, but the form of the coin is more like the Macedonian. Taking these facts in connection with the small number of such coins, it appears likely that when the rise of the Macedonian empire made gold plentiful in Greece, and the kings of Macedon began to coin gold, Athens, like other Grecian states, may have followed their example, and issued gold coins in imitation of her old silver, which however never came into very extensive circulation, as they were superseded by the Macedonian money

It is very clear however that foreign gold was in circulation at Athens quite as early as the Peloponnesian war. It was obtained doubtless in commerce, and as the tribute of the allies, many of whom had gold currencies. Among the denominations so used, the chief were the darics of Persia [Daric] and the staters of the Greek cities of Asia and the neighbouring islands. In fact, the Greeks got nearly all their gold from Asia. The following were the principal coins of Greek states in circulation at Athens:—

Demosthenes (in *Phorm.*, p. 914, Reiske) informs us that a little after 335 B.C. the *Státer of Cyzicus* passed at Bosporus in the Tauric Chersonese for twenty-eight Attic drachmae. The existing coins vary from 160 to 120 grains, the former of which is greater, the latter less than the Attic, and both apparently derived from an element of 40 grains. The existing coins seem however to have been multiples of different standards. As the heaviest of the existing coins does not come up to the weight answering to the value assigned to the Cyzicene stater by Demosthenes, we must suppose that gold was dearer or silver cheaper than usual at Bosporus at the time referred to.

The *Staters of Lampsacus*, which may be recognised by the impression of a sea-horse, are of the standard of the daric Two in the British Museum weigh about 129 grains each.

The *Stater of Phocaea* also appears, from the specimens given by Sestini (*Degli Stateri Antichi*), to have followed the standard of the daric. It was divided into sixths (*ἕκται*) and twelfths (*ἡμίεκτα*), of which the latter were equal in value to eight obols, and in weight probably to one, since the obol bore the same proportion to the didrachm in the silver coinage, that the *ἡμίεκτον* did to the stater in the gold.

Most of the cities of Ionia coined staters. Those of Chios, Teos, Colophon, Smyrna, Ephesus, and other places, now exist. There were also gold coins struck in Samos, Siphnus, Thasos, the Greek cities of Sicily, and Cyrene, at an early period. After the Macedonian coinage of staters, many Greek states coined them according to the same standard; we may mention Epirus, Acarnania, Aetolia, and Syracuse.

The coins in the system of the stater were the single, double, and half staters; these were very common: there were also, less commonly, quarters, thirds, sixths, and twelfths of staters.

The Attic silver tetradrachm was called stater in later times, but it is doubtful whether it was so called in the best ages of the republic.

The term stater was also applied to weight, meaning apparently any standard of weight. The Mina and Sicilian Litra were so called.

(Hussey, *Antient Weights and Money;* Wurm, *De Pond.*, &c.; Böckh, *Metrologische Untersuchungen.*)

STATES GENERAL. This term is from the French *Etats Généraux*, the assembly of the three orders of the kingdom: the clergy, the nobility, and the third estate. It is generally understood of the estates of the kingdom of the Netherlands, which at present consist of two chambers. They are called States General, to distinguish them from the states of the several provinces. [Netherlands.]

STATICS, a subdivision of mechanics, meaning the part of the science in which equilibrating forces are considered, in opposition to Dynamics, in which the effects of forces producing motion are investigated: it is subdivided into the statics of rigid and of fluid bodies, the latter being called Hydrostatics. The general considerations in Mechanics, Force, Pressure, Power, Weight, &c., and such articles as Lever, Inclined Plane, Pulley, Wheel and Axle, Wedge, Screw, may be consulted; and also the articles Virtual Velocities, Theory of Couples, &c.

One foundation of statics was first given by Archimedes, and another by Stevinus, as noted in Mechanics. The former is the more rigorous, the latter being open to some objections of a serious character. The discoveries of Galileo turned the attention of philosophers upon dynamical problems, and the very easy connection which exists between the statical and dynamical measure of forces caused the theory of statics to be founded, almost up to the present day, upon dynamical principles. The taste for the purer form of statics has however revived, and we imagine that from henceforward it will be customary to make this science stand by itself.

The two great propositions of statics are that of the Lever, demonstrated in the article on that word, and that of the Composition of pressures, mentioned, but not demonstrated. Which of these shall be chosen as the foundation of the science, and how the other shall be deduced from it, are two points on which every writer on the subject should think much, as the character of his work in the eyes of others will, in a great measure, depend on his treatment of these parts of the subject. The method of Archimedes is, in our opinion, the soundest of all; but we say it without denying the possibility of exhibiting a direct statical proof of the composition of pressures which shall be equally satisfactory. In those which have hitherto been given, there is a want of distinction between the mathematical and physical assumptions: the student leaves off with no very clear perception how far the proposition is one of mathematics, and how far one of physics. There is a general dislike and distrust of these proofs, which is evidence almost conclusive against them: any one who would improve them should not leave off until he has not only made a better separation of the physical axioms from the rest, but has put it in a form in which such separation is exceedingly obvious. Till this is done, the proofs in question will only stifle opposition, while the proposition of Archimedes forces conviction. If there be anything likely to be misunderstood in the latter [Sufficient Reason], it applies as much to the former in all the cases which we have seen.

Statics, like all other mechanical sciences, is usually placed among mixed Mathematics. But the line which separates it from the pure sciences is almost imperceptible, and it would seem more reasonable to invent a third and intermediate distinctive term, than to place statics and electricity under the same name, to distinguish them from geometry. It would be easy to show that all which is common to geometry and statics, and not to electricity, is more extensive, more striking, and more easily described, than the little which is common to statics and electricity, and not to geometry. In fact, when we say that both statics and electricity are concerned with properties of matter as distinguished from space, we have stated the whole of the common tie by which the two sciences are united: while geometry and statics possess in common almost equal degrees of evidence in their axioms, altogether the same rigour of deduction, and strong analogies in their theorems. As far as we know, Mr. Whewell is the only writer on this subject who has contended for the alteration of the location of statics: but he carries the idea farther than we can follow him, for (*Mechanical Euclid*, p. 159) he asserts that the axioms of statics are 'self-evidently true,' 'not to be learnt from without, but from within.' We shall enter further upon this point in the article Sufficient Reason.

STATIONARY. This term requires introduction into mechanics in a manner corrective of the mistakes which have sometimes been made. One of these is pointed out in Stable and Unstable. Instead of saying that a system acted on by its weight is in equilibrium only when the center of gravity is highest or lowest, it is there pointed out that all that is necessary is that the motion which the centre tends to take should be horizontal: or that the centre should be *stationary* as to ascent or descent, for the moment. Again, there is what is called the *principle of least action* [Virtual Velocities], which the mathematician will recognise in the theorem that the motion of a system is always such that $\Sigma m\int v\,ds$ is a minimum. Now all that is proved is that in the motion of a system, in the language of the calculus of Variations, $\delta\,\Sigma m\int v\,ds$ is $= 0$. Now all that this requires is that $\Sigma m\int v\,ds$ should be *stationary*; or that if a path infinitely near the path of motion should be chosen, $\Sigma m\int v\,ds$, calculated for the new path, should differ from the same calculated for the old path, by a quantity of an order inferior to those on which the difference of the paths depends. Sir W. Hamilton proposes to call this the principle of *stationary* action, instead of that of least action; the action of a particle whose mass is m moving over an arc s being a name given to $m\int v\,ds$, taken from one end of the arc to the other, where v represents the velocity.

STATIONARY (Astronomy). All the planets appear at the earth to move alternately forwards and backwards in the heavens, the retrograde motion not continuing so long as the direct motion. For a little time at the beginning and end of the retrogradation, the planet appears to have no motion. This arises when the relative Motion of the planet is really towards the earth. The planet's velocity may always be decomposed into two, one in the direction of the earth's motion, or its opposite, the other towards or from the earth. When it happens that the former motion is not only parallel to that of the earth, but equal to it, the planet cannot change its place in the heavens, but all its apparent motion is the remaining motion, directly to or from the earth. If the planet were so near that we could readily see alterations of its distance, we should say it was directly approaching or receding: but as we cannot see this phenomenon, we pronounce it stationary, and for some nights we lose the distinction between it and the fixed stars. [Trochoidal Curves.]

STATISTICS is that department of political science which is concerned in collecting and arranging facts illustrative of the condition and resources of a state. To reason upon such facts and to draw conclusions from them is not within the province of statistics; but is the business of the statesman and of the political economist. In order to exemplify the precise character and limits of statistics, the Statistical Society of London have aptly chosen for their emblem a wheat-sheaf, with the motto 'aliis exterendum.'

That it is necessary for a government, in order to govern well, to acquire information upon matters affecting the condition and interests of the people is obvious. Indeed the civilization of a country may almost be measured by the completeness of its statistics; for where valuable statistical records of antient date are found concerning a country not yet advanced in civilization, which would appear to contradict this position, we owe them to sovereigns or governments of uncommon vigour and sagacity. However rude the government of a country may be, it cannot attempt to make laws without having acquired the means of forming a judgment, however imperfect, as to the matters brought under its consideration. In this sense statistics may be said to be coeval with legislation; but as the latter has rarely been conducted upon any fixed principles, or partaken of the character of science, in the earlier ages of the world, we must attribute to statistics, as a department of political science, a much later origin. It is chiefly to the rise of political economy that we are indebted for the cultivation of statistics. The principles of that science, which are directly concerned about the prosperity and happiness of mankind, were not reduced to any system until the middle of the last century: since that time, political economy has been cultivated as an inductive science. The correctness of preconceived theories has been tested by the observation and analysis of facts: and new principles have been discovered and established by the same means. A limited knowledge of facts had previously been an obstacle to the progress of political economy; and on the other hand the neglect of that science caused indifference to statistical inquiries. It is well remarked by Mr. M'Culloch that 'observations are scarcely ever made or particulars noted for their own sakes. It is not until they begin to be in request as furnishing the only test by which to ascertain the truth or falsehood of some popular theory, that they are made in sufficient numbers, and with sufficient accuracy.' For this reason, statistics, which had been neglected until political economy rose into favour, have since been cultivated with continually increasing care and method, as that science has been further developed, and the knowledge of its fundamental principles more widely diffused.

This connection between political theories and statistics, while it has led to the collection of many data which would not otherwise have been obtained, has too often introduced a partial and deceptive statement of facts, in order to support preconceived opinions. This is sometimes unjustly objected to statistics, as if it were a defect peculiar to them. That facilities for deception are afforded by statistics cannot be denied; but fallacies of this kind, like all others, are open to scrutiny and exposure. Reliance need not be placed upon statements of facts nor on numbers, unless supported by evidence; and inferences from them should only be admitted according to the rules by which all sound reasoning is governed. Fallacies are difficult to detect in proportion to the ingenuity of the sophist and the ignorance or inexpertness of his opponents; but in political matters, opposite theories and opinions are maintained with equal ability, and facts and arguments are investigated with so much jealousy, that, in the end, truth can hardly fail to be established. Neither does any suspicion of partiality attach to such facts as are collected by a government without reference to particular theories. Until some one has shown the value of noting a certain class of facts with a view to his own inquiries, no pains are taken to obtain information of that nature from the best sources; but as soon as the importance of seeking any data is acknowledged, the collection of them becomes the business of impartial persons. The statist must be acquainted with the purposes to which the facts collected and arranged by him are likely to be applied, in order that the proper distinctions and details may be noted in such a manner as to give the fullest means of analysis and inference; but his services are greatest when he does not labour in support of a theory.

It thus becomes the duty of a government to apply all the means in its power in aid of statistics, not only for the administration of the affairs of state, but also for the furtherance of political science, and for general information. Abundance and accuracy must be the object of a government in collecting statistical facts.

We would lay much stress upon the collection of facts by the highest authority of the state, because the classes of facts most important in political inquiries can scarcely ever be searched out by other persons, who have not access to the offices of government, and who are without authority to demand information; while the government has ampl means at its disposal, and can, without difficulty, and in the ordinary course of executive business, obtain statistical information of the highest value. In this and many other countries the respective governments are applying themselves earnestly to statistical investigations. In England a statistical department has been established at the Board of Trade to collect and arrange all the documents of a statistical nature that can be obtained through any department or agency of government. The admirably organised departments of the French government have abundance of statistical materials systematically collected, which they never fail to arrange in a very lucid manner, and to analyse with much ability. Great credit is due to the Belgian government for the diligence with which its several departments have engaged in statistics; and in March, 1841, the king appointed a central statistical commission. The object of this commission,’ said the minister of the interior, in his Report to the king, ‘will be to bring together in one common depository all the scattered information which is at present collected by the different departments of government; and it will propose models for the statements and tables employed in collecting and classifying the elements of official publications.’ He adds, that ‘if the commission carries out satisfactorily the object proposed, the government, the legislative chambers, and the country, will find in the official statistical publications, authentic documents calculated to throw light on all matters of discussion, to encourage useful works, and to make known annually the situation, the strength, and the material and moral resources of the kingdom.’ The useful results of this commission, it may be hoped, will not be confined to Belgium. The world at large is interested in the statistics of any country; and improved methods of conducting statistical inquiries must be generally applicable.

But while governments are thus engaged, there is ample room for the labours of individuals. Local statistics of all kinds are open to them. The books and records of public institutions, facts relating to particular trades, to the moral and social state of different classes of society, and other matters apparently of local interest only, often present results as important as those derived from inquiries on a more extended scale. Good service also may often be done by a judicious selection and comparison of matters not brought together in official statements, with a view to the illustration of principles of science or experiments in legislation, and by suggestions and criticism, which may direct the attention of government to particular branches of inquiry, to improvements in the mode of carrying them on, or in the form in which they are published.

It would be useless to attempt an enumeration of the various matters that are included in the province of statistics, but for the more convenient consideration of the subject we propose to divide it into—1, Historical statistics, or facts illustrative of the former condition of a state; 2, Statistics of population*; 3, of revenue; 4, of trade, commerce, and navigation; 5, of the moral, social, and physical condition of the people.

1. *Historical Statistics.*

The knowledge of the antient state of a country is obtained chiefly from its chronicles and histories. These are usually more minute in recording political events than in describing the state of the people either in regard to wealth or other circumstances. With such imperfect means it is the study of the historian to infer rather than discover the actual condition of a country in remote times. It is not often that we can find records of unquestionable authority containing the result of inquiries instituted by government; but when such exist, they are extremely valuable, and may be used by the statist in aid of political science with much effect. No country, perhaps, is more rich in such materials for statistical research than England, yet in the earliest periods of our history there were few occasions (as compared with modern practice) on which investigations of a general character were undertaken. Some of them however were so extensive as to merit particular notice.

The most antient statistical record in England is the Domesday-book’ of William the Conqueror. It contains the results of a minute survey taken by commissioners appointed by that king, and completed in 1086. Ingulphus, a writer of that age, states this survey to have been made upon the model of an earlier work of the same nature, ordered by Alfred, and called the ‘Roll of Winchester.’ No such record however has been discovered, and its existence at any time is doubted. It has been supposed, with some appearance of probability, that the ‘Dome-boc’ of Alfred, which is not a statistical survey, but the code of Saxon laws, may have been confounded, by reason of the similarity of name, with the later work called ‘Domesday. This supposition is confirmed by the fact that the latter was also called ‘Liber de Wintonia,’ and ‘Rotulus Wintoniæ,’ as the inquisitions, when taken, were sent to Winchester, and there entered in a register. This survey extended to the names of the owners of all lands in the reign of Edward the Confessor, and at the time of the survey; the number of tenants and serfs of different ranks and denominations, the divisions, quantity, tenure, and value of lands, whether pasture or arable; forests, parks, or vineyards; the number and value of mills, salt, iron, and lead-works, fisheries, and other property; and whether any advance could be made in the value. (*Introduction to Domesday-Book.*) So minute was the inquiry, that in some counties the number of young cattle, sheep, and working horses is stated, and even how many hogs the woods will support. (Kelham's *Domesday Book Illustrated*, p. 4.) ‘So very narrowly, indeed,’ says the Saxon Chronicle, ‘did he commission them to trace it out, that there was not a single hide nor a yard of land, nay, moreover (it is shameful to tell, though he thought it no shame to do it), not even an ox, nor a cow, nor a swine was there left, that was not set down in his writ.’ (Ingram's *Saxon Chronicle*, p. 289.)

The information thus acquired must have been of great importance at that time. The possessions of the crown were defined, the military strength of the country ascertained, its wealth, resources, and capacity for taxation exhibited to a conqueror. The record also served as a register of appeal in cases of disputed titles, which must have been very frequent after the changes effected in property by the Conquest. As such its evidence is still relied on, more particularly in claiming exemptions from tithes.

The ‘Hundred Rolls’ of Edward I. are worthy of notice, in connection with the early statistics of this country. During the reign of Henry III. the revenues of the crown had been diminished by various usurpations and encroachments, and the people had been oppressed by unlawful exactions. Edward, on returning from the Holy Land after the death of his father, immediately appointed commissioners to enquire into these abuses, who collected evidence of the true state of the possessions and rights of the crown, and of feudal and manorial dues throughout the country.

Another antient and memorable work is the taxation of Pope Nicholas IV. In 1288 that pontiff granted the tenths of all the benefices in England to Edward I. for six years, towards defraying the costs of an expedition to the Holy Land. In order that the full value might be collected, a taxation was ordered, which was completed in 1292. By this record all taxes were regulated until the survey generally known as ‘valor ecclesiasticus,’ made in pursuance of an act passed in the 26th Henry VIII. (1534). By this survey the precise nature and value of all ecclesiastical property of every description was ascertained and registered. All livings have since been assessed for the purpose of taxation at the value stated in this survey, or, as it is popularly called, ‘the king's books.’ In regard to the statistics of the church, it may be as well to add that in 1646 surveys of church lands were made by order of the Parliament, which at the Restoration were deposited in the Library of Manuscripts at Lambeth Palace, and have lately been copied for the House of Commons, and placed in their library; and that finally commissioners appointed in the reign of William IV. have reported the present value of every ecclesiastical dignity and benefice both in England and Ireland.

We have referred to these works as being examples of records expressly statistical; and will only add that there are many other interesting records from which illustrations of the antient statistics of Great Britain may be collected. Many of the most important of these have been made accessible to the public by the Record Commission. They are valuable in an historical point of view, as exhibiting the condition of our country, its sources of wealth, the direction given to its industry, the relations of different classes of the people to each other, and the state of particular institutions in past times. The works of contemporary writers have a peculiar charm in relating the events and circumstances of their own times: they carry us back to the age in which they wrote with a distinctness and reality not to be attained by those who compile history from the works of others. But there is still greater reality and truth in records collected in remote times for particular objects, not intended so much for posterity as for the very age to which they owe their existence, and of which they bear the stamp and character. Such records are not only instructive as the best materials for history, but afford ample scope for the inquiries and deductions of the political philosopher. Relics of former times, of much less pretension than records of the class we have been referring to, are often of great statistical value, and may be turned to good account by acute and diligent men. Of this nature are all statements of prices, of the value of monies, the income and expenditure of persons of rank and fortune, the wages of different descriptions of labour, the food and clothing used by the several classes of people, and how and whence obtained: all these and numberless other facts, when viewed in connection with certain laws and other circumstances existing at the time, are most instructive. The 'Household Book' of the 5th earl of Northumberland, at his castles of Wresil and Lekinfield, in 1512, is an interesting specimen of records of this character. Nor can we omit mentioning with pleasure three relics of antiquity lately published for the Roxburgh Club by Mr. Botfield, viz. 1, 'The Household Roll of Eleanor, Countess of Leicester,' A.D. 1265; 2, 'Accounts of the Executors of Eleanor, Queen Consort of Edward I.,' A.D. 1291; and 3, 'Accounts and Memoranda of Sir John Howard, First Duke of Norfolk,' A.D. 1462 to 1471. Contributions to our knowledge of this description of facts are most welcome to statists; and there are many sources from which they may yet be made. The 'Chronicon Preciosum' of Bishop Fleetwood shows in what abundance such facts may be collected; and the able 'History of Prices' by Mr. Tooke is a sufficient illustration of their importance to political economy.

2. *Population.*

One of the most obvious purposes to which statistics can be applied is that of ascertaining the population of a country, which is the foundation of its strength and resources. In very early times, when perhaps nearly every other branch of statistical knowledge was neglected, we find that pains were taken to learn the number of the people. In warlike nations it was indispensable to be acquainted with the number of fighting men that could be brought into the field; and as civilization developed itself, matters of civil administration and economy became involved in the inquiry.

The antient Egyptians appear to have taken great care in recording the number of their people. They had public registers, in which an exact enumeration of the inhabitants was entered. (Jomard, *Mém. sur la Population comparée de L'Egypte Ancienne et Moderne.*) These registers (ἀναγραφαί) were sacred, and were kept by the priests. Diodorus Siculus (i., 31), in stating the population of Egypt under the antient kings, alludes to these registers as his authority, as if they might have been consulted in his time, although he does not affirm that he had seen them himself. Unfortunately no trace of these records has been found, and they are rarely mentioned by antient authors; but that they did exist, enough has been said by them to leave no doubt. When this system of registration was first established we have no means of learning, but if it existed during the earlier dynasties of Egypt, it must be accounted unquestionably as the most antient of all recorded enumerations of a people; and the great antiquity of that interesting country, and the early age in which it had attained a high state of civilization, while nations that have since flourished had scarcely any existence, render it probable that no attempt at a census could have been previously made in any other part of the globe. China is the only country in which the antiquity of public chronicles or records kept by the priests would lead us to look for mention of censuses in an earlier age than those of Egypt; but although regular annals of all public events are said to have been kept without intermission since the reign of Yao (B.C. 2357), no enumeration is noticed of an earlier date than A.D. 609, in the reign of Yang-ti. (Du Halde, *Description de l'Empire de la Chine*, vol. i., p. 264; *Historical and Descriptive Account of China*, by Hugh Murray and others, vol. ii., p. 249.)

The sacred account of the census taken by King David, in the eleventh century B.C., is interesting. The king said to Joab, the captain of the host, 'Go now through all the tribes of Israel, from Dan even to Beersheba, *and number ye the people*, that I may know the number of the people.' 'And Joab and the captains of the host went out from the presence of the king to number the people of Israel.' When they had gone through all the land, they came to Jerusalem at the end of nine months and twenty days, and Joab gave up the sum of the number of the people unto the king; and there were in Israel 800,000 valiant men that drew the sword; and the men of Judah were 500,000 men.' (2 *Samuel*, xxiv.)

The census of the Romans was of a very extensive kind, and conducted in a manner that secured its accuracy. It was first established by Servius Tullius, the sixth king of Rome, about 576 B.C. Every head of a family was required to make a declaration before the censors of all his estates and possessions, his wife, children, and slaves. The census was generally taken every five years. A more perfect institution for acquiring knowledge as to the military strength of a country, and for purposes of taxation, could not have been devised. It appears also that there was a register of births and deaths, but only as regards persons liable to military service. The emperor M. Aurelius made a rule that all children should be registered by name within thirty days after their birth, but the provision apparently applied only to Rome. (Jul. Capitol., *M. Ant.*, c. 9.)

Most of the governments of Europe in modern times have taken pains to ascertain the population of their own dominions, and many have entered into the inquiry with great minuteness of detail.

In Great Britain there have been five complete censuses, viz. in 1801, 1811, 1821, 1831, and 1841. The population at earlier periods had indeed been ascertained by inference and estimate, as from the 'Domesday Survey;' from the accounts of persons liable to the poll-tax in 1377, and of houses paying the hearth-tax at the Revolution. The parish register returns of births and deaths, which were collected in 1801, as far back as 1700, and of marriages from 1754, also furnished the means of calculating to a certain extent the population at different periods during the last century, but no actual enumeration was taken by government previously to 1801. Since that time the censuses have shown the number of families and of males and females in each parish, distinguishing those employed in agriculture from those engaged in trade, manufactures, and handicraft. The parish register returns have also been continued, and in 1836 a complete civil registration of births, marriages, and deaths was established, from which the most accurate statistical results are anticipated. The law now requires every birth to be registered, with the following particulars, viz. the time and place of birth, the name and sex of the child, the name and surname of the father and mother, the rank or profession of the father, &c. In like manner every death is recorded, with the names, sex, age, and rank or profession of the deceased, together with the cause of death. All these particulars are entered by registrars appointed all over the country (of whom there are 2197), having certain districts assigned to them. They are under the control of superintendent registrars, who preside over larger districts conterminous with the Poor Law unions. These also are under the directions of the registrar-general in London.

Marriages are registered by clergymen of the established church, by registrars of marriages, who register marriages solemnised in their presence in registered places of worship, or in the superintendent registrars' offices. Certified copies of all the entries in these several registers of births, deaths, and marriages are transmitted to the general registrar, and preserved in his office. Indexes are there prepared, and an annual abstract of the births, marriages, and deaths is made up and laid before parliament. This system extends only to England and Wales.

In Ireland two excellent enumerations were taken in 1821 and 1831; and another in 1841, simultaneously with that of Great Britain.

In France censuses have been taken in 1791, 1801, 1806, 1821, 1831, and 1836, and will be repeated every five years. The adult males and females, divided into married or widowed, have been carefully distinguished from children and unmarried persons. Exact accounts have also been made of the births, marriages, and deaths, and comparisons instituted with a view to determine the increase of population and the rate of mortality. (*Rapport du Ministre de Commerce*, 1835.)

Enumerations have been made in the Austrian empire (the last of which was in 1834) of a very complete nature and official returns of births, marriages, and deaths are annually collected and published by the government.

The government of Holland took a census in 1838, in which the religious persuasions of the people were ascertained, and the numbers of each sect enumerated.

A valuable census was also taken in Belgium in 1836, with full details of the births, marriages, and deaths in town and country, and other materials for the advancement of statistical knowledge.

In Prussia the taking of the census forms part of the ordinary duty of the local police. It is done every third year, with elaborate classifications of age, sex, and religion, with a view to the administration of the laws relating to public instruction and military service.

In Sweden returns of the population are made by the clergy of each parish every fifth year, and arranged by the Table Commission. The clergy are also obliged to return annually the number of births and deaths in their parishes.

In Norway and Denmark also enumerations have been taken containing many particulars as to the condition of the people.

A recent census of Sardinia in 1838 is one of the fullest that has been made. The name of every person, as well as his age, occupation, place of birth, domestic condition (whether single or married), and religious profession was ascertained, and the information thus collected was abstracted and arranged in various tables. (*Journal of Statistical Soc.*, April, 1840.)

In other European states enumerations more or less complete have been made.

Population is the groundwork of the whole political structure of the federal government of the United States of North America; representatives and direct taxes being apportioned among the several states according to their respective numbers. It was accordingly directed in the first article of their constitution that an actual enumeration should be made within three years after the first meeting of the congress, and within every subsequent term of ten years. (*Constitution of United States*, Art. 1.) This census has since been regularly taken. The free white persons are distinguished from the free coloured persons and slaves, and their ages and occupations stated. The last census of the United States was taken in 1840.

Although the immediate object of enumerations has been political or fiscal, principles most important to the happiness and social improvement of mankind have been deduced from them. If no other benefit had been derived from statistical researches than a system of life-insurance and annuities, founded upon a knowledge of the average duration of life, tens of thousands will have had reason to regard the labours of statists with gratitude. From data limited in number and partial and defective in character, accurate tables of mortality could not be constructed. Every enlargement of statistical knowledge has been rapidly applied to the elucidation of the great problem of the average value of human life; but data more extensive and more minute are still required to perfect vital statistics. Mortality tables are constructed by taking the average of all classes of lives. It is notorious however that certain occupations are injurious to health, and tend to shorten life; while others are highly conducive to longevity. This fact should be taken into account in estimating the probable duration of the life of any person. For instance, persons in comfortable circumstances are likely to live long; while the labouring poor of crowded cities, living in ill-ventilated rooms, engaged perhaps in unwholesome employments, liable to frequent privation, and in many cases addicted to habits of intemperance, have a more limited chance of attaining an advanced age. A mortality table may strike a perfectly fair average of all classes, but the same law of mortality is clearly not applicable to each of these extremes. At present there are no sufficient data for such calculations, but the civil registration of births and deaths may eventually enable actuaries to determine the value of life in every great division of the people. The superior value of a female life, at a given time, as compared with a male life of equal age, has been established by the distinction of sexes maintained in our statistical inquiries as to population and births and deaths; and results not less important may be deduced from further distinctions and classification.

The circumstances of different countries are various, and the purposes for which they have taken censuses have been peculiar to each. Some had partially in view the illustration of vital statistics, but little uniformity can be expected where no means have been taken to effect it. It is not improbable that eventually most of the European states will seek the same information, in nearly the same way, and then instructive comparisons may be drawn. In the meanwhile it is important that whatever information is already possessed by foreign governments, with respect to their population, should be communicated. Much has already been obtained through British consuls, and for commercial purposes cannot be too highly prized. The actual commercial state of a country may be presented to view by statements of imports, exports, and consumption, but its capacity for improved commercial intercourse cannot well be estimated without a knowledge of its population.

3. *Revenue.*

The collection of facts concerning the revenue of a state is nothing more than a correct system of book-keeping in the various departments concerned in the receipt and issue of public money, and any neglect or failure in this respect is unpardonable. The mode of stating and arranging revenue accounts is a business of much intricacy, and from its importance demands great attention on the part of a government. An imperfect classification of the several heads of income and expenditure, a want of uniformity in the accounts of different departments or of the same departments at different periods, or an absence of well-devised enumerations and distinctions in detail, will defeat many of the objects for which public accounts are prepared. A government must know not only the total income of the state, but also the various sources from which it is derived; the productiveness of each tax, and of each class of taxes; the gross amount and the net amount received, with the items causing the difference; the charges of collection and other payments out of the income in its progress to the Exchequer; and the actual payments into the Exchequer (after all deductions) available for the purposes of expenditure. It is important that accounts containing such particulars should be uniform from year to year, for the purpose of comparison. For instance, where any alterations have been made either in the amount or in the mode of assessing or collecting a tax, the effect of such alterations upon the revenue can only be ascertained by comparing the produce of the tax before and after their enactment. Equal care is necessary in preparing accounts of expenditure. The classification of them will of course be determined in a great degree by financial circumstances peculiar to each country. It may be sufficient therefore to say that they should exhibit as faithful a statement of every description of outlay, whether on account of permanent charges, or varying and incidental expenses, as a merchant or banker would consider necessary in the management of his books.

In this country accounts are annually laid before parliament, which, in form and arrangement, may serve as favourable specimens of financial documents. Previously to 1797 the accounts were imperfect and very immethodical. In that year a committee of the House of Commons suggested new forms, which gave a more clear, detailed, and comprehensive view of the national resources than any that had been known before. The arrangement then adopted was continued till 1822, when further improvements were introduced.

These 'annual finance accounts' are divided into eight classes:—1, public income; 2, public expenditure; 3, consolidated fund; 4, funded debt; 5, unfunded debt; 6, disposition of grants; 7, arrears and balances; 8, trade and navigation. Each of these classes exhibit comprehensive abstracts of that branch of finance to which they relate; and appendices are affixed which contain numerous accounts in detail that could not conveniently form part of the general tables. Thus in the class account the whole produce of the customs is found, together with that of other taxes; and in an appendix the produce of each article liable to customs duties is added.

In addition to these accounts numerous returns concerning each branch of revenue and expenditure, and illustrative of every theory and experiment in finance, are continually ordered by parliament. These contain a mass of information unequalled perhaps in the official records of any country. They have been digested and systematised from the year 1820, and collected into very valuable volumes by the statistical department of the Board of Trade; by whom also annual volumes are published, continuing to the latest period the same information. To these volumes we shall have occasion to refer more fully.

The financial accounts of France have been the subject of investigation by Dr. Bowring, who was deputed for that purpose by the British government; and his Reports would lead us to form a very high estimate of their present condition. He says:—'The public accounts of France have, from the year 1808, been undergoing a succession of changes, all tending to unity and similarity of form in the different departments, and to the ultimate centralization of the whole in the department of the Treasury. These objects have been at length wholly effected by the introduction of a number of gradual improvements; and at this moment (1831) the books of the Ministry of Finance constantly present as complete a table of the financial situation of the country as the best regulated commercial establishment offers of its own transactions. M. Lafitte assured me, and the authority of the minister of finance is doubly valuable from his previous experience as a man of business, that he believed the present system was scarcely susceptible of melioration; that he had found the machinery complete, and its working both easy and efficient.' (1st *Rep.*, p. 3.)

The whole of this system is explained and illustrated in detail in these Reports. In the Second Report there is also a very interesting historical notice of the financial condition of France in former times, of the confusion of the accounts, and the complicated evils arising from a want of system. In this respect France may stand as an example to other nations, to show the indispensable necessity of care in the public accounts and attention to financial statistics.

Dr. Bowring has likewise investigated the public accounts of the Netherlands, which he has analysed in a Report in 1832. He states:—'On a general survey of the public system of accounts in Holland, though it cannot be deemed entitled to unqualified praise, yet many of its parts are worthy of approval and adoption.' (*Rep.*, p. 143.) With respect to Belgium, the recent revolution had caused disorder in all the financial departments of government. Since that time however great attention has been paid to all departments of statistics; and the published accounts of Belgian revenue and expenditure now appear sufficiently clear and detailed.

4. *Trade, Commerce, and Navigation.*

The fullest information that can be obtained of the state of trade and navigation should be collected by a government and published for the benefit of the people. The more publicity that is given to every description of statistical knowledge, the more productive will it be of good to the state, by stimulating inquiry and enlarging the circle of political intelligence; but in this branch of statistics it is more peculiarly necessary to lay before the people every information which may enable them to prosecute their commercial enterprises with judgment and effect. For this purpose the last class of the annual finance accounts alluded to above are of little or no value; but the returns ordered by parliament from time to time comprise much valuable information, though of an irregular description, and often for broken periods. Committees of both Houses are also in the habit of calling for documents to illustrate the subjects of their investigations, from which defects in other returns may often be supplied, and which are of themselves very important. These however have for the most part been 'framed so as to suit the passing occasion, or to illustrate the particular views of individuals. Returns of the same nature have for instance been made sometimes to comprehend the whole of the United Kingdom, and at other times to restrict the information to Great Britain. Occasionally too a link is wanting, without which it is impossible to arrive at any satisfactory conclusion upon the subject with which it is connected.' (*Preface to Statistical Tables of the Board of Trade.*) To remedy these defects, the statistical department of the Board of Trade was established. It began its labours by arranging and abstracting the information already distributed through the Parliamentary Papers, and by supplying defects and omissions. When that was accomplished, the collection and arrangement of every statistical fact that could be obtained through any department of government was commenced, and has been continued annually since 1833. Amongst the most important statements are those 'which exhibit the general view of our commercial intercourse with every part of the world, particularising the imports from and exports to each foreign country, as well as the trade between the United Kingdom and its colonies and dependencies.' (*Ibid.*) The statistics of foreign countries form a valuable addition to our own. The state of the whole world would be laid out before a merchant to direct his operations, if the statistics of every country could be presented to him in as perfect a form as the British government have prepared those relating to the United Kingdom. Pains have been taken to supply this knowledge. Series of questions have been directed to British consuls abroad, who have availed themselves of the means which their connection with foreign governments afforded to furnish the information required. The importance of this branch of statistics is so strongly felt, that doubtless no trouble will be spared in extending it as much as possible. Besides the ordinary means of collecting information concerning foreign countries by corresponding with consuls, commissioners have occasionally been sent abroad to seek such knowledge on the spot. In this way we have come into possession of facts that could not have been obtained by other means. Valuable reports have been printed on our 'Commercial Relations with France;' on the 'Commerce and Manufactures of Switzerland;' on the 'Statistics of Tuscany, Lucca, the Pontifical and Lombardo-Venetian states, with a special reference to their commercial relations;' on the 'Prussian Commercial Union;' on 'Egypt and Candia;' and on the 'Commercial Statistics of Syria.'

One excellent mode of gathering together the statistics of foreign states requires to be diligently carried out. We have ministers accredited to the governments of every civilised country, through whom an interchange of all official documents of a statistical character might be effected. The principle of this plan has indeed been partially recognised in the case of France, Belgium, and Würtemberg, whence collections have been forwarded to England, in exchange for British Parliamentary Papers: but a regular system of interchange is needed. Whatever information is possessed by a foreign government should be immediately transmitted to England; and when reduced to an intelligible and concise form, should be published with the other documents as 'Foreign Statistics.'

The trade of our colonies with this kingdom, with foreign countries, and with one another, forms another important branch of statistical inquiry, which was imperfectly and irregularly attended to before 1832. As all the official persons in the colonies are servants of the British government, nothing was wanting but a system of transmitting regularly such accounts as were called for. This system is now in full operation, and our colonial statistics of commerce are perhaps as complete as need be desired.

In the arrangement of such masses of facts, great care is necessary to avoid confusion or delay. Already the accumulation of materials is such that a large volume is published annually by the Board of Trade; and the digesting it and preparing it for press is a work of such labour that it is more than two years in arrear; that is to say, when published it refers not to the preceding year, but to two years back. The expediency of dividing this work into consecutive parts, to be published when prepared, would be worth considering. The time required for obtaining information from the colonies has made it necessary to publish it in a separate part; and if further subdivisions could be made of a similar kind, parts of the work need not wait for the completion of the whole.

The statistical compilations of the Board of Trade have not in any degree superseded the custom of moving for returns in Parliament. Documents of all kinds are constantly ordered, as before, and the information contained in them is of great value; yet the want of system which has been alluded to above, continues to detract from their value. Measures for ensuring uniformity and correctness by means of official inspection have already been under consideration, and the importance of the object leaves little doubt that they will shortly be carried into effect.

Many of the tables published by the governments of France and Belgium, illustrative of the condition of these countries in reference to commerce, deserve much praise, both on account of the variety of facts contained in them, and of the clearness and simplicity with which they are arranged.

5. *Moral, Social, and Physical Condition of the People.*

The statistics of revenue and of commerce fall directly within the cognizance of the executive departments of government, and may be collected in the ordinary course of business. When a system is established, the working of it is little more than mechanical. But inquiries into the moral, social, and physical condition of a people are, for the most part, occasional and extraordinary, and usually originate with the legislature. In this country there are two modes of conducting such inquiries, viz. by Parliament itself, or by commissioners appointed by the Crown. When the former is preferred, the labour is usually confided to a committee, who examine witnesses, and call for any papers that may be required by them. Matters that need personal investigation on the spot cannot be conveniently undertaken by Parliament, and commissioners are then entrusted with the duty. The Reports of Parliamentary Committees and Commissions furnish the chief materials for legislation. The subjects to which they relate are as various as are the interests and circumstances of a great people; for the eye of the legislature is upon all things. To attempt any examination would be useless; but it may not be uninstructive to notice briefly as examples some classes of subjects which have been investigated.

To begin with the religious condition of the people. In 1834 an inquiry into the means of religious instruction in Ireland was undertaken. Commissioners ascertained on the spot the number of persons in each parish in communion with the Established Church; the number of resident and non-resident ministers; the periods at which divine service was performed, and the average number of persons usually attending; the number of places of worship beonging to Roman Catholics, Presbyterians, and Protestant Dissenters, the number of ministers officiating in each, the proportion of the population belonging to each of such peruasions, the periods at which divine service is performed in each of their chapels, and the average number usually attending; the means of education, the number and descripion of schools, and the kind of instruction afforded; and lastly, whether adequate provision was made for the religious nstruction and general education of the people of Ireland. The manner in which this information was collected is fully xplained by the commissioners in their Report.

A commission has also been appointed to ascertain the xtent of church accommodation in Scotland. The revenues of the church in England and Ireland have been fully nvestigated by commissions. Though in Ireland the number of persons of each religious persuasion has been disovered, no attempt to ascertain this fact in England has et been made, and it is perhaps questionable whether much dvantage would be derived from such an inquiry. In 1830, return of the number of churches, chapels, and places of worship of each religious denomination was sought for; but he answers were so confused and unintelligible, that the county of Lancaster alone was thought perfect enough to e printed. Upwards of fifty sects were mentioned in hem. In the censuses of Prussia, Belgium, and Sardinia, he religious persuasion of each person has formed one of he series of questions to which answers were obtained. The necessity of such inquiries will depend upon the pecuar circumstances of each country with respect to church overnment, and the laws relating to religion. Where any gislative or executive object is in view, the inquiry may e made with advantage; but without any such object, mere uriosity perhaps would scarcely be thought to justify it.

The state of education has of late years occupied the ttention of most of the countries of Europe. The Prussian compulsory system of state education involves the most exensive knowledge as to its observance. The classification f ages to which we referred in speaking of their census is dopted in furtherance of the general system of enforcing he attendance of children at schools and the contribution f their parents to the expenses of their support. This ystem forms part of the ordinary administration of the ate, and the statistics of education are therefore collected ot by any special agency, but by simple registration.

The government of France, having a superintendence over he schools, and an organised system of instruction throughut the whole kingdom, is enabled to collect systematically uthentic accounts relating to education. There is a minister f public instruction, and under his authority twelve inpectors visit the several departments and ascertain the tate of education. The reports of the minister are geneally of an extremely interesting character, and illustrate he operations of the educational system in every point of iew.

As there is no national system of education in this ountry under the superintendence of government, our nformation as to the existing state of education has been collected not systematically, but by special inquiries. In 1833, on the address of the House of Commons, circulars were sent to the overseers of every parish in England and Wales desiring answers as to the number of schools of every description, the number, sex, and age of scholars, and from what funds the schools were supported, with other particulars. An abstract of their answers was prepared and printed. In the following year a return somewhat similar with regard to Scotland was obtained from the presbyteries; and in 1838 a committee of the House of Commons circulated a number of queries, and obtained answers from a large proportion of the schoolmasters in Scotland relative to the system of administration and instruction pursued in their schools; the number, sex, and age of scholars, the books used, the salary of the schoolmaster, the amount of school fees, &c. These answers were abstracted and published in 1841. Parliamentary committees have also at different times taken evidence upon the subject of education in England and Scotland; nor would it be irrelevant to mention the extensive investigations of the Charity Commissioners, which embraced, among other charities, most educational establishments enjoying any endowment or bequest. [SCHOOLS, ENDOWED.] In Ireland the means of general education formed part of the inquiries of the Commissioners of Public Instruction in 1834-5, to which we have already referred.

The collection of facts concerning crime is simply a matter of registration in the several tribunals which administer justice. In the classification and arrangement of them, much light may be thrown upon the operations of the various laws for the prevention and punishment of offences; and thus, in forming criminal tables, the distinctions recognised by the law should be as nearly as possible adhered to. The state of crime in Great Britain is annually exhibited in tables. The offences are divided into six classes, under each of which the particular crimes are specified; together with the number of persons committed for trial or bailed; whether convicted or acquitted; the punishment if convicted, and the causes of acquittal if acquitted; and the age, sex, and degree of instruction of the persons committed for trial or bailed. Uniformity is preserved from year to year, and thus excellent means of comparison are afforded, especially in the event of any alterations in the law.

The Metropolitan Police Commissioners also publish abstracts of the state of crime within their district, observing a similar classification of offences, and distinguishing the profession or trade of all persons charged with each description of offence.

In France elaborately classified criminal tables are published annually, which state the particulars included in the English tables, but arranged in a different manner, and distinguish the professions of the accused, and whether they inhabit rural or city communes. To these are prefixed an explanatory Report by the minister of justice.

The criminal tables prepared by the Belgian minister of justice are very simple and well arranged. Offences against the person and against property are separated, and the number of cases in which each offence has been committed is stated under these divisions upon opposite sides of the page. The number of crimes of which the authors are unknown; the number of persons charged, and convicted or acquitted, with the punishments awarded, form columns in these tables, and at the top of the pages referring to each province the population of the province is printed in a conspicuous type.

The most extensive inquiries perhaps that have been undertaken with reference to the social and physical state of the people of this country have been those connected with the administration of the poor laws. They have been conducted both by committees and commissions, and have brought to light the whole social state of the poorer classes. In Ireland the investigations into the condition of the people were more extensive than those instituted in England, and the Reports of the commissioners embody more statistical information upon that country than can easily be found in any other works with which we are acquainted. We will only add that information has been collected by the same means concerning the condition of children and young persons employed in factories, of hand-loom weavers, and of persons engaged in various branches of industry.

STA'TIUS, P. PAPI'NIUS, a Roman poet, born at Naples, A.D. 61. His father was an eminent grammarian and poet, and was in consequence much distinguished by the patronage of Domitian. The son was educated at

Rome and his early genius met with like encouragement from the emperor; he gained the prizes in the poetical contests held at that time at Alba and elsewhere. His popularity is described by Juvenal (*Sat.*, vii., 82). His tragedy or poem of 'Agave' has not been preserved; neither is the poverty of Statius, which is spoken of by Juvenal, noticed or accounted for elsewhere, though such inconsistencies of circumstance are not unusual in the lives of poets. In the year 80 A.D., according to Dodwell (*Annales Statiani*), he married Claudia, a widow, of whom he makes frequent and affectionate mention in his writings: having no issue by her, he adopted a son. His great success drew upon him the jealousy and ill-will of his rivals, among whom Martial is thought to allude to him under the name Sabellus, and to have slightingly omitted his name while making honourable mention of his contemporaries generally.

When he was no longer able to maintain his superiority in the poetical contests, Statius withdrew to the retirement of Naples, where he died, A.D. 96. He wrote—1, 'Sylvæ,' a collection of 32 poems distributed in 5 books, on various subjects, such as passing events or passing thoughts would suggest. They are more of a lyric than of an epic character, and are written chiefly in hexameters, and occasionally in the alcaic, sapphic, and other metres. The last book appeared in the last year of the author's life.

2, 'Thebais,' an epic poem in 12 books, giving an account of the Theban war between Eteocles and Polynices: in this work he has borrowed much from Greek sources, and in particular from the 'Thebais' of Antimachus.

3, 'Achilleis,' an unfinished epic poem in 2 books, the further progress of which was arrested by the death of the poet.

The 'Sylvæ' are the most interesting of the poems of Statius. In them we find examples of trifling subjects treated with lyric playfulness of fancy, the poet's thoughts appear in the easy garb of private life, and his domestic feelings and affections are unaffectedly revealed (see the beautiful address to his wife, 'Sylvæ,' iii. 5). Many curious particulars illustrative of the manners and way of life of the Romans of that time may be gathered from this work.

As an epic poet, Statius belongs to a school of later Roman writers, the successors and imitators of Virgil, and, like them, he is characterised by a learned obscurity of allusion, a tasteless and unskilful use of metaphor, and a strained yet feeble mode of expression, masking in pompous language the simplest thoughts, and seeking to surprise the reader by rhetorical artifice, rather than to call up the feelings which true poetry suggests. The few facts in the life of Statius are nearly all furnished by passages in his own poems, which are quoted at length by Crusius, 'Lives of the Roman Poets,' i., 12mo., and the principal dates are fixed by Dodwell, 'Annales Statiani:' other authorities quoted by Baehr, 'Geschichte der Römischen Literatur,' are, 'Crinit., 'De Poett. Latt.;' Lil. Gyrald., 'De Latt. Poett. Diall. IV.;' Voss, 'De Poett. Latt.;' Funcc., 'De imminent L. L. senectat.;' Fabricii 'Bibl. Lat.,' ii.; 'Saxii Onomast.,' i. 273. The principal edition of Statius are: Edit. princ., 1470, Venet., 1483, fol.; Bernartius, Antwerp, 1595; ed. Fr. Tiliobroga (Lindenbrog), Paris, 1600, 4to.; rec. Crusius, Paris, 1618, 4to.; J. Fr. Gronovii, Amstel., 1653, 24mo., cum comment. ed. F. Hand., Lips., 1817, 8vo.

STATUARY; STATUE. [Sculpture.]

STATUTE. Bills which have passed through parliament and received the royal assent become acts of parliament [Bill in Parliament], and are sometimes, though not often, spoken of collectively as forming the body of statutes of the realm. But a more restricted application of the word is that generally in use, by which private acts of parliament [Bill in Parliament] are excluded, and even public acts when their purpose is temporary and they soon lose their efficiency. The application is still more restricted when the measures of the early parliaments are the subject in question, there being many acts passed and having received the royal assent which are to all intents and purposes of the class of public acts and to be found at large on the Rolls of Parliament, which are not accounted statutes in the sense in which that word is ordinarily used.

No strict and proper definition can however be given of those results of the deliberations in parliament to which the king has signified his assent, which are now called the statutes of the realm, and it would seem that we are thrown upon this mode of distinguishing them from other enactments of early times—that they were at a very remote period separated from the rest, written in books apart from the rest, and received by the courts of law as of co-ordinate authority with the antient customs of the realm.

It may seem also that they have, with very few exceptions, a more general and extended bearing than the other public acts which are found upon the rolls of parliament.

Three volumes, preserved in the court of Exchequer, and now in the custody of the Master of the Rolls, contain the body of those enactments which are called statutes. One volume contains the statutes passed before the beginning of the reign of Edward III.; and the other two, those from 1 Edward III. to 7 Henry VIII., all very fairly written. These may be considered as the manuscript of the early statutes of superior dignity, if not of superior antiquity as to the earlier portions, to the many similar collections which are to be found in the libraries of the inns of court, of the universities, of the British Museum, and in some other depositaries public and private. These numerous manuscript copies of the statutes are in substance pretty nearly the same, though some of these collections contain statutes which are not admitted into others. These books are not considered in the light of authorized enrolments of the statutes. For the authentic and authoritative copies, if any question arises, recourse must be had (1) to what are called the statute rolls at the Tower, which are six rolls containing the statutes from 6 Edward I. to 8 Edward IV., except from 8 to 25 Henry VI.; (2) to the inrolments of acts of parliament which are preserved at the Rolls chapel from 1 Richard III.; (3) to exemplifications and transcripts with writs annexed, signifying that they were transmitted by authority to certain courts or other parties, who were required to take notice of them, of which many remain in the Exchequer and elsewhere; (4) in those since 12 Henry VII., to the original acts in the parliament office; (5) the rolls and journals of parliament; (6) the close, patent, fine, and charter rolls at the Tower; on which statutes are sometimes to be found.

With the parliament of the reign of Richard III. began the wholesome practice of printing, and in that manner publishing, the acts passed in each session. This followed very soon on the introduction of printing into England. Before that time it had been a frequent practice to transmit copies of the acts as passed to the sheriffs of the different shrievalties to be by them promulgated. And the practice of printing the sessional statutes has continued.

Before the first of Richard III. the aid of the press had been called in to give extended circulation to the old statutes. Before 1481 it is believed that an abridgment of the statutes was printed by Lettou and Machlinia, which contains none later than 33 Henry VI., 1455. To the next year is assigned, by those who have considered this subject, a collection, not abridged, from 1 Edward III. to 22 Edward IV. Next to these in point of antiquity is to be placed a collection printed by Pynson about 1497, who also, in 1508, printed what he entitled 'Antiqua Statuta,' containing Magna Charta, Charta de Foresta, the Statutes of Merton, Marlbridge, and Westminster primum and secundum. This was the first publication of those very early statutes.

In the reign of Henry VIII. the first English abridgment of the statutes was printed by Rastall; and during that reign and in the succeeding half century there were numerous impressions published of the old and recent statutes in the original Latin and French, or in English translations. Barker, about 1587, first used the title 'Statutes at Large.'

In 1618 two large collections of statutes, ending in James I., were published, called Rastall's and Pulton's. Pulton's collection was several times reprinted with additions.

In the eighteenth century an edition, in six folio volumes was published by Mr. Serjeant Hawkins in 1735, containing the statutes to 7 George II. Cay's edition, in 1758, in the same number of volumes, contains the statutes to George II. Continuations of these works were published as fresh statutes were passed; and another work in 4to., of the same kind, was begun in 1762, well known by the designation of Ruffhead's 'Statutes at Large.' Pickering's edition is in 8vo., and ends with 1 George III.

None of these collections had ever been published by authority of the state, and though able men had been employed upon them, they have been thought by many inquirers not adequate to the dignity and importance of the subject, and to be liable moreover to some serious objections. And this led a committee of the House of Commons, who, in 1800, were appointed to inquire into the state of the Public Records, to recommend, among other things, that 'a complete and authoritative edition of all the statutes should be published.' When the commission was appointed for carrying into effect the recommendations of this committee, they proceeded to the execution of this project; and finally, between the years 1810 and 1824, they produced, in a series of large volumes, a critical edition of the statutes (including the early public charters), ending with the close of the reign of Queen Anne. This is what is now considered the most *authentic* edition of the statutes, and it is supplied with a valuable index. It forms ten folio volumes. In the large introduction to that work there is a more particular account of the former editions of the statutes and of the means for making such a work as this complete.

STATUTES OF LIMITATION. There appear to have been no times limited by the common law within which actions might be brought; for though it is said by Bracton (lib. 2, fol. 228), that, 'omnes actiones in mundo nfra certa tempora limitationem habent;' yet, with the exception of the period of a year and a day, mentioned by Spelman (*Gloss.*, 32), as fixed by the antient law for the heir of a tenant to claim after the death of his ancestor, and for the tenant to make his claim upon a disseisor, all the limitations of actions in the English law have been established from time to time by statute. Certain remarkable periods were first fixed upon, within which the cause of action must have arisen. Thus in the time of Henry III., he limitations in a writ of right, which was then from the ime of Henry I., was by the Statute of Merton, c. 8, reduced o the time of Henry II.; and by the Statute of Westminser, 1, c. 8, the period within which writs of right might be sued out was brought down to the time of Richard I. (Co. Lit., 114, b.)

I. As to limitations of actions and suits relating to real property.

1. And first of limitations as to land and rent generally.

By the 4 Hen. VII. c. 24, a fine with proclamations was made a bar to all persons having rights of entry at the ime of the fine being levied, and not under any disabilities, if they did not claim within five years after proclamaion made; and to persons under disabilities, if they did not claim within five years after the removal of their disabiliies; and to all persons not having present right of entry, if hey did not claim with five years after their right of entry accrued, except they were under disabilities, and then within five years after the removal of their disabilities.

The first general statute establishing regular periods for he limitation of actions relating to land was the 32 Hen. VIII., c. 2, whereby a writ of right on the seisin of an ancesor was confined to sixty years, and a possessory action on the eisin of an ancestor to fifty years, and no real action, droitural or possessory, could be maintained by any person on his own seisin after a lapse of thirty years; formedons n reverter and remainder were required to be sued within fifty years; and it was enacted that no avowry or cognizance should be made for any rent or service after fifty years from the seisin of the ancestor or any other person.

By the 21 Jac. I., c. 16, the period for all writs of formedon was limited to twenty years; and it was enacted generally that no person should make entry into any lands but within twenty years next after his right of entry accrued. This act contained a saving of the right of entry of persons who at the time when such right first descended or accrued were minors, *femes covert*, *non compotes mentis*, persons imprisoned or beyond the seas, and their heirs, provided they made entry within ten years after the removal of their respective disabilities.

By the 10 and 11 Wm. III., c. 14, it was enacted that no writ of error for reversing a fine, recovery, or judgment should be brought after twenty years.

By the 4 Anne, c. 16, § 15, it was enacted that no claim or entry made of or upon lands should be effectual to avoid a fine levied with proclamations, or be sufficient within the statute 21 Jac. I., c. 16, unless an action were commenced within one year of such entry or claim, and prosecuted with effect.

By the 9 Geo. III., c. 16, the right of the crown to sue or implead for any manors, lands, or other hereditaments (except liberties or franchises) was limited to sixty years. Before this act, the rule that *nullum tempus occurrit regi* was universal; and it still prevails as a maxim of law except where abridged by statute. The same maxim applies to the duchy of Cornwall, which, though it vests in the crown from time to time, so long as there is no eldest son of the sovereign, or other person entitled to the dignity, is not within the above statute.

The next statute upon this subject is the important act of the 3 and 4 Wm. IV., c. 27, by which great changes were made in the remedies for trying the rights to real property, and which embodies the greater part of the present law of limitations relating thereto.

In order to understand this act, it is necessary to advert to the definitions of the words 'land,' 'rent,' 'person through whom another claims,' and 'person,' contained in the first section. The word 'land' extends to 'manors, messuages, and all other corporeal hereditaments whatsoever, and also to tithes (other than tithes belonging to a spiritual or eleemosynary corporation sole), and also to any share, estate, or interest in them or any of them, whether the same shall be a freehold or chattel interest, and whether freehold or copyhold, or held according to any other tenure;' and the word 'rent' extends 'to all heriots and to all services and suits for which a distress may be made, and to all annuities and periodical sums of money charged upon or payable out of land (except moduses or compositions belonging to a spiritual or eleemosynary corporation sole);' and the 'person through whom another person is said to claim' means 'any person by, through, or under, or by the act of whom, the person so claiming became entitled to the estate or interest claimed, as heir, issue in tail, tenant by the curtesy of England, tenant in dower, successor, special or general occupant, executor, administrator, legatee, husband, assignee, appointee, devisee, or otherwise; and also any person who was entitled to an estate or interest, to which the person so claiming, or some person through whom he claims, became entitled as lord by escheat;' and the word 'person' extends 'to a body politic, corporate, or collegiate, and to a class of creditors or other persons, as well as an individual.' There seems reason to think that the word rent here, and also in sect. 42 of the act, refers to rents charged upon land only, and not to conventional rents payable by tenants to their landlords (*infra*, sect. 42). It has been determined that turnpike-road trusts are not comprised in this section, and are consequently not affected by subsequent enactments. (3 Beav., 22.)

By section 2, no person can make an entry or distress, or bring an action to recover any land or rent, but within twenty years after the right to make such entry or distress, or bring such action, accrued to the claimant, or some person through whom he claims. The action for rent here spoken of is the action of ejectment. The action for debt or covenant for rent reserved, belongs to personal actions, and will be afterwards considered. It has been decided under this section, and with reference to the next, that a person claiming an annuity charged on land, under a will, who has never received his annuity, is barred by it, unless he bring his action within twenty years of the death of the testator. (8 Bing., N. C., 544.)

By section 3, the right to make an entry or distress, or bring an action to recover any land or rent, is to be deemed to have accrued at the times following:—(1) When the person claiming, or some one through whom he claims, has been in possession of the rents and profits of such lands, and has been afterwards dispossessed or has discontinued such possession or receipt, the right is to be deemed to have accrued at the time of such dispossession or discontinuance of possession, or at the last time when such rents or profits were received. (2) When the person claiming claims as being entitled, immediately upon the death of some person deceased, who died in possession, the right is to be deemed to have accrued on the death of that person. (3) When the person claiming claims under some grant, appointment, or assurance, by some instrument (other than a will) to him, or some person under whom he claims, from a person who was, in respect of the same estate, in possession or in receipt of the rents and profits of the land or of the rent, when no person entitled under the instrument has been in such possession or receipt, the right is to be deemed to have accrued at the time at which the person claiming, or the person through whom he claims, became entitled by virtue of such instrument. (4) When the estate or interest claimed has been in reversion or remainder, and no person has been in possession or in receipt of the rents and profits in respect of such future interest, the right is to be deemed to have accrued when such estate or interest became an estate or interest in possession. (5) And when the estate or interest is claimed in respect of a forfeiture or breach of condition, the right is to be deemed to have accrued when the forfeiture was incurred, or the condition broken. (Sect. 4) But when such right by reason of any forfeiture or breach of condition, first accrued in respect of an estate or interest in reversion or remainder, and the land or rent has not been recovered by virtue of such right, the right to make an entry or distress, or bring an action, is to be deemed to have accrued at the time when such estate or interest became an estate or interest in possession, as if no such forfeiture or breach of condition had happened. (Sect. 5) And the reversioner is to be considered as having a new right, commencing from the time of the estate or interest vesting in possession by the determination of the prior estates, notwithstanding he, or some person through whom he claims, may at any time previously to the creation of the estate which has determined, have been in possession or receipt of the rents and profits of such land or of such rent.

An administrator for the purposes of this act is to claim from the death of the intestate (sect. 6). This section removes, for the purposes of the act, that distinction which existed, under the old law, between executors and administrators, by which the right of the former was considered to commence from the death of the testator, and that of the latter from the grant of administration.

The right of a person claiming subject to a tenancy at will, or of the person through whom he claims, is to be deemed to have accrued either at the determination of the tenancy, or at the expiration of one year from the commencement of the tenancy; but no mortgagor or cestuyque trust is to be considered a tenant at will to his mortgagee or trustee within the meaning of the clause (sect. 7).

The right of a person claiming subject to a tenancy from year to year, or other period, without any lease in writing, or of the person through whom he claims, is to be deemed to have accrued at the determination of the first of such years, or other periods, or at the last time when any rent payable in respect of such tenancy has been received (which shall last happen) (sect. 8).

Where rent amounting to 20*s.* and upwards, reserved by a lease in writing, has been wrongfully received, and no payment of such rent has afterwards been made to the person rightfully entitled thereto, the right of the person entitled is to be deemed to have accrued at the time at which the rent reserved by such lease was first so wrongfully received (sect. 9).

The three last sections alter the old rule of law, that the mere receipt of rent by a stranger was not evidence of adverse possession against the legal owner, for it was no disseisin, though the stranger made a lease-reserving rent, unless he made a actual entry.

No person is to be deemed to have been in possession merely by reason of having made an entry (sect. 10). This clause will have the effect of shortening the time within which an ejectment can be brought within the 21 Jac. I., c. 16, and the 4 & 5 Ann., c. 16, s. 14; for by those statutes a party might enter just before the expiration of the 20 years, and commence his action within one year after.

No right of entry or distress, or of bringing an action, is to be preserved by continual claim upon or near any land (sect. 11). This alters the old law, whereby an actual entry made every year and day, by the person entitled, or his attorney, was sufficient to prevent the right of entry being tolled by descent or barred by the statute of limitations. (Litt., ss. 414, 415.)

The possession or receipt of rents and profits of one or more coparceners, joint-tenants, or tenants in common, of the entirety, or of more than his or their undivided share or shares, for his or their own benefit, or the benefit of any person or persons other than the person or persons actually entitled to the other share or shares, is not to be deemed the possession of such last-mentioned person or persons, or any of them (sect. 12). This alters the old rule, that the entry of one coparcener, joint-tenant, or tenant in common, was the entry of all, so as to prevent the statutes of limitation from attaching.

The possession of the younger brother or other relation of the person entitled as heir is not to be deemed the possession of the person entitled as heir (sect. 13). This abolishes the law of *possessio fratris*, under which it was held that if a man seised of lands had two children, and the younger son or sister entered by abatement, without the heir ever having been in possession, the statute did not operate against the heir, on account of the intendment of law that the younger had entered claiming under the same title of heir to the father.

The enactments contained in the above-mentioned sections, from the 3rd to the 13th inclusive, are intended to remove one of the great difficulties attending the investigation of titles under the old law, namely, the determination of the time at which adverse possession commenced. Whether possession was adverse or not, was frequently a question of fact to be determined by a jury, and therefore necessarily subject to great uncertainty, and the question was often further embarrassed by the several rules of law before mentioned, as well as by the principle formerly laid down, that possession, rightful in its commencement, did not become wrongful or adverse as against the true owner by being continued beyond the period at which the right of the party in possession ceased.

An acknowledgment in writing of the title of any person actually entitled to any land or rent, given to him or his agent, signed by the party in possession or receipt of the rents and profits, or of the rent, is to be equivalent to the actual possession of the rent and profits, or of the rent, and the title to such land or rent is to be deemed to have accrued at the date of such acknowledgement (sect. 14). Formerly parol acknowledgements were admitted to have this effect. The requiring an acknowledgement in writing is adopted by analogy to the statute 9 Geo. IV., c. 14, as to actions on simple contract, and to the statute 3 & 4 Will. IV., c. 42, s. 5, as to actions on specialties. As the possession of one coparcener, joint tenant, or tenant in common is not the possession of another (sect. 12), so as to take the case out of the statute, it seems to follow that an acknowledgement in writing made to or by one coparcener, joint tenant, or tenant in common, will not be evidence to establish or impugn the title of another.

Persons under the disability of infancy, coverture, idiotcy, lunacy, unsoundness of mind, or absence beyond seas, or persons claiming under them, notwithstanding the period of twenty years shall have expired, are to be allowed ten years after the person to whom the right first accrued has ceased to be under any disability or has died (which shall have first happened) (sect. 16). It is to be observed that imprisonment is not a disability under this act, as it was under 21 Jac. I., c. 16, s. 2.

But no entry, distress, or action is to be made or brought by any person under disability at the time of his right accruing, or by any person claiming under him, but within forty years from the time at which the right first accrued, though such disability should have continued during the whole of such forty years, or although the term of ten years from the time at which the person to whom the right first accrued ceased to be under any disability, or died, should not have expired (sect. 17).

In the case of a person under disability at the time that his right accrued dying under such disability, no further time beyond the said term of twenty years next after the right accrued, or the said term of ten years after the death of such person, is to be allowed by reason of the disability of any other person (sect. 18).

No part of Great Britain and Ireland, nor the adjacent islands, is to be deemed beyond seas, within the meaning of the act (sect. 19).

It was held upon the construction of 21 Jac. I., c. 16, s. 2, that the saving in that clause extended only to the persons upon whom the right first descended, so that when the statute once began to run as against him, no subsequent disability could prevent its operation; but that the right of entry subsisted for ten years after the cessor of the disability or death of the person to whom the right first accrued, however long that disability might have continued. The present statute confirms the first rule, and establishes the limit of forty years as to the second. It has been held that where no account could be given of a person within the exception of the statute of James I., he is to be presumed to be dead at the end of seven years from the last account of him 6 East, 84); but there is no presumption of law as to the time at which his death actually took place, which is a question for a jury to determine upon the facts of the case (1 Stark, *N. P. C.*, 121; 2 Nev. and M., 219.)

Where the right of any person to an estate in possession has been barred, and such person has at any time during the period of limitation been entitled to any other estate, interest, right, or possibility in reversion, remainder, or otherwise, in or to the same land or rent, no entry, distress, or action is to be made or brought in respect of such estate, &c., unless in the meantime such land or rent has been recovered by some person entitled to an estate, interest, or right which had been limited or taken effect after or in defeasance of such estate or interest in possession (sect. 20). This is an alteration of the old law, under which a person might have availed himself of a right of entry at any time within twenty years after it accrued, although in the meantime the same person might have had a different right in the same land or rent which had been previously barred by more than twenty years' adverse possession.

When the right of a person who is tenant in tail of any and or rent is barred by lapse of time, no entry, distress, or action is to be brought by any person claiming an estate or interest which the tenant in tail might have barred (sect. 21).

Possession adverse to a tenant in tail is to run on against he parties claiming estates or interests which he might have barred (sect. 22).

These clauses make a great alteration of the law as it stood under the statute of James, by which the twenty years commenced only from the time at which the right to enter actually accrued, and therefore each remainder-man had a new right commencing from the time of the determination of the prior estates.

When a tenant in tail makes an assurance which does not bar those in remainder, they are to be barred at the end of twenty years' possession under such assurance, reckoning the twenty years from the time at which such assurance, if hen executed, would, without the consent of any other person, have barred them (sect. 23). This clause gives to an assurance executed by a tenant in tail in remainder, without the consent of the protector, followed by twenty ears' possession under it, reckoning from the time at which the remainder should, according to the limitations of he estate tail, have vested in possession, the same effect n barring the remainders over as an assurance by him with he protector's consent. Formerly no length of possession under a conveyance by lease and release could have the ffect of a fine or recovery in barring the issue in tail, or he remainders over, and therefore when an ejectment was brought by any of the heirs in tail, the defendant was bound o show that the conveyance to him or his ancestor had been by fine or recovery.

No suit in equity is to be brought for the recovery of ny land or rent but within the time when the plaintiff, f entitled at law, might have brought an action (sect. 24). This clause confirms the doctrine already established in ourts of equity.

In cases of express trust, the right of the *cestuy que trust* to bring a suit against a trustee, or person claiming hrough him, is not to be deemed to have accrued till a coneyance has been made to a purchaser for a valuable consideration, and then only as against such purchaser and persons claiming under him (sect. 26). In cases of express trust, o time, as between the *cestuy que trust* and trustee, can perate as a bar to the right of the former; and the abovementioned clause applies as between the *cestuy que trust* nd strangers only. The possession of the trustee is that f the *cestuy que trust*, and the possession of the *cestuy que trust* cannot be adverse to the trustee, unless where there as been actual ouster of the trustee by the *cestuy que trust*, or where the latter denies the title of the trustee. Though no time bars a direct trust, as between trustee and *cestuy que trust*, a court of equity will not allow a man o make out a case of constructive trust at a great distance f time, and after long acquiescence, but will in such ases apply rules as to length of time by analogy to the tatutes of limitation. (17 Ves., 97.)

In cases of concealed fraud, the right of a person to ring a suit in equity for the recovery of land or rent of which he, or the person through whom he claims, has been eprived by such fraud, is to be deemed to have accrued at he time when the fraud was, or, with reasonable diligence, might have been discovered; but nothing in this clause is o affect the title of a purchaser for valuable consideration who was not a party to the fraud, and had, at the time of his purchase, no notice of such fraud (sect. 26). This principle had already been established in courts of equity.

Nothing in the act is to interfere with the jurisdiction of equity in refusing relief on the ground of acquiescence or otherwise, to any person whose right to bring a suit may not be barred by the act (sect. 27). It has been laid down in many cases in the courts of equity, that the concurrence of the *cestuy que trust*, with full knowledge of the circumstances, in a breach of trust by his trustee, or even acquiescence without original concurrence, may bar him of his relief. (3 Swanst., 4, *et seq.*)

Where a mortgagee has remained in possession of the rents of land, or in receipt of any rent comprised in his mortgage for twenty years, the mortgagor's right to bring a suit for redemption will be barred, unless in the meantime an acknowledgment of his right has been given to the mortgagor, or some person claiming his estate, or the agent of such mortgagor or person, in writing, signed by the mortgagee or person claiming under him; in which case the suit must be brought within twenty years after the date of such acknowledgment. Where there are several mortgagors, an acknowledgment to one is to be as effectual as if given to all; but where there are several mortgagees, such acknowledgment is to be effectual only against such of them as have given it; and the persons claiming under them, and the persons entitled to estates or interests after or in defeasance of their estates or interests, and where the mortgagees giving such acknowledgment are entitled to a divided part of the land or rent, but not to an ascertained part of the mortgage money, the mortgagor is to be entitled to redeem such divided part, on payment of a proportionate part of the mortgage money (sect. 28). It was settled, before this act, that twenty years' possession by a mortgagee was a bar to the right of redemption, unless there was in the meantime some acknowledgment of the mortgagor's right; and for this purpose a parol acknowledgment, if clearly made, was considered sufficient. The possession of the mortgagee is not, like an adverse possession at law, inconsistent with the equitable title of the mortgagor; but it was considered that twenty years' negligence on the part of the mortgagor ought to protect the mortgagee from any further liability to account. There is no saving of the rights of redemption of mortgagors under disabilities.

At the determination of the period limited by the act for making an entry or distress, or bringing any action or suit, the right of the person entitled to the land or rent, for the recovery of which such entry, distress, action, or suit might have been made or brought, is to be extinguished (sect. 34).

The receipt of rent from the tenant from year to year, or lessee, is to be deemed, as against such tenant from year to year, or lessee, or any person claiming under him, to be receipt of the profits of the land (sect. 35).

By section 36, all real and mixed actions, except ejectment, and the actions of dower and *quare impedit* hereafter referred to, were abolished after the 31st of December, 1834; but it is provided by sect. 38, that any person whose right of entry had, at the passing of the act, been taken away by descent cast, discontinuance, or warranty, may bring a real action within the same period during which he might, under the provisions of the act, have made an entry, had his right of entry not been taken away.

Since the 31st day of December, 1833, no descent cast, discontinuance, or warranty can toll or defeat any right of entry or action for the recovery of land (sect. 39). By the old law, descents of corporeal hereditaments in fee simple to the heir of the disseisor, who had been five years in possession without entry or claim on the part of the person entitled, took away the right of entry. (Co. Litt., 240 b.) A discontinuance is defined by Coke to be 'an alienation made or suffered by tenant in tail, or by any that is seised *in autre droit*, whereby the issue in tail, or the heir or successor, or those in reversion and remainder, are driven to their action and cannot enter.' Warranty of lands at common law was in general held to toll the right of entry of the heir. (Co. Litt., 365 a, 393 b, Butler's notes.) The effect of this section of the act is to preserve to the claimant his right of entry, that is to say, his right to bring an action of ejectment, notwithstanding descent cast, discontinuance, or warranty, during the whole period of limitation.

Since the 31st December, 1833, no money secured upon land by any mortgage, judgment, lien, or otherwise, or charged upon land by way of legacy, can be recovered by action or suit, but within twenty years after the right to receive the same accrued, unless in the meantime some part of the money or interest thereon has been paid, or some acknowledgement in writing of the right thereto signed by the person liable to payment or his agent, to the person entitled thereto or his agent; in which case the action or suit must be brought within twenty years after such payment or acknowledgement (sect. 40). This clause is a statutory confirmation of what was formerly established by decision as to money secured upon land, namely, that possession of the land by the mortgagor or person otherwise liable for payment of the money, without payment or demand of principal or interest for twenty years, was sufficient to raise the presumption of satisfaction. It has been determined that the limitation in this clause applies to bills of foreclosure, which are in substance suits to recover the money secured by mortgage. (9 Sim., 570.) With respect to legacies, there has been some variety of decision. Formerly it seems to have been thought that there was no limitation as to the time within which a legacy might be demanded, but in the later cases the court of equity appears to have adopted twenty years as the limit.

The above-mentioned section secures to the mortgagee to whom a payment of principal or interest has been made, or an acknowledgment in writing has been given, his right of action or suit as to the money for twenty years from the time of such payment or acknowledgment, and in the latter case his right of entry, distress, or action for the recovery of the land is during the same period secured to him by the 14th section; but it being considered doubtful whether the 2nd section did not bar this right, when the act relied on as taking the case out of the statute was a payment of principal or interest, the 7 Wm. IV. and 1 Vic., c. 28, was passed, reserving to the mortgagee the right of entry, distress, and action for the recovery of the land for twenty years from the last payment of principal or interest, although more than twenty years may have elapsed since the right first accrued.

Arrears of dower, or damages for such arrears, are not to be recoverable by any action or suit beyond six years before the commencement of the action or suit. Before the act, there was no limitation either at law or in equity to a claim for arrears of dower during the life of the heir (sect. 41).

Since the 31st day of December, 1833, no arrears of rent or of interest in respect of any money charged in any manner on land or rent, or any damages in respect of such arrear of rent or interest, can be recovered by any distress, action, or suit, but within six years next after the same respectively became due, or next after an acknowledgment in writing given to the person entitled thereto or his agent, signed by the person by whom the same was payable, or his agent; except where there has been a prior mortgagee or other incumbrancer in possession within one year next before an action or suit is brought by any person entitled to a subsequent mortgage or other incumbrance on the same land, in which case the arrears of interest may be recovered for the whole time during which such prior mortgagee or incumbrancer was in possession, though it exceed the term of six years (sect. 42). It had already been established in equity, by analogy to the rule at law, that an account of rents and profits could not go back beyond six years before the filing of the bill, and in many cases where a party had neglected his rights, and where there was no disability on the one side, or fraud on the other, the court has refused to carry the account farther back than the filing of the bill. (1 Ball and B., 130.) This discretionary jurisdiction seems to be within the saving of the 27th clause of the act. It seems that the above section refers to rents charged upon land only, to which it had been held that the former statutes did not apply, and not to conventional rents (2 Bing., *N. C.*, 688), the limitations as to which are provided for by the 21 Jac., c. 16, § 3, and the 3 and 4 Wm. IV., c. 42, § 3.*

This clause contains no exception in favour of persons under disabilities.

2. Of limitations as to tithes and other ecclesiastical property.

On the principle that *nullum tempus occurrit ecclesiæ*, it was held that none of the earlier statutes of limitation had any application to actions and suits relating to tithes.

The first statute on the subject is the 53 Geo. III., c. 127, as to arrears of tithe, which enacts that no action should be brought for the recovery of any penalty for not setting out tithes, nor any suit instituted in any court of equity, nor in any ecclesiastical court, to recover the value of any tithes, unless within six years from the time of such tithes becoming due.

No limitation existed of the time within which suits might be prosecuted for establishing a right to tithe; nor could the validity of any modus decimandi, or of any right to exemption or discharge from tithes, be established, but by antient prescription, or by proof of a composition real existing before the stat. 13 Eliz., c. 10, until the enactment of the 2 & 3 Wm. IV., c. 100.

By section 1 of that act, all prescriptions for any modus decimandi, or for exemption or discharge from tithes by composition real or otherwise, are, in case the render of tithes in kind shall afterwards be demanded by any person except a spiritual or eleemosynary corporation sole, or by any corporate body, to be deemed valid in law, upon proof of payment or render of such modus in the one case, and enjoyment of the exemption in the other, for 30 years' next before such demand, unless the commencement of such payment, render, or enjoyment be shown at some time prior to such 30 years, or the payment, render, or enjoyment be shown to have been under some deed or writing; and if such proof be extended to 60 years before the time of such demand, the claim is to be deemed absolute and indefeasible, unless such payments, render, or enjoyment be shown to have been under some deed or writing. This clause applies to the right of the crown and of the duchy of Cornwall. Where the render of tithes is demanded by any spiritual or eleemosynary corporation sole, such prescription as aforesaid is to be valid and indefeasible upon showing such payment or render made, or exemption enjoyed during the period in which two persons in succession have held the office or benefice in respect whereof such render of tithes is claimed, and for three years after the appointment, institution, or induction of a third person, provided that, if such period do not amount to 60 years, it shall be necessary to show such payment or render made, or enjoyment had during such further number of years, either before or after, or partly before and partly after, as shall with the said period amount to 60 years, and three years after the appointment of such third person as aforesaid, unless it be shown that such payment or render was made or exemption enjoyed under some deed or writing.

Every composition for tithes made or confirmed before the passing of the act by decree of a court of equity in a suit in which the ordinary, patron, and incumbent were parties, and not since set aside, abandoned, or departed from, is to be held valid; but no modus, exemption, or discharge is to be deemed within the act unless proved to have existed and been acted upon at the time of, or within a year before the passing of the act (sect. 2).

By section 4 it is provided that the act shall not extend to cases where tithes have been demised by deed for any term of life or number of years, or where any composition for tithes has been made by the person or body corporate entitled to them with the owner or occupier of the land for any such term or number of years, where such demise was subsisting at the time of the passing of the act, and an action or suit instituted for the recovery or enforcing payment of tithes within three years after the expiration, surrender, or other determination of such demise or composition.

By section 5 it is provided that where lands have been held or occupied by the person entitled to the tithes thereof, as rector, vicar, or other person, or by any lessee of, or any person compounding for tithes with, or any tenant of such rector, vicar, or other person, the time of such holding or occupation shall be excluded in the computation of the several periods mentioned in the act.

And by section 6, the time during which any person otherwise capable of resisting any claim to a modus or exemption from tithe shall be an infant, idiot, non compos mentis, fême covert, or lay tenant for life, or during which any action or suit shall have been pending and diligently prosecuted till abated by the death of parties, is to be excluded in the computation of the above-mentioned periods, except where the claim is declared by the act to be absolute.

By section 8, no presumption is to be allowed in support of any claim, upon proof of exercise of the right claimed for a less period of time than that specified in the act as applicable to the particular claim.

---

* In the observations upon section 2, omit the words, 'The action for rent here spoken of is the action of ejectment;' and in the following sentence of the same paragraph, instead of 'action for debt' read 'action of debt.'

It has been stated that tithes and moduses or compositions for tithes, in the hands of any other persons than spiritual or eleemosynary corporations sole, are included in the first section, and consequently in the subsequent enactments of 3 & 4 Wm. IV., c. 27; and by sect. 29 of the same act, no ecclesiastical or eleemosynary corporation sole can bring an action or suit to recover any land or rent but within the period during which two persons in succession have held the office or benefice in respect of which such land or rent is claimed; and six years after the appointment of a third person thereto, if such period amount to 60 years; and if not, then during such further period as will make up 60 years from the period at which the right to bring such action or suit first accrued.

The 34th section of the same act, as to the final extinction of right after the period of limitation, is applicable to tithes ecclesiastical as well as other property.

And by sect. 43 no person claiming tithes can bring a suit in any spiritual court but within the period fixed by the act for actions and suits at law or in equity.

In considering the operation of the 2 & 3 Wm. IV., c. 100, and the 3 & 4 Wm. IV., c. 27, upon claims to tithe by persons other than spiritual, or eleemosynary corporations sole, it should be observed that the period of 30 years mentioned in the former act is fixed with reference to claims as between the landowner and the tithe-owner, while the period of 20 years in the latter is applicable, as far as respects tithes, to actions and suits between claimants to the tithes. Cases however may arise to which there will be some difficulty in applying this distinction, and it seems that, at least in cases where there has been no payment of tithe for twenty years, the second section of the latter act will operate as a bar to the claim of the tithe-owner, though probably contrary to the intention of the legislature.

But the questions as to tithes upon these statutes, though they must still exist for some time to come, have become of less importance since the enactment of the 6 & 7 Wm. IV., c. 71, and the subsequent acts for the commutation of tithes for fixed rent-charges, which in the course of a few years will be carried into effect throughout England.

3. Of limitations as to advowsons.

By the statute of Westminster the second (13 Edw. I., c. 25) writs of *quare impedit* could not be sued out after six months, where a parson had been presented to a living by a person not entitled.

By the 1 Mary, sess. ii., c. 5, it was declared that the 32 Hen. VIII., c. 2, should not extend to writs of right of advowson, *quare impedit*, *jure patronatus*, and writs of *darrein presentment*. Before this statute, it seems to have been held that if the incumbent of a living had lived 60 years and died, and a stranger had presented, the patron could not maintain *quare impedit* or *darrein presentment*. (Co. Litt., 115 a.)

The 7 Ann., c. 18, which enacted that no usurpation should displace the right of a patron, in effect took away all previous limitations of suits as to the right of patronage.

The 3 & 4 Wm. IV., c. 27, s. 30, enacts that from the 31st day of December, 1833, no *quare impedit* or other action, nor any suit to enforce a right of presentation to any church, vicarage, or other ecclesiastical benefice, is to be brought after the expiration of the period during which three clerks in succession shall have held the same, all of whom obtained possession adversely to the right of the person claiming, or of the person through whom he claims, if the times of such incumbencies together shall amount to sixty years, and if not, then after such further period as with the times of such incumbencies shall make up the period of sixty years.

By section 31 of the same act, incumbencies where the clerk has been presented upon a lapse, by the crown or the ordinary, are to be reckoned within the period, but not incumbencies when the clerk has been presented by the crown after a promotion to a bishopric.

By section 32, persons claiming a right to present by virtue of any estate, interest, or right, which the owner of an estate tail in the advowson might have barred, are to be deemed to claim through the person entitled to such estate tail, and their right is to be limited accordingly.

By section 33, no advowson is to be recoverable after the expiration of a hundred years from the time at which a clerk obtained possession of the benefice adversely to the right of the person claiming, unless a clerk shall subsequently have obtained possession of the benefice on the presentation of the person so claiming, or some person through whom he claims, or some other person entitled to a share or right derived under the same title.

The 34th section of the same act as to the final extinction of right after the period of limitation, applies to advowsons.

There is no saving of the rights to advowsons of persons under disabilities.

4. Of limitations as to other incorporeal rights.

Before the 2 & 3 Wm. IV., c. 71, no right of common or other profit or benefit out of land, except tithes, rent, or services, could in general be established but by proof of immemorial custom or prescription; though in certain cases the courts both of law and equity had been in the habit of establishing titles to such property by means of the doctrine of presumed grants. (2 Starkie *on Evid.*, 669.)

By section 1 of that act, no claim which can be made at common law, by custom, prescription, or grant, to any right of common or other profit or benefit to be taken or enjoyed from or upon any land, except the matters in the act afterwards provided for, and except tithes, rent, and services, is, after an uninterrupted enjoyment of thirty years, to be defeated only by proof of such enjoyment having commenced at any time prior to the thirty years; and where such uninterrupted enjoyment has been for sixty years, the right is to be deemed absolute and indefeasible, unless it appear that the right was enjoyed under some deed or writing.

Right of common of pasture appendant exists by the common law, and belongs to every tenant whose lands are part of a manor (2 *Inst.*, 86; 2 Bl., *Com.*, 33); but all other rights of common must formerly have been established by custom, prescription, or grant (1 Bac., *Ab.*, 616, et seq.), and the rights to them will now be regulated by this act. By the statute of Westminster 2 (13 Edw. 1, c. 25), a writ of assize might be brought for right of common appendant or appurtenant, but as that and the other real actions for rights of common (Comyn, *Dig.*, *Common*, i.) are now abolished by 3 & 4 Wm. IV., c. 27, s. 36, there will be no remedy for rights of common after twenty years' adverse possession; for it was held, before the act, that, after that period, the commoner's right of entry was given, and that he must resort to his assize of common. (2 Taunt., 159, 160.) The same limitation applies to the incorporeal rights mentioned in the subsequent sections of the act.

By section 2, no claim to any way or other easement, or to any watercourse, or to the use of any water, is after an uninterrupted enjoyment of twenty years to be defeated only by proof of its having commenced prior to that period, and, where such uninterrupted enjoyment has been for forty years, the right is to be deemed absolute and indefeasible, unless it appear that the right was enjoyed under some deed or writing.

By section 3, when the use of light for any dwelling-house, workshop, or other building has been actually enjoyed for twenty years without interruption, the right is to be deemed absolute and indefeasible, notwithstanding any local usage or custom to the contrary, unless it shall appear that the same was enjoyed under some deed or writing.

By section 4, the periods mentioned in the act are to be taken to be those immediately preceding the commencement of an action or suit as to the matter to which such period relates; and no act is to be deemed an interruption unless submitted to for a year after the party interrupted had notice.

By section 6, no presumption is to be allowed in favour of a claim upon proof of the exercise or enjoyment of the right for a less period than that mentioned in the act as applicable to the particular claim. Before the passing of the act, enjoyment of incorporeal rights for a period of twenty years was generally sufficient to raise the presumption of a grant. But this rule can no longer be applied to the rights included in the first section, which has fixed another period of thirty years for raising such presumption, and it has been decided, upon the construction of the act, than an enjoyment for twenty years of a right comprised in the second section, while the land was held under a term of life, as it cannot by the eighth section of the act give any title as against the owner of the fee, does not give even a presumptive title against the termor. (1 C., M. & R., 211, 223.)

The time during which any person otherwise capable of resisting any claim to any of the matters mentioned in the act, shall have been, or shall be in part, idiot, or *non compos mentis*, *fême covert*, or tenant for life, or during which any suit or action pending shall have been abated by the death of parties, is to be excluded in the computation of the above-mentioned periods, except where the right or claim is declared by the act to be absolute (sect. 7). The act contains no saving in favour of persons beyond seas or in prison.

When land or water, over or from which any way, watercourse, or use of water has been enjoyed, or has been held under any term, life, or years, exceeding three years from the granting thereof, the time of enjoyment, during the continuance of such term, is to be excluded from the term of forty years, in case the claim shall, within three years after the end, or sooner, determination of the term be resisted by any person entitled in reversion expectant on the determination of the term (sect. 8). This clause applies only to a way or watercourse, and use of water, and therefore the saving cannot include the rights which are the subjects of the first and third sections. The consequence seems to be, that as to those rights the reversioner may, contrary to the former law on the point, be bound by the acquiescence of the owner of the particular estate.

II. As to Limitations of Personal Actions and Suits relating to Personal Property.

1. Of actions of assault and battery.

By the 21 Jac. I, c. 16, s. 3, all actions of trespass, of assault, battery, wounding, imprisonment, or any of them, must be commenced and sued within four years after the cause of action arises.

2. Of actions of slander.

By the 21 Jac. I, c. 16, s. 3, all actions on the case for words must be commenced and sued within two years next after the words spoken.

Upon the construction of this part of the statute it has been determined—1, That an action for *scandalum magnatum* is not within the statute; 2, That it is confined to slander of the person, and does not extend to actions for slander of title, which is a cause of specific damage; 3, That if the words used are actionable, the statute is a bar, though specific damage has ensued; but if the words are not actionable, and specific damage has arisen from them, entitling the plaintiff to an action, the statute is no bar. (5 Bac., *Ab.*)

3. Of actions arising upon simple contract, and actions founded in wrong.

By the 21 Jac. I., c. 16, s. 3, all actions of trespass *quare clausum fregit*, actions of trespass, detinue, trover, and replevin for taking away goods and cattle, actions of account and upon the case (except merchant's accounts), actions of debt grounded upon lending or contract without specialty, and actions of debt for arrearages of rent, must be commenced and sued within six years next after the cause of action arises.

The same period of limitation is established by the 53 Geo. III., c. 127, s. 5, for the recovery of penalties for not setting out tithes, and for bringing suits in equity or in the ecclesiastical courts, for the recovery of the value of tithes; and by the 3 & 4 Wm. IV., c. 42, s. 3, for actions of debt upon awards, where the submission is not by specialty, for actions or fines due in respect of copyhold estates, for actions against a sheriff for escapes, and for money levied under a writ of *fieri facias*.

Formerly there was no limitation applicable to a suit for a legacy, though in some cases presumption of payment was admitted; but the 3 & 4 Wm. IV., c. 27, s. 40, which fixes the period of limitation to twenty years, is applicable to all legacies, whether charged on real estate or not.

Before the statute of the 3 & 4 Wm. IV., c. 42, there was no remedy for injuries done to the real estate of a person deceased, in his lifetime, nor against the estate of a person deceased, in respect of wrongs done by him in his lifetime to the property of another; but now, by sect. 2, executors may bring an action of trespass, or trespass on the case, for an injury done to the real estate of a deceased person in his lifetime, and for which he might have maintained an action, at any time within a year after the death of such person; and any such action may be brought against the executors or administrators of a person deceased, for an injury done by him in his lifetime to the real or personal property of the plaintiff, within six calendar months after they shall have taken upon themselves the administration of the deceased's estate, provided in each case that the injury was committed within six months of the death of such person.

In actions on the case in which the gist of the action is the consequential damage, the time of limitation runs from the time of the occurring of the damage. In actions of assumpsit upon contracts, the time runs from the date of the breach. (5 Bac., *Ab.*, 230.)

It would seem that in cases of fraud the statute does not begin to run, but from the discovery of the fraud. This rule, as before stated, is now established by statute as to actions relating to real property.

In cases of intestacy, where the cause of action was complete before the intestate's death, the statute, having once begun to run, continues as against the administrator, even before the grant of the letters of administration; but when the cause of action was not complete as against the intestate, the statute was held not to run against the administrator until the grant. (Willes, 27; 5 B. and Ald., 204.) The latter rule has, as before stated, been altered as to real property, but not, it seems, as to personalty.

The limitation as to arrears of rent in the statute of James does not apply to rents reserved by indenture.

For the purpose of settling the questions that had existed as to what was a sufficient commencement of an action to take the case out of the statute, it is provided by 2 Wm. IV., c. 39, § 10, that 'no first writ shall be available to prevent the operation of any statute whereby the commencement of the action may be limited, unless the defendant shall be arrested thereon or served therewith, or proceedings to or toward outlawry shall be had thereupon, or unless such writ and every writ (if any) issued in continuation of a preceding writ shall be returned *non est inventus*, and entered of record within one calendar month next after the expiration thereof, including the day of such expiration, and unless every writ issued in continuation of a preceding writ shall be issued within one such calendar month after the expiration of the preceding writ, and shall contain a memorandum indorsed thereon or subscribed thereto, specifying the day of the date of the first writ; and return to be made in bailable process by the sheriff or other officer to whom the writ shall be directed, or his successor in office, and in process not bailable, by the plaintiff or his attorney suing out the same, as the case may be.' This enactment applies to all personal actions.

The fourth section of the statute of James, and the 6th section of the 3 and 4 Wm. IV., c. 42, both contain a proviso, that if judgment in any of the above-mentioned actions be given for the plaintiff, and afterwards reversed by error, or a verdict pass for him, and upon matter urged in arrest of judgment, judgment be given against him, or if the defendant should have been outlawed, and should afterwards reverse the outlawry, the plaintiff, or his heirs, executors, or administrators, may commence a new action or suit, within a year after such reversal of judgment, judgment, or reversal of outlawry.

The 7th section of the statute of James contains an exception in favour of infants, *fcmes covert*, *non compotes mentis*, and persons imprisoned and beyond seas, who may bring their actions within the times mentioned in the act, after the removal of their disabilities; and the 4 and 5 Ann. c. 16, § 19, enacts that in case of the absence of the defendants beyond seas, any action for seaman's wages, or any of the actions enumerated in the above-mentioned clause of the statute of James, may be brought within the times mentioned in the statute, after the return of the defendants from beyond seas.

Sect. 4 of the before-mentioned act of 3 and 4 Wm. IV. c. 42, contains, as to the actions enumerated in it, a saving of the right of persons under disabilities, and against defendants absent beyond seas, exactly similar to the above, except that it does not extend to persons imprisoned.

By sect. 7 of the last-mentioned act, no part of the United Kingdom or of the adjacent islands is to be deemed beyond seas within the meaning of that act or of the 2 Jac. I., c. 16.

Questions had frequently arisen as to the effect of subsequent promises and acknowledgments to take a case out of the statute of James. Thus it was held that no acknowledgment was sufficient in a case of tort or breach of duty to take the case out of the statute, while in a case of debt not only a verbal promise, but even a mere acknowledgment of the existence of the debt was held sufficient, not against the party making it only, but his co-contractor. To settle such questions, it was enacted by 9 Geo. IV., c. 14, §, reciting the act of James, that in actions of debt, or upon the case, grounded on any simple contract, no acknowledgment should be deemed sufficient, unless it were in writing, signed by the party chargeable thereby; and the where there were two or more joint contractors, or executors, or administrators of any contractor, the written promise of one or more of them should not bind the others. But it was expressly provided that nothing in the act contained should alter, take away, or lessen the effect of any payment of principal or interest by any person whatsoever; so that it would seem that this species of acknowledgment will, according to the old doctrine (2 Saund., 63, *j. n.* (*t*), be effectual, not against the party making it only, but his co contractor. Also (by sect. 6) no indorsement or memorandum of payment upon a promissory note, bill of exchange, or other writing made by or on behalf of the party to whom payment should be made, should be deemed proof of such payment to take the case out of the statute; and (§ 4) that the act of James and that act should apply to simple contract debts alleged on the part of a defendant by way of set-off.

4. As to actions arising upon specialty.

Before the 3 & 4 Wm. IV., c. 42, there was no statutable limitation to actions upon specialties, though the courts held that payment was *primâ facie* to be presumed after twenty years.

By the 3rd section of the above act, actions of debt for rent upon an indenture of demise, actions of covenant or debt upon bond or other specialty, and actions of debt or *scire facias* upon recognizance must be commenced and sued within twenty years after the cause of such actions or suits arises. If the 3 and 4 Wm. IV., c. 27, § 42, applies to actions on specialty, it is so far repealed by this act; but the better opinion seems to be that the former act applies to rents which are a charge upon land only, and not to conventional rents, whether reserved by indenture or otherwise. (2 Bing., *N. C.*, 688.)

The savings on the ground of disability of the plaintiff and absence of the defendant, and the limitations after judgment or outlawry reversed, are the same as for actions of debt not on specialty by the same act.

By sect. 5, it is provided, in accordance with the enactment of 9 Geo. IV., c. 14, as to actions on simple contract, hat if any acknowledgment has been made, either by writing signed by the party liable by virtue of such indenure, specialty, or recognizance, or his agent, or by part payment, or part satisfaction, on account of any principal or nterest then due thereon, the person entitled may bring his action for the money remaining unpaid and so acknowledged o be due, within twenty years after such acknowledgment, r part payment, and in case of the plaintiff being under any f the disabilities mentioned in the 4th section of the same ct, or absence of the defendant beyond seas at the time of uch acknowledgment being made, then within twenty ears of the removal of such disability, or the return of the efendant from beyond seas.

III. Of Limitations of Actions on Penal Statutes.

By the 31 Eliz., c. 5., s. 5 (which act repeals a previous one, he 7 Hen. VIII., c. 3, upon the same subject), all actions, uits, bills, indictments, or informations for any forfeiture pon any statute penal, whether made before or since the ct, whereby the forfeiture is limited to the queen, her heirs, nd successors only, must be brought within two years after he commission of the offence; and all actions, suits, bills, ndictments, or informations for any forfeiture upon any enal statute, whether made before or since the act (except he statute of tillage), the benefit and suit whereof is limited o the queen, her heirs, and successors, and *to any other hat shall prosecute in that behalf*, must be brought by the erson sueing within one year after the commission of the ffence; and in default of such prosecution, the same may e brought by the queen, her heirs or successors, at any me within two years after the end of that year; and any ction, suit, bill, indictment, or information brought after he time limited is to be void. It is provided that where a horter time is limited by any penal statute, the prosecution ust be within the time so limited.

The limitation in the above act extends to offences of mission as well as commission (2 Chit., *R.*, 420), and to ctions brought by the common informer alone. (1 Raym., 3.) If an offence prohibited by a penal statute be also an fence at common law, it has been held that a prosecution r the common law offence is not restrained by the statute. 1 Mod., 144.)

It was doubted whether a suit by a common informer on penal statute which first gives an action to the party rieved, and after a certain time to any one who will sue, as within the restraint of the statute; but it is now settled hat it is. (Bull., *N. P.*, 195.)

A prosecution by the party grieved was not within the restraint of the statute; but now, by the 3 & 4 Wm. IV., c. 42, s. 3, all actions for penalties, damages, or sums of money given to the party grieved by any statute now or hereafter to be in force must be brought within two years after the cause of such actions or suits. It is provided that nothing in that section should extend to actions the time for bringing which is especially limited by any statute. The saving in that act in the case of the disability of the plaintiff and the absence of the defendant beyond seas, and also the limitation as to further proceedings after judgment or outlawry reversed, apply to actions by the party grieved.

By the 24 Geo. II., c. 44, s. 1, actions against justices of the peace and constables or others acting in obedience to their warrants are limited to six calendar months.

There is no time limited by any statute for indictments for felonies and other misdemeanours when there is no forfeiture to the queen or to the prosecutor, but the acts of general pardon which have been passed from time to time have the effect of limitations. The last of such acts was the 20 Geo. II., c. 52.

IV. Of the exceptions to the operation of the Statutes of Limitation.

The exceptions in the several statutes of limitation in favour of infants and other persons under disabilities have been already stated. It has been held that as the words of the statutes as to absence beyond seas are express, Scotland is not included in the exception. If the plaintiff was in England at the time that the cause of action accrued, the statute runs as against his personal representative, though abroad at the time of his death. The absence of one of several co-plaintiffs will not prevent the statute from attaching, for it lays the others under no disability of sueing. If the right of action or suit be vested in a trustee, the *cestuy que trust*, though under disability, will be bound by the laches of the trustee who neglects to sue within the time provided by the statute, and he will have no remedy but against the trustee.

It has been stated that, in cases of express trust, the statutes of limitation have no application as between trustee and *cestuy que trust;* and that in cases of fraud they operate only from the time of the discovery of the fraud. The exception in the 21 Jac. I., c. 16, s. 3, as to merchants' accounts, applies in general to tradesmen and to all persons whatsoever having mutual accounts and dealings, but not to a case where the items are all on one side, as in that between a tradesman and his customer. The accounts must also be open and current, for if the last item be beyond the six years, the statute operates against the whole. (2 Saund., 124, 127 *a*, n.; Bull., *N. P.*, 150.)

Where a debtor creates by his will a trust of real or personal estate for the payment of his debts, such a trust will prevent the statutes from operating upon a debt not barred at the time of the creation of the trust, that is, from the death of the testator; but such a trust will not, it seems, have the effect of reviving debts barred by the statute at the time of the testator's death, (5 Bac., *Ab.*, 244.)

Proceedings in bankruptcy are held to create a trust for the benefit of the creditors, so as to take a debt out of the statute; and proceedings under the act for the relief of insolvent debtors will have the same effect. A decree in a creditor's suit also creates a trust for the benefit of the creditors so as to prevent the operation of the statute; but the trust dates only from the decree, and the mere pendency of a suit has no such effect. (2 Daniel, *C. P.*, 155, 156.)

In general, in personal actions the statutes of Limitation do not run against the estate of a person who has died intestate, in respect of claims accrued after his death, until the appointment of an administrator, though the rule is altered by 3 & 4 Wm. IV., c. 27, s. 6, as to rights to chattel interests in land, and apparently also as to money charges on land, besides arrears of dower and arrears of rent or interest of money charged on land. And if there be no personal representative against whom actions may be brought, the rights of claimants against the deceased's estate are unaffected by the statutes, as no laches can be attributed to them until an administrator is appointed. (5 B. and Ald., 204.)

It seems that if a bill be filed in chancery which is afterwards dismissed, the matter being properly cognizable at law, and the Statute of Limitations attaches in the meantime on the demand, the court will preserve the plaintiff's right, at least in cases where he was stayed from proceeding at law by some act of the court, or where there are equitable circumstances attending the case. (1 Vern., 74.) In the same manner, if an action be commenced in one court within the time of limitation, and afterwards removed into another by proceedings on the part of the defendant, the plaintiff's right of action will not be barred. (5 Bac., *Ab.*, 238.)

It has been shown what acknowledgments are sufficient in real and personal actions and suits to take the case of the plaintiff out of the operation of the statutes.

It has been held that if a debtor, after his debt is barred by the statute, publish an advertisement in the Gazette or other newspaper, that all persons having debts owing to them by him will receive payment on application, the operation of the statute will be defeated. (Prec. in Chan., 385.)

V. As to what courts are bound by the Statutes of Limitation.

The Statutes of Limitation extend to all the actions, real and personal, above enumerated; and all other actions on the case brought in any court of common law in England; but it does not appear that they can apply to actions respecting any interest in or description of real property except those properly comprised in them.

Courts of equity, in respect to legal titles and demands, seem to have been held bound by the statutes as well as the common-law courts, but with respect to equitable titles and demands, they were not within the statutes, and were only influenced in their determinations by analogy to the statutes. By 3 and 4 Wm. IV., c. 27, s. 24, suits in equity, with respect to real property falling within the definition of land or rent in that statute, are subjected to the same limitations as actions at law, but it would seem that suits in courts of equity respecting any other description of real property, and suits respecting personal property, except legacies, which are expressly included in the 40th section of the above-mentioned act, are not within the statutable limitations, but are governed by the rules of limitation adopted by the practice of those courts.

In cases of charities the jurisdiction of courts of equity is not within the statutes. But though a charity is never considered in equity as absolutely barred by the statutes, or by any rule of limitation analogous to them, the court nevertheless takes notice of a long adverse possession in considering the effect and construction of instruments under which claims are set up on its behalf. (2 J. & W., 321.)

It was formerly held that though the Statute of Limitation was a bar to the claim of a debt, it was not a bar to discovery in equity as to when the debt became due, but the point seems now to be settled otherwise, on the rule adopted that a plea or demurrer, good as to the relief, extends to the discovery. (Mitf., 269.) It was formerly thought that the statute was a good bar to a bill of revivor if the proper representative did not proceed within six years after the abatement of a suit, and if there had been no decree, but it has since been decided otherwise (1 M. & C., 121), so that it would seem that there is no limit to the time at which a suit in equity, once commenced by the filing of a bill, may be revived. A decree, being in the nature of a judgment, cannot be affected by the Statutes of Limitation, though the court has sometimes refused to carry a decree for an account into execution after a great length of time, and under peculiar circumstances of laches.

Formerly the Statute of Limitation was no plea to a suit in the spiritual court or in the Court of Admiralty, where they proceeded according to their law, and in matters of which they had cognizance. (5 Bac., *Ab.*, 233.) By the 4 and 5 Ann., c. 16, s. 17, suits and actions for seamen's wages in the Court of Admiralty must be commenced and sued within six years. By the 3 and 4 William IV., c. 27, s. 43, persons claiming tithes, legacies, or any other property for the recovery of which an action or suit at law or in equity might have been brought, cannot bring a suit or other proceeding in any spiritual court for the same but within the period during which they might have brought their action at law or suit in equity. Also by the 27 Geo. III., c. 44, s. 1, suits in the Ecclesiastical Court for defamatory words must be commenced within six calendar months, and (sect. 2) suits for fornication, incontinence, or for striking or brawling in a church or churchyard, must be brought within eight calendar months after the commission of the offence. But, except in these cases, it does not appear that the Statutes of Limitation have any application to suits in the Ecclesiastical or Admiralty Courts.

VI. As to the manner of pleading the Statutes of Limitation.

The Statutes of Limitation must in general be pleaded positively by the defendant in any action at law, who wishes to take advantage of them, and he cannot give them in evidence (5 Bac., *Ab.*, 244); and it has been held in equity that unless the defendant claims the benefit of the statutes by plea or answer, he cannot insist upon them in bar of the plaintiff's demand. (Mitf., 277.)

By the 2 and 3 William IV., c. 100, s. 7, in actions or suits as to moduses and exemptions from tithes, it is sufficient to allege that the modus or exemption, or discharge claimed, was actually exercised for the period mentioned in the act as applicable to the case; and if the other party intends to rely upon any matter of fact or law not inconsistent with the simple fact of the exercise and enjoyment of the matter claimed, it must be specially alleged, in answer to the allegation of the party claiming, and cannot be received in evidence on any general traverse or denial of the matter claimed.

By the 2 and 3 William IV., c. 71, s. 5, in actions and suits relating to the prescriptive rights mentioned in that act, it is sufficient, in pleading such a right, to allege it generally without averring its existence from time immemorial, in all actions on the case and other pleadings, when such an allegation was sufficient before the passing of the act; and in pleading to actions of trespass and other pleadings, where before the passing of the act it was necessary to allege the right to have existed from time immemorial, it is sufficient to allege the enjoyment of the right by the occupiers to have existed during the period mentioned in the act as applicable to the case, without claiming in the name of the owner of the fee, and if the other party intends to rely upon any matter of fact or law not inconsistent with the simple fact of enjoyment, it must be specially alleged, and cannot be received in evidence, upon any general traverse or denial of the plaintiff's allegation.

(Bacon, *Ab.*, art. 'Limitation;' Chitty's *Statutes*; and *Report of Real Property Commissioners.*)

STAUNTON, SIR GEORGE LEONARD, was the eldest and only surviving son of Colonel George Staunton of Cargin in the county of Galway, Ireland, a gentleman of small fortune, but descended from a very antient English family. He was born at Cargin on the 19th of April, 1737, and received his education partly in Galway and partly in Dublin, until he entered his sixteenth year, when the delicate state of his health, and a tendency to consumption, rendered necessary an immediate removal to a warmer climate. His father accordingly sent him to Montpellier in the south of France, where he remained some years, and having completed his studies in the college of that city, he took a medical degree.

In the year 1760 he returned to England, and resided for some time in London, where he occupied himself in contributing some valuable essays to the periodical publications of that day, and formed an acquaintance with many eminent literary men of the time, especially Dr. Johnson, who in the year 1762, upon his intended embarkation for the West Indies, wrote him a most affectionate valedictory letter. This letter is preserved in Boswell's 'Life of Dr. Johnson,' and bears a very high testimony to Mr. Staunton's merits at that early period.

Mr. Staunton practised for a short time in the West Indies as a physician, but he held at the same time considerable official situations in the islands, and having acquired a competent fortune, which he invested in estates in the island of Granada, he returned to England in 1770. In 1771 he married Jane, the second daughter of Benjamin Collins, Esq., of Milford, near Salisbury, and a banker in that city; but the disorder into which his West Indian property fell in his absence obliged him very soon to return to Granada, where he continued to reside until the capture of the island by the French in 1779.

During this period Mr. Staunton devoted himself with considerable success to the practice of the law, a profession much more congenial to his talents and habits than that of medicine, and he was appointed, by the crown, attorney-general of the island. In 1774 Lord Macartney went out to Granada as governor, and a very warm intimacy and friendship was soon formed between that nobleman and Mr. Staunton, which ended only with their lives. Mr. Staunton's established influence and character in Granada rendered his aid and support of essential advantage to the administration of the new governor, and these and other services his lordship warmly and affectionately acknowledged.

Upon the capture of the island by the French, Lord

Macartney and Mr. Staunton were both sent to France as prisoners of war. Lord Macartney immediately proceeded to England on his parole, but Mr. Staunton remained some time longer at Paris, and had the address and good fortune to obtain, under circumstances of peculiar difficulty, his lordship's exchange, as well as his own. Lord Macartney was thus enabled to avail himself of the appointment which the East India Company had conferred upon him, of the government of Madras, and Mr. Staunton accompanied him to India as his confidential secretary. In this character he was in fact his lordship's chief adviser on all the various transactions of his arduous and upon the whole successful government.

Nothing could have been apparently more adverse to Mr. Staunton's interests than the capture of Granada. His house and plantation, which unfortunately lay in view of the enemy when they were landing, were totally pillaged and destroyed. Everything moveable was taken away; and the land itself was afterwards in part confiscated and given away to Frenchmen upon frivolous pretences. The recovery of any part of the wreck of his fortune was rendered hopeless by his sudden and compulsory departure from the island, and he was reduced to the necessity of commencing, as it were, the world anew.

These circumstances, seemingly so unpropitious, were nevertheless in the end of great advantage to him, for they led to his immediate removal to a more suitable sphere for the exercise of his talents.

While in India, Mr. Staunton was engaged in a series of missions of great importance. On a very critical occasion, when the civil and military authorities at Madras were at issue, he undertook the delicate and possibly hazardous office of executing an order of the government, placing under arrest the commander-in-chief of the army, Major-General Stuart; and he thus preserved, by his vigour and promptitude, both the tranquillity of the settlement and the supremacy of the civil government.

But the transaction in which his diplomatic abilities were chiefly displayed was the negotiation of a treaty of peace with Tippoo Sultan in 1784, by which the safety of our Indian possessions was secured at a crisis of great difficulty and peril. For this service he was immediately raised to a baronetcy, and the East India Company conferred on him a pension of 500*l.* a year for life. On his return to England he also received the degree of Honorary Doctor of Laws from the University of Oxford.

Lord Macartney, as well as Sir George Staunton, remained at home unemployed from this time until 1792, when the determination of the government to send a splendid embassy to the court of Pekin called them both again into active service.

At this period, Sir George, having succeeded to his patrimonial estate by the death of his father, and having made a moderate yet sufficient addition to it by his own exertions, was little covetous of further public employment; but the novelty of this undertaking, and the very extensive sphere of public utility to which it seemed to lead, gave it a degree of interest in his mind altogether independent of its pecuniary advantages. Although the negotiations were to have been opened by Lord Macartney, it was to Sir George Staunton that the government chiefly looked for the final and complete accomplishment of the objects of the mission, and with this view he was provided with separate credentials as minister plenipotentiary, to be acted on in the absence or after the departure of the ambassador.

Sir George's health fell a sacrifice to his exertions upon this occasion. A few months after his return to England he was seized with an attack of paralysis, from which he never entirely recovered, and after a painful struggle of about six years, he gradually sunk into the grave. He however happily retained his intellectual faculties in full vigour to the last. He gave to the world a remarkable proof of this, in his published narrative of the proceedings of the Chinese embassy, a work which was not only read with great interest and avidity at the time, but is still referred to as one of the first authorities on all matters connected with China.

Sir George died in London, on the 14th January, 1801, in the sixty-fourth year of his age, and was buried in Westminster Abbey, where an elegant monument, by the late Sir Francis Chantrey, was some years after erected to his memory. He was succeeded in his title and estates by his only son, the present Sir George Thomas Staunton, M.P. Portsmouth.

STAUNTO'NIA, a genus of plants of the natural family of Menispermaceæ and tribe Lardizabaleæ, named in compliment to Sir George Staunton, who introduced many plants from China on his return from the mission with Lord Macartney. This genus is remarkable as being one of those which is common to China and the Himalayan Mountains, and has hence afforded useful inferences respecting the districts where the tea-plant might be successfully cultivated. The genus is characterised by having monœcious flowers; the male having a six-leaved calyx, with the leaflets in two rows. Petals six or wanting. Stamens six, opposite to the petals, distinct or monadelphous. Anthers adnate, opening outwards. Rudiment of ovary. The female flower has the calyx of the male. No petals. Six sterile dwarfish stamens. Ovaries three, distinct, oblong, with many ovules. Stigmas sessile, simple furrowed. Berries often fewer than three, divaricate, fleshy, opening longitudinally on their inner side. Seeds numerous, oblong-ovate, or reniform. Embryo minute in base of a fleshy albumen. Radicle inferior. The species are divided into two subgenera: *Stauntonia* being without petals and having monadelphous stamens; *Holboellia* having six gland-like petals, and the stamens free. The species form large climbing shrubs, with alternate petiolate peltately digitate leaves. Leaflets leathery in texture, three-nerved, very entire, with all the petiols swelled and jointed at both extremities. Racemes fascicled, axillary, a few flowered at the base of the branches. Flowers white, externally purple, fragrant, berries large and purple. The Himalayan species are found in Nepaul and in 30° of N. latitude, at elevations of 5000 and 6000 feet. Their fruit, having a sweetish pulp, is eaten by the natives of these mountains, and they might no doubt be acclimated in the gardens of this country, as they experience a considerable degree of cold at the elevations where they are found.

STAUROLITE, *Staurotide*, *Grenatite*. This mineral is a silicate of alumina and iron; it occurs crystallized, the primary form being a right rhombic prism. Cleavage parallel to the lateral planes, and both diagonals. Fracture conchoidal, uneven. Hardness, scratches quartz with difficulty. Colour reddish-brown. Streak white. Transparent; translucent. Lustre vitreous and somewhat resinous. Specific gravity 3·724. The crystals often intersect each other. Does not fuse by the blow-pipe, but becomes nearly with borax it is slowly converted into a dark green transparent glass. Found in France, Spain and Portugal, Switzerland, and North America.

Analysis of a specimen from St. Gothard, by Klaproth:—Silica, 37·50; Alumina, 41·00; Oxide of iron, 18·25; Oxide of manganese, 0·50; Lime, 0·00.

STAVANGER. [Christiansand.]

STAVEREN. [Friesland.]

STAVESACRE. [Delphinium.]

STAVROPOL. [Simbirsk.]

STAYNER, SIR RICHARD, was a naval commander under the Protectorate and during the early part of the reign of Charles II. Nothing is known of his parentage or of the date of his birth. He is first noticed as having, in conjunction with Captain Smith, taken a Dutch East Indiaman of 800 tons burthen, which had four chests of silver on board. In 1656 Captain Stayner had three frigates under his command, when he fell in with the Spanish flotilla, which consisted of eight sail. He attacked them: two were captured, one burnt, two sunk, two driven on shore, and one escaped into Cadiz. Stayner is said to have returned to England with treasure amounting to 600,000*l.* sterling. In 1657 he sailed with the fleet under Blake for the purpose of intercepting the Spanish West India flotilla, which had taken shelter in the bay of Santa Cruz. The Spanish ships were well arranged, and strongly supported by batteries on shore. Blake, though he saw that he could not bring out the ships, resolved to attempt their destruction; and, on the 20th of April, Stayner was sent in to begin the attack. He was followed by Blake, with the rest of the fleet. In a few hours the Spaniards had fled to the shore, the batteries were silenced, and the whole of the ships burnt. A more detailed account of this gallant enterprise is given in the article Blake. For his conduct in this affair Stayner was knighted by Cromwell. Sir Richard Stayner held a command in the fleet under Montague, afterwards earl of Sandwich, when he went to receive Charles II. His knighthood was confirmed by Charles, and he was constituted rear-admiral of the fleet. He had no further opportunity of distinguishing himself, and is supposed to have died in or soon after 1661.

(Campbell's *Lives of the Admirals;* Charnock's *Biographia Navalis.*)

STE. CROIX, DE, GUILLAUME EMMANUEL JOSEPH GUILHEM DE CLERMONT LODÈVE, an eminent French historian, was born at Mormoiron near Carpentras, in the Comtat Vénaissin, January 5, 1746, of a noble family. He was educated among the Jesuits of Grenoble, and afterwards, in 1761, entered the army with a captain's commission in the French cavalry, and as aide-de-camp to his uncle the Chevalier Sainte Croix. On the death of his uncle the same year, he changed his regiment and obtained a company in the Grenadiers de France; after serving between six or seven years he left the army, and, abandoning an active life, gave himself up entirely to the study of history. His literary labours soon obtained him distinction, and he had the honour of being crowned three times by the Académie des Belles-Lettres, of which he was made a foreign member in 1772, being at that time resident at Mormoiron, not then in the French dominions. In 1770 he married Mad'lle d'Elbène, by whom he had two sons and a daughter. In 1791 he shared in the troubles of the times, being driven from his home and thrown into prison; his property was sequestered and his papers and books destroyed. He succeeded by means of a disguise in escaping to Paris soon afterwards. These calamities were followed by severe domestic afflictions which embittered his latter years. He died March 11, 1809.

Sainte Croix's works are numerous. Besides contributing many articles to the 'Journal des Savans,' the 'Magasin Encyclopédique,' the 'Archives Littéraires,' the 'Mémoires de l'Académie des Belles-Lettres,' he published the following works:—'Examen Critique des Anciens Historiens d'Alexandre le Grand,' Paris, 1775; second edition, Paris, 1804. This work was translated into English by Sir Richard Clayton, 1793. 'L'Ezour Vedam, ou Ancien Commentaire du Vedam, contenant l'Exposition des Opinions Religieuses et Philosophiques des Indiens,' Yverdon, 1773. 'De l'Etat et du Sort des Colonies des Anciens Peuples,' Philadelphie, 1779. 'Observations sur le Traité de Paix conclu en 1763 entre la France et l'Angleterre,' Yverdon, 1782. 'Mémoires pour servir à l'Histoire de la Religion Secrête des Anciens Peuples, aux Recherches Historiques sur les Mystères du Paganisme,' Paris, 1784. 'Histoire des Progrès de la Puissance Navale d'Angleterre,' Yverdon, 1782. 'Les Anciens Gouvermens Fédératifs, et de la Legislation de Crète,' Paris, 1798.

(For further information see the *Notice Historique*, by Sylvestre de Sacy, prefixed to the Catalogue of Sainte Croix's library. Paris, 1809, 8vo.)

STE. MARIE, at present the only settlement which the French preserve on the eastern coast of Madagascar, is an island whose centre is in 16° 45′ S. lat. and 50° 55′ E. long. It is called by the natives Nossi-Ibrahim, and is separated from Madagascar by a channel, which in its narrowest part is about three miles across, but towards the northern extremity of the island widens to ten miles. The island extends in length from south-west to north-east about thirty miles, and varies in width between five and eight miles. The circuit is nearly seventy miles. A narrow arm of the sea, not far from its most southern extremity, separates a small part of the island at high water from the remainder. The southern part of Sainte Marie is surrounded by a reef, rising above the level of the sea, but there are several openings in it, three of which are deep enough for large vessels. The shores of the island are in general low and swampy, except in a few places of small extent, where they are of moderate elevation. The interior consists of hills apparently isolated, but arranged in chains in the direction of the island from south-west to north-east. The highest of them are from 160 to 200 feet above the sea-level. Their slopes are gentle, and admit cultivation to the very summit; some of them are used as pasture-ground. The soil is bad, except a narrow tract in the interior, which may cover one-fifth of the area of the island, and which is regularly cultivated by the natives. The channel which divides Sainte Marie from Madagascar is a vast roadstead, with good anchorage, and safe, even during the western gales, which rarely occur. From this channel an inlet enters eastward into the island, which is more than 2200 fathoms long, and about 1100 fathoms wide, and constitutes the harbour of Port Louis. At the entrance of the harbour is a small island, called L'Ilot Madame. The passage south of this island can only be navigated by small vessels, but the northern passage is deep enough for frigates. At this place the French settlement has been made, as it affords a safe anchorage for several vessels, and as the interior of the harbour is almost entirely filled up with shoals. The island is watered by many streams, and the water is generally good.

The climate is very moist. The wet season begins in March and continues to August. In May, June, and July, it rains nearly without intermission, and sometimes in August. But even betweed August and the end of February rain is frequent. The number of days on which rain falls is stated to vary between 220 and 240, and it is presumed that there are few places on the globe on which a greater quantity of rain descends. The heat is excessive in January and February, when the thermometer sometimes rises in the afternoon to 100°, and varies during the remainder of the day between 88° and 92°; but in the night it descends considerably, so that at sun-rise it sometimes is at 70° and even 68°. During the rainy season the winds in general vary between south-west and south-east, and only occasionally blow from the east or north-east, generally in February and March. In the dry season the winds vary between south-east and north-east; they rarely blow from the south or south-west. The land-breeze, which blows from Madagascar, is felt during the night and early part of the day, and the sea-breeze sets in at noon. In the dry season the breezes are very feeble, but during the rains they nearly always blow with great force. The hurricanes, which are so terrible on the islands of Mauritius and Bourbon, are felt much less in Madagascar, and particularly at Sainte Marie. The natives rear cattle and cultivate rice, mandioc, and some other vegetables; and a great part of the island is covered with forests, which contain many timber-trees. The French settlers introduced several tropical productions, and they continue to cultivate coffee, cloves, sugar, and some vegetables. A considerable number of the natives live on the produce of their fisheries, fish being very abundant at certain seasons of the year. Dried fish is exported to several places in Madagascar.

The population is composed of natives and foreigners. In 1836 it was below 5000 individuals, of whom about 4000 were natives, or Malgashes, as the inhabitants of Madagascar are called. There were also 67 persons paid by the French government, 13 European settlers, and some blacks. The foreign population did not exceed 700 individuals. The French have built a few houses at Port Louis, and fortified L'Ilot Madame. In the vicinity of Port Louis are a few plantations, in which the French cultivate the articles for export for the European market. The natives inhabit about 40 villages chiefly situated in the interior of the island.

The commerce of Sainte Marie is not important, and is only carried on with the islands of Bourbon and Madagascar. Bourbon receives from Sainte Marie and other ports of Madagascar, cattle, beef, pork, suet, a few hides, land-turtles, game, rice and paddy, and some timber; and sends to it some cotton-stuffs of French and English manufacture, spirits, salt, soap, some articles of hardware, arms, and crockery.

The French began to form settlements on the eastern coast of Madagascar as early as 1642, but they had no stability, as they were frequently changed, abandoned, and again taken possession of. The few places occupied by them at the beginning of the present century were taken by the English in 1811, and destroyed. In 1818 and 1819 the French again took possession of Sainte Marie, Titingue, Foul Point, Fort Dauphin, and Sainte Lucie; and in 1821 Sainte Marie was regularly settled by a colony of seventy-nine persons. But a war soon broke out between the French and Radama, the king of Madagascar, who took Fort Dauphin and the other places in 1825, with the exception of Sainte Marie. In 1829 the French began an active war with the queen of Madagascar, who had succeeded Radama, and retook several places, as Titingue, Foul Point, and Tamatave; but after the revolution of 1830, all these possessions were again abandoned, and thus Sainte Marie has remained the only French settlement on Madagascar.

(*Notices Statistiques sur les Colonies Françaises*, Paris, 1840.)

STEALING. [LARCENY.]

STEAM is the name given in general to the vapour arising from moist or liquid bodies when subjected to the action of heat: in the mechanical applications however water is the liquid used; we shall therefore, in this article, treat steam as the vapour of water.

Steam, naturally, like other gases, is transparent and colourless, its visibility in air arising from its partial liquefaction, whence arise small vesicles of water enclosing steam, which are capable of reflecting light. From their great number, the light which they reflect or transmit, coming to the eye from all angles of incidence, and being a combination of the primary coloured rays, is white, as in snow, the foam of a cascade, &c.

As the application of heat has generally an expansive effect on bodies, so water converted into steam occupies more than 1700 times its former space. The action of heat in liquefying ice, on the contrary, slightly diminishes its bulk, which remarkable exception to the general effects of caloric is explained by an alteration of the relative positions of the solid elementary crystals of ice in passing into its liquid form, and arising from the repulsive action of heat; for it is easy to conceive how an alteration in the axes of a multitude of such infinitely small crystals, produced itself by repulsion, would bring the whole to occupy a smaller space than before. (Biot, *Physique.*)

When ice or snow is in the process of liquefaction, a mercurial thermometer plunged in it will remain constantly at the same height, whatever heat is applied, until the whole mass is dissolved. This heat, latent to the thermometer, but measurable by a calorimeter, is the caloric of liquefaction. Continuing after this stage to apply more heat, the thermometer in the water will be observed to indicate rising temperatures proportional to the surplus of heat thus given. If the heat be applied to the bottom of the vessel containing the water, the lowest stratum of the water expanded by the heat becomes specifically lighter than the incumbent strata; it therefore rises, making way for a descending current of the colder parts, which in their turn rise, and thus the heat becomes diffused through the whole mass. Upon a further application of heat, globules of vapour formed at the bottom rise along the sides of the vessel, but become liquefied in reaching strata of inferior temperature. When these bubbles become larger and more frequent, their condensation is attended by a series of sounds commonly called *singing;* and after they have acquired sufficient heat to reach the surface, and sufficient elasticity to overcome the pressure of the atmosphere, the vapour passes into the air in the form of steam, and the water is then said to boil. The further application of heat converts gradually the whole of the water into steam, during which the thermometer again becomes stationary, showing the absorption of latent heat; but after this stage has been completed, it proceeds again to indicate degrees of temperature nearly proportional to the surplus heat then applied. Hence we have two fixed points for the thermometer; that of melting ice, 0° Centigrade, or 32° Fahrenheit; and that of boiling-water, 100° Centigrade, or 212° Fahrenheit. [THERMOMETER.]

The point of ebullition will occur at lower temperatures by diminishing the pressure, 30 inches being the ordinary height of the barometer [BAROMETER]; we may diminish its altitude by ascending a mountain, or we may draw away a portion of the air by means of the AIR-PUMP; steam will then be produced at a proportionally lower temperature. When we continue to apply heat to ordinary steam, under a constant bulk, its elasticity rapidly increases, and it is then termed *high-pressure;* steam of the ordinary temperature being termed *low-pressure.*

The following table gives the temperature of boiling water and the corresponding pressures of the air as observed by Dr. Dalton and Sir J. Robison, those of the former are marked by the letter D, those of the latter by R:—

	Heat of boiling water.	Corresponding pressure of air.
R	215°	31·8
R	214°	31·2
R	213°	30·6
—	212°	30·
R	211°	29·4
R	210°	28·8
R	209°	28·2
D	200°	22·8
D	180°	15·2
D	160°	9·45
D	120°	3·27
D	100°	1·97
D	80°	1·03

Upon the important subject of the relations between the temperature and elasticity of steam, a multitude of experiments have been made by Watt, Southern, Ure, Dalton, Arago, &c. The following table for high-pressures is from the observations of Southern:—

Atmospheres.	Barometers.	Temperatures.
1	29·8	212°
2	59·6	250·3
4	119·2	293·4
8	238·4	343·6

The following is a table abridged from Dr. Ure's, showing the elastic force of the vapour of water in mercurial inches, with the corresponding temperatures, in which, it may be observed, that Dr. Dalton is confirmed in giving some elastic force even at the temperature of freezing:—

Temp.	Elast.	Temp.	Elast.	Temp.	Elast.	Temp.	Elast.
32°	0·20	170°	12·05	270°	86·30	300·6°	140·90
55	0·42	180	15·16	273·7	91·20	302	144·30
65	0·63	190	19·00	277·9	97·80	303·8	147·70
75	0·86	200	23·60	280	101·90	305	150·56
80	1·01	212	30·00	283·8	107·70	306·8	154·40
90	1·36	220	35·54	285·2	112·20	308	157·70
100	1·86	230	43·10	287·2	114·80	310	161·30
105	2·10	240	51·70	290	120·15	311·4	164·80
120	3·30	245	56·34	294	126·70	312	167·00
130	4·37	250	61·90	295·6	130·40		
140	5·77	255	67·25	297·1	133·90		
150	7·53	260	72·30	298·8	137·40		
160	9·60	265	78·04	300	139·70		

Various tables of the same kind have been constructed and published by the French academicians at the desire of government, and also by a committee of American gentlemen, which however do not harmonise with the first-named tables.

Various empiric formulæ have been attempted, and some on particular hypotheses have been calculated to represent the relation between the elastic force of steam and the temperature. As they all deviate from the observed results at very high or very low pressures, we shall here mention only a few of the more celebrated.

Laplace's formula (from Dalton's experiments):—

$$F_n = p.\,(10)^{\alpha n - \beta n^2}$$

where F_n is the force at a temperature $n°$ centigrade, and p. the pressure of the atmosphere $=0·76$ metres, and

$$\alpha = 0·0154547;\ \beta = 0·0000625826.$$

Ivory's formula (from Ure's experiments):—

$$\text{Log.}\,\frac{e}{30} = \alpha t - \beta t^2 + \gamma t^3,$$

where

$$\alpha = ·0087466;\ \beta = ·000015178;\ \gamma = ·000000024825.$$

Dr. Young's formula is remarkable from its simplicity:—

$$F = (1 + 0·0029t)^7.$$

Formula of the French Academy:—

$$F = (1 + 0·7153t)^5,$$

the degrees being here centisimal.

The general formula between the pressure, density, and temperature for all gases is

$$p = \kappa\rho(1 + \alpha\theta)$$

p being the pressure, ρ the density, and θ the temperature; κ and α are constants peculiar to the gas. If now we consider the *absolute* heat V to be a function of the temperature, we can deduce from this, by the integration of a partial differential equation, the relation

$$\frac{p^{\frac{1}{\gamma}}}{\rho} = \phi(V) \ldots\ldots \quad \text{(Poisson, \textit{Mec.}, vol. ii.)}$$

If therefore the *absolute* heat were constant (*i.e.* the sum of the latent and sensible heat), we should upon determining γ by observation, have the complete solution of the relation between the elasticity and temperature for each gas. The results in the case of steam are, as above mentioned, however, but approximations, and in extreme temperatures by no means close. Sir J. Lubbock has therefore modified the hypothesis, by supposing that the expression for the absolute heat ought to contain one term proportional to the temperature; thus, according to his view we should have

$$V=C+D\,(1+a\theta),$$

which combined with the former equations (supposing p' to be the pressure corresponding to θ') gives

$$\frac{1+a\theta'}{1+a\theta}=\frac{p^{\frac{1-\gamma}{\gamma}}-E}{p'^{\frac{1-\gamma}{\gamma}}-E}=\frac{p'\rho}{p\rho'}$$

and comparing the results of this formula with observations of Dr. Ure, from 123° to 224° Fahr., the errors are all within the limits of observation, some positive and some negative. (*Heat of Vapours*, by J. W. Lubbock, Esq., Lond., 1840.)

It has recently been observed that the discharge of steam from boilers is accompanied by a development of electricity. The facts are at present too little methodized to be introduced here. The reader may consult on this subject the *Phil. Mag.;* and Sturgeon's *Annals*.

STEAM-ENGINE. In conformity with the plan of this Cyclopædia, a general outline of the principles of the engine will be here given, the reader being referred to different articles connected with the subject, or to works written specifically on the steam-engine, for more detailed information.

The claim to the invention of the steam-engine has been made a subject of national contention; but the conclusion, arrived at from the discussions which this has originated, seems to be, that, in common with all other important applications of physical principles, no individual can lay claim to the invention. Whatever may have been the nature and date of its origin, it has been reared to its present gigantic stature by the fostering care of different countries, and, without detracting from or underrating the efforts of others, England may be justly proud of her share of the glory, a share readily conceded by our competitors.

Considering therefore dispute the as unprofitable, and the discussion of dates of patents and improvements as uninteresting, we shall incorporate all that is requisite of the history of the engine with our account of it.

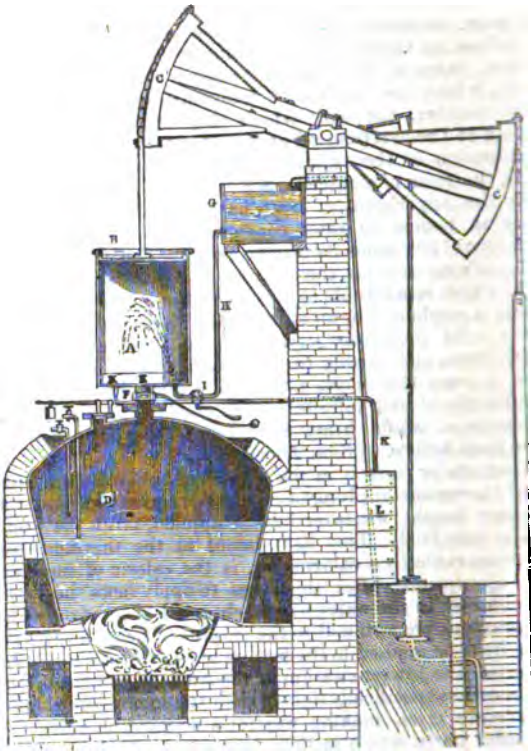
A steam-engine may be defined generally, as an engine by which the force arising from the properties of elasticity and of instantaneous condensation possessed by steam are transmitted to produce a continuous rotatory motion, either of a fly-wheel to constitute a reservoir of power for the purposes of driving machinery, or for any other uses that power may be put to.

Admitting this definition, the earlier steam-engines, as they are commonly called, those of the Marquis of Worcester (1663), and the improved forms of it contrived or suggested by others, and even Captain Savery's (1698), which was long employed in this country, were only *pumps* for raising water: a partial vacuum was formed in close vessels by the condensation of steam within them, the atmospheric pressure raised the water to a certain height; from whence it was forced higher by the elasticity of the steam admitted to act on its surface.

Passing over all these therefore as foreign to our subject, the first engine which it is necessary to describe is that of Newcomen (1705), as constituting the connecting link between the steam-pumps alluded to, and the modern engine, of which it contained the germ, and into which it was converted by the genius of Watt.

In the subjoined diagram, A represents a *cylinder* open at the upper end, fitted with a *piston* B, and rendered airtight by having water on it to the depth of several inches: the *piston-rod* was suspended by a chain from the arched end of a *beam* C, turning on an axle, and having a pump-rod at its other extremity, loaded so as to counterpoise the weight of the piston, and to raise it to the top of the cylinder. This cylinder was placed over the *boiler* D with which it communicated by a steam-pipe E, furnished with a cock F to open or close the passage. G is a cistern fixed above the cylinder, to the bottom of which a pipe H passed, also provided with a cock I.

When the piston was depressed to the bottom of the cylinder, it drove out all the air before it, which escaped at the orifice of a pipe K into the water of a smaller cistern L: the cock F being next opened, the steam from the boiler filled the cylinder as the piston rose again from the action of the counterpoise; as soon as it arrived at the top, the cock F was closed and I opened, a jet of cold water from the cistern G rushed into the cylinder, condensing the steam, and thus forming a partial vacuum beneath the piston,* the pressure of the air on its upper surface forced it downwards, and caused the pump at the other end of the beam to raise an equivalent weight of water to a height equal to that through which the piston moved: the injected water and condensed steam-water flowed off into the cistern L through K, as the air had previously done. The cock I was now closed, and F opened, and the action was repeated, and when this engine was first introduced, it was the duty of an attendent to open and shut these cocks alternately; but subsequently lever handles to open and shut the cocks were acted on by pins or cams, carried by a rod suspended from the beam; and the engine became self-acting. This improvement was rudely made in the first instance by a boy named Potter, for the purpose of saving himself trouble; it was subsequently perfected by an engineer named Beighton in 1718.



Newcomen's engine was successively improved upon by Smeaton, Brindley, and other engineers, previous to Watt's time, and from its intrinsic merits it remained in general use under the appropriate name of the 'atmospheric engine' during the greater part of the last century, but was only used for pumping water: its existence was further prolonged by the important improvements we are about to describe, and possibly one or two may still be found in our remoter mining districts, neglected or in ruins, witnesses to the rapid march of our mechanical skill within the last fifty years.

It hence appears, that in Newcomen's engine, the steam was solely employed to produce a partial vacuum by its *condensation*, its elastic force at high temperatures not being made use of; and a great waste of heat, or fuel, was occasioned by this condensation taking place within the cylinder: for the consequent reduction in temperature caused a partial condensation of the next charge of steam, till the latent heat given out by this condensing steam had raised the temperature of the cylinder again to that of the boiler: more steam was therefore requisite than would otherwise have been necessary.

The first and most important of Watt's improvements on the engine consisted in effecting the condensation in a separate vessel, termed the *condenser*, which communicated with the cylinder. This condenser being filled with steam from the boiler at the same time with the cylinder, the jet of cold water, admitted into the former only, effected the condensation of the whole volume of steam, both of that in the cylinder as well as of that in the condenser, in conformity with the well known principle in physics, that an action originated in any part of a homogeneous fluid is almost instantaneously communicated throughout its mass.

---

* This mode of effecting the condensation was considered an important improvement on that previously employed by Savery, which was by the external affusion of cold water over the steam-vessel; nevertheless, this latter principle has been partly re-introduced in the form of a condenser, patented by Mr. S. Hall, which is employed in many steam-vessels, and appears to be increasing in use.

To effect still further the object of this separate condensation, Watt placed his condenser in a cistern, the temperature of which was kept constant by a fresh supply of cold water, brought from a well by a pump, to be presently mentioned; for otherwise, the heat given out by the condensing steam would, by heating the vessel and the water surrounding it, have prevented the rapid or almost instantaneous condensation necessary to the efficient action of the engine.

To comprehend the necessity for a rapid condensation, it must be remembered that the effective power of the engine depends on the pressure on the piston minus any resistance it encounters and on the space through which it moves. If the steam could be *instantly* converted into water, and so entirely removed,* a perfect vacuum would be formed beneath the piston, in which case, there being no resistance from this source to overcome, a maximum of power would be obtained: but if the condensation be slow, or only partial, since the piston will begin to move the instant there is any inequality in the pressures exerted on its opposite surfaces, its motion will be retarded, or the power diminished, by the resistance to compression offered by the uncondensed steam, and although that resistance would tend to diminish as the condensation proceeded, yet the space occupied by the steam diminishing in consequence of the descent of the piston in nearly the same proportion, the resistance would be nearly constant through the whole of that descent.

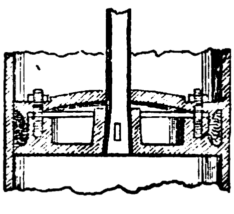
On the other hand, to maintain the temperature of the cylinder as high as possible, Watt, at first, cased it in wood o retard the radiation, and subsequently surrounded it by a second iron cylinder, admitting steam from the boiler between the two. This casing, or 'jacket,' as it is termed, is not used in most modern engines made since Watt's time; for reasons which will hereafter appear: and the effects of radiation from the surface of the cylinder are now chiefly guarded against as much as possible by keeping that surface bright and smooth.

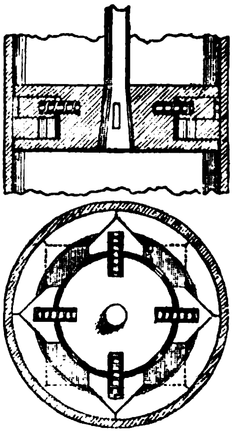
The second of Watt's improvements on Newcomen's engine consisted in closing the cylinder at top, the piston-rod being made to pass through a cylindrical neck in that op, termed a *stuffing-box*, from the passage being rendered team-tight by a stuffing of tow saturated with grease, which by its lubrication diminished the additional friction resulting from this arrangement. The object of this alteraion was to admit of the elastic force of the steam being employed to impel the piston downwards, instead of simple atmospheric pressure: for this purpose the steam was admited from the boiler above the piston at the same moment he condensation took place in the condenser; the steam-passage being made double for the purpose, so that the communication with the condensor could be cut off when that with the cylinder was opened, alternately. When the piston had descended to the bottom of the cylinder, the counterpoise at the pump-rod raised it again, as in Newcomen's engine; but to allow of this upward motion, it was necessary o remove the steam which was above the piston, and this was done by allowing it to pass under the piston, and into he condenser through a passage opened at the proper nstant for this purpose. Such is the general principle of Mr. Watt's *single-acting* engine, which hence became a *steam-engine*, and was no longer an *atmospheric* one.

By a further improvement the counterpoise at the pump-rod was done away with, which obviously had been so much added to the unproductive work of the engine, since this weight had to be raised in addition to that of the water. The upward stroke of the piston was now produced by admitting the steam *below* it, to act by its elasticity, as it had previously done *above* when causing the piston to descend: thus the engine became *double-acting*, and assumed hat essential general principle which it has ever since maintained, although all the details of its construction have been improved upon by successive engineers.

The changes in the engine introduced by Watt created the necessity for two pumps, and commonly three, which are worked by rods attached to the beam: the first of these is the *hot-water* or *air pump*, intended to remove the air, condensed water, and steam from the condenser, in which they would otherwise accumulate, and finally stop the action; for this water cannot flow away into an open cistern, as it had done in Newcomen's engine, since by Watt's principle it is essential that the condenser should be as steam-tight and as perfectly closed as the cylinder, or else the steam could not exert a pressure greater than that of the atmosphere, as it is intended to do in order to increase the effective force of the engine. The second is a force-pump, required to return the water, drawn from the condenser by the first, back to the boiler, as will be hereafter explained; and the third, termed the *cold-water pump*, is that alluded to in a preceding paragraph as supplying the cold-water cistern which contains the condenser.

Having thus explained the general principle of the engine, some of the details of its construction must now be considered, and the piston [HYDRAULICS] may claim our first notice, both from its paramount importance and the practical difficulties to be overcome in its formation. In hydraulic machines, all vessels, pipes, valves, &c. must be made *water-tight:* in Bramah's pump, for example, the efficiency of the engine entirely depends on the accurate fitting of parts moving in contact, which must be perfectly water-tight, though subjected to a pressure of many hundred pounds on each square inch of surface, and the utmost perfection of skill in workmanship is requisite to ensure this: this difficulty is obviously considerably increased when steam or gases are the fluids to be dealt with. Now the piston of a steam-engine must be *steam-tight*, and yet move with a minimum of friction in the cylinder; and as this latter, from defective workmanship, can never be a perfectly true one, the cylindrical periphery of the piston must be so contrived as to be capable of adapting itself to every inequality in the surface against which it slides; this is effected in common pistons by their being made two inches or more less in diameter than the cylinder, leaving a projecting flange at the bottom, which, together with a top plate bolted to them, accurately fits the cylinder. Tow or soft rope, saturated with grease, is carefully wound round the cylindrical body of the piston, between the upper plate and lower flange; the former is then drawn up by screws, compressing the intervening packing till it perfectly fits the cylinder, and yet by its elasticity allows of its adapting itself to the inequalities in the surface. The upper one of the annexed figures will explain the details of the construction of the ordinary piston.



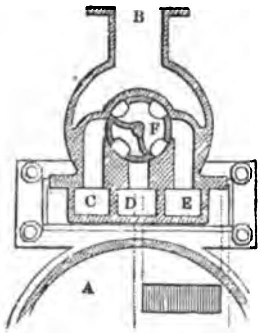


But as the friction of this common piston is necessarily very considerable, the better class of engines have usually what are called *metallic pistons*, of which there are different kinds, invented by Cartwright, Jessop, Barton, and others; the body of these pistons is metal, made in pieces or segments, acted on by springs radiating from a centre; so that while the friction is diminished by both surfaces being metallic, the piston, owing to its construction, can adapt itself to the irregularities of the cylinder. It is found in practice that these metallic pistons wear for a long time, and do not of course require the frequent repacking necessary to those with tow or hempen stuffing. The adjoining lower figures represent a plan and elevation of an improved form of Barton's piston, to explain the principle.

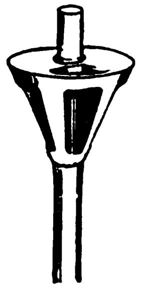
In Newcomen's engine the steam was admitted to the cylinder, and the communication again cut off by means of a cock of the common construction; but a more efficient contrivance is requisite when the steam is to be admitted alternately both above and below the piston, and to the condenser, as it is in engines since the introduction of Watt's improvements. This can be accomplished by a *four-passage cock*, originally invented by Leupold in 1720, and since improved by Bramah and others. The principle of a four-way cock will be understood by the annexed figure of the plan of one employed by Messrs. Maudslay and Field in their small engines.

---

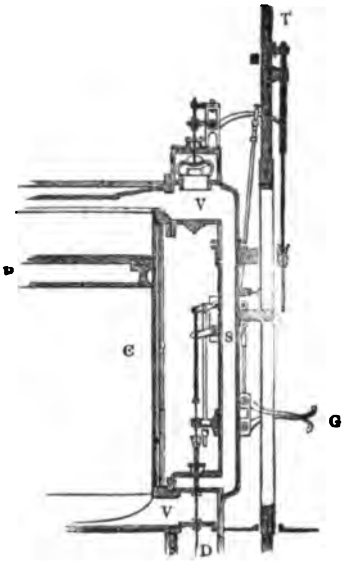
* One cubic inch of water occupies 1711 cubic inches of space, in the form of steam at 212°; consequently, the space occupied by the water after the condensation may be neglected in the computation.



A is a portion of the cylinder; B, the steam-pipe; C, D, E, three passages, one communicating with the top, another with the bottom of the cylinder, and the third with the condenser; F is the four-passage cock, which by turning alternately to the right and left establishes a communication between one of the former with the latter passage. The lower figure represents the conical valve with its side apertures, and that at the top, by which the steam enters.



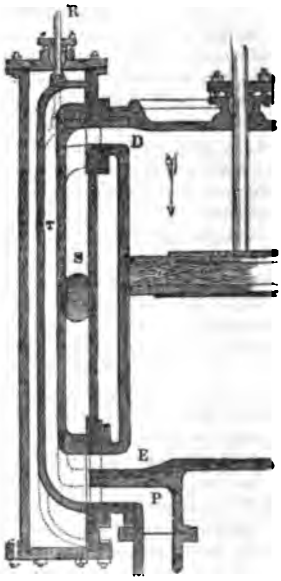
Watt employed flat conical valves for the purpose under consideration, which were raised or depressed by cranks acting on a guide-rod at right-angles to the plane of the valve, which therefore did not turn on a hinge like the common *clack-valve* of a pump; in some of his engines the valves were raised or depressed by toothed sectors acting on a rack in the guide-rod, so that the valve might rise from its seat without altering the parallelism of its plane. Two such valves were mounted in one box, one above the other, the guide-rod of the lowest passing through that of the upper.



The figure shows the valves of this construction, of the large engine recently erected by Messrs. Maudslay for the Chelsea water-works.

C, part of the cylinder; P, the piston; T, the 'plug-tree;' G, the gearing handles, which are struck by the tappets on the plug-tree, and thus open and close the valves V; S, the steam-passage to the upper and lower parts of the cylinder; D, the passage to the condenser.

In most engines of the present day however the *slide-valve*, as it is termed, has superseded the use of the others: a perfectly flat surface slides on another, terminating the orifices which are to be opened and shut; such is the general principle, but the forms and arrangements are too numerous to be mentioned The figure subjoined shows a part of the cylinder of an engine with *box-slide valves*, now much used.



S, the orifice of the steam-pipe; the steam passes to the upper part of the cylinder at D, the lower passage E being shut off in the position of the valve shown and shaded in the figure; the slide is moved by the rod R, and it is shown in its second position in dotted lines, in which position it will be seen that the steam can then enter *beneath* the piston, while the passage P to the condenser is in turn in communication with the upper part of the cylinder by means of the tube T of the slide.

The characteristic and most valuable part of this principle is this, of making part of the slide act as a pipe to connect the two parts of the cylinder alternately with the condenser. The steam by pressing on the slide in the common form enormously increases the friction with the surface against which it acts, and also produces rapid wear of the parts; this defect is remedied in the box-slide and all others which possess this peculiarity. Another form of slide-valve is shown in the diagram, page 480.

Slide-valves were proposed by Murray, in 1799, but were abandoned, till improved workmanship allowed of their being more perfectly made; they have been successively improved in principle by Murdoch, Bramah, Millington, Maudslay, and Seward, the slides of the last named being now much used in marine engines.

It has been mentioned that the alternate action of the valves in the atmospheric and Watt's engines was produced by pins, or *tappets*, adjusted on a rod called the *plug-tree*, suspended from the beam; as the plug-tree moved up and down with the beam, the tappets struck the ends of bent levers or cranks, which raised or depressed the valves in proper succession: some of these levers were so formed that the tappet by pressing against them might keep the valve closed during the greater part of the stroke* of the piston, and others required an intermediate shorter lever, or claw, to act on the valve-rod; so that the whole arrangement was inevitably complicated and cumbrous.† But when the slide-valve superseded Watt's double conical valves, and the steam passages could be opened and closed by the motion of one rod only, connected with the slide, this motion could be readily produced by what is termed an *excentric*, which for this purpose usually consists of a circular plate of metal, keyed *excentrically* on the shaft of the fly-wheel, and working within a ring attached to the end of a frame intended to move a crank directly connected with the slide-rod at its other extremity. As the shaft revolves, the excentric plate imparts an alternating motion to the frame, which, transmitted by the crank, alternately raises and depresses the slide-rod. The principle of the excentric is one of the most valuable of those mechanical contrivances by means of which a continuous circular can be converted into an alternating rectilinear motion.

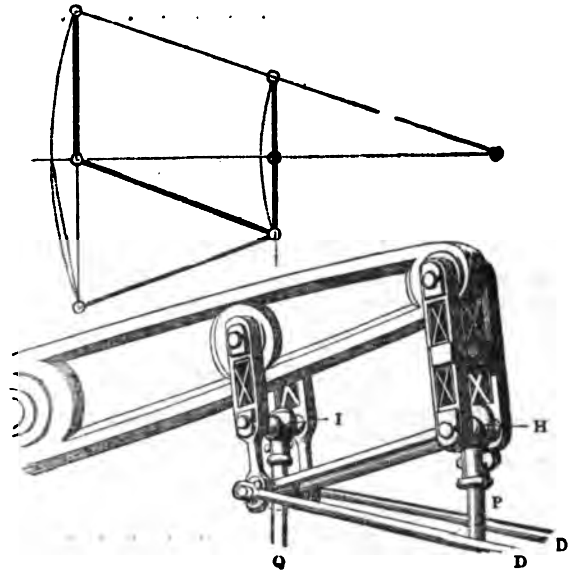
---

* The term *stroke* is technically used by engineers to express the whole motion of the piston from the top to the bottom of the cylinder and back again.

† Messrs. Maudslay and Field have however retained the plug-tree and tappets and the conical flat valves in the large condensing engine erected by them for the Chelsea Water-Works at Pimlico in 1837; which replaced an original engine of Boulton and Watt, probably the last to be seen in the neighbourhood of London.

The 'beam,' so frequently alluded to, was obviously the readiest mode of connecting the alternating motion of the piston with the pump to be worked, in the atmospheric engine; and owing to the facilities it offers of working the plug-tree and the three pumps necessary in Watt's condensing engines, continued to form a part of the arrangement whether the engine were intended to pump a mine or to drive machinery. The beams of the first engines were made of two or more trees, bolted together to obtain the requisite rigidity, and further strengthened by a kind of truss, as is seen in the diagram of Newcomen's engine. But when the art of making heavy iron-castings was perfected, that metal was substituted for wood, to the manifest improvement of the engine in every respect. Watt also removed the cumbrous arched heads, which had been previously employed for the purpose of causing the piston-rod to move up and down in the same right line, though connected with the end of the beam, which necessarily described an arc of a circle, as turning on a fixed centre; this arrangement implied the use of a flexible chain, to suspend the piston, which might wind round, and unwind from, the arch, but a chain could not be used when the piston had to raise the beam, as it had to do in Watt's engine, instead of being raised by it, as in Newcomen's.

The object of these 'arched heads' is attained in modern engines by a system of simple rods or levers, so combined that one point may move in a straight line nearly. There are a variety of combinations by which this may be effected, but that termed the 'parallel motion,' invented by Mr. Watt for the purpose, is the only one which need be here noticed, as being that most commonly used.



The geometrical principle of this motion is shown in the diagram, as well as the whole arrangement when the piston is near the top of the cylinder. D D are rods fixed by one end to the frame supporting the beam, while the three other pair of levers being jointed together and to the beam, must obviously, in every position, form a parallelopipedon, whence the name is derived; P is the piston-rod attached to H; Q that of the hot-water pump connected with the parallel motion at I in the centre of that side.

When the engine is employed to drive machinery of any kind, a *fly-wheel* becomes a necessary adjunct to it. A fly-wheel is one in which the principal quantity of the matter is distributed in the periphery; when such a wheel revolves on an axis perpendicular to its plane, the greatest quantity of matter moving with a maximum velocity, the momentum of whole is a maximum, while its inertia, if it be large, causes it to control, or equalize, the motion of the machinery through which it receives its own. It is the momentum of such a wheel which constitutes the disposable force available for the multifarious purposes to which machinery can be applied; so that in the case of the steam-engine, although the elasticity of steam is the original source of power, the immediate one by which the work is executed is the momentum of the fly-wheel.

It is consequently necessary to adapt some contrivance to the end of the beam, which shall convert the alternating circular motion of the latter into a continuous one of the fly-wheel; this is effected by the *rod* and *crank*, a piece of mechanism of such frequent occurrence that it is unnecessary to describe it; the treadle of a lathe is a familiar instance of its application, and for a similar purpose, that of connecting the alternate motion of the turner's foot with the continuous one of the wheel of the lathe; the principle of the treadle, or rod and crank, is in fact the only one by which an alternating can be converted into a continuous circular motion it must therefore be employed, notwithstanding the variation in the power transmitted by means of it, consequent on that of the angle formed by the rod and crank with each other. Thus, for example, when the rod and crank are in the same direction, which occurs twice at every rotation, no force whatever is transmitted by it, and the primary one is entirely suspended or held in equilibrium by the resistance of the fixed centres on which the crank and rod turn.

In the steam-engine the rod and crank are so adjusted that these two neutral positions occur when the piston is at one or the other end of the cylinder, and the valves are so arranged that both steam passages being closed, all communication between the engine and the boiler is cut off, otherwise the steam, which could not under these circumstances move the piston, would exert its force to the detriment of the machine; as soon however as the momentum of the fly-wheel has carried the crank past these positions, the motion reciprocally imparted through it to the piston and valves admits the entrance of the steam from the boiler into the cylinder again. It is one of the important details in the construction of the engine, that the piston should be in that point of its course when the steam exerts its maximum of effect on it, at the time when, the rod and crank being at right angles to each other, the maximum of force may be exerted to turn the fly-wheel.

Since the diameter of the circle described by the crank must be equal to the length of the stroke, or to the distance through which the piston moves, it might be thought advantageous to increase the length of the stroke as admitting of a longer crank; but there are limits to this length determined by a variety of circumstances, some of which will be hereafter explained.

When Watt substituted the elastic force of steam for the pressure of the atmosphere, he introduced a source of power which might be increased to an indefinite extent, provided it were found advantageous to employ it; and the question naturally suggests itself, what is the elastic force or pressure at which the maximum of useful effect can be produced with a minimum expenditure of fuel? Unfortunately no direct answer can be given; in mathematical language, the unknown quantity is a function of too many variables to be capable of determination, except by repeated experiments for every specific engine, this quantity varying with the principle of its construction, even to details. The results of such experiments seem to show that generally it is more advantageous to employ steam of a comparatively high elastic force; accordingly the pressure was increased, in engines constructed by Watt, from 4 to 8 or even 12 lbs. on the inch, the apprehension of danger from the explosion of boilers in which steam of high pressure was generated constituting the chief limit to a further extension of the practice. The nature of those improvements in the construction of boilers will be briefly explained hereafter, by which steam of 100 lbs. on the inch may be generated, if requisite, with nearly as much security as that of 4 lbs. in the earlier boilers; but at present, simply stating that such is the case, we proceed to explain some important changes which have been consequently made in the principles of the engine.

When the steam is first admitted into the cylinder, the total space filled by the steam is immediately augmented by that through which the piston moves; and if the capacity of the boiler were not several times greater than that of the cylinder, the consequence would be a gradual diminution of the pressure, supposing the total quantity to remain the same: but the moment the pressure in the boiler tends to diminish, an additional quantity of water passes into the state of vapour, of the same tension as that previously generated, provided the temperature be maintained; hence the pressure on the piston may be regarded as sensibly the same throughout the whole of its stroke, provided that pressure be somewhat greater than that of the atmosphere, and the communication with the boiler remain open. It is must not however be supposed that the pressure on the piston is the same with that of the steam in the boiler; all that is here asserted is that the pressure on the former will be uniform.

But if the pressure be considerably greater than that of the atmosphere, the steam, even when separated from the water, while expanding in the enlarging space formed by the motion of the piston, will exert sufficient force to continue that motion, till at last the pressure diminishing inversely as the space increases, and directly as the temperature, according to Mariotte's and Gay-Lussac's laws, that pressure will finally be not in equilibrium with the resistance, and all motion will cease. This is the important principle of working engines, originally proposed by Watt, though not employed by him, but which now, from the improvements in boilers above alluded to, is becoming general under the name of that of *expansion*. In the common engine, if the pressure on the piston continue uniform during the stroke, as it would do if the communication with the boiler remained open, the piston would move with an accelerating velocity till it arrived at the end of the cylinder, when the motion in that direction being suddenly stopped, the momentum must be expended on some of the fixed points of the machine, to its manifest injury, and with the useless expenditure of so much power; accordingly the communication with the boiler is always cut off when the piston has arrived at a certain point, and with a momentum sufficient to carry it to the end of its stroke without any useless expenditure of force, while the steam behind it, which was originally of but a few pounds pressure above that of the atmosphere, thus limited in quantity, rapidly declines in force, and ceases to urge the piston on. But on the 'expansion principle,' when the steam possesses considerable elastic force, the communication with the boiler may be cut off much sooner, and the piston is urged forward by the expansive force of the steam, which, although decreasing as the space increases, is yet sufficient to carry the piston to the end of the stroke.

If it be asked how it is advantageous to use half the quantity of steam at twice the pressure, when it takes perhaps twice the quantity of fuel to raise the steam to the double pressure, the answer is, that it can be shown analytically that the total force exerted by steam acting expansively is greater than that which would be exerted by steam of a constant pressure, equal to the mean of those exerted, first, at the moment the steam-valve is closed, and, secondly, when the piston arrives at the end of its stroke; consequently, as less steam may be used to produce the required effect, a saving of fuel is the result, or in other words, the quantity of steam may be much less than half, at double the pressure, or the pressure much less than doubled, to produce the same effect.

As long as a continued force of any kind produces a continued motion with a constant velocity in any body, the force must be in equilibrium with the resistance it has to overcome; for if the force were greater than the resistance, it would produce an accelerating motion, which is contrary to the supposition; and if the resistance became greater than the force, the velocity would retard till the equilibrium were produced: as long therefore as a steam-engine is moving with a constant velocity, the *pressure on the piston* must be equal to the resistance to be overcome, consisting of the net work to be done, together with the friction of the various parts, the resistance of the uncondensed steam, of the air on the opposite side of the piston, and of other sources of resistance, which all concur to produce the gross resistance to be overcome. Putting P′ for the pressure of the steam on each unit of surface of the piston, and R for the resistance for the same unit, or for the quotient obtained by dividing the total resistance by the number of units of surface, we have

$$P' = R \qquad \text{(A)}$$

as the first equation of condition; but since the velocity of the motion must be taken into consideration, when the *power* or force of the engine is to be determined, we must consider the velocity with which this pressure is applied, or, in other words, the rate at which the steam is applied to the cylinder; and it is obvious that when the engine is moving with a constant velocity, the supply to the piston must be exactly that produced in the same time by the evaporation going on in the boiler. If therefore S expresses the volume of *water* evaporated in a unit of time and transmitted to the cylinder, and m the ratio of the volume of *steam*, formed under the pressure P in the boiler, to the volume of *water* which produced it, mS would express the volume of steam generated in each unit of time under the pressure P: by passing into the cylinder this steam assumes the pressure P′, and, neglecting the further change produced by the variation in the temperature of steam in changing from pressure P to pressure P′, the volume of that quantity of steam would be inversely as the pressures by Mariotte's law; consequently the volume mS, when transferred to the cylinder, would become $m\,S\frac{P}{P'}$; and putting v for the velocity of the piston and a for its area, av will be the volume of steam expended in each unit of time; hence we get

$$av = m\,S\frac{P}{P'} \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(B)}$$

eliminating P′ between equations (A) and (B), we obtain

$$v = \frac{mS}{a} \cdot \frac{P}{R}$$

$$R = \frac{mSP}{av}$$

$$S = \frac{avR}{mP}$$

for the *velocity*, *resistance*, and *evaporation*, when the other quantities are known: it must be observed however that the element neglected in these general deductions, namely, the change produced by the variation in temperature, has an important influence on the result, and must therefore now be taken into account.

$$\mu = \frac{1}{n + qp} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(C)}$$

is the general expression for the steam during its action in the engine, μ being the volume, and p the pressure, and n and q constants, determined by experiments, for different kinds of engines.*

Let a certain volume of *water*, S, be converted into steam of the pressure p, and let M represent the volume of *steam* produced, then—

$$\mu = \frac{M}{S} = \frac{1}{n+qp};$$

if M′ and p' stand for the volume and pressure of steam from the same volume of water S, under other conditions, then—

$$\mu' = \frac{M'}{S} = \frac{1}{n+qp'};$$

and therefore the ratio of the volumes of steam produced under these different conditions from the same volume of water will be—

$$\frac{M}{M'} = \frac{\frac{n}{q} + p'}{\frac{n}{q} + p} \quad . \quad . \quad . \quad . \quad . \quad \text{(D)}$$

that is, the volumes will not be inversely as the pressures simply, according to Mariotte's law; but inversely as the pressures augmented by a constant.

---

* It can be shown that the density and relative volume of a vapour, whether or not in contact with the liquid, may be deduced, if its pressure and temperature are known; and that when in contact with the liquid, the temperature varies directly with the pressure. In deducing formulæ for the steam-engine, it is necessary to be able to determine an expression for the relative volume of the steam in contact with the water, or the volume of the steam at the maximum of density and pressure at any proposed temperature. Now this cannot be done from the existing formulæ for analytical reasons, and it becomes necessary to adopt some empirical formula, for determining this relative volume of steam at its maximum of density, in terms of its pressure only; this formula must be tested by its conformity with experiment. The late M. Navier proposed for this purpose,

$$\mu = \frac{1000}{0{\cdot}09 + 0{\cdot}0000484\,p}$$

in which μ is the ratio of the volume of steam to an equal weight of water, and p the pressure; but this formula, though true within certain limits of pressure, is not consistent with experiments at pressures lower than the atmospheric, and the following is propounded by M. de Pambour, as more correct and comprehensive :—

$$\mu = \frac{10000}{0{\cdot}4227 + 0{\cdot}00258\,p} \text{ for condensing engines;}$$

$$\mu = \frac{10000}{1{\cdot}421 + 0{\cdot}0023\,p} \text{ for non-condensing engines;}$$

p being the pressure in pounds on the square foot. These formulæ in general terms therefore are expressed by

$$\mu = \frac{1}{n + qp} \text{ as in the text.}$$

From the above equation we get—

$$p = \frac{M'}{M}\left(\frac{n}{q} + p'\right) - \frac{n}{q} \quad . \quad . \quad . \quad . \quad . \quad (E)$$

Let P = Pressure of the steam in the boiler.
P' = Pressure of the steam in the cylinder; $P' < P$ *generally*.
π = Pressure at any instant when acting *expansively* in the engine.
l = length of the stroke.
l' = the length of that part of stroke performed before the communication between the boiler and cylinder is cut off.
λ = the length of that portion of the stroke performed when the pressure is become π.
a = area of piston.
c = *clearage*, or space in the cylinder at each end left between the piston and the ends of the cylinder, including the part of the steam-pipe between the slide-valve and the cylinder, which space is necessarily filled with steam at each stroke.

When the piston has performed λ of its course under the expansive force of the steam, let $d.\lambda$ be the differential of this length, then the corresponding *force* or effect will be $\pi a d.\lambda$: and at the same instant the space $a\,(l' + c)$ occupied by the steam before the expansion will become $a\,(\lambda + c)$. Hence from (E)—

$$\pi = \left(\frac{n}{q} + P'\right)\frac{l' + c}{\lambda + c} - \frac{n}{q};$$

and $$\pi a d.\lambda = a(l' + c)\left(\frac{n}{q} + P'\right)\frac{d.\lambda}{\lambda + c} - \frac{n}{q}\,a d.\lambda.$$

Integrating between the limits l' and l, we obtain

$$a\,(l' + c)\left(\frac{n}{q} + P'\right)\log\frac{l + c}{l' + c} - \frac{n}{q}\,a\,(l - l').$$

for the value of the total effect produced by *expansion* from the moment when the communication with the boiler is cut off, to the end of the stroke. By adding to this therefore the effect $P'al'$, produced previously, we get

$$a\,(l' + c)\left(\frac{n}{q} + P'\right)\left[\frac{l'}{l' + c} + \log\frac{l + c}{l' + c}\right] - \frac{n}{q}\,al = aRl \quad (F)$$

If in this expression, $l' = l$, which is equivalent to supposing the engine to be working without expansion, we get $P' = R$, as it ought to be.

Resuming the equation $\frac{S}{n + qP'}$, which expresses the volume of steam at the pressure P' furnished by the boiler in the unit of time, and $a\,(l' + c)$ being the volume of this steam expended at each stroke; then if there are K strokes in that time, the expenditure of steam will be

$$Ka\,(l' + c);$$

and if v be put for the velocity of the piston, we have $v = Kl$, or $K = \frac{v}{l}$; hence, by substitution, the expenditure will be

$$\frac{va\,(l' + c)}{l} = \frac{S}{n + qP'} \quad . \quad . \quad . \quad . \quad . \quad (G)$$

by equating the expenditure to the volume furnished by the boiler, which, as has been above stated, must be the condition when the motion is uniform. Eliminating P' between (F) and (G), we get for the final general equation—

$$v = \frac{S}{a}\cdot\frac{1}{n + qR}\left[\frac{l}{l' + c} + \log\frac{l + c}{l' + c}\right] \quad . \quad . \quad . \quad (H)$$

The resistance expressed by R in this formula is the *total* pressure on each unit of surface of the opposite side of the piston, and is composed of three parts. First, of the *load*, or work to be moved or done, which we will denote by r. Secondly, of the resistance arising from the friction of the engine, which may be expressed by $f + \delta r$; f being the friction when there is no load, and δr the increment due to the additional friction for each unit of the load r. And, lastly, of the pressure on the opposite surface of the piston, which will be the atmospheric pressure in non-condensing engines, or that of the uncondensed steam and residue of air in condensing ones: this we shall call p. All these, r, $f + \delta r$ and p, refer only to each unit of surface of the piston, or

$$R = (1 + \delta)\,r + p + f,$$

by substituting this valve for R in (H), and by putting k for

$$\left[\frac{l'}{l' + c} + \log\frac{l + c}{l' + c}\right],$$

we obtain

$$v = \frac{S}{a}\cdot\frac{k}{n + q\,[(1 + \delta)\,r + p + f]} \quad . \quad . \quad (K)$$

Now the quantity $\frac{S}{n + qR}$, it will be seen (C) is the total space occupied by the steam (in contact with the water) under the pressure R: hence to deduce the velocity v, the volume of steam corresponding to the volume of water S, supposed to be converted into steam under a pressure equal to R, must be calculated; and this volume being divided by a, the area of the piston must be multiplied by k.

The equation thus deduced shows the relation between all the quantities, known or sought, that enter into the mechanical theory of the engine in its most general form: it should be observed however that to preserve homogeneity, the dimensions a, l, l', should be expressed in the same unit as the volume S of the water evaporated; and the pressures P, r, and p referred to the same unit as S.

When this formula is used for computation, it must be understood that the quantity S expresses the *effective* evaporation; that is, the volume of water which really passes to the cylinder in the form of steam, and which acts on the piston, and does not allow for any loss by leakage or from any peculiarity in the structure of the engine.

If the engine is a condensing one, acting expansively, l' must be made equal the length at which the steam is cut off; if expansion is not employed, l' must be put equal to l, or to the whole length of the stroke, in which case the quantity k becomes $\frac{l}{l + c}$, and the expression for the velocity becomes

$$v = \frac{S}{a}\cdot\frac{l}{n + qR}\cdot\frac{1}{l + c}.$$

The part p of the quantity R must be made equal the pressure of the uncondensed steam, &c. If the engine be a non-condensing one, then p will be equal the atmospheric pressure.

Since from (K) we obtain

$$ar = \frac{Sk}{(1 + \delta)qv} - \frac{a}{1 + \delta}\left(\frac{n}{q} + p + f\right) \quad . \quad . \quad . \quad (L)$$

it might be supposed that when $v = 0$, the resistance would be infinite, a paradox which would appear to vitiate the correctness of the formula. But it must be borne in mind that when $v = 0$, $S = 0$; for S is the quantity of steam which passes through the cylinder in each unit of time: and since no quantity of steam, however small, can pass without moving the piston, as long as S has any real value, v will have one too: when therefore $v = 0$, $S = 0$ also; and then

$$ar = \frac{0}{0}, \text{ and not } = \infty;$$

that is, the formula becomes indeterminate, but not the less direct, as will appear by considering the other quantities it involves, and the consequences of putting $v = 0$.

By supposing the velocity zero, it is, in the first place, evident that no steam can pass to the cylinder, as has been stated; consequently there can be no expansion, that is, $l = l'$. Again the velocity being zero, the piston at rest becomes equivalent to the fixed sides of the boiler, and the pressure it sustains is equal to that in the boiler.

The working of an engine may be considered under three conditions: first, when it is working with a given pressure of steam, and with any, whatever load or velocity. Secondly, when it is working with a given pressure, and with that load or velocity compatible with the production of a maximum of useful or net force with that pressure: this may be termed the *relative maximum of useful effect*. And thirdly, when the pressure having been determined to furnish the force most consonant with the action of steam in any specific engine, the load is regulated so as to be that most advantageous for that pressure: this last constitutes the *absolute maximum of useful effect* for that machine.

The three fundamental problems for solution in the calculation of steam-engines consist in determining the velocity, the load, and the rate of evaporation in the boiler, since the useful effect, or net available power, is a function of these three quantities; and this net available power may be expressed in six different ways:—

First, by the number of pounds raised to a unit of height in a unit of time.

Secondly, by what is termed the 'horse-power' of the engine.

Thirdly, by the weight raised by the consumption of 1 lb. of fuel.

Fourthly, by the weight raised by the evaporation of a cubic foot of water.

Fifthly, by the number of pounds of fuel, or of cubic feet of water, for each horse-power.

Sixthly, by the number of horses-power which is furnished by each pound of fuel, or by each foot of water.

For the various formulæ by which all these problems may be numerically solved for different kinds of engines, and for the investigations by which those formulæ are deduced, we must refer to more comprehensive works; contenting ourselves here with deducing the general equations for the other unknown quantities of evaporation, useful effect, and horse-power, as we have done for velocity.

From (K) we obtain

$$S = av\,\frac{n+q\,[(1+\delta)r+p+f]}{k} \quad . \quad . \quad . \quad (M)$$

as the expression for the evaporation of which an engine must be capable to overcome a given resistance r, with a proposed velocity v, S being the quantity of water which is to be converted into steam and transmitted to the cylinder in each unit of time.

The useful or net force of the engine generated in the same unit of time is obviously arv; since v, the velocity, is in fact the space moved through by the piston in that time; by multiplying therefore both sides of (L) by v we obtain

$$\text{Useful force} = arv = \frac{Sk}{(1+\delta)q} - \frac{av}{1+\delta}\left[\frac{n}{q}+p+f\right] . \quad . (N_1)$$

or by multiplying both sides of (K) by ar, we obtain an expression for the same quantity in terms of the load

$$\text{Useful force} = arv = \frac{Srk}{n+q\,[(1+\delta)\,r+p+f]} \quad . \quad . \quad (N_2)$$

It will be noticed that for any proposed engine this force does not depend on the pressure of the steam in the boiler, P not entering into these expressions; but on the evaporation S effected in the boiler in each unit of time.

What is termed a 'horse-power' is estimated as 33,000 lbs. raised one foot in a minute: by dividing therefore the equations last obtained by 33,000, we get

$$\text{U. F. in horse-power} = \frac{\text{Useful Force}}{33000}.$$

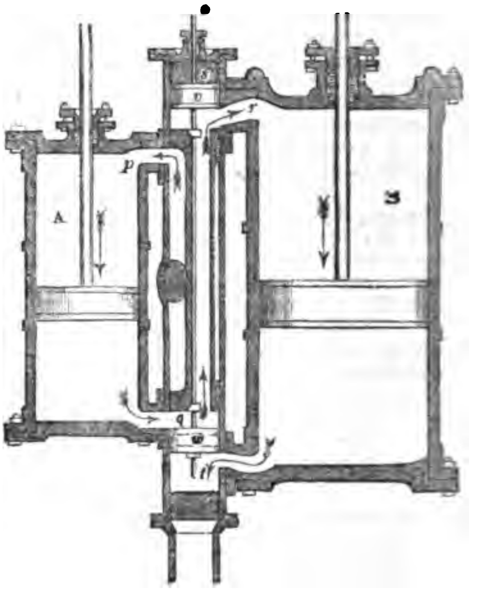
and if during the unit of time N lbs. of coals are used in the furnace,

$$\text{U. F. from 1 lb. of fuel} = \frac{\text{Useful Force}}{\text{N}}$$

We must now return to our general description of the engine and of its modifications.

In 1781 an engineer named Hornblower proposed using the expansive principle by means of a double cylinder, but was prevented from carrying out his plan by the comprehensive and jealously guarded patents of Watt and his partners. In 1804 however Woolf brought this principle of the double-cylinder engine into use. The annexed figure will explain the mode of its action with an improved slide-valve.

The steam enters through the passage p *above* the piston in the smaller cylinder A, at a considerable pressure: while the piston is descending under its influence, the steam from beneath passes through the tube r to *above* the piston in the large cylinder B, which is impelled downwards by its expansion, the steam which was previously under this piston having passed to the condenser by the passage t. When the stroke is completed, the slide is moved downwards by its rod o. The small plugs or pistons v and w pass below the openings r and t, and the slide below the orifices p and q, and the action is reversed.



But though possessing considerable advantages, the double-cylinder engine has not become common, probably owing to the complication of its structure, and the increased effects of radiation from so large a surface, more than compensating its merits; and the expansive principle, equally applicable to a single cylinder, is now principally employed in engines of the common construction.

If by the use of steam under conditions by which, though not in themselves economical, we are enabled to reduce so materially the cost price of the engine that the increased cost of fuel is more than balanced by the interest on capital, or if this more costly power were necessary to render the engine available for purposes which could not otherwise be attained, it is clear it would be had recourse to. It is such considerations which finally led to the adoption of the *non-condensing engine*, first suggested by Leupold, then patented but not used by Watt, and efficiently carried out by Trevithick and Vivian in 1804; their object being to produce a locomotive engine to draw waggons on a tram-road. In the article RAILWAY the reader will find a comprehensive account of a locomotive engine as connected with the subject of railways; we shall here confine ourselves therefore to a few observations on this form of engine in connection with others which would have been foreign to the subject there considered.

To reduce the compass and weight of the engine sufficiently to render it portable, the cumbrous apparatus of the condenser, and its attendant pumps and cisterns, had to be discarded; and since the principle of condensation was consequently renounced, it was necessary to raise the steam to a pressure sufficient to overcome that of the atmosphere on the opposite side of the piston. To allow the steam to act alternately on both sides of the piston, that which had just acted on one side to drive the piston was expelled into the open air through an orifice, corresponding to that which would have connected the cylinder with the condenser in an engine of the usual construction; but unless this orifice were as large as the diameter of the cylinder, which obviously it never can be nor nearly, the steam, retarded in its escape by the contraction of the passage, must diminish, by its resistance to compression, the effective force of that which is acting to impel the piston.

Such is the simple principle, and such the greatest defect, of the non-condensing engine; but the saving in original cost and the paramount advantage of portability more than compensate for this defect; so that the use of this kind of engine has become general, not only for the purposes of locomotion, but for a variety of others where the engine is stationary, and probably in many instances where its advantages are imaginary.*

Since the pumps of the condensing engine are dispensed with in the non-condensing one, the beam may be so likewise; the piston-rod is made to move in a straight line, by having a cross-piece attached at its top, which slides between *guides* fixed on each side of the cylinder, the rod which works the crank of the fly-wheel being attached to the end of this cross-piece. A still further simplification is effected by connecting the piston-rod directly with the crank on the shaft of the fly-wheel, the cylinder being mounted so as to oscillate as the wheel revolves on the steam passage, and thus alternately to open and close the communication between the top and bottom of the cylinder. Such engines are termed *vibratory*, and are successfully used where space must be economised, as with marine engines, but the weight of the cylinder thus moved is so much to be deducted from the power of the engine, and further causes a rapid wear of the centres on which it turns, which consequently cannot be long preserved steam-tight, and require frequent renewal.

---

* The non-condensing engine is frequently termed the *high-pressure engine*, from the comparatively great elastic force of the steam employed in it; while in contradistinction the condensing engine for the same reason is termed the *low-pressure* one: vague and indefinite denominations, which ought to be abandoned, since high and low are relative. Many condensing-engines are worked with steam Watt would never have contemplated using; and Trevithick's engine was a low-pressure one compared with many now in use.

Steam-engines are properly classed, according to the principle on which the physical properties of the steam are employed in them, into—

1. *Condensing Engines.*

1. Atmospheric engines, acting by	Condensation only.
2. Double-acting engines	Pressure and condensation.
3. Double-acting engines	Pressure, expansion, and condensation.

2. *Non-condensing Engines.*

1 Engines worked by	Pressure only.
2. Engines worked by	Pressure and expansion.

The form of the engine, the arrangement and construction of its parts, its power, &c., depend entirely on the purpose to which it is to be applied, and may be indefinitely diversified, but those most in use may be artificially classed thus—

1. *Condensing engines*, with beams and parallel motions.
   1. Without a fly-wheel, for pumping in mines, &c.
   2. ——————— Marine engines.
   3. With a fly-wheel, for working machinery.
2. *Non-condensing engines*, without a beam.
   1. Stationary, with a fly-wheel for working machinery.
   2. —————— Rotatory engines.
   3. Locomotive engines, without a fly-wheel.

Marine engines, or those used for propelling vessels, are in this country* generally condensing engines, their situation admitting the abundant use of cold water. The principal peculiarity in the arrangement of the marine engine is the position of the beam, which, for the purpose of economising room, is placed lower than the cylinder, and is double, there being one on each side; a rod from one end of each of these is connected with a cross-piece at the top of the piston-rod, the rectilinear motion of which is produced either by guides, or by a crank-arrangement, analogous in its action to the parallel motion. The other ends of the double beam are connected by a cross-piece, carrying in its centre the 'rod' to work the crank on the shaft of the paddles. In all vessels of any magnitude, there are two engines complete, so arranged that while the rod and crank of one are in their neutral position, those of the other are in that of greatest effect. Two engines are necessary to equalize and continue the motion of the wheels; for in the marine engine, the paddles, instead of performing the part of fly-wheels to continue and control the motion of the piston, require the whole force of the engines to maintain their own, owing to the resistance they have to overcome. There is also this further advantage derived from two engines, that if one should be injured, the vessel may be still propelled by the other, and not be entirely dependent on her sails, as she would otherwise be.

It has been mentioned that there is a limit to the proportion between the diameter and length of the cylinder; the advantage that would accrue in gain of power by a long stroke being diminished by the greater radiation of heat from the larger surface diminishing the force of the steam in the cylinder; here therefore, as in every other calculation connected with the steam-engine, it is hardly possible to arrive at any formula or rule that can be invariably used. If the surface of the cylinder were to be made a minimum, with a maximum of capacity, we could readily determine that the length should be twice the diameter;* but we find that this proportion is not adhered to by the best makers; it varies from 3 : 1 to 2 : 1; but in the marine engine it is usually shorter; in some instances the proportion is 1 : 1·25.

The diameter of the cylinder of a marine engine is usually greater, in proportion to its length, than in others, in order to obtain, by an increased surface of piston, that power which is unattainable by a long stroke, owing to the limited space which can be appropriated to the engine. Formerly, the apprehension of danger, where so many lives were at stake, prevented the use of steam of more than 4 to 6 lbs. on the inch in marine engines, and the expansion principle consequently could not be had recourse to. At present, the economy of using this principle has outweighed the apprehension in the minds of the owners of vessels, while the public, contented with the information that the engine is a condensing one, seldom inquire further, and conceive that the steam is at a low pressure in all marine engines, although, where the expansion principle is used, which it now extensively is, the pressure in the boiler is at about 20 lbs. on the inch above the pressure of the atmosphere.†

Engineers have always been induced, by the obvious advantage of a continuous over an alternating motion, to aim at contriving a steam-engine in which the steam should act directly to produce such a motion. It does indeed appear at first sight that, where the object of the engine is to produce a continuous circular motion of a fly-wheel, or of wheels of some kind, it would be desirable that the steam should be applied directly to impel the wheel, instead of having its force transmitted through a series of levers, necessarily increasing the friction and the cost of the engine. Watt accordingly patented more than one of such rotatory engines, and many others since have from time to time brought forward arrangements for the purpose, but none have come into permanent and general use. The fact is, that, as can be easily shown, the employment of steam in this way is productive of a greater waste of power, with a greater increase of friction, than can be compensated by any real advantages. In all rotatory steam-engines hitherto proposed, the principle has been to admit the steam to act on a fan or fans revolving round an axis of the cylinder, and, by ingenious excentric movements, the surface of these fans is made to increase as the steam diminishes in elastic force from the enlargement of the space it occupies. Many such engines have been used for a time, but commonly after a few years' trial they have been abandoned, and the reciprocating principle substituted, thus proving that experience confirmed the deductions from theory.

In all mechanical combinations the object to be effected necessitates a certain characteristic form of the machine, which it retains, whatever improvements may have been successively introduced either in its principle or in the details of its construction. We can recognise in a modern Sussex plough the general form of that used by the subjects of the Pharaohs to till the banks of the Nile; and Newcomen would acknowledge a marine engine made by Maudslay and Field as a descendant of his atmospheric one: but he would for some time be at a loss to tell the object of a locomotive engine of Stephenson's, if he could see it at rest only; and the connection between it and its tender would be beyond his comprehension. The reason of this is that a locomotive engine is a perfectly new one, having no other analogy to an ordinary engine except that steam is the source of power in both; but all locomotive engines will ever possess a family likeness.

The principal causes of this novelty of form are, that

---

* It is stated by Mr. Stevenson that the American steamers which navigate the Mississippi are always non-condensing engines.

* Let l = length, x = the diameter, c = the capacity of the cylinder: since the concave surface is only gradually brought into contact with the steam, by the motion of the piston, its effects on the temperature may be considered as about half what it would be if the whole surface were at once exposed. Then the whole surface, including the two ends, being

$$\pi xl + 2\frac{\pi x^2}{4} \text{ and } c = \frac{\pi l x^2}{4},$$

we have for the surface affecting the temperature of the steam

$$\frac{\pi xl + \pi x^2}{2} = \frac{2c}{x} + \frac{\pi x^2}{2}$$

therefore

$$\pi x dx - \frac{2c dx}{x^2} = 0$$

and by substituting the value of c, and reducing $2x = l$.

† On the Mississippi the boat-engines are worked with steam of from 100 lbs. to 130 lbs. on the inch; but the latter enormous pressure is rarely exceeded, 'except,' as an American commander said, 'on *extraordinary occasions*.'

great velocity being the object, the boiler must constitute the greatest part of the bulk, in order to supply a sufficient quantity of steam to meet the demands of two pistons making 200 strokes per minute, and even then it requires a *tender* to accompany it to carry a supply of fuel and water to keep up the quantity. The locomotion is produced by a pair of *driving-wheels* made to revolve by the engine by means of cranks on their axle, receiving motion almost directly from the piston rods; the adhesion which takes place between these wheels and the edge-bars or rails, causes the carriage to move on, just as the paddle-wheels of a steam-boat propel the vessel by the resistance of the water to the float-boards. The driving-wheels of a locomotive engine do not, any more than the paddle-wheels of a steam-boat, act as fly-wheels to regulate the velocity of the engine; this is effected in the former by the inertia of the whole mass; the great velocity consequently ensures the steady action of the engine. In the steam-boat this great velocity of the paddles is unattainable, and consequently two powerful engines are requisite to maintain even a moderate velocity; but air being the medium in which the driving-wheels of a locomotive engine act, almost any velocity can be imparted to them, and for obvious mechanical reasons is best attained by steam acting with a force almost amounting to impact on small pistons through a short stroke, two alternately acting cylinders being necessary, as in the steam-boat, to equalize the action of the cranks.

The two cylinders are most conveniently placed under the boiler in nearly a horizontal position; intermediate cranks preserve the rectilinear motion of the piston-rods, and connect them with the cranks on the axle; while excentric frames on this axle actuate the simple slide-valves required in a non-condensing engine. The steam which is driven out of the cylinder at each stroke, instead of escaping directly into the open air, passes into the funnel of the furnace, and thus increases the draught; but as the action of the engine cannot be understood independently of the boiler, it becomes necessary to turn our attention to that subject, without a general description of which, any account of the steam-engine would be incomplete.

Since some of the principal objects to be kept in view in the construction of boilers are incompatible with each other, one or more must be dispensed with in order to secure the rest. The specific purpose for which the engine is constructed must determine the general principle of the boiler; thus, rapid generation of steam, security, compactness, and lightness must be aimed at in boilers for marine or locomotive engines, even at the cost of a comparative waste of fuel; while for those intended for pumping or driving machinery, economy of fuel must be the paramount object, the weight, form, and space occupied by the boiler being secondary considerations. And whenever steam of a high elastic force is to be used, that form of boiler should be adopted which will most nearly equalize the strain on it. The following requisites are therefore to be understood as being those which it would be desirable to combine, though, united, they are unattainable in practice.

First, The boiler should have the greatest capacity with the least surface, to save material, diminish the weight, and increase the strength: hence a spherical form would be best in this respect, but it is incompatible with an economical application of the heat to a great extent of surface, which is essential to the rapid generation of steam.

Secondly, The form should be as simple as possible, both as reducing the expense of construction and most readily admitting of repair. Boilers are made of iron or copper plates riveted together at their edges, and if one of these is cracked, or has been burnt, that plate can be taken out and another put in without pulling the whole to pieces, which must be done when the boiler is of a complex form; added to which, all angles are sources of weakness, owing to the inequality of the strain on the adjoining surfaces, and the injury done to the metal by bending it to form the angle.

The form of boiler used for Savery's, Blakey's, Newcomen's, and other engines of the seventeenth and eighteenth centuries, up to the time of Watt, was that of an inverted frustum of a cone, with a spherical top, and its bottom slightly concave; this boiler was set in brick-work like a common copper, the flame playing round the whole of the lower part. The steam-pipe was connected in the usual way to a flange of a collar in the spherical head. Watt adopted a long rectangular form, with a semi-cylindrical top; the ends were flat and upright, the sides slightly curved inwards, as was also the bottom. From this form it is termed the *waggon-head* boiler; it is set in a rectangular mass of masonry, the cylindrical head alone projecting above the level of the brickwork; the fire-place was underneath one end of the boiler, and extended backwards for one-third of its length; the flue, after proceeding to the further end, returned along one side, across the end, over the furnace, and along the other side, into the chimney shaft, the boiler itself every where forming one side of the flue, and consequently having the flame and heated air directly in contact with it at the bottom and sides. In some cases, when the boiler was very large, a cylindrical iron flue was formed through the boiler longitudinally, opening at each end into and forming a continuation of the brick one, thus increasing the surface to be acted on by the heat.

The next and important modification in form was that of making the boiler entirely cylindrical with hemispherical ends, which is probably the best to combine as many requisites as possible. With this form the furnace is often placed in a second cylinder within the boiler, and forming the first part of the flue; thus the fuel being entirely surrounded by the water, little or no heat is lost by radiation; but there are serious objections to this practice on the score of accidents, as well as the deficiency in draught, owing to the confined space in which the combustion takes place.

When an engine is of such a size as to require more steam than one boiler of the ordinary magnitude can supply, it has two or more, set side by side, communicating with a common steam-pipe. Since the extent of surface exposed to the pressure of the steam, and therefore the liability to bursting, increases in a greater ratio than the capacity, there is obviously a limit to size, which can never safely be surpassed, while the security is proportionally increased by diminishing that capacity; hence the necessity for using two or more small boilers instead of one large one: and the principle, carried to its limit, constitutes that of the *tubular boiler*, in which the steam is generated in a series of independent metal-pipes of small diameter, all communicating with a common steam-chamber or reservoir, itself small, and strong enough to resist great pressures.

These tubular boilers however have not come into general use, not only from their complexity, and consequent liability to derangement, but because there does not exist any demand for steam of such high pressure as they are intended to generate.

Since, in accordance with the general hydrostatic law, every unit of surface of the boiler has to sustain the same pressure, if a small portion of that surface can be opened by the pressure of the steam, when it has attained that which the boiler was only intended to withstand, by the escape of a quantity of the vapour at this orifice, the elasticity of the remainder is again reduced below the limit. This is the object of the *safety-valve*, which is such an aperture, kept closed by a valve retained in its seat by a weight calculated to yield to, or be raised by, the pressure the moment the steam exceeds its proper elastic force.

The safety-valve was first contrived by Papin, and used in his digester and boilers, and has ever since constituted an essential appendage to every boiler. In its simplest form it is an obtuse conical valve, kept in its seat, which is at the end of a short collar, standing up from the surface of the boiler, by a weight acting at the end of a lever, resting on the spindle of the valve, and having its fulcrum or hinge at the other extremity. The effective weight by which the valve is kept down may be varied by shifting the position of the weight on the arm of the lever; and as this alteration might be unintentionally made by carelessness or accident, the valve should be inclosed in a box under lock and key, to prevent its being tampered with. A chain attached to the valve, and accessible to the engineer, should be provided, to enable him to raise the valve, to ascertain that it is in efficient order, and has not become fixed in its socket. But the best mode of applying the weight is directly on the valve, so that it cannot be increased, as long as it is inclosed, by any accidental alteration in its position. In locomotive engines the weight would be liable to derangement by the motion, and a spiral spring is employed to keep down the valve.

The safety-valve is perfectly effective as long as it is free to rise in its seat, and is loaded with a constant weight which ought never to be more than half the pressure the boiler is just capable of withstanding. The rapid diminution in the number of accidents from explosions, notwithstanding the increased employment of steam, sufficiently proves that they are nine times out of ten caused by gross negligence or culpable recklessness; but to obviate as much as possible the recurrence of explosions, every boiler should have at least two safety-valves, both secured from access, and yet both capable of being raised by hand from time to time; one should be loaded with a less weight than the other, that by the escape of the steam from it the engineer may be warned to reduce the quantity of steam generated, by 'damping' his draught; and the other safety-valve should be only loaded with a weight equivalent to one-third the pressure which, by computation founded on actual experiments, would burst the boiler, if made with metal of a given thickness; for however carefully the boiler may have been made, it is impossible to ensure equal strength of it in every part.

A plan was originally suggested by Trevithick for insuring safety from a boiler by inserting in it a plug of metal, which, melting at the temperature attained by the steam when its tension became dangerous, might open an exit for it. This plan is, we believe, adopted in France, but besides that it is repugnant to our ideas of mechanical fitness, it is liable to many objections; none of the pure metals melt at a temperature sufficiently low to be available, and all the fusible alloys soften long before they melt, and vary in these respects with minute differences in the proportion of their ingredients, so that the plug would be driven out before the proper time.

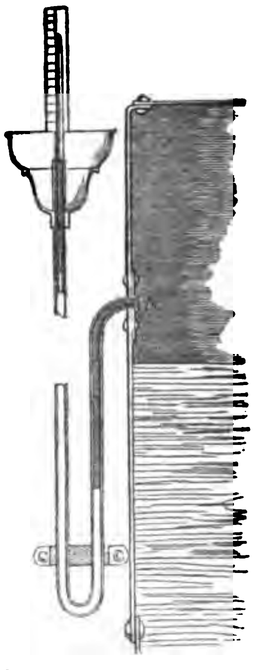
The boiler, besides the danger of bursting from over-pressure of the steam within it, is also liable to injury by the external pressure of the air, if the steam within be condensed, as it must be on cooling, when the fire is let out, thus causing a comparative vacuum in the boiler. To guard against this there should be a safety-valve to act in the direction opposite to the usual one, which, yielding to the pressure of the atmosphere, would allow of the entrance of the air, when this pressure exceeded that exerted by the steam to keep the valve closed.

Another source of accident, which should be guarded against most sedulously, is the formation in the boiler of a deposit of the earths, &c. chemically united with the water or held suspended in it, and which are deposited from all water when long kept boiling in any vessel, as is illustrated and proved by the furring of old tea-kettles. This deposit is intensely hard, and adheres so closely to the metal, that it requires a chisel and hammer to detach it when accumulated to any thickness. Being a bad conductor of heat, it prevents the rapid generation of steam, and by not allowing the water to be in contact with the metal, so as to carry off the heat imparted to the latter, the metal gets red-hot and is burnt, or, in chemical language, becomes oxidized by long exposure to a high temperature. If, under these circumstances, a fissure should be produced in the silicious crust, the water, suddenly admitted to contact with the red-hot iron, is converted instantaneously into steam of such high pressure as to risk the bursting of the boiler.

It is one of the advantages held out as an inducement to their adoption by the inventors of tubular boilers, that owing to the inequality of the temperature of the liquid at different distances from the source of heat, a circulation is continually going on, which mechanically prevents the formation of a deposit, while in large open boilers no such cause can operate to any extent. In these the remedy appears to be the frequent cleaning out of the boiler, to prevent the accumulation of the deposit, and the admission of the water, which supplies the waste to the part not over the furnace, which should be separated from the rest by a partition extending upwards nearly to the level of the water; the fresh water is thus allowed to deposit its sediment in the part where it can be least productive of the evils alluded to, and whence it may be removed collectively from time to time.

Mr. S. Hall, the patentee of the new form of condenser mentioned above (note p. 474), has contrived a plan for supplying the boilers of marine engines, which are most obnoxious to furring from the quantity of salts contained in sea-water, with distilled water. This ingenious apparatus consists of a closed vessel or still placed within the boiler, and supplied with cold sea-water from the waste pipe of the condensing cistern, by means of appropriate connections with self-acting cocks. The upper part of this still is connected with the condensers, the vacuum consequently formed above the water in the still produces rapid evaporation, the vapour passes into the condenser, whence it is returned, as pure water to the boiler by the hot-water pump. We do not know whether the advantages of this plan compensate for its expense.

To indicate the actual pressure at any time of the steam within the boiler, this is furnished with a *gauge*, consisting of a bent tube, open at both ends, one orifice A opening into the boiler. This tube contains mercury, which will obviously be at the same level in both branches when the steam in the boiler is of the same pressure as the atmosphere, but will rise in the longer leg as the pressure of the steam increases, and will thus by its altitude indicate that pressure. If the longer leg be of a certain length, the mercury would flow over, or be blown out altogether; if the steam were suddenly to increase in its elastic force, the gauge would in this case act as a safety-valve. The loss of the mercury may be guarded against, under these circumstances, by a cistern placed round the orifice of the gauge to receive it, as shown in the figure.



A water-gauge is often used instead of a mercurial one, to save the expense of this metal; but then the tube must be long enough to allow a sufficient column of water to balance the pressure of the steam; and by making the tube of sufficient diameter, this water-gauge then constitutes an efficient safety-valve. As these gauges cannot, for obvious reasons, be made of glass, to allow of the height of the fluid within them being directly observed, this height is indicated by a light wooden rod projecting beyond the end of the gauge, which floats on and therefore rises and falls with the mercury or water.

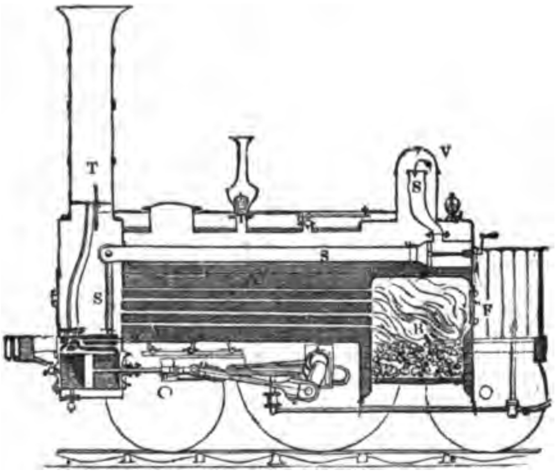
In locomotive-engines, where the use of a mercurial and still more of a water gauge is impracticable, the same end is attained by a thermometer, on the well-known principle that the temperature of steam is always in a constant relation to its pressure. [STEAM.]

If there be not water in contact with that part of the boiler exposed externally to the direct action of the flame and hot air in the furnace and flues, the iron will become red-hot, and so suddenly increase the pressure of the steam in contact with it, that an explosion would probably ensue and if not, the iron in that part would be more oxidized o burnt. To prevent this it is necessary that there shoul be always water in the boiler above the level of the highest part of the flues; and to enable the engineer to ascertain whether this is the case, there are in all boilers tw pipes with cocks, one of which dips down into the wate while the other reaches only to within a few inches of it surface when at the right height in the boiler; the consequence of this arrangement is, that if the cock of th shorter pipe be opened steam will issue from it, and wate from the other when that is opened in its turn; but if steam escapes from both cocks, the engineer is warned that there is not sufficient water in the boiler, and therefore directs his attention to remedy the deficiency.

The boiler is always supplied with water by the action of the engine; the hot water, pumped out of the condenser, is raised into a cistern placed at a sufficient height above the boiler, by the force-pump mentioned in the general description of Watt's engine; from this cistern a pipe passes through the top of the boiler, and reaches nearly to the bottom, where it is bent at right angles; the upper orifice in the cistern is closed by a valve connected by a spindle-rod with one end of a simple lever, from the end of the other arm of which a wire is suspended, supporting a stone float in the boiler, the valve being weighted just to counterbalance the specific gravity of the float; as the water subsides in the boiler in consequence of its evaporation, the float falls and raises the valve, allowing sufficient water to descend into the boiler till the float rising again causes the valve to close; the weight of the column of water in the pipe prevents the steam from escaping in that direction during the action of the valves; hence the necessity for the feeding-cistern being raised sufficiently above the boiler. The bend at the bottom of the feeding-pipe is intended to cause the water, when issuing near to the bottom of the boiler, to wash away the sediment which would otherwise collect there.

About five or six years ago, a novel and ingenious plan for generating steam for engines was proposed by Mr. T. Howard: it consisted in injecting small quantities of water at regular intervals on a surface of iron raised to a temperature of about 450°, by being in contact with mercury heated over a furnace. By this arrangement the space occupied by a boiler of the usual construction was saved. A vessel was fitted with one of Mr. Howard's engines, and made a voyage from Falmouth to Lisbon, and apparently with a saving of fuel. Nevertheless this principle has not been brought into use: it was stated at the time that enough of the vapour of the mercury escaped to be prejudicial to the health of the engineers; but we believe the true cause of its want of success was that it was intended to remedy an evil of no great magnitude; or, in short, that the usual principles are not easily to be improved on, if they are properly applied.

The locomotive engine, as has been stated, requires a boiler of a form and principle totally different from those of an ordinary one.



The boiler A is a cylinder made of wrought-iron plates, riveted together in the usual way, but is covered with a wooden casing, to prevent as far as possible the great waste of heat which would radiate from a metal surface moving through the air with such velocity. At one end of the boiler is the furnace B, consisting of a double case, the outer one of iron with a semi-cylindrical head, but quite open at bottom; within this is an inner square case of sheet copper, riveted all round the bottom edge to the outer one, but leaving on its three sides a space of three inches between them, which is filled with water, and indeed forms a continuation of the boiler. The bottom of this inner case is the grating on which the fuel is laid. F is the feeding door in front, opening of course through both cases, which are therefore riveted together, so as to be steam-tight all round. A series of upwards of 100 brass tubes of small diameter pass from the back of the furnace to the further end of the boiler, where they open into the chimney. These tubes, which are entirely immersed in the water, constitute the flue, and thus increase considerably the heated surface in contact with the water, and therefore promote the rapid generation of steam. The introduction of these tubes forms an epoch in the construction of boilers, and was the suggestion of Mr. R. Stephenson in 1829. [RAILWAY.]

The cylinders of the engine, of which one can only be seen in the section, are fixed at the bottom of the chimney. The steam passes to the slide-valve by the pipe S, S, while the waste steam escapes up the funnel at T. The cylindrical vessel with the spherical head V is called the *separator*, the steam-pipe terminating in it at S. The object of this arrangement is to prevent the water, which is agitated by the motion, from passing through the steam-pipe to the cylinder, where it would be highly detrimental; the main steam-pipe divides into two branches in the chimney, one passing to each cylinder.

The boiler is supplied with water from the tender by two force-pumps worked by the engine, and has a gauge, try-pipes, safety-valves, &c., in common with other engines, though all peculiar in their construction.

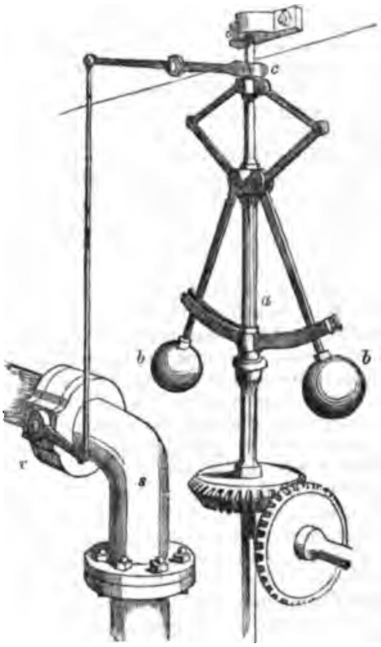
This brief account of the boiler and of its various arrangements will hardly be considered complete without some notice of the explosions to which it is liable; and that these may arise from several causes is sufficiently indicated by the various precautionary adjuncts above described, which are intended to obviate their occurrence. We have already mentioned that the number of accidents is rapidly diminishing relatively to the extended use of steam, as an indication that negligence is the commonest cause of them. It is indeed obvious that, provided a boiler be originally well constructed, of a good form, and furnished with double safety-valves adequate in size and kept in efficient action, with a gauge by which the actual pressure at any time on the boiler may be ascertained by simple inspection, an accident never can occur except by the burning out of the boiler, which will always announce itself previous to any explosion by certain indications. If it be objected that unremitting attention is more than can be expected of an engineer actively engaged, perhaps sixteen hours out of the twenty-four, we can only reply that the moral causes of these accidents are not under consideration, though there are obvious remedies for these; our object is only to remove any apprehensions from the extended use of steam in the minds of the timid, by showing that there are no physical causes of danger that may not easily be provided against. If the proprietors of engines or the commanders of steam-vessels are selfish enough to prefer their immediate interest to the safety of those they employ, or the passengers who have trusted them, by raising steam of 100 lbs. in a boiler only intended to generate steam of 50 lbs., or by employing defective boilers, public opinion can alone provide the remedy by the manifestation of public indignation.

The bursting of boilers present very different phenomena, being sometimes a simple rent in the metal, allowing the harmless escape of steam and water; and at others accompanied by an explosion in its violence equal to that produced by gunpowder;* it has hence been conjectured that on these occasions some explosive gases are formed in the boiler; but this does not appear probable, nor is reconcileable with any known physical laws, while the elastic force of steam is capable of indefinite increase, and is quite adequate to produce any mechanical effect whatever. It is always difficult to get any satisfactory evidence as to the facts of an explosion of a boiler; the terror of the moment prevents the survivors from accurately recalling the phenomena immediately antecedent, while those who from their proximity would be best capable of affording this evidence are either killed or are too interested in exculpating themselves to be impartial witnesses. With regard to the formation of explosive gaseous compounds in the boiler, it is generally admitted that hydrogen gas is the only ingredient of such that can be formed; and that is obtained by the decomposition of the steam when in contact with the red-hot iron; but pure hydrogen is not explosive; and to render it so it must be mixed with oxygen or atmospheric air. It has been suggested that the latter may be introduced along with the water by a defect in the feeding-pump; but the proportions of the air and of the hydrogen must be definite to produce an explosion; and it is difficult to suppose that in such a situation either should continue to accumulate till the quantity is exactly that necessary to produce an explosion. In short this explanation of the subject is beset with difficulties which have not yet been removed, though the attention of scientific men both in Europe and America has been frequently directed to it.

Whenever the steam-engine is employed to execute any work which is variable in its quantity or intensity, there must be some means of adjusting the force of the engine to this varying resistance it has to overcome: if the engine were suddenly relieved of half that resistance, as, for example, would be the case if half the machinery it was driving were suddenly stopped or thrown out of gear, the engine, if impelled by the same quantity of steam, would immediately move with a rapidly accelerating velocity, till that velocity were doubled, which would be prejudicial to the engine itself and to the rest of the machinery it was working, as well as be a useless expenditure of force or fuel. The object of that beautiful piece of mechanism termed the *governor*, is to enable the engine to regulate the supply of steam admitted to the cylinder, or in other words to adapt the force it has to transmit to the resistance it has to overcome.

---

* When the boilers of the American steam-boat Moselle exploded on Apr. 25, 1837, at Cincinnati, by which accident 150 persons were killed, and about 100 severely wounded, several portions of the boiler were thrown to distances of from 300 to 400 feet; one of which, weighing 336 lbs., was thrown 480 feet into the garret of a back shop in a yard, having broken through the roof and driven out the gable end; while another portion, weighing 236 lbs., 'went obliquely up the river eight hundred feet, and passing over the houses landed on the side walk.' The height to which some of these pieces were carried may be inferred from the great angles at which they descended, of from 45° to 60°.



The governor, the form and principle of which will be better understood from the figure than from any description, is made to revolve on its vertical axis *a*, by a band passing round a pulley and round one on the axle of the fly-wheel, or else by bevilled wheels, as shown in the figure; so that its velocity of rotation varies with that of the fly-wheel. If this velocity increase, the heavy balls *b b* diverge by the increased centrifugal force, and cause the collar *c* to slide up the axis; this by means of the intermediate cranks partially closes the valve at *v*, in the steam-pipe *s*, termed the *throttle-valve*, and consequently diminishes the quantity of steam passing to the cylinder: if, on the contrary, the velocity of the fly-wheel is diminished by an increase in the resistance; the balls of the governor collapse, and the throttle-valve is opened so as to admit more steam to the cylinder to augment the force in proportion to the increased resistance.

The effect on the governor is equivalent to varying the diameter of a second fly-wheel, the circumference of which is represented by the balls *b b*, consequently the governor itself, independently of its action on the throttle-valve, has a tendency to effect the adjustment required; since a portion of the surplus force of the engine, on the first supposition, is absorbed in overcoming the increased inertia of the governor; while, on the second supposition, that inertia, being diminished, relieves the engine of a portion of resistance. This accounts for the prompt action of the governor in effecting the adjustment, which it does without those fluctuations in the velocity of the piston which would be prejudicial to the effect of the machinery actuated by this prime-mover.

In the marine engine no governor is requisite; the resistance being so great compared to the force, that the velocity can never be excessive, and all the power the engine is capable of exerting is required to turn the paddle-wheels; added to which the resistance is nearly uniform, only varying with the draught of the vessel or the state of the weather, but never diminishing below that originally calculated on and provided for by the power of the engines; an increase of the resistance accordingly produces a diminution in the velocity of the vessel, but the engine can never work so fast as to be injured by its own velocity.

The governor is equally unnecessary to the locomotive engine, since the attendant must constantly have the engine under his control, and be watching its action; he can therefore regulate the throttle-valve by hand-gear placed within his reach; and in this case also, as with the marine engine, the resistance is nearly constant, consisting chiefly in the weight of the engine and the train of carriages to be moved, a weight not liable to any sudden change during the transit, while the momentum of the whole mass acts as a fly-wheel or regulator to equalise the motion of the pistons.

We have not entered into any investigations of the formulæ for determining the dimensions of an engine and of its boiler, the pressure at which it must be worked, the velocity of the piston, &c., in order to produce any proposed available or net force; or into the account of the experiments by which the amount of friction, the effects of the uncondensed steam, the quantity of caloric obtained from different kinds of fuel, &c., all of which must be taken into account in these investigations, and have been approximatively determined. In the preceding article the formulæ expressing the physical and mechanical properties of steam will be found, and for the others the following works among others may be consulted:—Tredgold, T., *On the Steam-Engine*, recent edition, by Woolhouse, 2 vols. 4to., London; Farey, J., *On the Steam-Engine*, 4to., London; Stewart's *History of the Steam-Engine*, 8vo., London; Lardner, Dr., *The Steam-Engine*, 8vo., London, 1840; De Pambour, F. M. E., Chev., *Théorie de la Machine à Vapour*, 8vo., Paris; Galloway, *On the Steam-Engine; Reports in Parliament on Railways, Explosions of Boilers, &c.; Mechanic's Magazine.*

The most valuable sources of information on the action of steam-engines, their consumption of fuel, and effect produced, are the Reports and Tables published from time to time by the Cornish engineers of the working of the engines in their various mines.

STEAM-CARRIAGE. The application of the steam-engine to the purpose of locomotion upon railways having been noticed elsewhere [Railway, vol. xix., pp. 247, 259], it only remains to treat of such locomotive machines, impelled by steam-power, as have been contrived for use upon common roads.

It may perhaps appear, at first sight, that there can be no very material difference between machines adapted to purposes so nearly similar; yet there are several circumstances which render very different arrangements necessary in the two cases. The railway engine runs upon very hard and smooth surfaces, and has only slight and very gradual changes of level to surmount. Its precise track is determined by flanges upon its wheels, and that track never deviates suddenly from a straight line; so that no internal steering apparatus is necessary. The road upon which it travels is capable of bearing almost unlimited weight, and affords facilities for the disposal of the load to be conveyed in a long train of carriages; so that the construction of the engine itself is not necessarily affected by any arrangements for the accommodation of passengers or for the stowing of luggage. Hence the railway locomotive is usually nothing but a steam-engine upon wheels, without even any provision for carrying its own supply of fuel and water: this being conveyed in an accompanying carriage, or *tender*, behind which the vehicles containing the load are linked together; and the whole of the propelling machinery frequently weighs from ten to twenty tons, independent of the load conveyed—a weight unsuitable for rapid motion upon an ordinary road. In a steam-carriage for use upon a common road, on the contrary, provision must be made for passing over rough, soft, and constantly varying surfaces, and for surmounting acclivities of considerable steepness. The machine must be provided with a steering apparatus, by which it may be guided with ease and certainty along the sinuosities of a common road or street, among other vehicles, and round sharp corners. The weight must be kept within the smallest possible limits, as well for the sake of the road as to preserve an economical proportion with the load to be conveyed, which must never exceed what may be carried either upon the machine itself or upon one supplementary vehicle; the use of a long train of carriages being inadmissable. Hence also arises the necessity of so arranging the machinery as to occupy but little space, and to interfere as little as possible with the accommodation of passengers and goods.

These circumstances call for the exercise of much contrivance, and the combination of qualities apparently contradictory and irreconcilable. In order to keep the machinery small, and to ensure its rapid action, the steam must be worked at a very high pressure, and must be formed with great rapidity, thereby rendering a very strong boiler and powerful furnace necessary. But this strength and efficiency cannot be obtained by increasing the thickness of the metal, and the size of the boiler and furnace, because that would add to the weight and bulk. The object must be accomplished by a minute subdivision of the water, so that a very large extent of surface may be exposed to the action of the fire, and by urging the fire with a very strong blast, which, however contrived, absorbs a considerable part of the power of the engine. The construction of the boiler must also be *safe*, so that in the event of any part giving way—a contingency which it is impossible entirely to avoid—the explosion may take place *internally*, and may not endanger the passengers by causing the dispersion of water and steam. When these, the principal difficulties, are overcome, much ingenuity is called for in the arrangement of the engine, and in the means of communicating the power to the wheels. In order to accomplish the latter point effectively, an intimate, and, in one direction at least, a *rigid* connection must be formed with the axle; while it is essential to the durability of the machine that the whole apparatus shall be suspended upon springs, and thus protected from the concussions to which the wheels and axles are continually subject. The machinery should be so contrived as to act with varying power and velocity, to meet the frequent changes in the amount of resistance arising from the varying and imperfect surface of the road, or from its different degrees of steepness or inclination; and it should be perfectly manageable, so that the conductor can vary the speed, or stop suddenly, even when descending a hill. In addition to these requisites, the apparatus must be simple and easy of access, so as to be of moderate cost and easily kept in repair; its appearance should be such as to disarm prejudice; and it must neither emit smoke nor occasion any offensive noise or smell. It is not pretended that all these conditions have been perfectly attained by any steam-carriage projector; but sufficient has been accomplished to afford good reason for the belief that none of them are impracticable. The difficulties which have hitherto prevented the profitable introduction of steam locomotion on turnpike-roads are not chiefly of a mechanical kind, but arise in a great measure from unfavourable circumstances affecting the individuals by whom it has been attempted, and probably in part from the very injudicious manner in which its adoption has been advocated—the most absurdly exaggerated statements having been often made as to the profits to be derived from it, and the advantages to be realised by the substitution of mechanical, or, to use Gordon's favourite term, *elemental* for animal power in general travelling. The extensive adoption of railways, which afford facilities for more rapid conveyance than can ever be profitably or safely effected upon turnpike-roads, has also greatly tended to retard the use of steam-carriages on common roads; but this cause will probably operate less unfavourably than it has hitherto done, since experience has proved that the splendid results of modern railway travelling can only be attained at a cost which will long prevent the extension of such roads into districts of small traffic. Common-road steam-carriages have been, by many of their advocates, treated as *rivals* to railway conveyance, and have suffered by comparison with it; but there is good reason to believe, that when they come to be regarded as auxiliaries or feeders to the great lines of railway, which may be supported by, and aid in the development of, traffic too limited to require the more perfect means of conveyance, they will be much more favourably regarded by the public.

Hitherto, as far as locomotion is concerned, the substitution of steam for animal power has only been effected to any considerable extent upon railroads; and, wherever a large traffic is to be conducted, there can be no question as to their superiority over every other means of rapid conveyance. There are however many districts in which the amount of traffic is insufficient to justify the expenditure of from twenty to forty thousand pounds per mile for the sake of a saving, however great, in the labour of draught; and if, for the sake of accommodating such districts, railways were to be laid down with steeper inclinations than usual, much of their advantage would be lost. Paradoxical as it may appear, steep inclinations are of less consequence upon a less perfect road; it being less difficult to construct a common-road steam-carriage with power to ascend ordinary hills, than to adapt a railway locomotive to similar changes of level. This point is explained in the following manner by Mr. Gurney, in his 'Observations on Steam-Carriages on Turnpike-Roads.' It should be premised that while the relative amounts of resistance upon a railway and a common road, as here given, are hypothetical, and are probably erroneous (a much smaller proportion of power being sufficient to move a load upon a tolerably good turnpike-road), the *principle* upon which the calculation is made may be applied to any other ascertained degrees of resistance. Gurney submits that—

'1st. The amount of extra power necessary to draw a certain weight up a hill is given by the inclination, and is the same whether it be on a railroad or common road, whether it be carried on a horse's back, or dragged on wheels or on a sledge. This increment is occasioned by *gravitation* alone.

'2nd. The force of traction necessary to propel a ton weight upon a level railroad is about 8 lbs., that is, $\frac{1}{280}$th, or, to be within limits in practice, say $\frac{1}{240}$th part of the whole weight. The average force required to draw a ton weight on a common road is $\frac{1}{12}$th of the whole weight. The former is therefore to the latter as 1 to 20.

'3rd. To go up a hill rising one foot in twelve, viz. three inches in a yard (which is about the steepest now on our public roads), an additional force of traction is required, equal, in all cases, to $\frac{1}{12}$th of the weight, to overcome the increased opposition arising from gravitation. Thus then, to go up a common road of the above elevation, the power of traction is simply *doubled*, and no more, while on a railway it is increased to $\frac{1}{12}+\frac{1}{240}=\frac{21}{240}$ or *twenty-one times greater* than it was on the level.'

'It is evident from this,' he further observes, 'that if a steam-carriage have only double the power wanted on a level common road, it can ascend any hill that we have. If it have treble, it can ascend this hill, and has one-third to spare, and so on. But to ascend the same elevation on a railway, the engine must exert a power no less than twenty-one times that which it required on a level; and, to have one-third to spare, as the other, for contingencies, it had need to have upwards of thirty times the force that is necessary for propelling it over the level; the very weight needful for this (to say nothing about a load) renders it practically impossible.'

The earliest steam-carriage of the construction of which the writer has met with any account, was that of J[illegible] Theophilus Cugnot, a native of Lorraine, who, about the year 1763, exhibited a model of one to the Comte de Saxe. He subsequently removed to Paris, and obtained the patronage of the Duc de Choiseul. Here he constructed, in 1769, at the public expense, a large steam-carriage, which was tried in 1770, and moved with such force as to overturn a portion of wall which was opposed to its progress; a circumstance which led to the supposition that the new power was not sufficiently controllable for practical purposes. Stuart, from whose 'Historical and Descriptive Anecdotes of Steam-Engines,' this account is derived, states that the project was abandoned, and that the experimental machine was deposited in the museum of the Arsenal, and is now in the *Conservatoire des Arts et Métiers*. Some years before these experiments were made, the late Dr. Robison, while a student in the university of Glasgow, had conceived the possibility of propelling wheel-carriages by the agency of steam, and had suggested the idea to his friend Watt, who commenced a model of a contrivance for the purpose. The scheme was abandoned partly on account of the difficulties which presented themselves, and partly because both Robison and Watt had other avocations requiring their attention. The year 17[illegible] is often stated as the date of this suggestion; but it appears to have been made rather earlier, as Robison left college about the end of 1758, and went to sea. Subsequently, in his patent of 1784, Watt described a plan for a steam-carriage, which however he never carried into effect. He proposed that the boiler should consist of wooden staves hooped together with iron like a cask, and having the iron furnace within it, surrounded with water. The reciprocating action of the piston was to be converted into a rotatory motion by the contrivance known as the sun-and-planet wheel; and the rotation was to be communicated to the running wheels by toothed gear, with a provision for varying the relative velocities of the piston and the wheels, according to the varying resistance of the road. To get rid of the cumbersome condensing apparatus, it was proposed to allow the steam to escape into the air after propelling the piston. It is well known that Watt entertained a prejudice against the use of high-pressure steam, and that circumstance may partially account for his not having prosecuted this design. Mr. Murdoch, a Cornish engineer, to whom Trevithick is said to have been a pupil, and who subsequently became connected with Boulton and Watt, was perhaps the first who actually constructed a steam-carriage in this country. His machine, which is by some writers styled a *model*, was exhibited at Redruth about 1782 or 1792. These different dates are given by different authorities, and we have no means of ascertaining which is the most correct statement. Mr. William Symington, who was also connected with some of the earliest experiments on steam navigation, constructed a model of a steam-carriage, which was exhibited in Edinburgh about 1786. A representation of this machine, communicated by the son of its inventor, was published in No. 480 of the 'Mechanics' Magazine.' In this the whole of the machinery is placed at the back of the carriage, and the rectilinear motion of the piston-rod is communicated to the axle by a rack and pinion; a ratchet being used to prevent the wheels from turning backwards with the return of the piston. The bad state of the roads, and the difficulty which would have been experienced, at that time, in procuring supplies of water and fuel, are mentioned as the principal causes of the abandonment of the experiment by Symington. In North America the use of steam-carriages was early advocated by the ingenious Oliver Evans, who applied, in 1786, to the legislature of Pennsylvania for an exclusive right to the use of steam-waggons, and certain other inventions, in that state. His ideas respecting steam-locomotion appeared so strange that he was considered insane; and though in the following year his petition was granted as far as regarded his improvements in flour-mills, no notice was taken of the steam-waggons. A similar application in Maryland was more favourably received; the required privilege being granted for a term of fourteen years, on the ground that it could injure no one, and might lead to the production of something useful. Evans however could not obtain such encouragement and assistance as would enable him to build a steam-carriage; and therefore he turned his attention more to the application of his improvements in the steam-engine to mill-machinery. In a curious autobiographical notice of his inventions, which has been published in No. 372 of the 'Mechanics' Magazine,' and in several other English works, Evans states that, in 1804, he demonstrated the practicability of his steam-carriage project by applying temporary wheels to a machine which he constructed for the purpose of cleansing docks, and connecting these with the steam-engine which was intended to work the apparatus for raising mud into lighters. With this cumbersome and necessarily imperfect steam-carriage, he succeeded in obtaining a satisfactory though slow motion. Stuart's account of Evans's scheme (*Anecdotes of Steam-Engines*, p. 391) intimates that he sent drawings and descriptions of his machinery to England. The views of this projector were far in advance of his age, for he expressed his belief that the time would come when carriages propelled by steam would be in general use, as well for the transport of passengers as goods, travelling at the rate of fifteen miles an hour, or three hundred miles a day, upon good turnpike-roads.

The next invention which claims notice is that patented in 1802 by Messrs. Trevithick and Vivian, and shortly afterwards brought into operation with greater success than had attended any earlier experiment. Disregarding the prejudices which had previously deterred English engineers from the use of high-pressure steam, these gentlemen contrived a steam-engine far superior to any previously known in lightness and portability. The propulsion of wheel-carriages was one of the objects proposed by the patentees. Their carriage, as described in their specification, was to be mounted upon four wheels; the principal weight resting upon the hind wheels, which were of large diameter, while the fore wheels, which were used for guiding the carriage were small, and nearer together than the others. The boiler and the steam-cylinder were placed at the back of the hind axle; the cylinder being horizontal. The piston-rod imparted motion to a sliding cross-piece, the ends of which moved in horizontal guides, and from which a connecting rod, returning towards the piston, communicated the power to a cranked axle. By the ingenious device of dividing the piston-rod into a forked form, to allow the connecting rod and crank to play through it, the apparatus was rendered very compact. On each end of the crank-axle was a toothed-wheel, working into another fixed upon the nave of the hind wheel of the carriage; and on one end of this axle was fixed a fly-wheel, to obviate any inconvenience arising from the use of a single cylinder. The toothed-wheels on the crank-axle were not fixed immoveably to it, but were so arranged that, by means of a lever under the command of the steersman, either or both of them might be disconnected from it, so as to allow the wheels to stand still, or to roll backwards, without stopping or reversing the engine. Thus the greatest facility was afforded for turning the carriage, since one wheel might be propelled by the engine while the other remained stationary. A provision was also made to allow the wheels to alter their relative velocities sufficiently to meet the ordinary sinuosities of the road, without throwing either side of the propelling apparatus out of gear. It was proposed to alter the velocity and power of the carriage when necessary, by the use of cogged-wheels of various sizes. This mode of communicating motion to the wheels is convenient, as it allows them to revolve freely upon the axle, the ends of which may be bent, as in common carriages, if preferred. A lever, or brake, pressing against the periphery of the fly-wheel, was used for retarding the motion of the machinery, when running down-hill or stopping suddenly; and a lever-handle connected with the fore-wheels afforded the means of directing the vehicle. The details of this invention evince much ingenuity, and fully entitle its contrivers to the credit of having produced the first really efficient locomotive carriage of which any minute description is known. Engravings of the apparatus, with a full explanation from the specification of the patent, may be found in Hebert's 'Engineer's and Mechanic's Encyclopædia,' vol. ii., pp. 387-8. Shortly after the date of this patent, a carriage was constructed, which was exhibited in London with sufficient success to prove the practicability of the invention; although, owing to the generally defective state of the roads at that time, its inventors soon gave up their experiments on common-road locomotion, and adapted their machinery to use upon a railway. [Railway, vol. xix., p. 248.] It is a remarkable coincidence that one of the principal places in which Trevithick's steam-carriage was exhibited in London nearly forty years since, should have been near the site of the great railway station at Euston Square.

For about twenty years after the experiments of Trevithick, the only locomotive steam-engines of any note were those constructed for use upon railroads. [Railway.] When the improved state of the common turnpike-roads rendered steam-locomotion more practicable upon them, steam-carriage projectors arose in rapid succession. One of the first of these was Julius Griffith, who obtained a patent in 1821 for the mechanism of a steam-carriage, some parts of which were communicated to him by a foreigner residing abroad. He had a carriage built by Messrs. Bramah, with two steam-cylinders and pistons, impelling the hind-wheels by the intervention of small cogged wheels, so arranged as to be always in gear, notwithstanding the jolting and vibration of the carriage. To preserve the boiler and machinery from injury, they were suspended from the frame-work by chains and helical springs. Imperfect as this device for the elastic suspension of the machinery appears to have been, it deserves to be mentioned as one of the earliest attempts to overcome what has always proved a very serious difficulty. Trevithick's locomotive was, we believe, without springs, as far as the machinery was concerned. Griffith's boiler was tubular, and will be noticed hereafter. Its action proved defective; and, probably on this account, the experiments were given up.

Several of the inventions which follow next in chronological order were based upon the erroneous assumption that a carriage could not be propelled with certainty, especially in ascending a hill, by the action of any internal mechanism merely turning the wheels—an assumption which also led to contrivances in railway engines, noticed elsewhere. A singular plan for obviating this difficulty, and rendering the irregular surface of the road of little consequence, was patented in 1822 by David Gordon. He proposed to use a small locomotive engine, resembling those employed by Trevithick upon a railway, but having its wheels surrounded by cogs or projecting teeth. This engine was to be placed within a large rolling drum, about nine feet in diameter and five feet wide, the inside of which should be fitted with circular rack-rails, fitting the wheels of the steam-engine. Thus the motion of the engine would cause the drum to roll forward, on the same principle that the endless race of the squirrel in a cylindrical cage occasions it to revolve; and the rolling of the drum was to move a carriage connected with it. It does not appear that this invention has ever been applied in the form described; but heavy goods have been conveyed across a swamp in America by a similar apparatus, the goods being placed within a drum formed of sheets of iron. In 1824 the same gentleman patented a highly ingenious machine of very different character, to overcome the supposed difficulty. It was to be propelled by means of six legs, disposed under the body of the carriage, the weight of which was supported upon wheels. The propellers, or legs, were set in motion by six long cranks, which were turned by means of two steam-engines vibrating on gudgeons, so as to avoid the necessity of using connecting-rods; the ends of the piston-rods being connected immediately with two small cranks upon the same axle as those by which the propellers were moved. Experience has proved that all such contrivances are quite unnecessary in ordinary cases; but this does not detract from the merit of Gordon's contrivance, in which the most admirable provisions are made for adapting the propellers to the undulating surface of the road, and rendering their action at once effective and harmless. The details of the propelling machinery are represented in Alexander Gordon's 'Treatise upon Elemental Locomotion.' There have been several more recent schemes for the same purpose, but they do not require further notice.

Among the numerous competitors for public favour in this department of enterprise, Mr. Goldsworthy Gurney, formerly lecturer on chemistry at the Surrey Institution, stood for some years the most prominent. The time at which he commenced his experiments was much in his favour, curiosity being then highly excited; and the circumstance of his having obtained much more pecuniary support than any other steam-carriage projector, doubtless tended in a great degree to the reputation which he obtained. Of others who have invented and built steam-carriages between 1824 and the present time, the names of Burstall and Hill, of Leith, W. H. James, of Birmingham, Walter Hancock, Summers and Ogle, Messrs. Heaton, of Birmingham, Dr. Church, of the same place, Dance and Field, Squire and Macerone, Scott Russell, of Greenock, Hills, of Deptford, and Sir James Anderson, are the most prominent, although many others have appeared upon the field. Several of these inventors have produced carriages capable of maintaining an average speed of from ten to twelve miles per hour for considerable distances, and a much more rapid rate of motion for a short time; and some have succeeded in performing extensive journeys with their steam-carriages. Experimentel journeys, especially when of considerable length, are attended by many inconveniences, arising from the want of means for supplying fuel and water at the stopping stations, and several other circumstances which would not interfere with their success if steam-carriages were regularly established; but, notwithstanding all these difficulties, the experiments have fully proved the possibility of constructing steam-carriages of sufficient power to ascend all ordinary hills, and to surmount any difficulty likely to be met with upon a tolerably good turnpike-road.

A complete history of steam-carriages from 1825 to the present time would require very considerable space. Gurney, after experimenting for several years, at great expense, and with the assistance of several ingenious artisans, and having repeatedly altered the arrangement of his boiler and machinery, succeeded in so far proving the practicability of his scheme, that Sir Charles Dance was induced to put his carriages to the test by establishing a regular steam-conveyance between Gloucester and Cheltenham, a distance of about nine miles. The steam-carriage commenced plying on the 21st of February, 1831, and continued running four times a day for four months, with tolerable regularity; the time of each trip averaging about fifty-five minutes. At the end of this time part of the road was covered with loose stones to such a depth as to render it almost impassable, even to horse-coaches; this was done, according to Sir Charles Dance, at the instigation of parties who were interested in opposing the new conveyance. The steam-carriage passed through the stones twice, with some difficulty, but the hind axle, which was cranked to receive the impulse of the pistons, and appears to have been strained by the unusual exertion of power, broke on the third journey, before arriving at the place where the stones were laid. The proprietor of the carriage, in a letter to Mr. Gurney, stated that the stones were laid eighteen inches deep, and that the road did not need any repair, but was in excellent order before they were put on. He further stated that he had intended to have the injury repaired, and the wheels strengthened, and so to have gone on in spite of this opposition; but that, in the course of the following week, he was informed that several turnpike acts had just been passed, and that others were in progress, which imposed prohibitory tolls upon carriages propelled by mechanical power; an act for the Cheltenham Trust being one of the number. He therefore relinquished the experiment, feeling any further contest to be useless, until the unreasonable tolls should be discontinued. 'In some cases,' Gurney states, 'the tolls imposed amounted to 2*l.* at every gate, at others to 2*l.* 8*s.*, and in some to 3*l.* 8*s.*' To meet this new difficulty, Gurney immediately petitioned parliament, and thus led to the appointment of a select committee of the House of Commons to inquire into and report upon the tolls which ought to be imposed upon coaches and other vehicles propelled by steam or gas upon turnpike-roads; the rate of toll actually levied under any acts of parliament then in force; 'to inquire generally into the (then) present state and future prospects of land-carriage by means of wheeled vehicles propelled by steam or gas upon common roads; and to report upon the probable utility which the public may derive therefrom.' The report of this committee, made in October, 1831, was very favourable. They represented steam-carriages as deserving of legislative protection, and reported that they considered the practicability of substituting inanimate for animal power in draught on common roads to have been fully established. The report adverts to the prospective advantages claimed for steam locomotion in economy and safety; observing that while the cheapness of the conveyance would probably be for some time a secondary consideration, a saving of expense, as well as an increase of speed, as compared with horse-conveyance, might be ultimately expected. The evidence adduced was such as to disprove the supposition that steam-carriages would necessarily frighten horses, or cause annoyance either from noise or from the emission of smoke or steam. With regard to the toll question, it did not appear that there was any sufficient reason for the heavy imposts complained of, either on the ground that steam-carriages would carry many more passengers than other vehicles, or that they would prove injurious to the roads. The weight of the steam-carriages then in use is stated to vary from fifty-three to eighty cwt.; but some have been since used of rather greater weight. Still, with cylindrical wheels of suitable width, such carriages would be far less injurious than the pounding of horses' feet, and the grinding of the narrow conical wheels in common use. The committee concluded their Report by observing that sufficient evidence had been adduced to convince them—

'1. That carriages can be propelled by steam on common roads at an average rate of ten miles per hour.

'2. That at this rate they have conveyed upwards of fourteen passengers.

'3. That their weight, including engine, fuel, water, and attendants, may be under three tons.

'4. That they can ascend and descend hills of considerable inclination with facility and safety.

'5. That they are perfectly safe for passengers.

'6. That they are not (or need not be, if properly constructed) nuisances to the public.

'7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.

'8. That as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will cause less wear of roads than coaches drawn by horses.

'9. That rates of toll have been imposed on steam-carriages which would prohibit their being used on several lines of road, were such charges permitted to remain unaltered.'

No legislative encouragement arose out of the proceedings of the committee of 1831, nor have the subsequ occasions on which the subject of steam-carriages has been brought before parliament been productive of any measures calculated to promote their general adoption. In 1834 and 1835 the subject was investigated by committees appointed to report upon Gurney's claims to an extension of his patent right, or to a pecuniary compensation for the loss which he was alleged to have sustained through the legislative discouragement of steam-carriages, and it was stated that he had expended more than 36,000*l.* in his experiments, of which about 20,000*l.* was advanced by parties who had hoped to derive profit from working his engines. This inquiry led to the introduction, in 1836, of a bill for relieving steam-carriages from exorbitant tolls; but the bill, after passing through the House of Commons, was thrown out by the Lords. Still, as the prohibitory tolls complained of do not apply to every road, it cannot be supposed that the general introduction of steam-carriages has been materially retarded by them. So soon as the economy as well as the practicability of running steam-carriages on common roads shall be satisfactorily established, it is likely that all minor difficulties will disappear. The advocates of this kind of locomotion will have far more difficulty in removing the suspicion which has been excited by the numerous exaggerated and deceptive statements which have been made on the subject—statements which have in many cases, from their palpable incorrectness, cast ridicule upon a project which, if carried into effect in a judicious manner, might prove highly beneficial. The performances of Gurney's carriages especially have been the subject of such gross misrepresentation, that it is extremely difficult to elicit the truth from the contradictory statements of his partisans and his rivals. The performances on the Cheltenham and Gloucester road, for instance, might be supposed, from the statements of Mr. Gurney and some other writers, to be those of one carriage; in which case they would appear very satisfactory. In Gurney's pamphlet, above referred to, the work is described as that of 'a carriage,' and a tabular 'Account of the Journeys made by *the carriage* between Cheltenham and Gloucester' is given; so that the reader is left to assume that nearly four hundred trips were made by one machine. The case appears very different when we are informed by Colonel Macerone, in his 'Few Facts concerning Elementary Locomotion,' that Sir Charles Dance had *three carriages*, all constructed and painted alike; and 'that it required the utmost exertions of an engineer (Mr. Stone), at a salary of 1*l.* per day, and four men, at 3*l.* per week, to keep one of the three coaches in moving order.' That this account is in the main correct may be presumed from the circumstance that it has never been, as far as the writer is aware, publicly contradicted; and also from the fact that in a letter from Sir Charles Dance to Mr. Gurney, printed at the end of the second edition of his pamphlet, the carriages are spoken of in the plural number.

The performances of Mr. Hancock's steam-carriages appear more satisfactory, all things considered, than any other, though the modesty of the inventor has deterred him from publishing such favourable statements as have appeared in many other cases. This gentleman commenced operations about the same time as Gurney; and, after a series of experiments, which have been detailed in an interesting 'Narrative,' published in 1838, he succeeded, early in 1831, in setting to work a very promising carriage, which he called The Infant.

In February of that year, a few weeks before the starting of the steam-carriage between Gloucester and Cheltenham, Mr. Hancock commenced running The Infant regularly for hire between Stratford and London; not with any expectation of profit, but with the hope of dissipating prejudice. This was, it is stated, the first steam-carriage that ever plied for hire upon a public road; and its inventor succeeded in bringing it into operation single-handed. He has since built more steam-carriages than any other individual; and has repeatedly run one or more as public conveyances about London for several weeks together, with such success as to leave very little reason to doubt the profitable introduction of such vehicles in lieu of the common omnibuses if they were taken up by parties with sufficient capital to try the experiment upon an extended scale. With the exception of the carriages of Mr. Russell, which ran for some time between Glasgow and Paisley, no other steam-propelled vehicles than those above mentioned have, as far as the writer is aware, been actually run for the regular conveyance of passengers; although that of Messrs. Squire and Macerone, and several others, have performed many journeys about the metropolis.

It may appear strange that, in the face of so many tolerably successful experiments, common road locomotion should have made so little *practical* progress, that it may even now be said, in the words of an able paper in the 'Foreign Quarterly Review' for October, 1832, that 'every attempt yet made to render steam-carriages the means of economical and regular inland communication has totally and absolutely failed.' The paper alluded to, which has been attributed to Mr. John Scott Russell, is, in most points, as applicable to this branch of science in its present state, as it was at the date of its publication. The reviewer observes that 'not in the nature of the thing to be done, but in the mode of setting about it, is the cause of failure to be discovered;' and it would perhaps be scarcely going too far to say with him, that it is possible 'to detect in each invention omissions and elements of self-destruction necessarily involving total failure; and these not in mere details, but in the great principles of structure and arrangement.' Many of the defects alluded to arise from the circumstance that steam-carriage builders have usually worked independently of each other; each having to find out, by tedious experience, difficulties which have impeded the success of his predecessors. The effect of the patent laws has also occasioned, in all probability, many imperfections. The man who has invented an excellent boiler may not have the practical knowledge necessary for the construction of an efficient well-proportioned engine; or, if he be able to contrive that, he may not be competent to build a good carriage. The necessary perfection in boilers, in the mechanism of the steam-engine, the convenient disposition of the component parts of the machine, and the construction of a carriage suitable for the conveyance of a heavy load at a rapid speed, are not likely to be attained by any individual; yet it has mostly happened that the contriver of something ingenious in one department has, in order to test his invention, been compelled to apply himself to all the rest. It is needless to suppose, with Gordon, that the imperfect machines thus produced exhibit 'the partial efforts of men who underrate the defects and magnify the merits of their own invention, and are disinclined to adopt any improvement, however good, which did not originate with them selves.' (*Observations on Railway Monopolies*, &c.) It is very true, as the same writer observes, that 'there has been no hearty and combined co-operation in the various endeavours to bring forward this object,' but this circumstance may be more liberally accounted for by the necessity which exists for avoiding any encroachment upon the patent rights of those who have previously turned their attention to the subject. Another circumstance which often presents a serious difficulty is the great expense of experiments; the inventor being sometimes compelled, by the deficiency of his pecuniary resources, to try his inventions at great disadvantage, or to abandon them when on the eve of perfection. Several attempts have been made to meet some of the difficulties alluded to by the formation of societies or companies for the introduction of steam-carriages; but such have, from various causes, hitherto failed. There is indeed at the present time (January, 1842) a 'Steam-Carriage and Waggon Company,' who have recently advertised for proposals for the supply of steam-carriages; but it is doubtful whether the required improvements will be effected until means are provided for combining the results of past experience and the practical knowledge of several individuals to produce a more perfect machine. A careful analysis of the numerous inventions which have been tried or suggested, might facilitate such a measure; and were the subject taken up in a judicious way by a company with ample pecuniary resourses, totally unconnected with any steam-carriage projector, but willing to compensate any inventor for such parts of his apparatus as might be adopted, it is not unreasonable to believe that a steam-carriage, far superior to any hitherto constructed might be the result. Great attention should be paid to the proportions and other characteristics of the machine considered as a *carriage*, in order to make a favourable impression upon the public. Many of the steam-carriages which have hitherto appeared have been so deficient in these qualities as to excite, rather than to allay, that prejudice which it will be difficult to overcome, even when every precaution is attended to. The same qualities which will tend to the comfortable motion and pleasing appearance of the carriage,—its lightness and elasticity,—are also desirable for the durability of the machinery. Russell observes on this subject, 'Let any one who has paid attention to the progress of coach-building during the last hundred years compare the ponderous framework of a royal equipage of that date with the exquisitely elegant and astonishingly light structure of a private carriage, or even a stage-coach of the present day, and he will then understand what steam-vehicles are now, and what they ought to be.'

Such a complete review and analysis of inventions connected with steam-locomotion as would be desirable to direct any efforts for its perfection, would far exceed the limits of this article; but it has been deemed most advisable to notice a few of the most important in a classified form, rather than to attempt any minute description of the vehicles of each individual locomotionist. In pursuance of this plan boilers will be first noticed; a good boiler or steam generator being the first requisite in a steam-carriage.

The essential features in a steam-carriage boiler are the power of generating steam very rapidly; strength, to secure it from explosion; lightness; and compactness. A great number of contrivances have been tried with the hope of accomplishing the desired union of these qualities; many of them consisting of combinations of small tubes. In Griffith's steam-carriage the boiler consisted of horizontal tubes, communicating with vertical side chambers to aid the circulation of the water, and with chambers above the the tubes to contain steam. The tubes were about an inch and a half in diameter, and one hundred and fourteen in number; and the flames were made to play between and around them. This boiler was abandoned for a defect which applies also to many others in which water is contained in tubes of small diameter; that of some of the tubes becoming so hot that they would not contain water. Gurney's various boilers were also tubular. Originally he used the tubes in several curved forms, and he proposed to cleanse them from the deposit of fur which is so injurious to such boilers, by means of a chemical solvent; but, finding difficulties in this plan, he eventually adopted that represented in section in *Fig.* 1, in which all the tubes are straight, so that they may be cleansed with suitable instruments inserted through holes opposite their ends; these holes being, when the boiler is in use, closed by plugs of metal. This boiler consists of a number of small tubes, so arranged as to form a grating or case to contain the fire. The fuel rests upon the lower series of tubes, *a*, *b*, and the flames play upon and between those constituting the back, *b*, *c*, and the upper series, *c*, *d*. These small tubes communicate with two of larger diameter, *a* and *d*, placed at right angles with them, in front of the fire. To complete the circulation of the water vertical tubes are added to connect *a* and *d*; the fire-door, for feeding the furnace, being situated between them. Water is pumped into the boiler by the cylinder *a*, and the heat causes it to circulate in the direction *a*, *b*, *c*, *d*; while the globules of steam, by their superior levity, rise into the large cylindrical vessel *e*, the office of which, as its name imports, is to allow the steam to become perfectly separated from the water, so that it may be supplied to the engines in a pure *dry* state. The boiler and furnace are enclosed in an iron case, from which the gaseous products of combustion escape into the chimney *f*. The use of tubes filled with water instead of solid fire-bars economises the heat, and tends to prevent the formation of clinkers, because the metal, being in contact with water, cannot become over-heated. The chief defect of Gurney's boiler appears to have been that the water was too minutely divided, the steam being unable to escape freely from the tubes. The steam-chambers, or *separators*, being of comparatively large diameter, were necessarily thick and heavy. The boiler patented by Sir Charles Dance and Mr. Field, in 1833, was a modification of Gurney's. An ingenious boiler was constructed by Mr. James, of Birmingham, consisting of a cylinder formed of a number of annular tubes. The tubes were of small diameter, and each of them was bent into a ring. A number of such tubular rings, packed together side by side, constituted the boiler, in the interior of which the fire was placed. The boiler of Colonel Macerone and Mr. Squire consisted of eighty-one vertical tubes, between which the flames were made to play: the tubes in the inner part of the boiler being shortened at their lower ends to afford room for the fire. Hollow or tubular fire-bars, containing water, were also used to prevent the formation of clinkers. Messrs. Summers and Ogle used vertical tubes or cylinders about four inches diameter, in the centre of each of which was another tube of about one inch diameter. The water occupied the space between the two tubes, and was therefore exposed in thin cylindrical sheets to the action of the fire, which played round the outside of the large tubes and up the inside of the smaller ones each of which constituted a small flue. The steam-carriages of Mr. Scott Russell, which present several points worthy of notice, had boilers similar in principle to those used in railway engines. Instead however of the requisite strength being obtained by the thickness of the metal, it was provided for by the use of about thirteen hundred connecting rods or wires, about a quarter of an inch in diameter, so fixed as to tie the opposing portions of the boiler together. These also communicate heat very rapidly to the water, for which purpose alone some inventors have proposed to use plates or wires distributed throughout the boiler. Hancock's boiler is simple, efficient, safe, and easily repaired. In its original form it consisted of a series of flat-sided chambers of thin metal, arranged vertically at a small distance from each other, and held apart by vertical fillets. These chambers were enclosed in a strong outer case, in the lower part of which the fire was situated; and the flame and hot air rose up in the spaces between the chambers. The inventor has since improved this boiler by using plates embossed with hemispherical projections for forming the sides of the chambers; the projections being so arranged that the prominent parts of one chamber press against those of the adjoining one, as shown in *Fig.* 2, when the boiler is put together. In the annexed cut *a* represents, in section, parts of two chambers of this improved construction; the water being indicated by horizontal lines. The bosses, or projections, are, as shown by the portion of a plate represented at *b*, placed in alternate rows, by which arrangement the flames are compelled to take a tortuous course in passing between the chambers, and to impinge repeatedly upon their sides. By this admirable contrivance the chambers are held sufficiently apart without the useless weight of the fillets formerly inserted for that purpose. Mr. Hancock has used other forms of projection on the sides of his chambers, and has tried them of a corrugated or grooved form; the projections, as in the former case, resting against each other, and the grooves or hollows forming passages for flame.

Fig. 1.

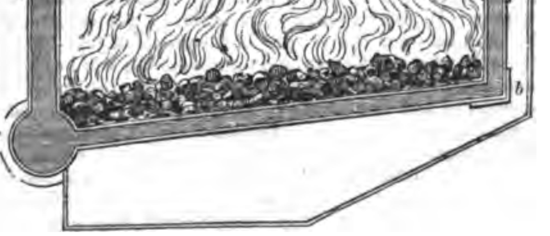
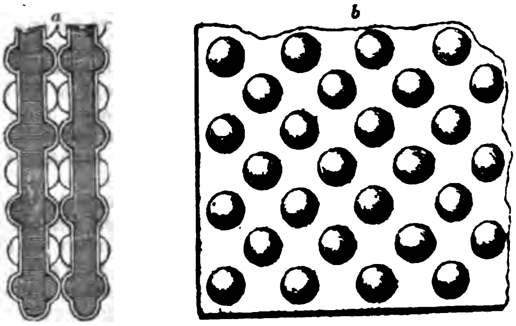


Fig. 2.



A boiler with chambers of the latter kind was also used in Redmund's steam-carriage. In a chamber-boiler on Hancock's plan the steam can escape from the water more readily than it can when confined in small tubes; yet the subdivision of the water is sufficiently perfect for safety. The chambers, being held tightly together by bolts passing through the whole boiler, support each other; but as they are much thinner than the outer case of the boiler, no harm is likely to arise if one of them should burst. Such a boiler has burst while the carriage was running, without either the engineer or the passengers being conscious of the occurrence, which was only discovered by the gradual stoppage of the machine. Mr. Hancock has also contrived a very useful apparatus by which the grate, or floor of bars upon which the fuel rests, may, when foul with clinkers, be easily removed, and a clean grate slid into its place. By this means the inconvenience of clearing the grate with a rake is avoided. The foul grate is laid aside to cool; and as it shrinks in cooling, the clinkers become detached. Sir James Anderson's steam-carriage boiler consists of a number of vertical chambers, differently arranged from Hancock's, and strengthened with iron framing to prevent bursting. The flames are made to take a serpentine course up and down between the chambers. Boilers have been tried consisting of several concentric cylinders, concentric cones, &c., the water being disposed in thin sheets or layers; and many other schemes, which it is needless to particularise, have been suggested.

The means adopted for producing a strong draft in the fire are of two kinds. The method commonly adopted in railway-engines, of throwing the waste steam into the chimney to produce a blast, would be inadmissible upon a common road, because of its noise. Gurney, in one of his carriages, turned the waste steam into a chest or case, acting like the air-chamber of a fire-engine, from which it issued into the chimney in a uniform stream; thereby avoiding the panting noise produced by the separate puffs of steam. The plan has the disadvantage of impeding the exit of the steam, after it has propelled the piston, and therefore diminishing the available power of the engine. The other kind of blast—that produced by blowing air into the fire with fanners—was also used by Gurney in some of his earlier carriages; and a similar apparatus has been adopted by Hancock, Macerone, and several others. Hancock destroys his waste steam by throwing it into the fire. The fan-blast, by requiring part of the power of the engine to work the fanners or blowers, diminishes its useful effect, though in a different way to the steam-blast.

Many different arrangements have been adopted for communicating the power of the pistons to the wheels of the carriage. One of the simplest methods, used by Gurney, Macerone, and some others, is to place the cylinders horizontally under the body, and to communicate the impulses of the pistons, by connecting-rods, to cranks upon the axle of the hind wheels. This plan, which resembles the common arrangement in railway engines, is attended by the disadvantage that the engines cannot be mounted fairly upon springs. The fore part of the frame-work, to which the engines are secured, may be so supported; but the hind part must either be without springs, or must have their action exceedingly limited. Hence the cranks and those parts of the machinery immediately connected with the axle are exposed to very injurious concussions. The axle itself also, having to bear the weight of the carriage as well as the impulses of the pistons, is very liable to be strained and broken. Hancock has a very effectual contrivance for avoiding these defects. He employs two vertical cylinders, working a crank-axle which is steadily mounted in the body of the carriage, so that the whole is suspended upon springs. The hind axle of the carriage is straight, and receives motion from the crank-axle by means of endless chains, working over grooved pulleys or sheaves, so formed that the chains cannot slip; and the chains are always kept at the proper state of tension by means of *radius-bars*, which extend from one axle to the other, and keep them constantly at the same distance apart, notwithstanding the vertical play of the springs. This beautiful arrangement has been imitated by some other steam-carriage builders. Another mode of communicating the motion of a separate crank-axle to that upon which the running wheels are fixed is by toothed wheels, as in Trevithick's steam-carriage. In Russell's steam-carriages this method was adopted; a peculiarly formed spring, with other contrivances, being used to prevent the distance between the axles from varying. The singular project patented in 1825 by J. and S. Seaward, for avoiding the difficulty attending the use of springs, closely resembles, in principle, the arrangement of Hancock. In this plan a propelling wheel or roller at one end of the carriage, attached to it by a swinging frame pivoted to the body, which acts like the radius-bars of Hancock, is turned by means of an endless chain which passes round a crank-axle in the body of the carriage, which was to be mounted upon springs. The want of sufficient weight upon the propelling-roller would probably have rendered the plan, in this form, useless; but it is referred to as giving an early intimation of what, in an improved form, appears to be the best mode yet adopted of communicating power to the wheels of a steam-carriage. Mr. James and Dr. Church each proposed the use of a separate axle to each hind wheel; the plan of the former being to apply two cylinders, of very small diameter, and worked with steam of unusually high pressure, to the axle of each wheel; so that each wheel might move with any required velocity, independent of the other, to facilitate the turning of the carriage. Mr. James further proposed that the oblique position assumed by the fore axle when the carriage moves in a curved direction should so influence an apparatus connected with the valves through which steam is supplied to the engines, as to regulate its access to the cylinders on each side of the carriage, according to the respective velocities with which the wheels were required to revolve. Trunnion engines, which are applied to the cranks without the intervention of jointed connecting-rods, have been used by several steam-carriage projectors; and some have suggested the use of three or even four cylinders and pistons, acting upon as many cranks on one axle. Mr. Russell, on the contrary, in the 'Foreign Quarterly Review,' recommended the use of one cylinder, because of the difficulty of making two act perfectly together. In his steam-carriages he has used two; but the difficulty is avoided by making them work separate shafts.

The contrivances for locking the wheels to the axle need not differ materially from those used for similar purposes in other machinery. It has been found sufficient, in ordinary cases, to have one wheel so connected with the axle, the other being left free to revolve with varying velocity according to the sinuosities of the road; but in ascending a steep hill, or passing over soft and uneven ground, the adhesion of both of the hind wheels is required. The clutching or locking apparatus should therefore be capable of easy application. In one of the steam-carriages invented by Messrs. Burstall and Hill, of Leith, a provision was made for communicating the power of the engines to the fore as well as the hind wheels, by means of mitre wheels and shafts, a universal joint being inserted in the apparatus to allow the fore wheels to lock in turning, and the wheels being so connected with the axle that they might vary their velocities to the extent necessary for ordinary curves without any of them being thrown out of gear.

In the means of adapting the power of the vehicle to the varying resistance of an undulating road, most steam-carriages hitherto built have been very deficient. This object may be effected to some extent by varying the pressure of the steam; but, if carried too far, this method is dangerous. The use of wheels of different sizes,—small wheels for a slow speed with great power, and large wheels for quick running, when the roads are in a good state,—is an expedient too inconvenient for general adoption. Whenever the running-wheels are placed upon the crank-axle, one of the above methods must be resorted to; but when a separate crank-axle is used, the relative velocities of the pistons and the running-wheels may be varied by means of different sets of spur-gear; or, when Hancock's mode of connection is adopted, by changing the relative sizes of the pulleys over which the coupling-chain works. This facility is one of the great recommendations of a distinct crank-axle; as some contrivance for varying the power, which may be brought into action on a journey without delay, is almost indispensable in any steam-carriage intended for use upon a hilly road, or one on which the resistance, from the progress of repairs, or any other cause, varies greatly in different parts.

The operation of steering is usually performed by a hand-wheel in the fore part of the carriage, giving motion, by means of a rack and pinion, or a chain and pulley, to the fore-axle. Gurney, and one or two others, used a small wheel or pair of wheels rolling on the ground in advance of the carriage, to assist in turning; but no such contrivance has been considered necessary by recent steam-carriage builders. The labour of steering is much diminished by the use of a friction-band and drum, contrived by Mr. Hancock, which, when brought into action by the pressure of the steersman's foot upon a pedal, retains the steering-apparatus in a direct position. Thus the guide may remove his hands from the tiller-wheel whenever the carriage is running in a straight course; the friction of the band and drum being sufficient to overcome any tendency to swerve occasioned by the irregular surface of the road; while, by relaxing the pressure of his foot, the apparatus becomes easy to move in any direction. In the contrivance invented by Mr. James, and subsequently adopted, with some modification, by Messrs. Heaton, the vertical spindle by which motion is communicated to the axle is not turned immediately by a tiller-wheel fixed upon it, but by means of bevil-gear turned by two winch-handles, one for each hand of the steersman. This apparatus may be so arranged as to increase the power of the steersman over the fore-carriage to any required degree, by varying the diameters of the bevil-wheels. Mr. Redmund, in a carriage built in 1832 or 1833, effected the operation of steering by means of reins acting upon levers which moved the fore-wheels. To facilitate the movements of the carriage, each wheel was fixed upon a distinct axle, according to the plan patented in 1816 by Mr. Ackerman, to avoid the inconvenience of the common system of locking the wheels in turning. This mode of constructing the fore-axles has the advantage of giving increased safety in turning; the fore-wheels being enabled to assume any required angle with the body without running under it. In one of James's steam-carriages, a lamp was fixed a little in advance of the steersman's seat, supported upon and turning with the fore-carriage, so as both to light the road at night and to indicate the direction in which the carriage was running. Mr. Russell used an arrow in a similar way.

All locomotive carriages should be provided with efficient brakes, by which their motion may be arrested when necessary. These, in common-road steam-carriages, usually consist of metallic bands, capable of being pressed against either the nave or the periphery of one or both of the hind-wheels. The latter plan appears to be the most effective. It might be a good precaution to have this apparatus in duplicate, as several accidents have occurred in descending hills, from the derangement or insufficiency of the brakes.

In the general arrangement of the machinery, as well as in the contrivance of its component parts, much ingenuity and judgment are required. Some locomotionists arrange their machinery and accommodation for passengers in the same carriage; but others prefer conveying the load, or the greater part of it, in a supplementary carriage, drawn by that containing the engine, which then becomes a mere drag. The latter plan requires the most power, owing to the friction of the increased number of wheels and axles; but it would probably be preferred by the passengers, from the circumstance that they are thereby further removed from danger in the event of an explosion. It also affords facilities for changing the engine in the course of a long journey, or in case of any derangement of the machinery, without disturbing the passsengers any more than they are disturbed by changing the horses of an ordinary stage-coach; and the passenger-carriage may be fitted with provisions for attaching horses to take it forward whenever an accident occurs to the drag. Further than this, when the engines and carriages are separate, the capital invested in the one need not be unproductive while the other is undergoing repair. This was the arrangement adopted in the carriages used by Sir Charles Dance. Hancock has built some engines for use as drags, but he, in common with several others, prefers placing the whole weight upon one carriage. In one of the steam-coaches designed by Burstall and Hill, a model of which was exhibited in Edinburgh and London nearly fifteen years ago, the engines were placed in the hind boot of the vehicle, which resembled a common stage-coach in form; but the boiler and furnace were supported by an additional pair of wheels, connected by a jointed framework with the back of the coach. The connection between the boiler-carriage and the coach was such as to allow the machine to turn with facility; the steam-pipes being provided with peculiar joints to enable them to accommodate themselves to the motion. This plan has the advantage of removing the boiler from the passengers without so great an increase of weight and friction as the use of a distinct carriage involves, and would also afford great facilities for removing a defective or furred boiler, and substituting a fresh one, without difficulty or delay; but possibly it might, by reducing the weight on the driving-wheels, so diminish their adhesion as to prove inconvenient. In the carriages of Mr. Russell, which were much handsomer in appearance than those of most steam-coach builders, the boiler and engines were supported by the hind axle of the carriage (with the intervention of springs), but the supply of fuel and water was contained in a supplementary vehicle, or tender, supported upon two wheels, and having seats for some outside passengers. This tender it was proposed to change at the stations, so as to avoid needless delay. In many steam-carriages water-tanks are formed under the passengers' seats; and when these do not afford sufficient room, another tank may be placed underneath the body. To facilitate the operation of taking in a supply of water, Mr. Gordon, in his 'Journal of Elemental Locomotion,' suggested the use of a moveable tank, suspended beneath the framework of the carriage, and capable of being detached and wheeled away on a small truck pushed underneath to receive it, while the carriage stopped at a station; a full tank being then brought on the truck, and attached in the place of the empty one. The same gentleman recommends that the boiler be so placed and connected with the engines, that it may be easily removed, and another of the same or a different construction put in its place. This precaution will be especially important so long as steam locomotion remains in an experimental state.

It is advisable to place the cylinders and working parts in a position readily accessible while the carriage is running, so that any derangement may be immediately perceived and rectified by the engineer. Mr. Hancock provides for this by placing the engines in a small chamber, in which the engineer is stationed, between that part of the carriage which is devoted to passengers, and the boiler, which occupies the extreme rear of the vehicle, and is fed with fuel by a stoker who rides outside at the back, and acts also as brakesman. The draft being produced by blowers, the fire-place must always be close; it is therefore fed by a hopper with double doors, and eye-holes, glazed with talc, are made to enable the stoker to see the state of the fire. A very promising drag, built by Mr. James of Birmingham, but abandoned, it is stated, for want of more ample pecuniary resources, had the whole of the machinery, with the boiler and supply of water and fuel, enclosed in a compact carriage somewhat resembling a small omnibus, the roof of which was little more than six feet from the ground. The engineer was placed on a seat at the back, and had access to the engines through openings in the roof. In the machines of Gurney and several others, the engines, being placed under the body, are inaccessible when in motion, and are exposed to dirt and currents of cold air. It is important to attend to the length and direction of the pipe for conveying steam from the boiler to the cylinders; since a great length of pipe or angular turns in its course diminish the power of the steam. This point has been singularly disregarded in some cases. In one of Gurney's carriages, for instance, the steam-pipe from the upper part of the boiler, which was at the back of the carriage, was turned down to pass underneath the body, thence up again through the fore-boot, in which the fanners for blowing air into the furnace were placed, to the steersman's seat, where the throttle-valve was situated; it then turned suddenly downwards, and passed through the boot to the cylinders. With such an arrangement, it is not surprising to find Gurney himself stating that, although the average pressure of steam in his boiler was about 70lbs. to the inch, he thought the pressure on the piston was not more than 20lbs. The throttle-valve must always be under the immediate control of the steersman; but this may be effected without the absurdity of conducting the steam-pipe to his feet. Gurney contrived an apparatus, by which, if the steersman were thrown off his seat, or were absent from it from any other cause, the throttle-valve should close of itself by the action of a spring; so that, on level ground, the carriage could not possibly run away without a guide. That some such provision is desirable may be inferred from the fact that several instances have occurred of railway engines being set in motion in the absence of their drivers. As the safety of the boiler depends much upon the perfect action of the pumps by which it is supplied with water, they should be particularly attended to. Several accidents have been occasioned by their becoming choked with mud, bits of straw, &c. suspended in the water.

Finding it difficult to procure wheels of sufficient strength for his steam-carriages, Mr. Hancock contrived his patent wedge-wheels, which are described under WHEEL.

Many plans have been proposed for the propulsion of locomotive carriages by means of gas or compressed air in lieu of steam; but nothing has been accomplished of sufficient importance to claim detailed notice. Hitherto none of the gas-engines tried have proved as economical as those worked by steam. The other project is attended by very serious practical difficulties; and were these overcome, its advantages are questionable, since it merely affords a means of storing up and gradually expending the power exerted in condensing the air, and does not either produce or economise power. Whatever advantage is realised must be in the convenient application of the power of the stationary machinery used to compress the air; the amount of such power being diminished by the friction of the apparatus.

More detailed information on the subject of this article may be obtained from Gordon's 'Treatise upon Elemental Locomotion;' the article 'Railway,' in Hebert's 'Engineer's and Mechanic's Encyclopædia,' which contains a chronological account of the principal inventions in steam-locomotion, mixed up with those relating to railways; Hancock's 'Narrative;' the pamphlets of Gurney, Macerone, &c.; and the 'Mechanics' Magazine,' and other scientific periodicals. Many facts may also be gleaned from the evidence given before the select committee of the House of Commons on Steam-Carriages, in 1831, and the select committees appointed in 1834 and 1835, to investigate Mr. Gurney's claims. The subject has likewise been brought before parliament in connection with the prospects of turnpike trusts; but the statements made by the promoters of common-road locomotion have in too many cases been so deceptive and exaggerated, as to provoke ridicule rather than to induce a calm investigation of the prospects of this important branch of practical science. When a speed of twenty or thirty miles an hour is talked of as attainable upon a turnpike-road, it is not surprising that steam-carriage projectors should be deemed wild enthusiasts; since anything like that velocity, even if attainable at a moderate expense, must be attended with most fearful danger upon a road liable to the intrusion of miscellaneous vehicles, animals, and foot-passengers. More moderate pretensions, coupled with due regard to the appearance and comfort, as well as the efficiency of steam-carriages, and satisfactory proof of their economy, will do far more for the cause of common-road locomotion than the extravagant statements which have appeared so frequently within the last fifteen years.

STEAM-VESSEL, a vessel moved by the power of a steam-engine acting upon paddle-wheels or other mechanism for propelling it through the water. In narrating the principal facts relating to the history of the application of the steam-engine to the propelling of vessels, and describing a few of the more prominent peculiarities of the mechanism by which it is effected, it may be convenient to treat first of the experiments and suggestions made on the subject prior to the practical introduction of steam-vessels as a regular means of conveyance; in the second place, to give very briefly the principal circumstances of their subsequent history, and some statistical information respecting the progress and present state of steam-navigation in Great Britain and its dependencies; and, thirdly, to consider the principal features of the structure of steam-vessels, and of the mechanical contrivances by which steam navigation is usually effected.

History of the Invention of Steam Navigation.—Closely connected with the application of the steam-engine to the purpose of propelling vessels, is the use of revolving paddles or similar contrivances in lieu of oars. Although no such means of propulsion have ever been extensively adopted except in connection with steam-power, they have been repeatedly tried, and more frequently recommended, in connection with other prime-movers, for rendering the progress of a vessel in some degree independent of wind and tide. It has been asserted that boats with paddle-wheels turned by oxen within the vessel were known to the antient Egyptians, and that they are represented in some Egyptian tombs; but the writer is not acquainted with any such representation, and it is possible that some mistake may have given rise to the statement. Be this as it may, wheel-boats impelled either by oxen, horses, or men, were known to the Romans. The rare and curious work of Valturius, 'De Re Militari,' which was published in 1472, contains representations of two wheel-boats, one of which has one pair of wheels, and the other five pair. The wheels consist of four paddles each, and are turned by cranks in their axles; and in the second boat the five cranks are connected together by a rope, so that their motion may be simultaneous. Such boats are alluded to by some other early writers on military subjects, as advantageous for the conveyance of troops. That wheel boats have long been known to the Chinese may be presumed from the 'Mémoires' of the Jesuit Missionaries at Peking. In the eighth volume of that work, which was published at Paris in 1782, appeared an engraving and description of a vessel of war, which is called 'Barque à Roues,' and has two paddle-wheels on a side, turned by men (pl. xx., *fig.* 94). The writer remarks (p. 343) that this might give rise to some useful invention for moving vessels during calms; observing that if they could be thus propelled for only one league, it might suffice to remove them from a bad position. Many writers have recommended the use of paddle-wheels or revolving oars for this purpose, both before and after the commencement of experiments on steam navigation. Some projectors have proposed to work such wheels by a capstan, a treadwheel, or cranks turned by hand; and others have suggested their being set in motion by revolving sails, so that the vessel might be propelled by the wind even when moving in a direction contrary to it. Prince Rupert tried a wheel-boat propelled by horses upon the Thames; and so far succeeded as to leave the king's barge, which was manned by sixteen rowers, far behind. Such a vessel was also tried at Chatham in 1682. Captain Thomas Savery, who is better known for his share in the invention of the steam-engine, exerted himself much to introduce a similar apparatus, to be worked by a capstan; and, failing to obtain patronage from government, he published an account of his scheme in 1698, in a work entitled 'Navigation Improved, or the Art of rowing Ships of all rates in calms with a more easy, swift, and steady motion than oars can.' Revolving paddles were tried about the same time in France by M. Duquet, and have since been repeatedly experimented upon, but without realising any important advantage, except when moved by a steam-engine. These experiments are nevertheless interesting from their bearing upon steam navigation.

In order to notice the inventions connected more immediately with steam navigation in chronological order, allusion must be first made to the curious claim which has been brought forward on behalf of Blasco de Garay, a sea captain, who is stated to have exhibited in Spain, in 1543, an engine by which ships and vessels of the largest size could be propelled, even in a calm, without the aid of oars or sails. [BARCELONA, vol. iii., p. 438.] The documents relating to this claim, which, if correct, gives Spain the priority by a long period in experiments on steam navigation, were discovered in the royal archives at Simancas, and were published in 1826, by Thomas Gonzales, director of the archives. It appears that Blasco de Garay proposed his invention to the emperor Charles V., who ordered a public experiment to be made in the port of Barcelona, before commissioners appointed for the purpose. The experiment was made on the 17th of June, 1543, the vessel used being a ship of two hundred tons burden, which had just discharged a cargo of corn at Barcelona. Garay wished to keep his mechanism secret; but it was perceived to consist partly of a large cauldron or vessel of boiling water, and of two moveable wheels, one on each side of the ship. The reports made to the emperor and to his son (Philip II.) were favourable to the engine, particularly, it is said, on account of the promptitude and facility with which the vessel was turned. Ravago, the treasurer, who was one of the commissioners appointed to examine the invention, appears to have been unfriendly to it. He reported that the vessel would go two leagues in three hours; that the machine was too complex and expensive; and that there was danger of bursting the cauldron. The other commissioners, more favourably inclined, stated that it made a league an hour at least. After the trial, Garay removed the machinery from the vessel, deposited the wood-work in the arsenal at Barcelona, and retained the rest himself. It is stated that the invention was approved, and would have been encouraged further by the emperor, had not an expedition in which he was engaged interfered with it. Garay was however rewarded by promotion, and received a sum of two hundred thousand maravedis, besides having his expenses defrayed from the public treasury. The authenticity of this curious narrative has been called in question; and, supposing it to be strictly correct, it bears only conjectural evidence of the use of steam. Considering the low state of the mechanic arts in the sixteenth century, which precludes the supposition that any machinery requiring much accuracy in the execution could have been employed, it has been suggested that probably the moving-power was obtained by an apparatus resembling the primitive steam-engine of Hero. However this may be, the invention was kept secret, and led to no practical result.

Stuart, in his 'Anecdotes of Steam-Engines,' endeavours to establish something like a claim to the invention of steam navigation by the Marquis of Worcester. By taking the sixty-eighth proposition of his 'Century of Inventions' (which was written in 1655, though not published until 1663), in connection with the ninety-eighth and hundredth propositions, as suggested by a writer in the 'Glasgow Mechanics' Magazine,' vol. ii., p. 339, it would appear that he designed to describe, though obscurely, a steam-engine with a piston and lever. Stuart prints a short account of Worcester's invention, which is, he states, still extant in manuscript, and which appears to corroborate this idea. This paper describes what may, without any great stretch of fancy, be supposed to be a machine for effecting navigation by means of a steam-engine; although some of the circumstances mentioned are difficult to account for on that supposition. Stuart also quotes a pamphlet published in 1651, entitled 'Invention of Engines of Motion lately brought to perfection,' which, though published anonymously, describes an engine of such great and universally-applicable power, that Stuart seems to incline to the opinion that the Marquis of Worcester must have been the writer. The author alludes to a little engine, or great model, which he had 'already erected' at Lambeth; and, among many other purposes to which his invention might be applied, states that it may be used 'to draw or hale ships, boates, &c. up rivers against the streame; to draw carts, wagons, &c. as fast without cattel; to draw the plough without cattel, to the same despatch if need be,' &c.

The project to be next alluded to is that of Papin, who proposed an apparatus somewhat like that subsequently patented in England by Jonathan Hulls. Those who have endeavoured to establish a claim to the invention of steam navigation on behalf of France have pleaded Papin's suggestion in favour of their views; but none, so far as we know, have asserted that he put his scheme to the test of experiment. In 1730, in his 'Specimina Ichnographica,' Dr. John Allen propounded a plan for propelling vessels by forcing a stream of water or air out of a tunnel or pipe at the stern of the vessel, which was to be urged forward by the reaction. This scheme has been repeatedly brought forward, with various modifications. Dr. Allen tried it with a boat of considerable size, the pumping being effected by men; but he conceived that the steam-engine might be employed for the purpose. While the possibility of moving a vessel by this means has been proved, none of the experiments tried have indicated any advantage.

On December 21, 1736, a patent was granted to Jonathan Hulls for a machine which may be designated a steam tug-boat; of which a full description was published in the following year, in a sensible pamphlet entitled 'A Description and Draught of a new-invented Machine for carrying Vessels or Ships out of or into any Harbour, Port, or River, against Wind and Tide, or in a Calm.' Hulls proposed to place an atmospheric steam-engine in the tug-boat, and to communicate its power by means of ropes to the axis of a kind of paddle-wheel mounted in a frame-work projecting from the stern of the vessel. A contrivance is added for continuing the motion of the paddles by the descent of a counterbalance-weight, in the intervals between the strokes of the piston. To guard against the injury of the fans or paddles by the violence of the waves, Hulls proposed to lay pieces of timber so as to swim on each side of them. The objections likely to be brought against the scheme are anticipated and answered by the writer, who expresses his opinion that it would be found better to place the machine in a separate vessel than in the ship itself, because the machinery would be cumbersome in the ship, and, if in a separate vessel, it might lie at any port to be ready for use, &c. It was suggested that up inland rivers, where the bottom could possibly be reached, the fans (or paddles) might be taken out, and cranks placed at the hinder axis, on which the paddles were usually fixed, to strike a shaft to the bottom of the river, and so to drive the vessel forward. It is not known whether Hulls ever did anything more to bring his project into use than the publication of the work referred to.

In 1759 a scheme for the improvement of navigation was published at Geneva, by a Swiss pastor, named Genevois, who proposed, in imitation of the web-feet of aquatic birds, to use a kind of jointed oar or propeller, which should be expanded while actually propelling the boat, but should fold together, so as to pass through the water with very little resistance, while being moved forward in order to make a fresh stroke. These propellers he intended to work by the reaction of springs; using a kind of cannon with a piston to compress the springs. The project of Genevois is the more entitled to notice in this place owing to another proposal which he made, namely, to bend his springs by a steam-engine on Newcomen's principle. So eager was Genevois to pursue his plan, that he visited London in 1760 to lay it before the commissioners of the British navy, and translated and published some extracts from his book, under the title of 'Inquiries tending to the Improvement of Navigation.' In this pamphlet he states that he was informed by a member of the Navy Board, that a Scotchman had, about thirty years previously, attempted to move a ship by means of gunpowder, but in a very different way from that proposed by himself; the Scotchman's plan being to urge the vessel forward by the reaction produced by firing one or more cannon from the hinder part of the ship. By this plan, it is said, thirty barrels of gunpowder were found necessary to propel the vessel ten miles in twenty-four hours.

The next circumstances which claim notice in the history of the invention of steam navigation afford the principal reasons for attributing, as some of their writers have done, the origin of the art to the French. In 1774 the Comte d'Auxiron, a French nobleman of scientific attainments, constructed a steam-boat, and tried it on the Seine, near Paris. It appears that the engine had not sufficient power to move the wheels efficiently, an error into which many of the early experimenters fell; and consequently the result was unsatisfactory, and the persons who had united to enable the Comte to construct the machine abandoned the project. In the next year, 1775, the eldest of the ingenious brothers Perier, who had assisted in d'Auxiron's experiment, resumed the attempt, and placed a very imperfect engine, of about one-horse power, in a boat on the Seine, connecting the engine with two paddle-wheels. He, also, laboured under the disadvantage of having too little engine-power, and therefore failed to obtain any satisfactory result; his boat moving but slowly against the current of the Seine. Fortified by the favourable opinion of the Marquis Ducrest, who perceived the cause of his disappointment, 'Perier did not,' observes Stuart, 'altogether abandon the subject; and in succeeding years he made a few attempts with other propelling mechanism instead of paddle-wheels, which he thought were defective substitutes for oars, and which, in his view, occasioned his failure.' He did not however accomplish anything important; nor did his attempts, according to the author just quoted, excite much attention in France, or any at all in England. In an Historical Notice on Steam-Engines, by M. Arago, in the French 'Annuaire' for 1837, it is stated, probably from inadvertence, that M. Perier was the *first* to actually construct a steam-vessel. From this paper we learn that trials were made on a larger scale in 1778, at Baume-les-Dames, by the Marquis de Jouffroy, who subsequently, in 1781 or 1782, tried a boat of considerable dimensions upon the Saône, at Lyon. Several English authorities give the dimensions of this boat as a hundred and forty feet long and fifteen feet broad; but Arago says it was forty-six metres long and four and a half broad. Colden's Life of Fulton, in an extract from the 'Journal des Débats' for March 28, 1816, states the dimensions to have been a hundred and thirty feet long and fourteen broad. The vessel had a single paddle-wheel on each side, and the machinery appears to have been constructed with some skill, although it was not sufficiently strong. The experiments of the Marquis were eventually stopped by the political disturbances of the country. After a long exile, he returned to his country about 1796, and found that M. des Blancs, a watchmaker of Treveux, had obtained a patent for a steam-vessel, which, it has been supposed, was constructed chiefly on the information which he could collect respecting that of the Marquis. Jouffroy appealed to the government, but nothing important resulted from his doing so, or from the experiments of M. des Blancs, which, like those of Jouffroy, were made on the Saône. While M. des Blancs was engaged in his steam-boat project, Fulton, who was then in France, was also experimenting upon the same subject. It appears, indeed, that both tried the scheme of propelling by means of paddles or float-boards attached to an endless chain stretched over two wheels projecting from each side of the vessel. Fulton abandoned this plan, and adopted paddle-wheels in its stead; but during his experiments, M. des Blancs complained of his operations as an infringement upon his patent right, and remonstrated with Fulton upon the subject. Fulton, according to his biographer Colden, answered him by explaining the difference between the wheels which he was then using, and the chains, or *chaplets*, of the Frenchman, and informing him of the unfavourable result of his own experiments with a similar apparatus. Colden states that he concluded by offering M. des Blancs a share in the advantages of his discovery, if he would bear a proportion of the expense; but that no notice was taken of the offer.

The narrative must now return a few years, in order to notice the attempts making in North America to solve the problem of propelling vessels by mechanical power. Without noticing mere vague suggestions of its possibility, of which some have been mentioned of earlier date, we find that two individuals named Fitch and Rumsey were early in the field as experimentalists. Stuart goes into their claims very minutely; but it may be briefly stated that as early as 1783 Fitch had succeeded in moving a boat on the Delaware by means of paddles (not paddle-wheels) set in motion by a steam-engine; and that in 1785 he presented a model and description of his apparatus to Congress. He was supported for some time by an association of wealthy persons, and was so sanguine as to the success of his project, as to send drawings and descriptions of his machinery to Messrs. Boulton and Watt, in order that they might procure an English patent for it. Nothing was accomplished by Fitch and his friends in England, and but little in America. It is worthy of notice that Fitch expressed his belief that the time would come when steam-power would be employed for crossing the Atlantic. Rumsey, the rival of Fitch, had exhibited a model of a contrivance for moving a boat to General Washington as early as 1784; but Fitch alleged that it was merely an apparatus for enabling a boat to stem the current of rapid rivers, by means of wheels, cranks, and poles; and that it had been tried some years before by another person on the Schuylkill, and had failed. In 1787 Rumsey made some short voyages on the Potomac, with a boat about fifty feet long, propelled by the re-action of a stream of water drawn in at the bow and forced out at the stern by means of a pump worked by a steam-engine. This boat moved, it is said, at the rate of three or four miles an hour, when loaded with three tons, in addition to the weight of her engine, which was about one-third of a ton. The boiler held only five gallons of water, and the whole machinery did not occupy more space than four barrels of flour. The fuel consumed was from four to six bushels of coals in twelve hours. Rumsey afterwards proposed applying the power of a steam-engine to long poles, which were to force the boat forward by reaching the bed of the river, when it had to move against a rapid current. Rumsey, as well as Fitch, was backed by a company; and their respective friends did not confine their rivalry to America, for the adherents of Rumsey addressed themselves to Boulton and Watt in opposition to the statements of Fitch. After all their conflicting pretensions, however, neither succeeded in the practical establishment of steam navigation. Rumsey came to England after the failure of his projects in America, and commenced a steam-boat on the same principle as that he had used on the Potomac, which will be recognised as like the much older plan of Dr. Allen. He died before the completion of this vessel; but it was finished by the persons associated with him, and was brought to trial in February, 1793. This steam-boat performed several times on the Thames, against wind and tide, and attained a speed of four miles an hour. This method of propelling a boat was subsequently tried by Mr. William Linaker, master-shipwright in Portsmouth dockyard, who obtained a patent for it in 1808. His experiments had, as appears by his papers, been commenced as early as 1793. Stuart states that a similar apparatus was tried on the Thames after Linaker's death, the engine used being on the principle of that invented by Savery.

While Fitch and Rumsey were making their experiments in America, other experiments were in progress in Scotland, which tended, more than any previous trials, to the useful application of steam to the purpose of propelling vessels. Of the highly interesting experiments made in 1788 and 1789, under the auspices of Patrick Miller, Esq., of Dalswinton, in Dumfriesshire, many accounts are extant, differing indeed very slightly from each other, yet tending, by the colouring given to minor details, to attribute different degrees of honour to the three individuals by whom they were carried out. It is not likely that this question will ever be thoroughly set at rest; for the degree in which each contributed to the success of the experiments will ever be estimated differently, according to the peculiar mode of judgment adopted by the inquirer. Without desiring to throw any slight upon those who differ from him, rather in his deductions than in the facts upon which they are based, our narrative will be condensed from that of Mr. Russell, who has evidently taken much pains to produce a satisfactory account of the whole course of proceedings.

After stating that it has been very usual to attribute the invention of steam navigation to Miller, and that two competitors have contested his claim, Mr. Russell observes, 'We shall soon see that to no one of the three can the palm be awarded. The creation of the steam-ship appears to have been an achievement too gigantic for any single man. It was produced by one of those happy combinations in which individuals are but tools working out each his part in a great system, of the whole of which no single one may have comprehended all the workings.' The persons who have contested the title of inventors of steam navigation, or rather, they for whom the title has been contested by others, are Patrick Miller, James Taylor, and William Symington; and, after a long and patient examination of their respective claims, and of the papers, published and unpublished, of the parties who advocate the cause of each, as well as of the personal testimony of such individuals as could throw light on the case, our author gives it as his conclusion that the art of steam navigation was the joint invention of the three. It will be seen from the history given above, that if the mere suggestion of applying a steam-engine to the propulsion of a vessel, or even the actual construction of a steam-boat, be considered sufficient to entitle a person to the name of inventor of steam navigation, that name belongs to some earlier projector, and not to any of the three individuals just mentioned; and if, on the other hand, the honour be due to those who produced the first successful steam-boat, it cannot be applied with propriety to any individual, seeing that the superiority of the boats of Miller, Taylor, and Symington was attributable to a happy union of talent and enterprise.

Mr. Miller of Dalswinton was a gentleman who gave much attention to mechanical pursuits, and freely expended his property in the promotion of schemes which he considered to be for the public good. He had been engaged in attempts for the improvement of naval architecture, proposing to build ships of much greater length than usual, in proportion to their breadth, and, in order to enable such narrow vessels to bear sail, to unite two or even three boats or hulls, side by side, so as to form a double or triple boat. He had also experimented upon the application of paddle-wheels, turned by a power within the vessel, instead of, or rather as auxiliary to, the force of the wind. Russell observes, that he does not find that Miller anywhere claimed absolute property in the invention of paddle-wheels, which, as has been already stated, had been often tried. Having thus prepared a form of vessel suitable for the purpose of steam navigation, and provided it with an apparatus for propelling it through the water, it only remained to apply the steam-engine itself. This, it appears, was done subsequently, in consequence of the suggestion of Mr. Taylor, who, in 1785, went to reside in Mr. Miller's family as tutor to his younger sons, and, in 1786 and 1787, frequently assisted in his experiments with paddle-wheel boats. In one of these, in the latter year, one of Miller's double boats, sixty feet long, propelled by two wheels, each of which was turned by two men, was matched against a Custom-house boat, which was reckoned a fast sailer; and on this occasion the want of a sufficient moving-power to turn the wheels was sensibly felt. Both Miller and Taylor perceived this; but when the latter suggested the steam-engine, Mr. Miller, for a time, questioned its applicability. In 1787 he published an account of his experiments, in which he observed, after describing his paddle-wheels, 'I have also reason to believe that the power of the steam-engine may be applied to work the wheels, so as to give them a quicker motion, and consequently to increase that of the ship. In the course of this summer I intend to make the experiment; and the result, if favourable, shall be communicated to the public.' This project formed the subject of much conversation at Dalswinton in the summer of 1787, and was mentioned by Taylor to his intimate friend Symington, who was then engaged as a mining-engineer at the Wanlockhead lead-mines, but had devoted much attention to the improvement of the steam-engine, and had recently constructed a model of a steam-carriage [STEAM-CARRIAGE, p. 487], in which he had provided simple means for converting the reciprocating motion of the pistons into a rotatory motion. Thus, while Miller had been preparing a proper vessel and propelling apparatus, and Taylor had been recommending the agent required to work it, Symington had been effecting those modifications in the structure of the engine which were necessary to adapt it to the purpose required. There is some reason, indeed, to believe that he had conceived the possibility of this particular application of the steam-engine; for, in a letter to Taylor, dated August 20, 1787, apparently in answer to one just received from him, Symington says, 'I must make some remarks upon your summer's inventions, which, if once made to perform what their author gives them out for, will undoubtedly be one of the greatest wonders hitherto presented to the world, besides its being of considerable emolument to the projector. Great success to you, *although overturning my schemes*.' In December of the same year the Dalswinton experimenters were in Edinburgh, where they met Symington, and, at the house of his patron, Gilbert Meason, Esq., saw his steam-carriage model. The result of this meeting was, that Symington, in conjunction with Miller and Taylor, constructed a small engine in the following summer; the castings being, by a curious coincidence, executed by a founder of the name of Watt. In October, 1788, this engine was placed in a small double pleasure-boat belonging to Mr. Miller, and was tried upon Dalswinton lake. The engine was placed on one side, the boiler on the other, and the paddle-wheel in the middle. With all the disadvantages of a first experiment, and with cylinders of only four inches diameter, the boat moved with a velocity of five miles an hour. After repeated satisfactory trials, the engine was removed from the boat, and kept for many years as a trophy in the library at Mr. Miller's.

Had the experiments of Miller and his fellow-labourers stopped here, it might have been conceived that their success was in some degree attributable to accidental circumstances. The result of a second experiment, in the following year, is sufficient to dispel any such idea. In 1789 an engine of about twelve-horse power (or twelve times the power of the first) was made by the same parties at the Carron works. This was mounted in the large double boat which had formerly run against the Custom-house boat at Leith. Except in size, this machine resembled the former model. The engine was commenced in June, and near the end of the year the boat was tried on the Forth and Clyde canal. Some difficulty was at first experienced from the weakness of the fastenings by which the float-boards or paddles were secured to the arms of the paddle-wheels; several of them being broken off by the severe strain to which the power of the engine subjected them. When this matter was set right, the boat performed very successfully, and attained a speed of nearly seven miles an hour, 'being,' observes Mr. Russell, 'about as great a velocity as it has been found possible to obtain by steam-boats on canals, even at the present day.' The vessel having been built for a different purpose, and being much too slight for permanent use as a steam-boat, or for taking out to sea, was, soon after the trial, dismantled. Mr. Miller, having thoroughly proved the practicability of the plan, and having expended a large fortune in his enlightened pursuits for the public benefit, relinquished the experiment, leaving its great results to be worked out by others. That he should have done so need excite no surprise, when the difficulties attending the introduction of any great improvement are considered. Taylor was still less likely to take any effective steps for carrying out the grand design; and Symington was not in a situation to do so immediately, although he was subsequently engaged in further experiments to that end.

Satisfactory as was the result of these experiments, they did not immediately lead to the introduction of steam navigation, and several other unsuccessful schemes were tried in this country and in North America before it was effected. One of these, that of Rumsey the American, on the Thames, has been already mentioned. About this time Dr. Cartwright contrived a steam-barge, and explained it to Fulton. Some authorities state that it was shown to Fulton in 1793, when he was studying painting under West; but others date it a few years later, stating that he was introduced to Dr. Cartwright during his journey to Paris in 1796. However this might be, it is evident that Fulton's attention was directed to the subject about this time. Colden, his biographer, states that he made drawings of an apparatus for steam-navigation in 1793, and soon afterwards submitted them to Lord Stanhope. In 1795 Earl Stanhope himself made experiments with a steam-vessel propelled by duck-feet paddles placed under the quarters, like those formerly recommended by Genevois. Notwithstanding the ingenious folding of the paddles, in order to diminish the resistance of the back-stroke, the apparatus required so much power that, with a powerful engine, he could not obtain a speed greater than three miles an hour.

In 1801 Symington commenced a satisfactory series of experiments on steam navigation, under the auspices of Thomas, Lord Dundas. The object immediately aimed at was the introduction of tug-boats instead of horses for drawing boats upon canals. After several minor trials, one of the boats built on this occasion by Symington drew, on the Forth and Clyde canal, in 1802, two loaded vessels, each of seventy tons burden. On this occasion, it travelled with its load a distance of nineteen miles and a half in six hours, although there was so strong a wind ahead that no other vessels in the canal could move to windward on that day. The tug-boat was a rather short vessel, with a single paddle-wheel in the stern, impelled by an horizontal cylinder of twenty-two inches diameter and four feet stroke, working, by means of a connecting-rod, a crank on the axle of the wheel. The rudder was double, on account of the situation of the paddle-wheel, and it was moved by means of a tiller-wheel in the fore-part of the vessel. In this case, though the object aimed at was fully attained, as far as the successful performance of the vessel could go, the project was abandoned, in consequence of an idea that the undulation of the water occasioned by the paddle-wheel would prove injurious to the banks of the canal. The speed attained by this steam-boat, when unimpeded by having any others to draw after it, was about six miles an hour.

While the experiments of Symington, under the patronage of Lord Dundas, did not lead to the immediate adoption of steam-vessels for commercial purposes, they probably tended, in no unimportant degree, to their subsequent profitable establishment in America and in Great Britain; for among the numerous individuals who inspected his vessel with interest were Fulton and Bell. It has been shown that projects for steam navigation had been early tried in North America. After Fitch and Rumsey, the chancellor Livingstone attempted to build a steam-boat on the Hudson, and in 1797 he applied to the legislature of the State of New York for an exclusive privilege to navigate boats by a steam-engine. Though his project excited much ridicule, the privilege was granted in 1798, on condition that he should, within twelve months, produce a steam-vessel which should attain a mean rate of at least four miles an hour. This he failed to accomplish, although assisted, it is said, by an Englishman named Nesbit, and by Brunel (now Sir Mark Isambard), and consequently his grant or patent became void. Shortly afterwards, being at Paris as minister from the United States, Livingstone conversed with Fulton on the subject of steam-boats, and intimated his intention of resuming the experiments on his return to America. Fulton then commenced, under his auspices, the experiments which have already been alluded to as exciting the jealousy of M. des Blancs. After several preliminary measures, Fulton and Livingstone completed a boat of considerable size on the Seine near Paris, early in 1803; but, being too weak to bear the weight of her machinery, she broke through the middle, in a gale of wind during the night, and went to the bottom. To this discouraging accident Mr. Russell attributes one of the excellencies of American steam-boats,—the strong and light framing by which, though slender, they are enabled to bear the weight and strain of their large and powerful engines. To remedy this evil, Fulton had to reconstruct his vessel almost entirely, after her shattered hull was raised; and in August of the same year he had her in trying order. This vessel was sixty-six feet long and eight feet wide. The speed attained was much less than had been hoped for; but the result of the experiment was such as to induce the projectors to order an engine of Boulton and Watt, with a view to further trial in America. As the boat into which it was fitted was the first regularly established steam-packet, it will be noticed in the second part of our history; but before closing this narrative, allusion must be made to the proceedings of Fulton between the time of these French experiments and his successful enterprise on his return to America. During this time he visited England [Fulton, Robert, vol. xi., p. 13.]; and while here he introduced himself to Symington, from whom he asked for particular information respecting what he had done in steam navigation. According to Symington's account, Fulton told him frankly that he intended shortly to return to America, and to establish steam-boats on the rivers of that country, where he thought they might be adopted with great advantage. Symington further stated that Fulton expressed an opinion that the proposed establishment of steam-vessels on the other side of the Atlantic could not fail to be advantageous to him, and earnestly requested to see his boat in action. This account certainly indicates at least a want of generosity on the part of Fulton towards a man whose perseverance and talent had accomplished far more than he had done himself; as, after obtaining all the information he could from Symington, who performed a satisfactory voyage solely on his account, he took no subsequent notice of him. Symington states that during the voyage Fulton requested and obtained permission to make notes respecting the steam-boat; and proceeds to say, in a narrative which he himself wrote, 'In consequence he pulled out a memorandum-book, and after putting several pointed questions respecting the general construction and effect of the machine, which I answered in a most explicit manner, he jotted down particularly everything then described, with his own remarks upon the boat, while moving with him on board along the canal; but he seems to have been altogether forgetful of this, as, notwithstanding his fair promises, I never heard anything more of him till reading in a newspaper an account of his death.' The conduct of Fulton does not appear in a more favourable light from the circumstance that, in making proposals to Boulton and Watt for the construction at Soho of a steam-engine for the vessel which he contemplated building in America, he gave a feigned name. His disguise was soon detected, but the engine was nevertheless proceeded with. Before returning to America, his colleague, Livingstone, wrote thither, and secured to themselves the monopoly of steam navigation in the state of New York, setting forth their claim to the *invention* of steam-boats.

This brief sketch of what may be termed the preliminary history of steam navigation would be incomplete without referring to the experiments of John Stevens, of Hoboken, near New York, who was connected with some of the earliest attempts of Livingstone to introduce steam navigation in North America. Stuart describes a small boat, twenty-five feet long and five feet wide, impelled by a steam-engine with a cylinder of four inches and a half diameter and nine inches stroke, which he tried about New York in 1804. The boiler, which was only two feet long, fifteen inches wide, and twelve inches high, consisted of eighty-one tubes of an inch diameter. This little steam-boat had a velocity of about four miles an hour, or, for short distances, of seven or eight miles an hour. The subsequent vessels of Stevens and his son will be hereafter noticed. About the same time (1804) Oliver Evans, another early American improver of the steam-engine, constructed his 'Orukter Amphibolos,' or machine for removing mud from docks, with a steam-engine to work the buckets. It was a heavy flat-bottomed boat, thirty feet long and twelve feet broad. Evans constructed this machine at a distance of a mile and a half from the river Schuylkill, and exhibited his long-cherished project of steam locomotion on land by mounting it upon wheels, and connecting them with the engine. [Steam Carriage, p. 487.] After doing this to his satisfaction, he fitted a paddle-wheel to the stern of the machine, and launched it on the river as a steam-boat.

It is not pretended that the above account embraces every project brought forward, or even every public experiment made respecting navigation by steam; but enough has been related to show that its possibility had long been contemplated, and that many persons had expended much time and money upon the scheme before a single steam-vessel was regularly used for the purposes of commerce. Upon the subsequent history of steam navigation it is needless to treat at length; but, before entering upon it, it may be well to state that besides the claims to the invention which have been put forth on behalf of Spain, France, England, Scotland, and North America, one has been made also for an Italian, named Serapino Serrati, in a work published at Florence in 1796, in which it is stated that Watt was the inventor of steam-engines in England in 1787, but that Serrati was 'the first not only to conceive the design of a steam-boat, but also to place one upon the river Arno, which runs through Florence.' Russell observes that he had no means of testing the truth of this statement, but that, like the narrative of Garay's performances, it may be either true or untrue, without affecting the history of steam navigation; since it is evident that our present system of steam navigation has been in no way derived from either of them.

History of the Practical Application of Steam Navigation.—In order to the successful introduction of any great improvement, much more is required than mere proof of its possibility. It must be shown to be also profitable, and in some degree necessary; and, when everything has been done which it is in the power of the inventor to accomplish, it must be taken up by parties able and willing to meet and triumph over incredulity and prejudice. There are some cases in which the author of a valuable invention succeeds in obtaining liberal patronage by his own unaided exertions; but the instances are more numerous in which an enterprising speculator, who has had little to do with the labour of invention, is the first to reap benefit from a project that has perhaps occupied years of anxious and unrequited labour. It seldom happens indeed that the persons who can conceive and construct a new machine possess also the qualities necessary for rendering it commercially successful. Hence it is not difficult to account for the fact that while the machinery of Symington, which had accomplished more than any other steam-boat apparatus, remained for years disregarded in his own country, Fulton, with less merit as an inventor, but with more ample pecuniary resources, and with energy to face the numerous obstacles to the scheme, succeeded in establishing steam navigation on the rivers of America, and in thereby acquiring a larger share of honour than is due to him. Without denying that his perseverance did essential service to the cause, or even depriving him, as some would do, of all merit as an inventor, it is notorious that he sought for and obtained minute information respecting the early experiments of Miller, Taylor, and Symington, as well as the later experiments of Symington under Lord Dundas; and that, until he had personally inspected the steam tug-boat on the Forth and Clyde canal, he did not accomplish anything which will bear comparison with what the Scotch experimenters effected.

Fulton returned to America towards the latter end of 1806, and immediately commenced building a steam-boat for use upon the Hudson. This vessel was built at New York, and was launched in the spring of 1807. The engines were mounted and ready for trial by August in that year, engineers from Soho assisting in the work, and when the vessel started, its success became immediately evident. Colden, in describing the first trip, says, 'The minds of the most incredulous were changed in a few minutes—before the boat had made the progress of a quarter of a mile the greatest unbeliever must have been converted. The man who, while he looked on the expensive machine, thanked his stars that he had more wisdom than to waste his money on such idle schemes, changed the expression of his features as the boat moved from the wharf and gained her speed; his complacent smile gradually stiffened into an expression of wonder; the jeers of the ignorant, who had neither sense nor feeling enough to repress their contemptuous ridicule and rude jokes, were silenced for the moment by a vulgar astonishment, which deprived them of the power of utterance, till the triumph of genius extorted from the incredulous multitude which crowded the shores shouts and acclamations of congratulations and applause.' Soon afterwards this vessel, which was named, from Livingstone's residence, the Clermont, made her first voyage from New York to Albany, a distance of about a hundred and forty-five miles, though it has frequently been stated to be a hundred and fifty or a hundred and sixty miles; which distance it accomplished at the rate of about five miles an hour. On the first journey however the boat did not run through at once, but stopped at Clermont for some time. The whole voyage was performed without any accident. So novel an object as a steam-boat very naturally called forth the astonishment of persons who, like many of the inhabitants of the shores of the Hudson, had never even heard of a steam-engine. Colden states that the vessel was described by some who saw her indistinctly in the night, as 'a monster moving on the water, defying the winds and tide, and breathing flames and smoke.' 'She had,' he proceeds to say, 'the most terrific appearance from other vessels which were navigating the river when she was making her passage. The first steam-boats, as others yet do, used dry pine-wood for fuel, which sends forth a column of ignited vapour, many feet above the flue, and whenever the fire is stirred a galaxy of sparks fly off, which in the night have an airy, brilliant, and beautiful appearance. This uncommon light first attracted the attention of the crews of other vessels. Notwithstanding the wind and tide were adverse to its approach, they saw with astonishment that it was rapidly coming towards them; and when it came so near that the noise of the machinery and the paddles were heard, the crews in some instances shrunk beneath their decks from the terrific sight; and others left their vessels to go on shore; while others again prostrated themselves, and besought Providence to protect them from the approach of the horrible monster which was marching on the tides, and lighting its path by the fires which it vomited.'

Satisfactory as was the performance of the Clermont, she did not, owing to the want of proper proportion in the wheels, attain so great a speed as Fulton had anticipated. The dimensions of the boat, which was of a hundred and sixty tons burden, were one hundred and thirty-three feet long, eighteen feet wide, and seven feet deep. Her cylinder was two feet in diameter, and four feet stroke; and the paddle-wheels were fifteen feet in diameter, with paddles four feet long, dipping two feet into the water. These dimensions probably refer to the improved paddle-wheels used subsequent to the first trial, those originally used being too large, so that they dipped too deep into the water. The wheels were of cast iron, and had no support beyond the sides of the vessel, and consequently some trouble was occasioned by their frequent breakage in the earlier experiments. The vessel made several trips as a passage-boat between New York and Albany in the year in which she was launched; and, after being repaired and strengthened during the winter, she was again brought into action in 1808, with complete success. In common with many other public benefactors, Fulton had to bear with much ungenerous opposition and rivalry. It is stated that the jealousy of some parties interested in the sailing-vessels displayed itself in the wilful damage of the Clermont, by other vessels running foul of her. In spite of all opposition, the Clermont, and the steam-vessels subsequently built by her proprietors, immediately obtained considerable patronage, and the profitable establishment of steam navigation on the rivers of America was fairly accomplished. Until his death in 1815, Fulton continued to be actively engaged in building steam-vessels, and at that time he had just completed a large steam-frigate or floating battery, supported by two hulls, with a canal fifteen feet wide between them, in which the paddle-wheel worked. So highly were his services then appreciated, that, besides other testimonies of respect, the members of both houses of the legislature wore mourning on occasion of his death.

Fulton had scarcely launched the Clermont before a rival appeared. Stevens of Hoboken had a steam-vessel ready for trial in a few weeks after the triumph of Fulton; but, as the monopoly of steam navigation in the state of New York was secured to Livingstone and Fulton, he could not employ it upon the Hudson, and therefore took it round by sea to the Delaware, thus becoming the first (unless the case of Garay be an exception) to venture to sea with a steam-vessel. To R. L. Stevens, his son, American steam navigation is deeply indebted. He has, according to Russell, improved the form of the American vessels, by substituting a very long proportion, with a fine entrance and a fine run, for the full round bows and sterns of Fulton, whose boats were, he says, mere boxes sharpened a little at both ends, which drove before them so large a heap of water as to limit their speed to about nine miles an hour. The improvements of Stevens enabled him to rise to a velocity of thirteen miles an hour. He also adopted a different form of engine from that of Fulton; using cylinders of very long stroke, with upright guides, instead of the old parallel motion, to ensure the accurate motion of the piston, and placing the working beam above the deck, instead of altering the usual arrangement of the machinery in order to keep it below the deck, as done in Fulton's engines and in those commonly used in British steam-vessels.

The practical application of steam navigation in Scotland, though attributable to the experiments of Miller, Taylor, and Symington, at least as distinctly as were the operations of Fulton upon the rivers of North America, did not take place till a few years later, and was in some degree suggested by them. Henry Bell, of Helensburgh, on the Clyde, the individual by whom steam-vessels were first used in Britain for commercial purposes, had been well acquainted with the experiments at Dalswinton and on the Forth and Clyde canal; but he did not take any step for carrying into effect the important scheme of which they proved the practicability, until the proceedings of Fulton, combined with peculiar circumstances in his own case, urged him to do so. Of the connection that existed between Fulton and Bell we have never met with any satisfactory account. In a letter published in 1816, in the 'Caledonian Mercury,' Mr. Bell himself states that Fulton had occasion to write to him respecting some machinery in Scotland, and, in doing so, requested him to make inquiries respecting Miller's boats, and, if they had succeeded, to send him a full drawing and description of the apparatus. Bell accordingly had a conversation with Mr. Miller on the subject, and sent Fulton the information he required. The date of this transaction is not stated, but it is affirmed that about two years afterwards Fulton wrote to Bell, informing him that he had constructed a steam-boat from the drawings he had sent, which was likely to answer the end, but required some improvement. These letters of Fulton, which would throw light upon the history of steam navigation, were left, according to Bell's account, in the hands of Mr. Miller. He proceeds to say, 'This letter led me to think of the absurdity of writing my opinion to other countries, and not putting it in practice myself in my own country; and, from these considerations, I was roused to set on foot a steam-boat, for which I made a number of different models before I was satisfied. When I was convinced that they would answer the end, I contracted with Messrs. John Wood and Company, shipbuilders in Port-Glasgow, to build me a steam-vessel, according to my plans, forty feet keel, and ten feet six inches beam, which I fitted up with an engine and paddles, and called her the Comet, because she was built and finished the same year that a comet appeared in the north-west part of Scotland.' Owing to some misapprehension, it was erroneously stated in the Fifth Report of the Select Committee on the Roads from London to Holyhead, in 1822, that Bell went over to America to assist Fulton in establishing steam-boats in that country. In the minute and interesting narrative of Russell, who, from residing in the neighbourhood, has peculiar facilities for obtaining correct information respecting the history of steam navigation upon the Clyde, it is stated that Bell was a house-carpenter in Glasgow for many years, and was rather fond of what are called *schemes*. In the year 1808 he engaged in an undertaking somewhat of this character, by becoming proprietor of an establishment of the nature of an hotel, or bath-house, at Helensburgh, a watering-place on the Clyde, opposite to Greenock. To increase the facilities for reaching this place, and thereby to induce a larger influx of visitors from Glasgow, Bell endeavoured to introduce passage-boats moved by paddles impelled by manual labour; but his experiments failed, and at length he determined upon the construction of a steam-boat to meet the difficulty. Thus his connection with an undertaking of very different character combined with his correspondence with Fulton, led him to take this important step.

The Comet was a vessel of forty feet keel, and ten and a half feet beam; of about twenty-five tons burden, and three-horse power. Representations of her machinery are given by the author just referred to, who now possesses the original boiler. It was inferior to those used by Symington, inasmuch as the fire was not wholly surrounded by water, so that the furnace had to be enclosed with brick-work. The boiler was placed on one side of the vessel, and the funnel, or chimney, was bent so as to rise in the centre of the vessel, where it served the purpose of a mast for carrying sail. 'It seems indeed,' observes the writer, 'to ha been the anxious wish of the constructors of the early steam-boats to disguise the odious smoking funnel under the designation of a main-mast; and some even went so far as to raise up a top-mast in the thick folds of the dense black smoke.' The accuracy of this observation may be seen by the representations of the earliest steam-boats used upon the Thames, in Dodd's 'Historical and Explanatory Dissertation on Steam-Engines and Steam-Packets,' published in 1818. A single cylinder was used in the Comet, impelling a cranked axle which carried a large toothed wheel; and this wheel, working into two others fixed upon the axles of the paddles, caused them to revolve. Two paddle-wheels, or rather two sets of revolving paddles, each consisting of four paddles of a form resembling malt-shovels, were used on each side of the vessel. The engine was of the bell-crank construction, and was placed alongside of the boiler, and the two occupied the whole width of the boat.

This vessel began to run regularly between Glasgow and Helensburgh, in January, 1812, and continued to ply successfully during the following summer; her rate of motion was about five miles an hour. Improvements were soon found advisable, and Bell soon abandoned the peculiar arrangement of paddles by which his first experiment was distinguished, and adopted complete paddle-wheels. As was the case with Fulton in America, Bell had no sooner established his first steam-packet, than others were ready to follow in his track; and these, having the advantage of his experience, and possibly of more scientific knowledge also, exceeded him in success. The second steam-boat established on the Clyde, the Elizabeth, was commenced as early as March, 1812, and was ready for use about twelve months after. She was the property of Mr. Hutchison, a brewer; but she was built under the direction of an engineer named Thomson, who had been engaged in some of Bell's first experiments. She was of longer proportion than the Comet, being fifty-eight feet long aloft, fifty-one feet keel, twelve feet beam, and five feet deep; and her proportion of power to tonnage was much better, her burden being about thirty-three tons, and her engine of about ten-horse power. The Elizabeth performed the passage of twenty-seven miles, between Glasgow and Greenock, twice a day; and, according to her owner's account, made the voyage in something less than four hours, with a hundred passengers on board, and, in favourable circumstances, in two hours and three-quarters. She accomplished, it would appear from the same statement, a distance of eighty-one miles in one day, at an average rate of nine miles an hour. The arrangements for the accommodation of passengers were comfortable, although the description of the cabins contrasts rather curiously with the ample dimensions of the river steamers of the present day. These particulars are given at length by Russell; but we quote only the dimensions of the cabins, of which the best was twenty-one feet long, eleven feet three inches wide at midships, and nine feet four inches aft, and the forecastle was about eleven feet six inches by nine feet six inches. The fares for the best and inferior cabins were, respectively, four shillings, and two shillings and sixpence, being about one-third the amount of the coach fares. This speculation was immediately successful; and the profitable introduction of steam navigation on the rivers of Great Britain proceeded rapidly after the time alluded to.

Stuart relates that while Bell was engaged in establishing his steamers on the Clyde, a person named Dawson was making similar experiments in Ireland; and that he had, according to his own account, built a steam-boat of fifty tons burden, worked by a high-pressure steam-engine, as early as 1811; which, by one of those singular coincidences frequently met with in the history of inventions, he named the Comet. In 1813, it is added, Dawson established a steam-packet on the Thames, to ply between Gravesend and London, 'which was the first that did so for public accommodation, although Mr. Lawrence of Bristol, who introduced a steam-boat on the Severn, soon after the successful operations on the Clyde, had her carried to London (through the canals) to ply on the Thames; but from the opposition of the watermen to the innovation, he was in the end obliged to take her to her first station.' If this be correct, the Gravesend steam-packet alluded to must have been overlooked by the author of a pamphlet published in 1831, entitled 'An Account of the Origin of Steam-boats in Spain, Great Britain, and America; and of their Introduction and Employment upon the river Thames, between London and Gravesend, to the present time;' which, according to a MS. note on the copy in the British Museum, is by R. P. Cruden, of Milton by Gravesend. It states that the first steam-boat which plied between London and Gravesend was the Margery, of seventy tons burden, and fourteen-horse power; a vessel originally used on the Clyde, where she was built in 1813, by Messrs. Wood, of Port-Glasgow, the builders of the Comet and the Elizabeth. She was, it is stated, brought to London from Leith early in 1815, and on the 23rd of January in that year she began to ply between London and Gravesend, charging four shillings and two shillings for the best and inferior cabins respectively. She ran for some months, but had occasion to stop so frequently for repairs, that she never ran more than about three weeks without interruption. This vessel was, in the following year, removed to France, for use upon the Seine; and that tried on the Thames by Dawson was, according to Stuart, sent to Spain, to ply between Seville and San Lucar. Cruden states that the Richmond packet had been employed between London and Richmond in the year preceding the use of the Margery on the Gravesend station.

Among the enterprising individuals by whose exertions steam-boats were established upon the Thames, the name of George Dodd deserves a prominent place, although his history is a melancholy instance of the poverty which often attends the most ingenious inventors. He was, it would appear, the first to undertake a considerable voyage by sea in a steam-vessel. The boat with which this voyage was accomplished was built on the Clyde by Messrs. Wood, and was launched in 1813, under the name of the Glasgow; but was subsequently altered, and called the Thames. She was of seventy-four or seventy-five tons burden, and about fourteen or sixteen horse-power, with paddle-wheels nine feet in diameter. Dodd brought her round to the Thames by steam and sails, experiencing some very rough weather on the way, especially in the Irish Sea. A detailed account of the voyage was published in the 'Journal des Mines' for September, 1815, and subsequently at the end of Dodd's work on steam-boats. It is needless to follow minutely the extension of steam navigation in the British dominions and elsewhere subsequent to the success of Bell and his immediate followers. Bell himself said, 'I will venture to affirm that history does not afford an instance of such rapid improvement in commerce and civilization as that which will be effected by steam-vessels;' and probably there are few at the present time who would not fully acknowledge the truth of his prediction. The statistical tables hereafter given will show how rapid has been the increase of steam-vessels, although they do not embrace the whole of the steam-boats employed; but it may be interesting to give, from Dodd, an enumeration of the principal steam-vessels in use in Great Britain and Ireland at the date of his work (1818). He states that there were then eighteen steam-boats on the Clyde, two at Dundee, two on the Tay, two on the Trent, two on the Tyne, four on the Humber, two on the Mersey, three on the Yare, one on the Avon, one on the Severn, one on the Orwell, six on the Forth, two at Cork, and two intended to navigate from Dublin to Holyhead. In another part of his work he describes the vessels then in use upon the Thames, of which two, the Richmond and the London, plied between London, Richmond, and Twickenham, and had, he says, carried not less than ten thousand passengers within the last four months. These were built under Dodd's superintendence; and in consequence of having to pass under the bridges, they were made with an apparatus of his invention for lowering their chimneys. These boats experienced much but ineffectual opposition from the watermen, who deemed their use an invasion of their rights. A third steam-vessel designed by Dodd, the Sons of Commerce, intended for use between London and Gravesend, had been used, in the season preceding the publication of his work, between London and Margate, and had once performed the journey, about eighty-eight miles, in seven hours and thirty-five minutes. Her speed, when unassisted by wind or tide, was ten miles an hour. Another boat, the Majestic, plied between London and Margate in 1816. This vessel had been to Calais, and had often towed vessels of seven hundred tons burden down the river. The Regent, one of the early Thames steamers, was accidentally burnt off Whitstable, in July, 1817. Besides these, Dodd mentions the Caledonia, with two engines of fourteen-horse power, which had been from Margate to Flushing, and also on the Rhine; the Eagle, which had a single paddle-wheel in the centre, and failed, he argues, for want of room for the escape of the water agitated by the paddles; the Hope, a small vessel, built at Bristol, which proved a failure; and the Thames, the vessel which Dodd himself brought from the Clyde. In addition to British steam-vessels, it is stated that there were at that time steam-packets and steam luggage-vessels used in Russia, the Netherlands, France, and Spain; and that one was building in the East Indies. In order to give an approximate statement of the progress of steam navigation in the United States about the same period, a few facts may be quoted from the evidence of Seth Hunt, Esq., formerly commandant of Upper Louisiana, before the select committee of the House of Commons appointed in 1817 to consider the means of preventing the mischief of explosion on board steam-boats. This gentleman stated that there were then ten steam-vessels running between New York and Albany, two between New York and the State of Connecticut, and four or five to New Jersey, besides the ferry-boats, of which there were four.* On the river Delaware there were also a number of boats, which plied between Philadelphia and Trenton in New Jersey; and others between Philadelphia and Newcastle, and Philadelphia and Wilmington, besides ferry-boats. Some of these were worked with high-pressure engines. There were steam-boats from Baltimore to Norfolk, which passed a part of the Chesapeak, several miles in width; and steam-vessels had been to New London, which is still more exposed; and also up to New Hertford. The Powhatan steam-boat, which was built at New York, had been exposed to a severe gale of wind in the open ocean for three days, after which it arrived at Norfolk, and thence proceeded up the James river to Richmond. The largest steam-boats in America were those upon the Mississippi, plying between New Orleans and Natchez. These vessels, the Etna and Vesuvius, were of four hundred and fifty tons burden, and carried two hundred and eighty tons of merchandise, one hundred passengers, and seven hundred bales of cotton. This witness remembered but three steam-boat accidents in America, one of which was on the Ohio, another at Charlestown in South Carolina, and a third to the Powhatan.

The introduction of steam-packets upon the open sea was a favourite object with Dodd. He observes particularly the great importance of their establishment between Dublin and Holyhead, as the intercourse by sailing packets was liable to great delays. They were sometimes, it is stated, more than seventy-six hours at sea, although the distance is only about sixty miles. The use of steam-vessels upon this station was advocated for several years before they were regularly established; and Dodd had, on behalf of himself and friends, offered to bear the expense of two packets for making the experiment, provided the Post-office authorities would guarantee to him the conveyance of the mails, in the event of those packets fully answering his representations; but his offer was not accepted. It has been shown that some sea-voyages were performed at an earlier date; but the regular establishment of ocean steam navigation may be considered to have commenced with the Rob Roy, a steamer of about thirty-horse power and ninety tons burden, which commenced running in 1818 between Greenock and Belfast. This vessel was established by Mr. David Napier, who, says Russell, from the year 1818 until about 1830, 'effected more for the improvement of steam navigation than any other man.' This gentleman must be distinguished from his cousin, Mr. Robert Napier, of Glasgow, who is also honourably known for improvements of the same kind, but of a somewhat later date. David Napier, according to the interesting narrative of the progress of steam navigation in Britain, given by the above-mentioned writer, ventured at once to establish regular communication between Britain and the neighbouring countries, Ireland and France, by steam-vessels plying even during the stormy months of winter; though, previous to the time of his improvements, such vessels had scarcely ever ventured to sea except in fine weather. In order to make himself well acquainted with the difficulties to be overcome, he took passage, at the worst season of the year, in one of the sailing vessels which formerly plied between Glasgow and Belfast, and which often required a week to perform a journey that is now done by steam in nine hours. After anxiously watching the effect of the waves when the vessel was tossed in a storm, and satisfying himself that there was no insuperable difficulty, he retired contentedly to his cabin, leaving the captain of the vessel puzzled at his strange curiosity respecting the effect of rough weather. He subsequently tried experiments upon the best form of hull for getting through the water with the minimum of resistance; and these led him to adopt a fine wedge-like form for the fore part of his vessels, instead of the round full bow common in those propelled by sails. The Rob Roy, after plying two winters between Greenock and Belfast, was removed from that line, and employed as a packet between Dover and Calais. In 1819 he employed the Messrs. Wood to build the Talbot, of one hundred and fifty tons burden, into which he fitted two engines of thirty-horse power each. This fine vessel, the most perfect of her time in all respects, plied between Holyhead and Dublin; and she was soon followed, on the same line, by another excellent vessel, called the Ivanhoe. In 1821 steam-vessels were regularly established as Post-office packets on that important station. They had been intended merely as auxiliaries to the sailing packets; but they soon superseded them. From the evidence given before the Holyhead Roads Committee in 1822, it appears that even then the intercourse between the two countries had been reduced almost to a certainty; and that while, in the year preceding their adoption, exactly one hundred mails arrived in London after the proper time, there were only twenty-two cases of delay in the first nine months in which the steam-packets were used, although this period included the winter season, during the early part of which the weather was worse than had been known for more than sixty years. The vessels which were built expressly for this purpose were strengthened by diagonal framing upon the plan of Sir Robert Seppings.

It would occupy great space to follow, however imperfectly, the rapid progress of steam navigation in this country alone, and it may be more readily traced by reference to the tables hereafter inserted, which are founded upon parliamentary documents. The adoption of steam-vessels in every direction upon the ocean, and their use upon the rivers and lakes of every civilised country, have produced, and are daily producing, results which it is impossible fully to estimate. But we must notice the successful accomplishment of Transatlantic steam navigation, of which not only the probability was questioned even a few years since, but which was almost proved to be impossible down nearly to the time of its accomplishment. Experience has shown the great advantage of large over small steamers, because the capacity and buoyancy of the vessel increase in so much larger a ratio than the resistance; but in order to obtain sufficient room for carrying the enormous supply of fuel required for a voyage across the Atlantic, and at the same time to allow accommodation for passengers and cargo to a remunerative amount, it was necessary to build vessels of extraordinary dimensions. At length the great problem was solved by the voyages, in 1838, of the Sirius and the Great Western, each of which crossed the Atlantic direct for New York, without touching, as many advocates of Transatlantic steam navigation had considered desirable, at the Azores, St. John's, or Halifax. The Sirius, of seven hundred tons burden, and three hundred and twenty horse-power, had previously run between London and Cork. She was therefore prepared for the trial a few days earlier than her formidable rival, a vessel of thirteen hundred and forty tons burden, and four hundred and sixty horse-power. The Sirius started from Cork on the 4th of April, and arrived at New York early on the 23rd of the same month, having performed the voyage at the average rate of one hundred and sixty-one miles daily, or a little short of seven miles per hour. In her return she averaged a hundred and sixty-seven miles daily, or as near as possible seven miles an hour. The Great Western started from Bristol on the 8th of April, and arrived at New York on the same day as the Sirius, but some hours later. Her average speed on the outward voyage was two hundred and eight miles a day, or between eight and nine miles an hour, and in returning two hundred and thirteen miles daily, or very nearly nine miles per hour. The enterprise which thus commenced so favourably has been checked by some unfortunate occurrences, especially by the loss of the President; and consequently one of the companies formed for carrying on a steam communication between England and America has relinquished it, and the British Queen, one of the noble vessels built for the purpose, has been sold to parties who purpose running her between Belgium and New York; but notwithstanding all discouragement, the use of steam-vessels for long voyages may be considered fairly established.

---

* In Robertson Buchanan's Practical Treatise on Propelling Vessels by Steam, &c.,' which was published at Glasgow in 1816, allusion is made to ferry-boats then in use in America, under the name of *team-boats*, which were propelled by paddle-wheels worked by cattle.

The immense influence which steam navigation would have upon maritime warfare has attracted much attention, and has led to the construction, in this and other countries, of many steam-vessels adapted for the purposes of war. Happily there has been, since its practical introduction, little opportunity for this application of steam navigation. Our statistics may therefore be limited to the progress of commercial steam navigation, which, so far as Great Britain and its dependencies are concerned, may be accurately traced by means of the following tables, which are founded upon Custom-House returns and other official documents. They are however necessarily incomplete, because no correct information can be obtained respecting unregistered vessels, which ply only within the limits of their respective ports. Government steamers, of which several are employed as mail-packets, are not included. Tables I., II., and III. are extracted from the 'Tables of Revenue, Population, and Commerce,' for 1836, issued by the Board of Trade; and continued to the latest period of which the returns have been published, from the subsequent volumes of the same series.

I. *Table showing the Number and Tonnage of Steam-Vessels Built and Registered in the British Empire in each year from* 1814 *to* 1839.

YEARS.	England.		Scotland.		Ireland.		United Kingdom.		Isles of Guernsey, Jersey, and Man.		British Plantations.		TOTAL.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
1814	..	..	5	285	..	..	5	285	..	..	1	387	6	672
1815	2	161	7	625	..	..	9	786	..	..	1	608	10	1,394
1816	4	298	4	270	..	..	8	568	..	..	1	670	9	1,238
1817	4	227	3	194	..	..	7	421	..	..	3	1,633	10	2,054
1818	3	1,124	3	216	..	..	6	1,340	..	..	3	1,198	9	2,538
1819	2	175	2	167	..	..	4	342	..	..	..	..	4	342
1820	3	102	4	403	1	150	8	655	..	..	1	116	9	771
1821	12	1,463	10	1,545	..	..	22	3,008	..	..	1	258	23	3,266
1822	23	2,080	4	369	..	..	27	2,449	..	..	1	185	28	2,634
1823	17	2,344	2	125	..	..	19	2,469	..	..	1	52	20	2,521
1824	12	1,687	5	547	..	..	17	2,234	..	..	..	..	17	2,234
1825	19	2,600	5	403	..	..	24	3,003	..	..	5	1,189	29	4,192
1826	50	5,920	22	2,718	..	..	72	8,638	..	..	4	404	76	9,042
1827	18	2,264	9	994	1	118	28	3,376	..	..	2	408	30	3,784
1828	25	1,687	5	352	..	..	30	2,039	..	..	1	246	31	2,285
1829	13	1,080	3	671	..	..	16	1,751	..	..	..	..	16	1,751
1830	10	931	8	814	..	..	18	1,745	..	..	1	481	19	2,226
1831	24	2,054	7	695	..	..	31	2,749	..	..	5	1,687	36	4,436
1832	19	943	14	1,908	..	..	33	2,851	..	..	5	1,239	38	4,090
1833	27	1,964	6	964	..	..	33	2,928	..	..	3	1,017	36	3,945
1834	26	3,453	10	1,675	..	..	36	5,128	..	..	3	628	39	5,756
1835	63	6,844	23	4,080	..	..	86	10,924	..	..	2	357	88	11,281
1836	43	5,924	20	2,834	..	..	63	8,758	..	..	6	942	69	9,700
1837	53	6,223	22	4,488	3	958	78	11,669	..	..	4	478	82	12,147
1838	66	6,286	18	3,263	..	..	84	9,549	..	..	3	288	87	9,837
1839	43	2,885	18	2,968	1	286	62	6,139	..	..	3	383	65	6,522
Total .	581	60,719	239	33,573	6	1,512	826	95,804	..	..	60	14,854	886	110,658

II. *Table Showing the Number and Tonnage of Registered Steam-Vessels belonging to the British Empire, in each year from* 1814 *to* 1839.

YEARS.	England.		Scotland.		Ireland.		United Kingdom.		Isles of Guernsey, Jersey, and Man.		British Plantations.		TOTAL.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
1814	..	..	1	69	..	..	1	69	..	..	1	387	2	456
1815	3	209	5	429	..	..	8	638	..	..	2	995	10	1,633
1816	5	315	7	632	..	..	12	947	..	..	3	1,665	15	2,612
1817	7	462	6	514	1	63	14	1,039	..	..	5	2,911	19	3,950
1818	10	1,586	8	683	1	63	19	2,332	..	..	8	4,109	27	6,441
1819	11	1,459	11	825	2	264	24	2,548	..	..	8	4,109	32	6,657
1820	17	1,639	14	1,127	3	252	34	3,018	..	..	9	4,225	43	7,243
1821	29	3,377	26	2,344	4	330	59	6,051	..	..	10	4,483	69	10,534
1822	52	5,322	28	2,701	5	434	85	8,457	..	..	11	4,668	96	13,125
1823	69	7,527	26	2,347	6	487	101	10,361	..	..	10	3,792	111	14,153
1824	80	8,642	29	2,682	5	409	114	11,733	2	214	10	3,792	126	15,739
1825	112	12,280	36	3,292	3	192	151	15,764	2	214	15	4,309	168	20,287
1826	162	16,791	51	4,496	15	2,899	228	24,186	2	214	18	4,558	248	28,958
1827	173	17,734	59	5,390	21	4,194	253	27,318	2	214	20	4,958	275	32,490
1828	191	18,367	56	4,903	25	4,740	272	28,010	2	214	19	3,808	293	32,032
1829	203	19,085	57	5,399	27	5,017	287	29,501	2	214	15	2,568	304	32,283
1830	203	18,831	61	5,687	31	5,491	295	30,009	3	330	17	3,105	315	33,444
1831	223	20,304	62	5,777	35	6,181	320	32,262	4	433	23	4,750	347	37,445
1832	235	20,813	73	7,205	40	7,220	348	35,238	4	474	28	5,957	380	41,669
1833	268	23,290	71	7,075	43	7,757	382	38,122	5	555	28	6,340	415	45,017
1834	301	27,059	77	8,187	46	8,183	424	43,429	6	711	32	6,595	462	50,735
1835	344	30,351	85	9,833	68	12,583	497	52,767	6	718	35	7,035	538	60,620
1836	388	34,314	95	11,588	71	13,460	554	59,362	7	914	39	7,693	600	67,969
1837	422	37,240	109	13,368	87	18,437	618	69,045	6	832	44	8,411	668	78,288
1838	484	43,877	105	13,113	84	17,694	673	74,684	5	709	44	7,323	722	82,716
1839	517	45,160	117	15,704	86	18,376	720	79,240	3	389	47	7,102	770	86,731

III. *Table showing the Number and Tonnage of Steam-Vessels which Entered and Cleared from the Ports of the United Kingdom in each Year from* 1820 *to* 1839, *distinguishing the Countries to which they belonged, and separating the Vessels employed in the Coasting Trade from those engaged in Foreign Voyages. The figures give the number of Voyages, and the aggregate Amount of Tonnage for the Year. Vessels in Ballast, or with Passengers only, are not included.*

Years.	Countries to which the Vessels belonged.	COASTING TRADE.				FOREIGN TRADE.			
		Inwards.		Outwards.		Inwards.		Outwards.	
		Ships.	Tons.	Ships.	Tons.	Ships.	Tons.	Ships.	Tons.
1820*	United Kingdom	9	505	..	..	..	..	..	..
1821	United Kingdom	188	20,028	158	6,166	..	..	..	..
1822	United Kingdom	215	31,596	295	42,743	159	14,497	111	12,388
	France	..	..	..	..	10	520	..	..
1823	United Kingdom	434	55,146	647	73,424	129	8,942	108	9,027
	France	..	..	..	..	7	364	7	364
1824	United Kingdom	888	124,073	1,197	147,523	139	10,893	208	15,796
	France	..	..	..	..	6	312	8	416
1825	United Kingdom	1,666	257,734	1,946	279,384	186	16,155	256	19,685
	France	..	..	..	..	11	652	13	756
1826	United Kingdom	2,810	452,995	3,833	518,696	334	32,631	268	27,206
	France	..	..	..	..	38	2,206	31	1,742
1827	United Kingdom	4,404	737,020	5 617	820,361	443	50,285	439	47,322
	France	..	..	..	..	74	4,558	43	2,566
1828	United Kingdom	5,591	914,414	6,893	1,009,834	482	52,679	472	51,887
	France	..	..	..	..	58	3,406	31	1,802
1829	United Kingdom	5,792	978,981	6,875	1,066,041	497	51,754	428	47,480
	France	..	..	..	..	2	124	21	1,206
	Holland	..	..	..	..	1	281	1	260
830†	United Kingdom	6,840	1,050,392	6,808	1,054,850	560	62,613	475	54,372
	France	..	..	..	..	19	1,318	21	1,282
	Holland	..	..	..	..	23	6,463	32	8,992
1831	United Kingdom	7,123	1,133,110	7,087	1,129,975	537	65,946	563	67,930
	France	..	..	..	..	60	4,320	19	1,368
	Holland	..	..	..	..	25	7,025	38	10,678
1832	United Kingdom	7,835	1,223,133	7,797	1,221,628	537	71,493	564	73,898
	France	..	..	..	..	66	4,752	35	2,520
	Holland	..	..	..	..	8	2,248	36	10,116
1833	United Kingdom	9,070	1,427,493	9,083	1,431,968	681	98,224	704	102,639
	France	..	..	..	..	47	2,584	29	2,108
	Holland	..	..	..	..	4	1,124	16	4,496
1834	United Kingdom	10,046	1,609,324	9,941	1,597,270	988	146,720	896	137,607
	France	..	..	..	..	1	73	19	1,378
	Holland	..	..	..	..	11	3,091	38	10,640
1835	United Kingdom	11,227	1,849,409	11,105	1,833,496	1,015	170,151	1,146	189,305
	France	..	..	..	..	..	..	38	2,906
	Holland	..	..	..	..	18	5,058	39	10,920
1836	United Kingdom	13,003	2,238,137	12,649	2,178,248	1,122	195,722	1,225	202,499
	France	..	..	..	..	..	..	121	9,265
	Holland	..	..	..	..	50	10,948	67	14,249
1837	United Kingdom	15,481	2,671,577	15,019	2,604,739	1,193	217,640	1,278	234,919
	Hanse Towns	..	..	..	..	1	80	1	169
	Holland	..	..	..	..	32	7,164	40	10,080
	Belgium	..	..	..	..	25	4,925	27	5,319
	France	..	..	..	..	2	335	138	10,665
	Spain	..	..	..	..	..	..	1	165
1838	United Kingdom	15,771	2,959,125	15,489	2,871,506	1,983	286,264	2,004	289,977
	France	..	..	..	..	368	35,666	354	33,894
	Holland	..	..	..	..	34	7,718	37	8,399
	Belgium	..	..	..	..	39	11,017	72	20,263
	Portugal and Brazil	..	..	..	..	..	..	3	453
1839	United Kingdom	15,556	2,926,521	15,498	2,894,995	2,293	356,595	2,296	351,361
	Russia	..	..	..	..	..	..	1	217
	Holland	..	..	..	..	40	8,409	42	8,863
	Belgium	..	..	..	..	61	18,021	69	20,236
	France	..	..	..	..	410	44,343	360	39,221
	Portugal and Brasil	..	..	..	..	..	..	5	550
	Turkey	..	..	..	..	..	..	2	473

In the Report of the Commissioners appointed by the Privy Council in 1839 to inquire into the subject of steam-vessel accidents, an attempt is made to supply some of the deficiencies of the Custom-House returns relating to steam-vessels, by the publication of the table which is here marked IV. This table gives, *approximately*, the numerical tonnage and power of British steam-vessels, at the close of the year 1838, stating the *actual* as well as the *registered* tonnage, and giving much other information not comprised in any other published statement. In the course of their investigation of the subject more immediately before them, the commissioners obtained detailed information respecting eighty-three unregistered steam-vessels, nearly all of which were used to convey passengers. Of these vessels (which are included in the table) thirty-seven plied on the Mersey, twenty-six on the Humber, sixteen on the Thames, and four on the rivers on the east of Scotland; and the commissioners observe that there are, no doubt, many others unregistered at ports which they did not visit. The great number of such steam-vessels may be conceived from the statement of the Report, that while there were only twenty-five registered steamers in the Humber, Ouse, and Trent, there were twenty-six unregistered, and that at Liverpool there were thirty-nine registered and thirty-seven unregistered. It is also difficult to ascertain to what place many vessels properly belong. 'Two Liverpool companies alone,' says the Report, 'possess more vessels than the total number registered there. Of the large number of trading-steamers between Ireland and Liverpool, some of which are registered in English and some in Irish ports, we (the commissioners) were informed that nineteen-twentieths are owned in Ireland.' It further states, that of the seven hundred and sixty-six steam-vessels mentioned in the table as belonging to Great Britain, Ireland, and the isles of Guernsey, Jersey, and Man, 'four hundred and eighty-four may be considered as river-steamers and small coasters; and two hundred and eighty-two as large coasters and sea-going ships.'

---

* A note appended to the original document states that steam-vessels were not used in this kingdom for the conveyance of merchandise before the year 1820; but this statement must not be taken absolutely; for Dodd, writing in 1818, mentions steam-boats then in use upon the Clyde for the conveyance of goods. The original table is much more extensive than the above; separate returns being given from the ports of England, Scotland, and Ireland.

† The returns relating to the coasting trade from 1830 to 1836 are taken from the volume of tables for 1837; an error having been discovered in those previously published

IV. *Table showing the approximate Number, Tonnage, and Power of Vessels belonging to the Mercantile Steam-Marine of the United Kingdom and its Dependencies at the end of the year* 1838.

Size of Vessels per Custom-House Returns.	No. of Vessels per Custom-House Return.	Registered Tonnage.	Tonnage of Engine-room, &c.; not registered.	Total Computed Tonnage.	Computed Amount of Horse-power.	Average Horse-power per Vessel.	Average Computed Tonnage per Vessel.
Tons.	No.	Tons.	Tons.	Tons.	Horse-power.	Horse-power.	Tons.
Less than 50	256	6,106	10,816	16,922	6,400	25	66
From 50 to 100 . . .	145	10,267	7,458	17,725	6,866	47	122
100 to 150 . . .	84	10,034	7,761	17,795	7,483	90	211
150 to 200 . . .	63	10,982	7,147	18,129	7,560	120	287
200 to 300 . . .	76	16,654	10,839	27,493	11,188	147	361
300 to 400 . . .	41	14,247	7,580	21,827	10,914	266	532
400 to 600 . . .	10	4,488	3,506	7,994	3,000	300	769
679 . . .	1	679	661	1,340	450	450	1,340
1,053 . . .	1	1,053	810	1,855	500	500	1,855
Number of registered vessels in 1838	677*	74,510	56,578	131,080	54,361	..	..
Number not registered .	83	4,154	5,484	9,638	2,129	50	116
Total number in Great Britain and Ireland . . .	760	78,664	62,062	140,718	56,490	..	..
Registered vessels belonging to the isles of Guernsey, Jersey, and Man, in 1837 . . .	6†	832	618	1,450	600	100	241
Ditto, belonging to the British Plantations, in 1837 .	44†	8,411	7,253	15,664	6,160	140	356
Grand Totals .	810	87,907	69,933	157,840	63,250	..	..

Shortly before the date of the British inquiry into steam-vessel accidents, which led to the publication of the preceding facts, a Report was made to the Congress of the United States of America 'on the number of steam-engines and steam-boats in actual use; and of the number, nature, and causes of the disasters which have been occasioned by them.' From this Report, which is dated December 12, 1838, and has been reprinted by the English commissioners, a few statistical facts relating to steam-vessels in the United States may be gleaned. It is computed that since the first employment of steam-boats in the United States the numbers built, lost, and worn out have been about as follows.—

Number of steam-vessels built . .		1300
Lost by various accidents . .	260	500
Worn out	240	
Remaining in use in 1838 . . .		800

The tonnage and power of these steam-vessels are stated to be nearly as follow:—

Aggregate tonnage, upwards of .	155,473 tons.
Average tonnage per vessel, near	200 tons.
Aggregate horse-power of engines	57,019 h.-p.
Average horse-power, rather more than	70 h.-p.

'The largest boat in the United States,' it is observed, 'is supposed to be the Natchez, of eight hundred and sixty tons, and near three hundred horse-power, destined to run between New York and the Mississippi; the Illinois and the Madison, on Lake Erie, are the next in size, the former being seven hundred and fifty-five, and the latter seven hundred tons; the Massachusetts, in Long Island Sound, is the next largest, being six hundred and twenty-six tons; and the Buffalo, on Lake Erie, next, being six hundred and thirteen tons.' The government never owned, it appears from this document, more than two steam-vessels of war; and even these were at different times. The first, called the Fulton, was launched in 1815, and lost by accident in 1829. The second, of the same name, was built in 1838. The government had however, at the date of the Report, thirteen other steam-vessels, which were employed by the war department on the public works, and in the transportation of troops and stores.

Form, Structure, and Mechanism of Steam-Vessels.—As a ship, a steam-vessel should possess the qualities that favour rapid and steady motion through the water, combined with safety and strength to enable it to bear, without injury, the strain of the propelling machinery. The steam-engine employed to work its propelling machinery requires such modifications of arrangement as shall allow of its convenient stowage in a small space, and, in most cases, in such a position as to make the centre of gravity of the vessel as low as possible; its structure should be such as to enable it to bear the varied motions of the vessel without injury; and its power must be accurately calculated to produce the required velocity. When all these points are attended to, it still remains to provide a suitable apparatus for applying the power of the engine to the propulsion of the vessel. Considering the numerous and widely different departments of science with which an intimate acquaintance is necessary, in order to the attainment of all these requisite qualities, it need excite little surprise that so many steam-vessels have failed, and continually do fail, to accomplish as much as their builders have anticipated. The difficulty of the case is much increased by the circumstance that many of the questions to be considered are involved in uncertainty, so that nothing short of costly experience can positively determine the expediency of adopting particular forms of vessel, or arrangements of machinery, or the comparative advantages of different forms of paddle-wheels, or other contrivances for effecting progressive motion. Most of what has been effected by way of improvement upon the imperfect models of the first steam-boat builders, in Great Britain as well as in North America, has been the result of repeated trials, stimulated by the generous rivalry of different builders, rather than of any minute investigation of scientific principles.

---

* A note to the original table, at p. 17 of the 'Report on Steam-Vessel Accidents,' observes that the Custom-House Return enumerates 678 steam-vessels; but that the tonnage of one which had been burnt was omitted. Neither number, it will be perceived, agrees perfectly with Table II., but we have no data for ascertaining where the error, if there be one, lies.

† The compilers of this table took the numbers thus marked from the Returns for 1837, because Mr. Porter's Statistical Tables for the year 1838 were not then published. The matter could not be corrected here, because we have not the information necessary for altering the following columns. The registered number and tonnage for 1838 will be found in Table II.

It forms no part of the plan of this article to enter at length into the consideration of those points which, taken collectively, form the science of steam navigation; yet it would be improper to pass entirely unnoticed such of them as bear upon the form and proportions of steam-vessels, especially as much light has been thrown upon the subject by the important investigations of Mr. John Scott Russell upon the subject of waves, which have been reported at the recent meetings of the British Association for the Advancement of Science. Without giving any undue prominence to the particular theory which he has himself brought forward, that gentleman has, in his article 'Steam Navigation,' in the seventh edition of the 'Encyclopædia Britannica' (which, with the article 'Steam,' also written, in part, by Mr. Russell, has also appeared in a separate form), treated very ably upon the theory of steam navigation, particularly as regards the form and proportions of steam-vessels. Referring to that essay itself for more minute information, it will be sufficient to touch upon a few points very briefly. The advantages of a long proportion and a fine wedge-shaped entrance or fore-end have been slightly adverted to in mentioning the improvements of Stevens of Hoboken and of Mr. David Napier; and from those notices it will appear evident that the early steam-boat builders, both in America and in Great Britain, erred in adhering too closely to the form and proportions of sailing-vessels. The proportions of steam-vessels were originally, like those of sailing-vessels, short and full, their length being only about three or four times their breadth; while now the proportion of six breadths to the length is common in the best sea-going steam vessels, and many of the fast river-boats are still longer, ranging in length from seven to ten times their width. In America the proportion of length to breadth is sometimes made even greater than as ten to one; and boats have been built the length of which is twelve times their breadth. These dimensions of course apply to the hull only; and in the steamers of North America the form of the deck is very different, it being made to project far over the sides. In the Rochester, for instance, a steam-boat plying between New York and Albany, of which an account is given in Stevenson's 'Sketch of the Civil Engineering of North America,' while the maximum breadth of the hull is stated to be twenty-four feet, the deck was about double that width, projecting thirteen feet on each side. These projecting portions of the deck are denominated the *wheel-guards*. The proportion of depth to breadth increases with the size of the vessel. In a table of the dimensions of sea-going steam-vessels, according to the best British examples, which is given by Russell, the proportion of depth varies from rather less than one-half the breadth, in vessels of little more than one hundred tons burden, to about two-thirds in those of from five to six hundred tons, and three-fourths in vessels of fifteen hundred tons. The table runs as high as three thousand five hundred and ninety tons, for which the dimensions given are three hundred feet long, fifty wide, and forty deep; but these dimensions have never been tried, the largest steam-vessels yet built being those for Transatlantic voyages. The dimensions which are here given are for vessels with a fine entrance and run, and with sides nearly upright, and they require to be modified according to the *form* adopted. The depth, it is observed, is suitable for flush-decked vessels, without poop or forecastle; and in vessels which have these, the depth given should be the *mean* depth.[*]

Considered merely as a boat to be propelled by the machinery contained within it, which always acts in the same direction, that is, in the same direction as the line of the keel, the question of the best form of a steam-vessel is much simpler than that of a sailing-vessel, which is to be impelled by an external force, applied in various directions, and but rarely in that of the line of progress. The form to be aimed at in a vessel to be propelled by steam alone is indeed little more than that of a solid capable of passing through the water with the least possible resistance. The essential qualities of a steam vessel have been sometimes considered incompatible with those requisite for sailing; and it has consequently appeared very difficult to construct a vessel adapted for the combined use of steam and sails. Russell however conceives that there exists no such incompatibility, and observes that 'vessels built expressly for the purpose of steaming, and adapted for that purpose in the best possible way, have been found, when under canvass, to equal the fastest ships in sailing qualities.' 'Their great length and fine ends,' he continues, 'prevent them from falling to leeward; their fast formation adapts them for going through the water; their boilers and machinery form a well-placed and well-distributed ballast; their fine ends and flaring bows render them lively as sea-boats; and the small amount of their midship section, and small resistance, give them great speed under comparatively little canvass.' In confirmation of his position, the writer further states 'that the fastest schooners, cutters, smugglers, yachts, and slavers approach more nearly to the form of the best steamers than any other class of sailing-vessels.'

In the formation of steam-ships, one class of builders adopts a sharp bottom, a great rise of floor, great breadth of beam, extensive bearings on the surface, and round sides and water-lines; thus producing a full, capacious, stable, sea-going ship, merely varied in its proportions to adapt it for steaming. Another adopts a flat bottom, long floor, more angular bilge, upright sides, straight entrance, clean run, and sharp ends; peculiarities which give little stability, but are chosen with a view to passing through the water in all weathers with little resistance or change of position. A third school adopts the formation of which Russell has established the principles, and of which what he calls the 'hollow wave-lines' are the distinguishing feature.

In treating of the form of steam-vessels under several heads, our authority commences with the transverse midship section, and shows that, owing to the necessity of providing a wide and solid base for the engines, in as low a position as possible, it is advisable to make about two-thirds of the width of the vessel in the middle nearly flat; and that it is desirable to make the sides at the same part as nearly vertical as may be, consistently with giving an easy turn to the bilge. Where the sides are made full, spaces are left on each side of the engines, of which no convenient use can be made; and the greater breadth of beam consequent on such a form is injurious to the vessel. The form of the water-lines, or the degree and manner of fulness or fineness which the ends of a vessel should possess in reference to the middle, is the next point considered, and is one upon which there exists much difference of opinion. The use of full round ends has many disadvantages besides that of increasing the resistance to the passage of the vessel through the water; among these may be mentioned the tendency of a long vessel when so formed to sink down in the middle with the weight of the engines. It is evident that in order to the equal support of the vessel, which is necessary to avoid injurious strain, the amount of bearing surface in each part of the vessel should be in proportion to the weight it has to sustain. Another defect of the full ends consists in the circumstance that if they be used for stowage, their weight diminishes the facility of steerage, and impairs the quality which is termed liveliness; to rectify which the ends are sometimes bulk-headed off, so that any apparent advantage on the score of increased capacity is lost. In vessels constructed upon the wave-line system, the principle followed is, 'that the hollow lines forming the entrance are to correspond, as nearly as may be consistent with the form of a ship, to the form of a certain wave capable of moving with the same velocity as the vessel.' 'The analogy between the displacement of the water by a wave of the first order,' observes the author of this beautiful theory, 'and its displacement by a vessel moving with the same velocity, being so very close as to approach to identity, rendered it probable that the same mode of displacement would be followed in both cases with the same result, viz. the production of minimum resistance.' 'It was further to be anticipated, he adds, 'that as a wave, when allowed to follow the usual mode of displacing the particles of water over which it passes, presents a smooth and unbroken swelling surface, so the vessel, if of the proper shape, according to these wave-lines, would divide the water at the bow in a smooth unbroken sheet, instead of showing the usual head of water or surge exhibited at the bow of ordinary vessels at high velocities. On the other hand, when a wave encounters a shapeless rock, or breaks on a rugged coast, it exhibits the same violent surges which are presented on the bow of vessels of the usual form.' In order to test the accuracy of this theory, an experimental vessel, seventy-five feet, long was built of the form proposed; and when it was moved at the rate of seventeen miles an hour, the water parted smoothly and returned peaceably to its place without any white spray or other symptom of high speed and great resistance. This vessel was constructed in 1834, and has been followed by several steam-vessels of considerable size, which have succeeded admirably, although their form is considered to be only an approximation to the true wave-line. The Shandon steamer, which was altered in 1840 to the new form, affords a striking proof of its advantage, as the alteration increased her speed with the same engines between two and three miles an hour. The Fire-King, a fine steam-vessel of six hundred and sixty tons burden, and two hundred and twenty horse-power, which has been employed successfully on the sea-voyage between the ports of Fleetwood and Ardrossan, is another example of this construction, and has a speed of fifteen miles an hour in still water. The velocity of fourteen miles an hour has been attained by a much less powerful vessel built on the wave-line principle, the Flambeau, of two hundred and eighty tons, and seventy horse-power.

---

[*] Of the steam-ships intended for Transatlantic navigation the largest yet completed is the British Queen, which is two hundred and seventy-five feet long, forty feet wide between the paddle-boxes, and sixty-one feet over all. Her depth of hold is twenty-seven feet, and she is propelled by steam-engines of five hundred horse-power. Her engine-cylinders are seventy-seven inches and a half in diameter, and seven feet stroke; and her paddle-wheels are thirty-one feet in diameter. The Great Western and other steam-vessels built for this passage are nearly equal to the British Queen in size; and the Great Britain, an iron steamer now building at Bristol, is of much larger dimensions. Two other vessels now in progress at the same place, for the Post-office department, are stated to be larger than the Great Western. These are to be named the Avon and the Severn.

One of the important questions which has of late years attracted much attention in connection with steam navigation, is that of the comparative advantages of iron and wood as materials for steam-vessels. Small vessels of iron have for many years past been occasionally used for river and canal navigation; and recently steam-vessels of considerable size have been built of the same material. A first-rate iron steam-ship, now building for Transatlantic voyages, has been mentioned in a note on the preceding page. It is difficult, between the sanguine statements of those who favour the use of iron, and the sweeping condemnation of such as are prejudiced in favour of wood, to arrive at a correct estimate of the comparative merits of the two materials. It is however certain that, owing to the superior strength of iron, and its power of bearing strain in any direction, an iron vessel may be made much lighter than one of wood of equal strength; the saving of weight being sometimes estimated at one-half. Another great advantage of iron consists in the facility with which it may be formed into any shape. An iron hull is also superior to one of wood in its security from fire and its greater cleanliness.

Whatever material be adopted, a steam-vessel should be strengthened or stiffened by such a system of trussing as will enable it to bear the weight and strain of the machinery without alteration of form. The river-steamers of North America are remarkable for the skill with which this object is effected, notwithstanding their extremely slight build. In some of these vessels a trussed framing rises to a considerable height above the deck, and distributes the weight and strain of the engine over a great space. Steam-vessels may be greatly strengthened by means of water-tight bulkheads or transverse partitions in the hull, the general adoption of which would, more than any other proposed improvement, increase the safety of steam navigation. In a vessel of the ordinary construction a small local injury from striking upon a rock, from collision, or from any other cause, may occasion the sinking of the vessel, because the water has free access to every part of it. Fire also, wherever it may commence, is pretty sure to spread through the whole length of the boat. The adoption of water-tight bulkheads, to confine the effect of an accident to the particular division of the vessel in which it originates, was suggested by Dodd as early as 1818. He mentions them in p. 220 of the treatise which has been alluded to in the former part of this article, proposing to use them between the engine-room and the cabins; and he states that he intended to introduce them in two boats which he was then building. Whether he did so or not we are not aware; but the recent adoption of this excellent precautionary apparatus appears to be due to Mr. C. W. Williams, managing director of the city of Dublin Steam-packet Company. A minute description of his bulkheads, and a very satisfactory statement respecting their importance and their efficiency, are given in a communication from that gentleman to the commissioners on steam-vessel accidents in 1839, which is printed in the appendix to their Report. He therein states that he first applied water-tight bulkheads in an iron steamer called the Garryowen. The hull, as well as the partitions, being of iron, the application was, in this case, very easy; but additional contrivance was necessary to introduce them in wooden vessels, owing to the liability of the timber to shrinkage and alteration of form. The bulkheads themselves are always of plate-iron; and, to prevent the possibility of water passing at the sides and bottom of the vessel, the timber-work is made solid for the space of eighteen inches before and behind each bulkhead. By this, and some other precautions, a very strong and secure partition may be made, capable of preventing the escape of either water or fire from the compartment in which an accident may originate. In the case of fire, indeed, Mr. Williams considers it questionable whether the mere closing of the hatches over the section or division in which it occurs, would not be sufficient to extinguish it; as the supply of air would be thereby completely cut off, there being no communication below deck between the several divisions of the vessel. For several reasons which are specified in the document referred to, Mr. Williams conceives the best arrangement to be the division of the hull into five sections, by four bulkheads; appropriating the central division to the boilers, engines, and coal-bunkers, and the others to cabins or stowage-room. For the purpose of showing the efficiency of this means of securing the safety of a vessel, experiments were tried at Liverpool upon a steam-vessel called the Royal Adelaide. She was one hundred and sixty feet long, and divided into five sections; that containing the engines and boilers being fifty-eight feet long, the two next thirty-five feet each, and the end sections sixteen feet each. Water being admitted into the fore-end section, by boring through the vessel, the bow was depressed about six inches, and the stern was raised about two inches. The water being then pumped out from this section, an aperture was made in the adjoining one, and the result was that the bow was depressed about twelve inches, but the stern was not perceptibly raised. A still more decisive proof of the security obtained by this plan was afforded by the collision of the Royal William and the Tagus, near the Isle of Wight, on the 7th of November, 1837. The former vessel, which was fitted with water-tight bulkheads by Mr. Williams, was stove in with great force on the starboard-bow, and the water immediately rushed into the section before the engine-room. As soon as the alarm was over, the carpenter of the Royal William went under the bow in a boat, and covered the breach with planks and tarpaulin. In that condition the vessel steamed into Plymouth Harbour, where some extra fastenings were applied, after which she finished her passage to Dublin, and then crossed to Liverpool with the same temporary covering. The inconvenience occasioned by the want of communication between the different parts of the vessel, and the extra expense of the bulkheads, are objections by no means commensurate to the great advantages of this means of ensuring safety.

Perhaps this may be the best place for noticing the ingenious contrivance of Captain George Smith, for carrying life-boats upon the paddle-boxes of steam-vessels. The utter inadequacy of the boats commonly carried by steam-vessels, in the event of an accident rendering it necessary for the crew and passengers to abandon the ship, is notorious; and it is evident that a sufficient number of boats for such an emergency could not be carried upon deck without serious inconvenience. There is also considerable delay in getting out such boats; and sometimes, as in case of fire, it might be impossible to unship them. These circumstances led Captain Smith to contrive a kind of life-boat of such form and dimensions that it might serve, when inverted, for the upper part of the paddle-box; and might, when necessary, be immediately turned over and lowered outside the paddle-wheel. In a letter to the Commissioners of Steam Vessels Inquiry, printed in the same document as Mr. Williams's communication on water-tight bulk-heads, Captain Smith describes his invention as tried on her Majesty's steam-vessel Carron, of between two and three hundred tons burden:—'The upper section of her paddle-wheel,' he says, 'is covered by a life-boat twenty-five feet long, nine feet beam, having four air-tight cases, which may be removed if required on particular occasions. This life-boat is capable of containing between forty and fifty persons. When in her place over the paddle-wheel, the midship thwarts are unshipped, which admits of the wheel revolving within about six inches of her kelson; she lies bottom upwards, on two iron davits, having hinges, which enable her to be turned over and lowered down by six men in two or three minutes.' A boat of similar capacity, if stowed in the usual position upon deck, could not, it is stated, be got out by the whole crew in less than twenty minutes. This contrivance affords great facility for inspecting or repairing the paddles, as the boats may be easily raized a little on their davits. Captain Smith suggests that if it be thought requisite to add to the number of boats, the cabins before and abaft the paddle-wheels may be roofed by others, smaller than those forming the upper part of the paddle-boxes. The paddle-box boats might, it has been observed, be especially valuable in the landing or embarkation of troops. The whole apparatus is represented in one of the plates accompanying the commissioners' Report.

Another contrivance, which is very important for the safe management of river steam-vessels, may be mentioned before adverting to the actual apparatus of propulsion. It is that by which the steering-wheel is situated in the fore part of the vessels, its motion being communicated to the rudder by ropes, chains, or rods. An apparatus of this kind was used by Symington in his tug-boat upon the Forth and Clyde Canal, about 1802; but whether its subsequent adoption in North America is in any degree to be attributed to that circumstance, we are not aware. The peculiar arrangement of the river steamers of America, which have the engines and some of the cabins on deck, combined with their great length, renders it impossible for the steersman, if in the situation usual in the steam-vessels of this country, to see his course; and therefore he is usually elevated on a platform near the bow. Ropes were formerly used to connect the wheel with the helm, but the occurrence of serious accidents in consequence of the burning of the ropes has led to an enactment enforcing the use of rods or chains. The different construction of British steamers renders the use of a contrivance for steering from the bow less essential than in America; yet the numerous accidents to small boats in the Thames, from steam-vessels running into them, indicate the desirableness of such an apparatus. There might be also a steering-wheel in the usual situation, which might be used when at sea, or in case of an accident to the forecastle steering-apparatus.

The mechanism of steam-engines having been described in a previous article, it only remains here to notice the principal modifications required in order to their convenient application to the propulsion of vessels. As an ample supply of cold water can always be commanded for the purpose of condensation, there is less inducement for the use of high-pressure steam in marine engines than in almost any others; and this circumstance, combined with the prejudice against the safety of high-pressure boilers, has led to the universal adoption of low-pressure, or condensing engines, in European steam-vessels; although many of the steamers of North America are worked with steam of enormous pressure, far exceeding that allowed even in railway locomotive engines in this country. Stevenson mentions a vessel in which he rode on the Ohio, in which the steam was commonly used at a pressure of *one hundred and thirty-eight pounds* to the inch; and when passing places where there was a strong adverse current, at *one hundred and fifty pounds*. This last pressure the captain informed him 'was never exceeded, except on extraordinary occasions.' In the government report on steam-engines, which was alluded to in a previous page, it is stated that in competitions between rival boats the steam has often been raised to *two hundred pounds* or more on the square inch.

The common form of steam-engine known as the beam or lever engine, in which the impulse of the piston is applied under one end of a vibrating lever or beam, pivoted on its centre, and is communicated to a crank by means of a connecting-rod descending from the opposite end of the beam, is not well adapted to a steam-vessel, because it would require much of the weight of the machinery to be placed high above the deck. This arrangement is nevertheless common in the river steamers of North America; and, by leaving the whole space below deck free from machinery, it allows room for cabins of very large dimensions; the principal cabin, or saloon, being, in vessels so constructed, the full length of the hull. In American sea-steamers, and in all British steam-vessels, the machinery is either entirely or principally below deck, and consequently a very different arrangement is necessary.

The kind of engine most commonly used, which is known by the name of the side-lever engine, has been described under **Steam-Engine**, p. 481, where it is also stated that it is usual to employ two distinct engines, working separate cranks upon the same axis. This remark applies chiefly to British steam-vessels; for it appears that in American steamers it is common to use single engines, and sometimes counterbalance weights are attached to the paddle-wheels, to assist them in passing their centres; but the use of engines of very long stroke, and paddle-wheels of very large diameter, renders the use of a single crank less inconvenient than in vessels of the European construction. Stevenson states that even in those American vessels in which two engines are employed, their connecting-rods are not attached to the same axle, but each engine works independently of the other, and drives only one of the paddle-wheels.

The form of engine above described, though that most commonly adopted, is not by any means the only marine engine used in this country. Many plans have been contrived for rendering the machinery lighter and more compact, and simplifying the connection between the piston-rods and the cranks. One of the great difficulties to be overcome is the want of depth in the engine-room. The paddle-shaft or axis must be either below the level of the deck, or so little above it that, when covered in, persons may easily step over it; and if, as in the various plans for connecting the piston-rod more immediately with the crank, the cylinder be placed directly under the crank-axis, a considerable space is necessary between them, to allow for the length of the stroke, and the connecting apparatus by which the rectilinear motion of the piston is converted into a rotatory motion. In some small vessels the connection is very simple, the cylinders themselves vibrating on trunnions or gudgeons, so that they adapt themselves to the position of the cranks, and impart the force of their pistons to them without the intervention of a jointed connecting-rod. Another very simple plan is that recently adopted in the Gorgon and some other steam-frigates. In these the cylinders are fixed, and the movement of the piston-rods is vertical, but they are surmounted by connecting-rods, pivoted to them, which adapt themselves to the position of the cranks. This mode of connection is the same, excepting in the circumstance of the vertical instead of the horizontal position of the apparatus, as that commonly adopted in railway locomotive engines, and it has the advantage of great simplicity; but, as it requires a space equal to about three times the length of the stroke between the paddle-shaft and the base of the cylinder, it involves the necessity of either raising the former to an inconvenient height, using a cylinder of very short stroke, or employing a very short connecting-rod, by which the power is applied disadvantageously. In another modification of the plan of direct connection, which is represented in *Figs.* 1 and 2, an ingenious contrivance is resorted to in order to save depth, and at the same time to avoid the use of a short connecting-rod. The top of the piston-rod, *a*, carries a transverse cross-head, *b*, from which descend two rods, *c*, *c*, one on each side of the cylinder. To the lower ends of these side-rods are attached the lower ends of two connecting-rods, *d*, *d*, at the upper ends of which is another cross-head, *e*, and

***Fig.* 1.**

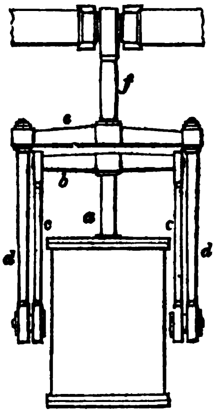
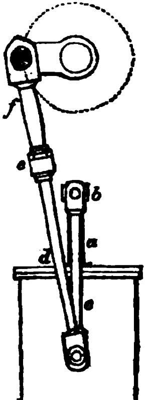


***Fig.* 2.**



from the centre of this cross-head a short rod, *f*, communicates motion to the crank. This plan has been simplified by Mr. David Napier, by uniting each cross-head with its pair of side-rods into one forked piece of metal. By this mode of communicating power, the connecting-rods may, if required, be nearly double the length of the stroke, while the total height of the engine-room need be little more. The side-levers or beams are not always dispensed with in this form of engine, although, as they are merely required for working the pumps, and not for communicating the power to the crank-axis, they may be of small dimensions. They are moved by means of the side-rods from the cross-head of the piston, as in the common side-lever engine; and the similarity in other parts of the apparatus is considerable; the main difference being that, instead of these side-rods and the connecting-rods being attached to opposite ends of the beam, they are both attached to the same end. Another arrangement for accomplishing the same object as the preceding is that to which the name of the steeple-engine has been given. In this the upper end of the piston-rod carries a frame of iron, which rises considerably higher than the paddle-shaft; the sides of the frame passing up on each side of the shaft, and being so far apart that the crank may turn freely within it. The connecting-rod descends from the upper part of the frame to the crank, and so imparts to it the motion of the frame and piston-rod. The steeple-frames may be made of various forms, but the simplest is that of a triangle, of which the upper angle, where the connecting-rod is attached, is kept steady by means of vertical guides. This contrivance is represented in *Figs.* 3, 4, and 5, which show the positions assumed by the apparatus at the top, middle, and bottom of the stroke respectively. Of course the machinery in this arrangement rises to a considerable height above the deck; but, as the steeple-frames merely rise through an opening or hatch, they do not interfere much more with free passage from end to end of the ship than the common side-lever engine, in which the cranks and cross-heads usually rise above the level of the deck in like manner. Among inventions of this class may be mentioned two novel forms of engine patented by Messrs. Maudslay and Field, with the intention of affording, by the extensive piston-surface, facility for the use of steam expansively. In one of these two cylinders and pistons are placed near together, the movements of the pistons being simultaneous. The two piston-rods carry a cross-head, from the centre of which descends a bar, and to the lower end of this bar the lower end of the connecting-rod is attached. The other plan consists of one very large cylinder and piston, with two piston-rods; the arrangement resembling that of the steeple-engine, but being more compact, because, as the piston-rod is double in every part, the crank may revolve close to the top of the cylinder. A very singular contrivance for the like purpose, which has been patented by Mr. Humphreys, and previously, according to Russell, by another person, dispenses entirely with the use of the ordinary piston-rod, and effects the direct connection of the piston with the crank without having any apparatus above deck, or at least without anything more than the ordinary crank. The connecting-rod, *a*, *Figs.* 6 and 7, proceeds direct from the crank to a pin or pivot attached to the piston; and the lateral play required to enable it to accommodate itself to the movement of the crank is provided for by a trunk or case, *b*, attached to the piston, and sliding up and down with it through a steam-tight slit, or long stuffing-box, in the head of the cylinder. It is needless to detail the contrivances by which, in engines of direct connection, the working of the pumps and other apparatus is effected. Such engines are convenient in small boats, but they do not appear to afford any great advantage, excepting economy of space.

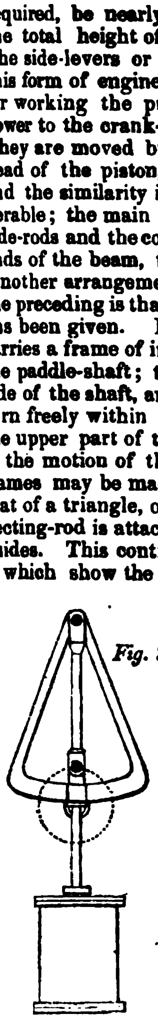


Fig. 3.

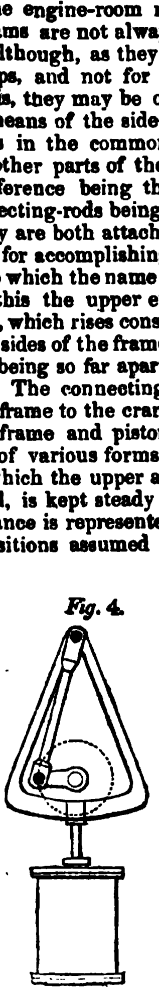


Fig. 4.

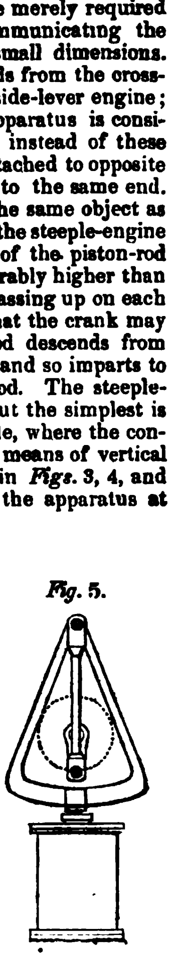


Fig. 5.

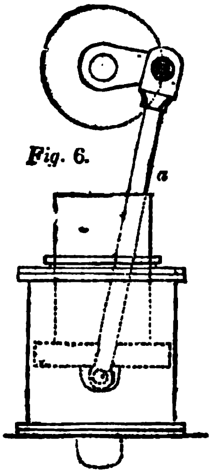


Fig. 6.

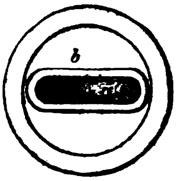


Fig. 7.

The proportion between the length of the piston's stroke and the diameter of the cylinder is a point upon which much difference of opinion exists; some advocating a very long stroke and comparatively small diameter, and consequently a crank of large radius, while others prefer the more compact arrangement of a small crank and short stroke, and obtain the requisite power by using a piston of large surface. The former system is carried to the extreme in the steam-vessels of North America, some of which have a length of stroke equal to three or four times the diameter of the cylinder; while in this country the length of stroke is generally not much greater than the diameter, and in some cases is even less. Russell mentions a vessel on the Clyde with a stroke of four feet, and a diameter of five feet, or, to use the common form of description, of sixty inches.* He also gives a table showing the dimensions proper for the cylinders of marine engines from ten to five hundred horse-power, according to the practice of the best British engine-makers, from which it appears that the stroke is usually about one-sixth greater than the diameter; but he observes that in deviating from this proportion a longer stroke will be preferable to a shorter one. This will be especially the case as the plan of working steam expansively, and of increasing the velocity of the piston beyond what has been generally considered the most advantageous limit, becomes more generally adopted. In both these particulars American steam-navigation affords a precedent worthy of attentive examination. While it has been considered advisable by most British engineers to limit the speed of the piston to about two hundred and twenty feet per minute, a velocity of five hundred feet per minute has been maintained in some American vessels; and, with large supply and exit pipes for the steam, and valves of suitable construction, there appears to be no practical difficulty in such a speed.

The means adopted for condensing the steam is a matter of great importance in sea-going steamers. The most effectual method of condensation is by the injection of cold water into the condenser, or by causing it to fall in a thin sheet, to which the steam is exposed. By this actual contact with cold water the steam is instantaneously condensed, and consequently the effective action of the engine is ensured; but, as the condensed steam is necessarily mixed with the condensing water, it follows that, during a sea-voyage, the boilers must be fed with salt-water, which, as it evaporates, deposits salt and other sedimentary matter on the interior surfaces of the boiler. The crust or deposit thus formed is a bad conductor of heat, and hence it not only impedes the formation of steam, but also, by preventing contact between the water and the iron, allows the latter to become overheated, and thereby liable to bursting or opening at the joints. Several different measures have been adopted for avoiding or mitigating this inconvenience, either by working the boiler with fresh water only, or by using sea-water with such precautions as may prevent the injurious deposition of salt. Of the latter class of measures that called *blowing-out* may be first alluded to. It consists in allowing a large quantity of water to escape from the boiler into the sea, whenever it is becoming so salt as to render the deposition of sediment likely to commence, and supplying its place with the comparatively fresh water from the condenser. As that portion of the water which contains the greatest proportion of salt sinks, by its greater specific gravity, to the bottom of the boiler, the blow-off cocks are usually placed very low down. It is usual to blow out a portion of the water about every two hours; but, as the performance of the operation involves loss of fuel, from the coldness of the water introduced to restore the proper level, it is very desirable to avoid blowing out too often, as well as to avoid delaying it too long. A beautiful contrivance for indicating when the operation is necessary has been recently introduced by Messrs. Seaward, consisting of a glass gauge communicating with the boiler, and containing two hydrometer balls, of slightly different weight, so adjusted that neither of them will float in common sea-water, which contains about $\frac{1}{33}$ part of its weight of salt, but that the lighter one will float when the proportion of salt rises to $\frac{4}{32}$, and the heavier one when it is more than $\frac{6}{32}$ parts. Deposition takes places when the salt amounts to $\frac{8}{32}$ parts. Thus the rising of one or other of the balls indicates the degree of saltness, and the proper time for blowing-out. Messrs. Seaward also use an apparatus by which the water is blown into a separate chamber before it is turned into the sea, and this chamber, being made to contain exactly a ton of water, prevents the accidental discharge of too large a body of water at once, while the valves are so arranged that no negligence can possibly occasion the boiler to be left in communication with the sea. Messrs. Maudslay and Field adopt a different method for preserving the proper state of the water, using pumps, called *brine-pumps*, to remove constantly a small portion of water from the lower part of the boiler. When these are used, the feed-pumps are made to inject an extra quantity of water, to take the place of that removed by the brine-pumps, and the current of hot brine is conducted along a pipe which passes through the feed-pipe, by which means much of its heat is imparted to the water entering the boiler. This apparatus appears to be very effectual, and has been tried in the Great Western and other steam-vessels. The use of copper instead of iron as a material for boilers lessens the evil attending the use of salt-water, as the sedimentary matter does not form a crust upon it, but is precipitated in a loose form, and easily removed by blowing-out; but both materials are alike subject to another serious evil—the rapid corrosion of the flues by the chemical action of the soot, when mixed with salt, of which minute particles will escape through the joints in spite of every precaution. This evil can only be avoided by the use of fresh-water in the boilers, a measure which, in sea-voyages, cannot be adopted without the use of a condensing-apparatus of such construction as to preserve the condensed steam free from any admixture of sea-water. This is accomplished by what is termed surface or dry condensation; a method which has been repeatedly tried, from the days of Watt to the present time, but which has never, we believe it may be safely affirmed, been found equally efficient with the condensation by jet. In the case of steam navigation, however, although no advantage may be gained in the act of condensation, the method may be highly advantageous, because, by saving all the water produced by condensation, and returning it to the boiler, the use of sea-water may be avoided. Mr. Samuel Hall, who is also the author of several other inventions connected with steam navigation, has laboured with more success than most experimentalists in this important attempt to obviate what has been shown to be a very serious difficulty. His condenser consists of a great number of small tubes, kept at a low temperature by means of cold water, of which a copious supply is made to flow around them. The steam passes through these tubes, and is condensed by their coldness; and to prevent, as far as possible, any waste of the fresh water with which the boiler is to be fed, the steam which escapes from the safety-valves, as well as that from the cylinders, is conducted to the condenser. Another invention in which the steam is constantly reproduced from the same water, is that commonly known as Howard's Vapour-Engine. Here a boiler, in the ordinary sense of the term, is dispensed with; steam being formed by injecting a small quantity of water on to the surface of mercury, which is heated in a shallow iron vessel, over a coke fire, to a temperature of 300° or 400°. The mercury is covered with a thin plate of iron; so that, although it is the medium by which heat is communicated, the water is never in actual contact with it. Further information respecting this and several of the other inventions alluded to in this part of our subject, may be found in the seventh edition of Lardner on the Steam-Engine.

---

* It is usual, in describing the proportions of a steam-engine cylinder, to express the length of the stroke in *feet and inches*, and the diameter in *inches only*.

In the construction and arrangement of marine boilers, safety, and the power of generating steam with great rapidity, are the grand requisites. The furnaces should be, as much as possible, surrounded with water; and, to economise heat, as well as to avoid the injurious effect of its radiation upon the vessel, the boilers and steam-pipes should be coated with felt, which is applied to the surface by means of a thick covering of white and red lead. 'This expedient,' says Lardner, 'was first applied in the year 1818 to a private steam-vessel of Mr. Watt's, called the Caledonia.' The boilers, of which there are three or four in most large vessels, are placed side by side across the vessel, immediately in the rear of the engines, and their flues are usually conducted into one large funnel or chimney. The boilers of sea-going vessels should be so arranged that any one of them may be emptied, and repaired or cleaned, during a voyage, without impeding the use of the others or stopping the engines.

The frame-work of the engines should be so contrived as to relieve the vessel as far as possible from strain, by causing the inevitable strain of the machinery to be, as it is termed, self-contained. The general arrangement should also be such as to allow free access to every part, and to bring the valve-gear within convenient reach of the engineer. In all the engines hitherto described, excepting those of Bell's Comet, the power of the engines is communicated at once to the paddle-shaft; but this, while by far the most common, is not the universal arrangement. In some towing-vessels, for instance, where great power is requisite, but speed is of minor importance, the paddle-wheels are mounted on a separate axis, which, by means of toothed gear, receives a slower motion than the crank-shaft turned by the engines.

It remains to notice, in connection with marine steam-engines, the question as to the best proportion of steam-power to the tonnage of a vessel, a question upon which very different opinions are entertained. In most of the early steam-vessels, a very low proportion of power was used; but experience has, in most cases, shown the superior economy attending the use of powerful machinery, capable of propelling the vessel at a high speed. It is not pretended that, simply considered, a high velocity can be maintained as cheaply as a slow one; but, independent of mere speed under favourable circumstances, it is essential that a steam-vessel should be able to make way against adverse winds and currents, without any very great diminution of velocity; and its power of doing this, in which its regularity and ultimate economy greatly consists, increases in proportion to the degree in which its average speed in still water exceeds the speed of the winds or currents which may be opposed to its progress. Thus a steam-vessel with a mean speed of six miles an hour, if opposed to a current of three miles an hour, will only move at half her usual rate, thereby occasioning great irregularity in the time of her voyages, and a very wasteful consumption of fuel; while a vessel whose mean speed is nine miles an hour will, under like circumstances, merely be reduced to two-thirds of her average speed. Hence, although the consumption of fuel increases in a larger ratio than the increase of speed, it may, in many cases, prove more economical to use a very powerful engine, capable of performing the required voyages with tolerable regularity in all weathers, than one of less power, which, though it may attain a moderate speed with less cost in fine weather, will be almost brought to a stand under difficult circumstances. In British steam-vessels the proportion usually ranges between two and four tons measurement to each horse-power.

Notwithstanding the defects commonly imputed to it, and the great number of contrivances which have been devised for avoiding them, the common paddle-wheel continues to be the only means of propulsion commonly used. It consists of a number of flat boards, called float-boards or paddles, bolted to the radii or arms of a light but strong iron wheel, which is fixed securely upon the crank axis of the engine, and it should be so placed that the lowest float-board is entirely immersed in the water. It is evident that the paddles produce the greatest effect in propelling the vessel when they are in or very near a vertical position; and it is urged as an objection to the common paddle-wheel, that the float-boards necessarily enter and leave the water in an inclined position; so that in entering they have a tendency, by pressing upon its surface, to lift the vessel out of the water, while in leaving the water they have the contrary effect, tending to depress the vessel, and to throw back the water, thereby occasioning a heavy swell. This evil is however less than might be supposed from a hasty consideration of the subject, as the motion of the paddles is not simply that of revolving round an axis, but that of revolving round an axis which is continually moving forward; so that, although the evils adverted to may be very apparent in starting the vessel, they disappear in a great measure when it moves with considerable speed. The action of a paddle-wheel of the common and of several modified forms may be more readily comprehended by the diagrams published in the new edition of Tredgold on the Steam-engine, than by any mere description; but it may be sufficient here to quote the words of Russell, who, after tracing the motion of a paddle of the common form during the progress of the vessel, comes to the conclusion that it 'is inserted into the water in an angular position, resembling closely the entrance of an oar into the water; that it is then made to act horizontally on the water during a short interval, after which it is withdrawn from the water edgeways, in an easy and elegant manner, which the dexterous rower might envy and try to equal, but which he could hardly excel.' It is admitted that, in order to the attainment of this perfect action, it is necessary that the paddle and the boat be well proportioned and placed; yet the writer argues that 'the common paddle-wheel is in practice, as it ought to be in theory, exempt from the faults generally attributed to it.' Perhaps, so far as regards mere efficiency as a propeller, this may be correct; but few will deny that some means of propulsion which shall occasion less agitation in the water, and less vibration in the vessel, is a desideratum. Several improvements upon the common paddle-wheel have been introduced, which tend to diminish the defects attributed to it. Among these is the divided paddle-wheel, which was invented by the younger (American) Stevens, and is commonly used in the steam-vessels of North America, which often have very large paddle-wheels. In this kind of wheel the float-boards, instead of extending the whole width of the wheel, are in two or sometimes three sets, each of which extends across only one-half or one-third of the width; one set of float-boards being placed opposite to the intervals of the other set. *Figs.* 8 and 9 give side and front views of such a wheel; the shaded parts in *Fig.* 8 being those which belong to the off-side of the wheel. This kind of wheel resembles in fact two or three narrow paddle-wheels placed close together on the same axis, the paddles of one being opposite to the intervals of that adjoining it. By this means the shock occasioned by the paddles entering the water is diminished, and the resistance is rendered more equal. Another kind of divided paddle is that in which the float-boards extend across the whole width of the wheel, but each of them consists of two, three, or more narrow strips, placed a little in advance of each other, so as to strike the water at slightly different times. *Fig.* 10 represents such a wheel, with the paddles divided into three parts. Under the name of the *cycloidal* paddle-wheel this has excited much attention. It has been used with apparent advantage in the Great Western and many other sea-steamers. A similar advantage is attained by the expedient of dividing the float-board into three slips, and bolting one of them on the opposite side of the arm of the wheel to the other two. Many of the contrivances intended as improvements on the common paddle-wheel have moveable float-boards, which, by various ingenious arrangements, are made to enter and leave the water in a nearly vertical position. The unavoidable complexity of such an apparatus, which renders it very liable to derangement, is fully sufficient to prevent its extensive use; yet a wheel of this kind, known as Morgan's paddle-wheel, has been adopted in several large vessels. Professor Barlow in a paper 'On the Motion of Steam-Vessels,' which was published in the 'Philosophical Transactions' in 1834, and subsequently, with additions, in the appendix to Woolhouse's edition of Tredgold, expresses his belief, after trying experiments on different kinds of paddle-wheel, that when the wheel is but slightly immersed, little or no advantage is derived from the vertical position of the paddles, and 'that in the navigation of rivers or smooth water, where generally little variation is required in the degree of immersion of the vessel, the common wheel, if properly proportioned, is preferable to the vertically acting wheel, in consequence of its admitting a larger surface of paddle-board.' On the other hand, as the vertical paddles have greatly the advantage when the wheel is deeply immersed, he considers them best 'for sea purposes or long voyages, where the immersion of the vessel is constantly diminishing by the exhaustion of the coals and stores required at the commencement of the voyage.'

Fig. 8.

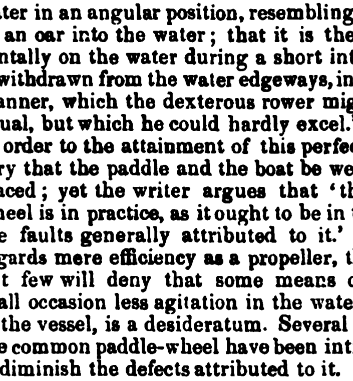


Fig. 9.

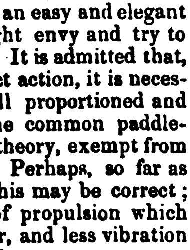
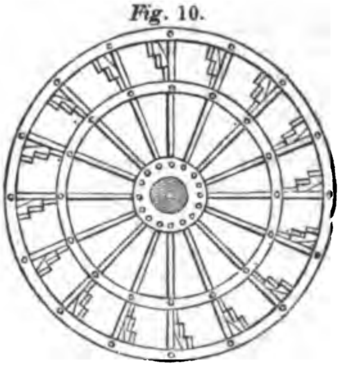


Fig. 10.



Another class of paddle-wheels have the float-boards placed obliquely across the width of the wheel, instead of in the usual position; and some have one-half of their width inclining one way, and the other half in the opposite direction. The paddle-wheels patented in 1836 by Mr. Samuel Hall were intended to reduce the tremulous motion of the vessel, and the quantity of back-water, by affixing the paddle-boards on one-half of the circumference of the wheel with an obliquity in one direction, and those on the other half with a contrary inclination; so that during one-half of the revolution of each paddle-wheel the water should be put in motion in one direction, and during the other half of the revolution it should be moved in the opposite direction. Mr. Hall states that the angle of obliquity may vary from 30° to 60°, but that he prefers 45°, and he proposes in large wheels to vary the inclination four times instead of twice in the circumference. A very singular scheme for propelling is that patented by Mr. Perkins in 1829, in which the paddles are fixed at an angle of 45° with the wheel, and the wheel itself is placed at an angle of 45° with the line of the keel; so that while the paddles enter and leave the water edgeways, they assume the most effective position for propelling when performing the lowest part of the revolution. Full details of this ingenious contrivance may be found in the 'Mechanics' Magazine,' vol. xiv., p. 305, &c. Conical paddle-wheels, resembling those of the common form, excepting in the circumstance of the diameter being greater on the side adjoining the vessel than on the outer side, have been tried by Mr. Russell, who says that they prevent much of the concussion of the common wheel, without any sacrifice of power or speed. Some proposed paddle-wheel improvements have reference to the convenient adaptation of the paddles to the depth of the vessel's immersion. Something of this kind is very desirable, because it often happens that a vessel is, in consequence of a heavy load and a large stock of fuel, so deeply immersed at the commencement of her voyage that the action of her paddles is impeded; while, after t consumption of great part of her supply of coal, she swims so high that her paddles have not sufficient hold upon the water. When the paddle-wheels are fixed immediately upon the crank axis of the engine, it is impossible, without too great a derangement of the machinery, to make the paddle-shaft itself rise and fall according to circumstances; and although many plans have been proposed for reefing the paddles, or removing them to a greater or less distance from the centre of the wheel, we believe that none has been introduced to any important extent. In some steam-vessels the inconvenience alluded to is in some degree remedied by admitting sea-water into the coal bunkers when they are emptied, so as to maintain a uniform degree of immersion. It would often be a convenience if, instead of being firmly keyed on to the shaft, the paddle-wheels were capable of being detached from the engines, so that either might move independently of the other. Many of the American steamers have such a provision, whereby the boat may be stopped by simply throwing the wheels out of gear, the engines continuing to work, so as to pump water into the boiler. By this means also the paddle-wheels are preserved from strains while the vessel lies at anchor, exposed to the influence of tides.

In noticing some of the early projects connected with steam navigation, allusion has been made to several other methods of propulsion, some of which have been revived of late years. Our space will not allow of any account of the numerous schemes which have been propounded for moving vessels by contrivances which have been expected to prove superior to paddle-wheels, either from producing a greater effect with a given exertion of power, from superior compactness, or from occasioning less disturbance in the water. Some apparatus that would effect the latter object without the sacrifice of power or speed, appears very desirable; and among many inventions which have been tried for the purpose, that commonly, though not very aptly, called the Archimedes' Screw,[*] appears to succeed very perfectly. It has been tried with considerable success on a large scale. This apparatus has been alluded to under SCREW OF ARCHIMEDES, vol. xxi., p. 111.

The means of diminishing the risk of steam-vessel accidents have been made the subject of parliamentary investigation in 1817, 1831, and 1839; in the latter year by means of commissioners. The valuable information collected on the last occasion has been repeatedly referred to in this article, and our space will not allow an analysis of the important suggestions made for increasing the safety of steam navigation. It is however very satisfactory to find, that while very much remains to be accomplished in this way, the number and character of the accidents which have happened to British steam-vessels will bear a very favourable comparison with those of North America. It is also observable that, while the total number of accidents is by no means large, considering the great number of steam-vessels in use, a considerable proportion of them, and those by far the most fatal in their consequences, were of a character by no means peculiar to vessels propelled by steam. The commissioners give a detailed table of ninety-two accidents which happened between 1817 and April, 1839, of which the following is an abstract. This account is merely given as an approximation to the truth, especially as regards the former years of the period embraced.

Nature of Accidents.	No. of Vessels.	No. of Lives lost
Wrecked, foundered, or in imminent peril	40	308
[†]Computed number of persons lost on board the Erin, Frolic, and Superb	..	120
Explosions of boilers . . .	23	77
Fires from various causes . .	17	2
Collisions	12	66
Totals . . .	92	573

In copying this table, we have omitted an item of forty lives lost in the Thames, from May, 1835, to November, 1838, by accidents to barges and small boats by the use of steam-vessels, and a similar item of twenty-one lives lost within ten years in the Clyde, apparently from similar accidents; as these scarcely fall under the denomination of steam-vessel accidents, although they intimate the necessity of increased precaution in the use of steam-vessels upon crowded rivers. It is stated that the greatest number of lives lost at any one time by each of the above classes of accident was as follows:—

Nature of Accident.	Name of Vessel.	Date.	Lives lost.
Wreck . .	Rothsay Castle .	1831	119
Collision . .	Comet and Ayr .	1825	62
Explosion .	Union . . .	1837	24
Fire . . .	Medway . . .	1837	2

The far greater number and more fatal character of steam-vessel accidents in the United States may be seen from the document from which the statistics of American steam navigation given in a previous page were derived. The first accident therein noticed took place in 1816, and the total ascertained number, down to 1838, was as follows:—

Wrecks, from collisions, gales, &c. . .	25
Destroyed by snags and similar obstructions	52
Explosions, &c.	99
Fires	28
Various causes	24
Total	228
Ascertained number of lives lost . .	1,676
Ascertained number of persons wounded	443

The report states that the computed number of lives lost was about two thousand; but that some persons think the aggregate treble that number. The following table gives, in the same form as has been done with British accidents, the most fatal instances of each class of casualties:—

Nature of Accident.	Name of Vessel.	Date.	Lives lost.
Wreck . . .	Home . . .	1837	100
Snags, &c. . .	St. Louis . .	1834	13
Collision (and consequent sinking)	Monmouth .	1837	300
Explosion . . .	Oronoka . .	1838	130
Fire	Ben Sherrod .	1837	130

---

[*] It has been stated, but we know not on what authority, that this name has not been intended to imply an identity in principle between the propeller alluded to and the hydraulic machine known as the screw of Archimedes; but has been given simply because it was first tried, on a large scale, in a vessel called the Archimedes. That the vessel was named after the propeller is more likely; but be this as it may, the action of the screw-propeller is very different from that of the screw of Archimedes.

[†] This item is differently placed in the commissioners' table; but as the difference between the cases to which it refers and those included in the preceding item consists simply in the circumstance that the numbers lost are computed instead of being exactly ascertained, there appears to be no sufficient reason for separating the two. The vessels alluded to were wrecked or foundered and are included in the ninety-two cases classified in the table.

END OF VOLUME THE TWENTY-SECOND.

London: Printed by William Tyler, Bolt-court.

89094571338

B89094571338A

DATE DUE

JE 25 '74			

DEMCO 38-297

89094571338

b89094571338a